

Full Length Research Paper

Sanitary and phytosanitary issues for fishery exports to the European Union: A Mauritian insight

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Quantitative restrictions to trade are declining, but in parallel sanitary and phytosanitary (SPS) measures are increasingly being applied to impede agro-food trade. There is evidence that developing countries experience problems in meeting SPS measures. The objective of this paper is to determine whether Mauritius is facing barriers pertaining to SPS issues when exporting fishery products to the European Union. We first provide an overview of fishery exports from Mauritius before reviewing EU SPS requirements governing fishery exports. We then assess whether there are problems in meeting EU SPS requirements. We adopt a mixed methods approach which hinges on a documentary analysis of the impacts of SPS measures on developing country agro-food exports, an inventory analysis of Food and Veterinary Office (FVO) mission reports to developing countries exporting fishery products and of Rapid Alert System for Food and Feed notifications pertaining to fishery exports. These methods were complemented with interviews with key informants along the fish export supply chain. Our main finding is that SPS measures have not acted as a major barrier for Mauritian fishery exports to the European market. Nevertheless, the Mauritian institutional strategy for compliance to EU SPS measures has predominantly been reactive. In light of recent inspections of the FVO to assess compliance both at the level of the local competent authority and the exporters and the increasing importance of food safety as a competitive determinant of agro-food trade, we argue that Mauritius should not only adopt a reactive but increasingly a proactive stance to secure its market, to tap emerging ones and also to safeguard its image as a safe fish exporter.

Key words: Fish export, food safety, sanitary and phytosanitary measures, strategic options.

INTRODUCTION

Fishery products are the most internationally-traded food commodities and they are subsequently at the forefront of food safety and quality improvement (Huss et al., 2004). The demand for improved quality and safety in the major markets of the European Union (EU), United States of America (USA) and Canada have resulted in the renovation of fish inspection regulations for the implementation of HACCP-based systems, in conformity with the guidelines of the Codex Alimentarius Commission (CAC) (Ababouch, 2004). This has concurrently, led to a proliferation of sanitary and

phytosanitary (SPS) measures which entails large compliance costs and represents a challenge especially for developing country exporters. Studies dealing with the impact of SPS measures have shown that they are an issue of prime concern (Anders and Caswell, 2009; Henson, 2008; Henson and Mitullah, 2004) and such issues need to be addressed. There is also mounting evidence of the benefits that some developing country exporters have reaped through compliance with SPS measures (Henson and Jaffee, 2008; World Bank, 2005).

As a small island developing state, Mauritius has witnessed rapid economic growth since the early 1980s, achieving a per capita gross domestic product of US\$ 12,078 PPP (Purchasing Power Parity) in 2008 (World Bank, 2009). It has been a member of the WTO since its creation. It is classified as a newly industrialised net food

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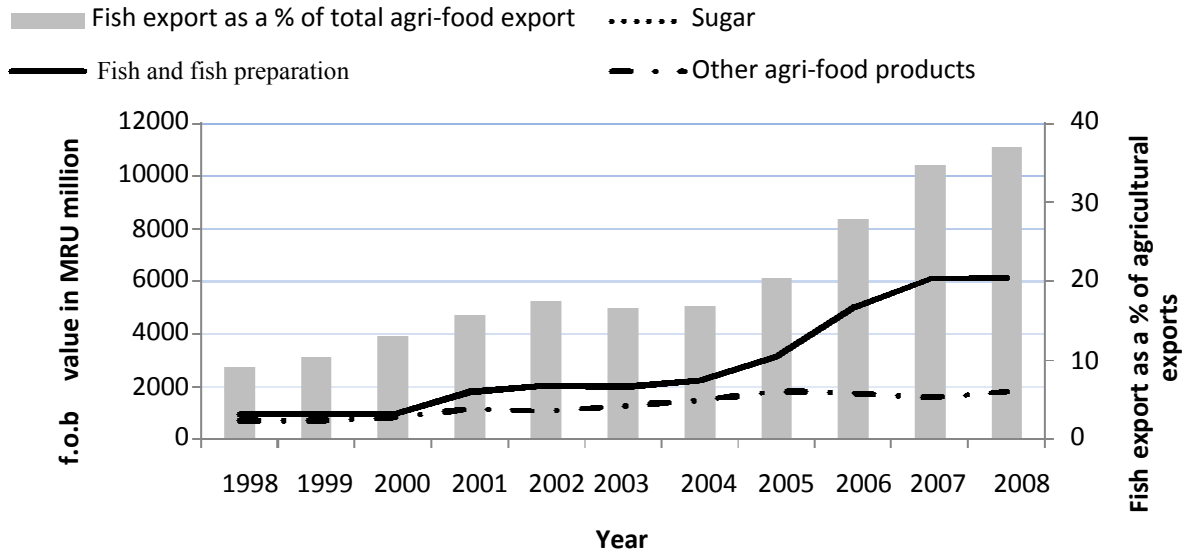


Figure 1. Increasing importance of fish products as an agro-food export from Mauritius over the period 1998 to 2008. Data source: CSO (1998 to 2009).

importing developing country (World Bank, 2009). However the Mauritian economy has recently witnessed changes as a result of the revision of the European trade policies towards African Caribbean Pacific (ACP) countries. Two notable consequences on Mauritius have been the gradual erosion of both the sugar protocol and the multi-fibre agreement, which have negatively affected foreign currency earnings from the EU. Sugar is still the main source of agricultural export revenue (CSO, 2007), but Mauritius has now started diversifying its agro-food exports and is exploiting higher value products such as seafood (MOF, 2007). Figure 1 shows the increasing importance of fish products as an agro-food export. Fish exports accounted for 37% of total agro-food exports in 2008 as compared to 9% in 1998. This export sub-sector is increasingly contributing to the socio-economic development of the country.

The case of Mauritius as a fish products exporter

Tuna processing and export dominates the fish export sector locally. In 1998, there were three fish processing establishments exporting to the EU (Fisheries Division, 1998), but since then, the sector has undergone fundamental changes and development in terms of the volume and the type of product handled, the players involved, technological advance and innovation. This has led to the emergence of a Seafood Hub (SFH). The SFH is defined as: "an efficient and attractive environment for the supply of value-added processes and ancillary services related to the sourcing and marketing of sea food products" such as warehousing, light processing, ship repair and bunkering (MOAIF, 2009). The number of establishments approved to export fishery products to the

EU has increased from 3 in 1998 to 12 in 2008.

Overall, this has resulted in a general increase in the export of tuna products (Figure 2). High value agro-food products do provide ample commercial opportunities for Mauritius, but the food safety landscape within which such trade occurs is also more stringent. Given the increasing contribution of the fishery exports and the evolving exigencies of export markets in terms of food quality, the most promising option for Mauritius to maintain and expand its agro-food exports is to provide high quality and safe fishery products. Currently, agro-food export between Mauritius and the rest of the world is insignificant and more than 95% is with the EU. UK and France are the principle markets for Mauritian fishery products export. This fragile export market though is threatened by the proliferation of SPS measures. The introduction of the EU Food and Feed Controls Regulation and Hygiene Regulations in 2004 is of concern because of the large compliance costs associated with the implementation of these regulations.

In fact, this has been voiced out by the Mauritius Exporters Association (MEXA) and fish exporters in numerous press articles as early as 2007 (L'Express, 2007). Food and Veterinary Office (FVO) missions¹ effected in 2006 and 2008 to Mauritius highlighted certain non-conformances within certain food processing industries and the competent authority (EU, 2006; 2008). In this paper, we assess whether the Mauritian fishery export sector faces difficulties in meeting EU market's SPS requirements.

¹ FVO mission reports can be downloaded from: http://ec.europa.eu/food/fvo/ir_search_en.cfm

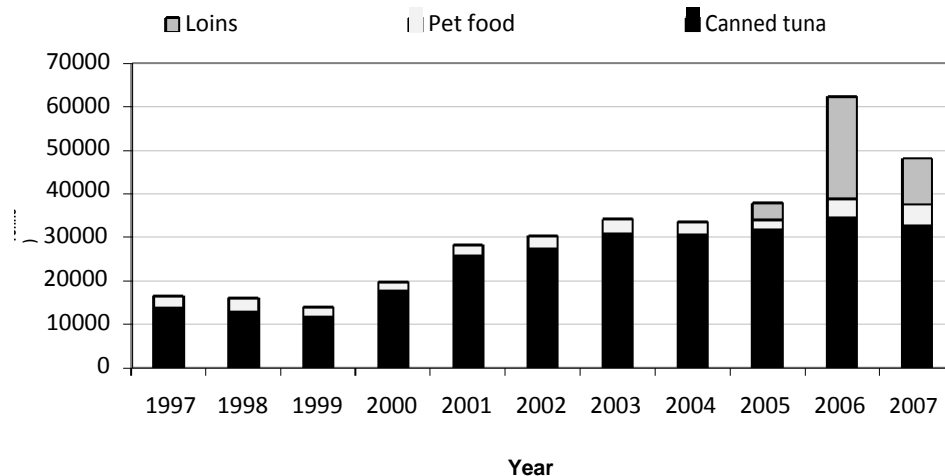


Figure 2. Export of tuna and tuna products from Mauritius over ten period 1997 to 2007. Data source: MOF (various years).

METHODOLOGY

The quantification of the impacts of SPS measures is of fundamental importance and a myriad of methodologies have been adopted to estimate and quantify their effects. These include the price wedge method (Calvin and Krissoff; 1998); the gravity-based approach (Moenius, 1999; Otsuki et al., 2001), risk assessment approaches (Biggsby and Whyte, 2000; James and Anderson, 1998); micro-economic approach and partial equilibrium models (James and Anderson, 1998); survey-based approaches (OECD, 1999; Thornsbury, 1998, 1999; Henson et al., 1999) and the inventory-based approach (Otsuki et al., 2001; Henson et al., 2000; Disdier et al., 2008). The adoption of a particular approach or mix of approaches depends mainly on the availability of consistent data and the level of development of the export sector and its institutional support. Since no studies have been carried out to assess the impact of EU SPS measures on Mauritian fishery exports, it is here proposed to use a mixed methods approach to quickly gather baseline information.

Against this background and given that the surge in fish exports is a recent development and consistent data is not yet available, the methodological approach used here borrows from studies carried out by the World Bank (World Bank, 2005; Henson and Jaffee, 2008) and the United Nations Conference on Trade and Development (UNCTAD) (Jha, 2002; UNCTAD, 2005). It consisted of documentary and inventory analyses and semi-directive interviews. The rationale behind using the methodological mix was to provide background information on fish and fish products exports to the EU and to determine the allocation of institutional and administrative responsibilities for fish exports and the problems being met.

The documentary analysis was based on relevant academic literature to review the impact of SPS measures on developing countries' fishery exports and identify the issues pertinent to Mauritius. Documents collected included news clippings, journal articles, reports of inspection missions, laws and regulations. Many of the documents were retrieved through internet search engines, online databases and interlibrary loans. For example, information was collected from the website² of the European Union (EU). Reports of food hygiene inspections carried out by EU-approved

veterinarians in Africa for assessing the compliance of fish and fishery exports to the EU were collected and analysed.

The inventory-based approach was based on (1) data on regulations, (2) data on frequency of detentions, e. g. the European Rapid Alert System on food and feed. As highlighted by Beghin and Bureau (2001), such an approach can be used in a qualitative and a quantitative perspective as well to determine the importance of domestic regulations as trade barriers. We carried out an analysis of food safety notifications available on the EU FVO website that pertain to third countries' fishery exports. The relevant content of the websites of the EU³ and of the MOH⁴ were also analysed to determine the requirements Mauritius has to meet prior to exporting fish and fish products (mapping). An inventory of notifications pertaining to Mauritius appearing under the Rapid Alert System for Food and Feed Safety was then made using the EU website⁵.

After the documentary and inventory analyses, interviews using an interview guide were carried out with key informants involved in the fishery export sector, namely the representatives of the Division of Veterinary Services (Competent Authority for fish exports) and of the Ministry of Fisheries. These two organisations are involved in the health certification of fish exports and imports. Four fish and fish products exporters⁶ were also interviewed.

The purpose of qualitative interviews was two-fold. Firstly, they allowed an in depth insight of the issues surrounding the research questions. Secondly, inputs from these interviews provided enough qualitative background to better contextualise and explain the findings from the documentary and inventory analyses.

RESULTS

A review of studies on the impact of SPS measures on the trade of fish products

Many studies have highlighted the impact of SPS

³ <http://europa.eu.int>

⁴ <http://www.gov.mu/portal/goc/moh>

⁵ <http://ec.europa.eu/food/food/rapidalert/archive>

⁶ One exporting chilled fish, the second one providing cold room facilities for fishery products, the third one exporting canned fish and the last one was a fishing vessel.

² <http://europa.eu.int/comm/food/fvo/>; <http://europa.eu.int>

measures on the fish export sector. Although some were qualitative in nature, others provided a quantitative estimate of the negative effects of SPS measures. Table 1 summarizes the main findings from such studies, delving into the nature and impact of the SPS measures and the remedial measures taken by developing country exporters.

A number of strands can be identified from the aforementioned review. First, the review shows that the progressively stricter SPS requirements in major industrialised countries, mostly the EU, have had a negative impact on exporters of fishery products in developing countries. Impacts included total bans, partial bans, product adaptation, product redirection to alternative markets and loss of reputation as a safe fish supplier. We here adopt the terminology from Henson and Jaffee (2008) to describe the strategy for compliance. Some exporters were forced to exit the market ("reactive exit"), while others deliberately did so ("proactive exit"), for example Ghana, in order not to lose their reputation. Developing country exporters who had not been prompt enough to react to EU legislation regulating the organisation of veterinary checks on products entering the EU from third countries (Council Directive 97/78/EC), had therefore incurred financial losses ranging from 2.5 to 22.5% of their turnover. The bans impacted both on the fisheries and ancillary sectors. In some cases, the costs of compliance with these requirements were high with impacts on the structure and *modus operandi* of supply chains and socio-economic consequences like in Bangladesh and Sri Lanka (Cato, 1998; Cato and Lima dos Santos, 1998; Nanyaro, 2006).

Coping mechanisms differ from country to country. Some countries gradually managed to re-integrate the international fishery market by complying with the requirements ("reactive compliance"). Countries like Kenya, Uganda and Bangladesh diverted their product to other markets ("reactive exit") with less stringent requirements while recovering from bans (Henson et al., 2000; Mehta and Georges, 2003). A number of developing countries, for example Ghana, tried to solve their problems bilaterally ("reactive voice") and also benefited from technical assistance programmes to improve upon critical areas. Thus these countries strengthened their competent authority and inspection system, upgraded the hygiene level at the processing establishments and implemented food safety assurance systems (Balagadde, 2003; Wilson and Abiola, 2003). Both the public and the private sectors participated in this process (Cato and Subasinghe, 2003; Nanyaro, 2006).

It also appears that mostly developing countries from Africa and Asia face problems while exporting (Table 1). The developed country market at the source of the problem is the EU. Individual developed country markets have different impacts for products subject to detailed SPS controls (Henson and Loader, 2001). This may be due to the differences in regulatory approaches existing

in different developed countries' market. Indeed, there are many differences between the food safety requirements and the related conformity assessment procedures applied to fish and fishery product imports in the EU, US, Japan and Australia (Henson and Mitullah, 2004; FAO, 2005). For instance, in both the US and the EU, imports of fish and fishery products must be processed in premises of equivalent standard to domestic facilities, including the implementation of HACCP. However, while in the United States the importer must take steps to ensure imports meet regulatory requirements, in the EU, this is the responsibility of a 'competent authority' in the exporting country. This requires not only that the exporter complies with EU regulatory requirements, but that the exporting country government has regulations and procedures in place in order to certify that this is the case. This may create an additional difficulty. Indeed, as shown in Table 1, many countries had to reorganise their competent authority to resume exports towards the EU.

In general, the review demonstrates the reactive stance of developing countries to meeting SPS measures of developed countries, but, the more recent evidence illustrates the fact that some countries proactively developed systems to conform to the stringent SPS requirements and managed to (Henson, 2005, 2008; World Bank, 2005). There were consequently positive returns in terms of continued and/or expanded access to markets for exporters who were able to comply (Henson and Mitullah, 2004).

Market requirements for exporting fish products to the EU

Here, the sanitary requirements imposed by the EU on the fishery exporters were delved into. The EU is the biggest importer of fish in the world (CBI, 2005). Third countries have been allowed to export to the EU since January 1999, if approved by the European Commission. Approval is subject to an assessment of the ability of the country's competent authority to guarantee the standards of the operators (Henson et al., 2000). Products imported from third countries must adhere to the same provisions that govern products produced in the EU for the EU market. The requirements on the sanitary control system of third countries have given way to two categories of countries. Countries included in List I are "harmonised" or "approved" countries, that is, their legislation requirements are at least equivalent to those governing the EU domestic production. A specific decision has been adopted for each of those countries fixing specific import conditions, including the official recognition of the competent authority, a specific model of health certificate and a list of approved establishments. Mauritius is currently on List I. List II includes third countries that provided enough guarantees concerning their inspection

Table 1. Past studies on the impact of SPS measures on the fish exporting sector of developing countries.

Nature of SPS		Source Trade Impact and remedial measures measure	
Wilson and Abiola (2003) and Balagadde (2003)	Uganda to the EU	Ban on fish exports in 1999 because of incapacity of Uganda's Competent Authority to guarantee fish safety and inadequate testing facilities	Impact at macro and micro levels with reduced returns of US\$ 36.9 million; 3 out of the 11 factories closed down and downstream related industries like packaging and transport were affected. The Ugandan economy was also generally affected. Implementation of HACCP and GMP (US\$ 100 million to comply with quality requirements), training, equipment purchase, certification, resulted in lifting of ban and increase in exports. The capacity of competent authority was strengthened and inspection improved.
Henson et al. (1999), Mehta and Georges (2003) and Henson et al. (2005)	India to the EU	Sanitary problems (shrimp peeling sheds); deficient official system of inspection in 1997	9% decline in total exports by value. Other export markets were targeted. Improvements were made by plants to comply with the EU requirements costing between US\$ 174,000 and 220,000 and training on HACCP. Seafood Exporters Association of India spent US\$25 million to upgrade facilities and improve official control. Costs of compliance ranged from US\$51,400 to 514,300. These costs ranged from 2.5 to 22.5% of the annual turnover for the year 1997 to 1998.
Henson et al. (1999)	Vietnam to the EU	Problem with microbiological content of seafood products in 1998	Initiatives taken by Government to improve sanitary conditions and implementation of HACCP by affected company.
Henson et al., (1999)	Ghana to the EU	Introduction of EU regulations relating to fish in 1997	Suspension of fresh and frozen fish to the EU at the initiative of the Ghana Standards Bureau Bilateral negotiation with the EU and technical assistance from the EU for HACCP implementation
Henson et al. (1999) and Henson et al., (2000)	Kenya, Uganda, Tanzania to the EU	Salmonella in Nile Perch- ban on exports in 1997	37% decrease in exports accounting for 20M pounds of trade lost by Kenya during ban. Part of exports directed towards other markets such as United Arab Emirates, Israel and Japan; legislative changes; reform of procedures for approval of plants for export to the EU and for health certificates; investments in upgrading of processing facilities; improvement in fresh fish supply management.
Cato and Lima dos Santos (1998)	Bangladesh to the EU	Problems in plants and at level of control by competent authority were detected: Ban on fish exports in 1997	Ban and increased export to alternative markets such as US and Japan; average of US\$ 7,584 lost per firm where products were destroyed. Total estimated lost revenue due to ban: US \$ 14, 665 million. The competent authority was recognised and after subsequent inspections, the ban was lifted after a year, for 11 companies.
Wilson and Abiola (2003)	Mozambique to the EU	Ban on fishery products (1998) because of a Cholera outbreak in Mozambique.	Loss of about US \$60,000 a month in hard currency earnings. Authorities of Mozambique tried to resolve problems through consultations (bilateral level and ACP level) with the EU. Mozambique was placed on List II in January 1999 after bringing a number of changes such as adoption of HACCP, establishment of a competent authority within the department of fisheries, legalisation of fish inspection

Table 1. Continued.

CTA (2003) and Abila (2003)	Kenya to the EU	Import restrictions for fish from Lake Victoria (1997 and 1999) due to concerns about hygiene standards in supply chain	This ban resulted in a 68% decline in the value of fish exports.
Nanyaro (2006)	Tanzania to the EU	Between 1996 and 1999 it suffered three major bans, the worst being in 1999, which lasted 11 months	Loss of foreign exchange earnings (about US\$ 90 million for the 1999 ban). Collapse of ancillary industries leading to massive unemployment as well as collapse of stakeholders' incomes. Total fishery products export fell by 40%. Around US\$ 8 million was reinvested by the Government and the industry to address the hygienic non-compliances

Source: Authors' compilation.

system and their legal sanitary requirements, but whose competent authority has not yet been audited by EU inspectors.

There are various market requirements before exporting to the EU, including tariffs and non-tariff measures such as product legislation, occupational health and safety, environmentally sound production, packaging and labelling. These are considered in great details in CBI (2005). Besides these market requirements, EU legal requirements (SPS measures) also have an impact on export of fish. Generally, most of the legislation on product quality, health and safety applies throughout the EU.

New EU regulations

The new EU food safety and hygiene framework ('hygiene package' or Regulations EC No 852, 853 and 854 of 2004) (EC, 2004) which came into force in January 2006 cover all foodstuffs from farm-gate to retail⁷. Special provisions/chapters/annexes apply to fishery products. With the implementation of the "hygiene package", third countries require health and sanitary regulations at least equivalent to the ones required within the EU. Competent authorities should also be present to guarantee effective implementation of the relevant regulations through inspection, monitoring and sanctioning systems. Food business operators need to apply specific sanitary and health practices in catching, handling, processing and packaging fishery products, using a system of risk management based on HACCP.

Other regulations include EC No 882/2004, which contains requirements for competent authorities. Regulations 396/2005 and 1881/2006 pertaining to

pesticide residues and contaminants, respectively, have also been updated.

Enforcement of EU SPS measures

Enforcement of EU SPS measures is mainly seen through reports of inspection missions carried out by the Food and Veterinary Office (FVO) and the operation of a Rapid Alert System for Food and Feed (RASFF).

FVO inspection missions

The FVO ensures that EU SPS legislation is properly enforced by checking on compliance with the requirements of EU food safety and quality, veterinary and plant health legislation within the EU and in third countries exporting to the EU (European Commission, 2006). The findings of food inspections carried out by the FVO in developing countries exporting fish, from 1998 to 2005 revealed that the status of compliance with EU requirements varies from acceptable to serious. In some developing countries, it appears difficult to achieve EU requirements for potable water in contact with food and to meet good hygiene practices. Countries like Namibia, Sri Lanka and Thailand have improved due to some measures taken at the level of the competent authority and of the establishments. In several countries, for example, Angola and Madagascar, problems of compliance with EU requirements still exist. The following deficiencies⁸ have also been noted:

1. Lack of clearly written guidelines and procedures at the level of inspection;

⁷ But some requirements are not applied to farms – e.g. HACCP.

⁸ Based on reports downloaded from the FVO website (European Commission, 2007)

2. Insufficient recording/documentation as proof that work was being done properly;
3. Absence of follow-up from the authority when non-conformances had been noted;
4. Insufficient powers or insufficient use of the powers for enforcing the requirements;
5. Difficulties regarding official assessment/control of the HACCP based own-checks programme;
6. Inadequate staffing and/or staff training;
7. Poor laboratory facilities- not all tests implied by the EU Directives were being performed: if facilities were available, they were not accredited;
8. Health certification;
9. Approval of freezer vessels/ establishments;
10. Poor hygiene in establishments/ vessels/ landing sites.

Generally, the findings of the FVO missions carried in African fish exporting countries concur with the findings of past studies (Table 1), although the methodological approach and the perspective from which the data was collected differed. However, in the FVO reports, more details are provided about the inspection and certification services and the functioning of the competent authority, while individual studies gave more information about changes that have taken place at firm-level.

The documentary analysis also highlights the fact that there have been upgrading at firm-level over the years. Thus, a recent FVO mission to Ghana (2005) showed the improvements that had taken place in the fish export sector since 1999 (Henson et al., 1999).

Rapid alert system for food and feed

The EU also operates a Rapid Alert System for Food and Feed (RASFF) as per regulation (EC) No 178/2002 (EC, 2002). This system provides the control authorities with a tool for exchange of information on measures taken to ensure food safety. Information is categorised according to risk:

1. Alert notifications are sent when the food or feed presenting the risk is on the market and immediate actions are needed, and
2. Information notifications are sent when the food or feed presenting the risk has not reached the destined market and the consignments have been tested and rejected at the external borders of the EU (European Commission, 2008).

Figure 3 graphs the total notifications for all categories over the period 2000 to 2008. It shows that there has been more than a five fold increase in the total number of notifications for all categories over that period. The figure also shows that the number of notifications for the 'fish, crustaceans and molluscs' category has also almost doubled over the same duration. This category now

accounts for 14.8% of total notifications as opposed to 34.9% in 2000. In 2008 the 'fish, crustaceans and molluscs' category registered the second highest of notifications after the 'nuts, nut products and seeds' category which accounted for 25.3% of total notifications.

Notifications pertaining to mercury, histamine, *Salmonella* species, pesticide residues and dioxins in fishery products were more recurrent.

Impact of SPS measures on Mauritian fishery exports

Based on the past review of studies dealing with the impact of SPS measures on fish exports from developing countries, on findings of FVO missions to third countries and on RASFF notifications pertaining to fish products, there is some evidence that developing countries face a number of problems whilst exporting fishery products to the EU. Some of these problems were upcoming while others were imminent.

It is therefore hypothesised that Mauritius, as a developing country, would also face compliance issues. There has been no systematic study to assess the impact of EU SPS measures on the Mauritian fishery exports to the EU. Nevertheless, the Mauritian Exporters Association raised compliance issues faced by local fishery exporters in press articles (L'Express, 2007). Moreover, recent EU evaluation missions that took place in 2006 and 2008 also highlighted some non-conformances (EU, 2006; 2008).

The regulatory environment for Mauritian fish and fishery products

The Food Act of 1998 (MOH, 1998) is the main Act dealing with food locally (Neeliah et al., 2009). Regulations under the Food Act that pertain to fishery products include food composition and labelling, packages for food, warranty and pre-market approval, food hygiene, contaminant, frozen food, food additive, fish and fish products, bottled water and ice (MOH, 2008). Local hygiene regulations are based on Codex

Alimentarius standards. HACCP is not yet mandatory. Fish and fish products regulations (Part 26) lay standards for various fish products like filleted fish, salted fish, smoked fish, canned fish and shellfish. It is prohibited to sell toxic fish. Other requirements pertaining to fish include limits for microbes, total volatile base (TVB), peroxide value, histamine and contaminants.

Of direct relevance to the fish sector is the Fisheries and Marine Resources Act of 1998. Regulations have been introduced under same in 2006 which recognise the Division of Veterinary Services of the MOAIF as the competent authority. The regulations also stipulate that any person that wishes to export fisheries products from Mauritius must apply to the competent authority.

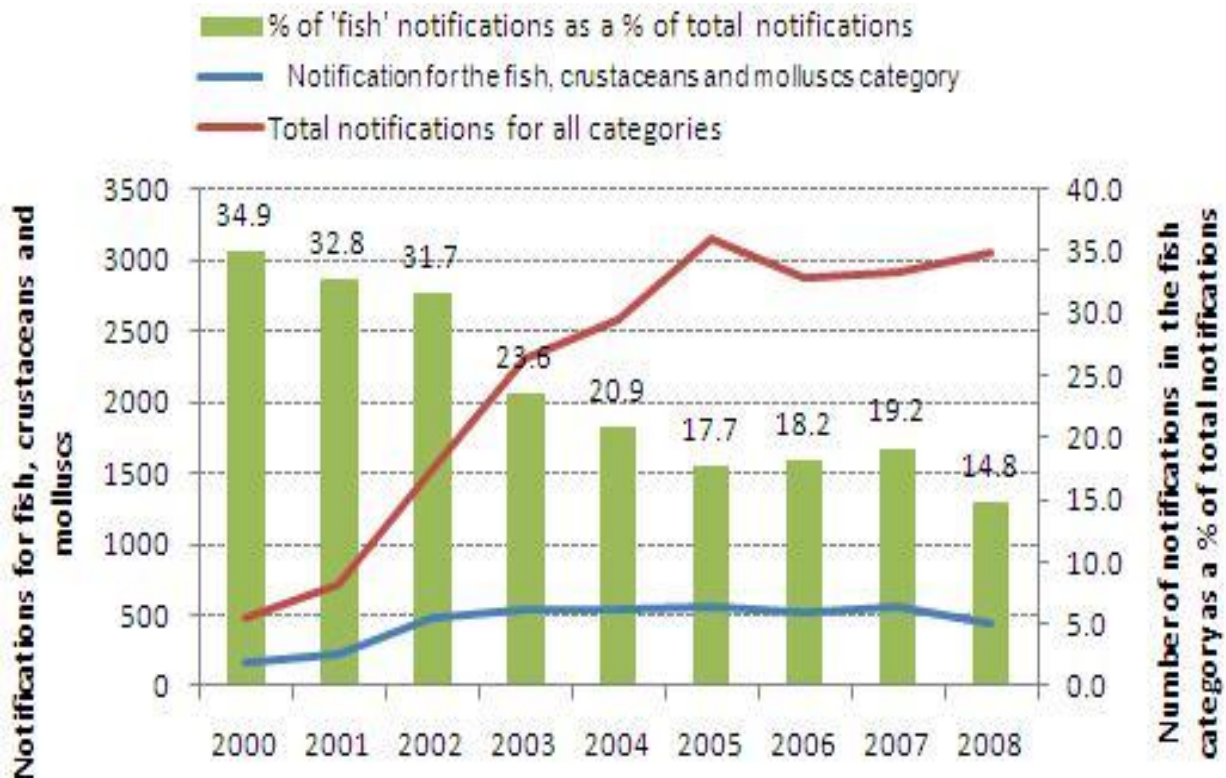


Figure 3. The total RASFF notifications for all categories of fishery products import into the EU over the period 2000 to 2008. Data source: European Commission (2008).

Institutions involved in fishery product control in Mauritius

Various institutions are involved in fishery products control in Mauritius, namely, the Ministry responsible for Agro-Industry and Fisheries, Ministries responsible for Health, Customs and Commerce. With respect to sanitary issues, fishery products control in Mauritius falls under the purview of two different ministries, namely the MOAIF and the MOH. The MOH is responsible for overall food control. Its Health Inspectors inspect local fish products processing facilities. After the first FVO mission to Mauritius (EU, 1998), the MOAIF was assigned with the responsibility of acting as a “competent authority” for the verification and conformity certification of fisheries and aquaculture products prior to exports.

Comparison of the Mauritian food regulations with the regulatory requirements of the EU

The EU as the importing country has its legal food safety requirements and Mauritius has its own food legislation that covers fish products. Table 2 highlights specific differences in parameters between the two legislations.

Generally, it can be said that the Mauritian legislation covering food and fish products is not equivalent to EU

legislation for several parameters like histamine and heavy metals. Regulations pertaining to hygiene and control by competent authorities are also different. The EU in general imposes a higher level of health protection as its regulations are above those in force in Mauritius. In fact, this difference was flagged during the 2006 EU FVO mission (EU, 2006) and as a result, regulatory reform was carried out for Mauritius to be in line with EU requirements for fish. Thus, regulations were introduced under the Fisheries and Marine Resources Act of 1998 (Amended in 2007) to stipulate requirements for the export of fishery products (FAO, 2009). The incorporation of new EU regulations and decisions relating to food hygiene and inspection by competent authority within the local regulatory system has made them mandatory for local exporters like any food business operators in the EU.

Issues facing the Mauritian fishery export sector in meeting EU SPS measures

Many studies depict the negative impact of SPS measures in a developing country context (Table 1). However, none has been carried out in the Mauritian context, probably because there have been no bans and

Table 2. Comparison between specific European and Mauritian SPS measures pertaining to fish products.

Parameter	EU	Mauritius
TVBn	25 to 35 mg of nitrogen/100 g of flesh depending on species	150 mg of nitrogen per 100 mg of moisture-free fish
Microbiological criteria	EU has set a number of sampling plans, microbiological limits and analytical reference methods for example, <i>Salmonella</i> species in cooked crustaceans and molluscan shellfish (EC 2073/2005). In addition, EU relies on regular microbiological analysis for verification of self-checks (HACCP).	Maximum permissible limits are imposed for <i>Salmonella</i> and <i>Vibrio</i> species in raw fish, crustacean and dried seafood Maximum permissible limits are also imposed for <i>E. coli</i> , <i>Salmonella</i> and <i>Vibrio</i> species in cooked crustacean.
Histamine	Fishery products from fish species associated with a high amount of histidine m = 100 mg/kg m= 200 mg/kg Fishery products which have undergone enzyme maturation treatment in brine, manufactured from fish species associated with a high amount of histidine m = 200 mg/kg m = 400 mg/kg n = number of units comprising the sample (9); c = number of sample units giving values over m or between m and M (2).	100 ppm for one fish or 200 ppm for two combined fish samples for fish such as dorade (<i>Coryphaena hippurus</i>), tuna (<i>Thunnus</i> species) or becune (<i>Acanthocybium solandri</i>)
Lead	Maximum permissible level (mg per kg wet weight) = 0.2 to 0.5 depending on species	2.0 mg per kg
Cadmium	Maximum permissible level (mg per kg wet weight) = 0.05 to 0.5 depending on species	1.0 mg per kg
Mercury	Maximum permissible level (mg per kg wet weight) = 0.5 to 1.0 depending on species	1.0 mg per kg

Source: Authors' compilation from MOH (1998), Regulation (EC) No 78/2005, Regulation (EC) No 2073/2005, Commission decision 95/249/EC.

Mauritius has historically been an exporter of sugar. With the changing composition of agro-food trade exports from Mauritius and the accrued importance the seafood sector has acquired since 2003, the context is changing. In the following paragraphs, the impact of SPS measures on Mauritian fish export to the EU is considered, based on the findings derived from our methodology.

FVO evaluation missions in Mauritius

The first FVO inspection to Mauritius was conducted in

1998 (EU, 1998). During their mission, FVO inspectors noted that the legislation⁹ of Mauritius was equivalent to EU requirements at that time. The report also highlighted the fact that the Veterinary Bill (Mauritius) specifying the requirements for the functioning of the competent authority would soon be adopted. The EU inspectors were in general satisfied with the competent authority, its management system, its staffing, organisation, recording

⁹ The Prices and Supplies Control Act of 1994 empowering the Principal Veterinary Officer of the Ministry of Agriculture to control fishery products prior to export

system and inspection activities. Regarding establishments, no major health risks were identified and HACCP was being well implemented, even by small industries. As a recommendation, the FVO inspectors requested the Mauritian Authorities to:

1. Activate accreditation of laboratories involved in the testing of fish and water samples prior to export;
2. Enact the Veterinary Bill as soon as possible;
3. Ensure the transfer of the tuna canning factory to more hygienic premises.

The following FVO mission took place in 2006. Based on interviews with key informants, it was clear that a number of initiatives were taken prior to that:

1. Modernisation of food legislation;
2. Setting up of a Food Technology Laboratory to provide support for the testing of fish.
3. Full operation of the “one-stop shop” set up in January 2006, where all departments involved in the delivery of permits and health clearances for fish export, work in collaboration to facilitate administrative procedures and thus reduce transaction costs.
4. Creation of a SFH Committee comprising representatives from the public and private sectors

Between 1998 and 2006, a number of regulatory changes had taken place in the EU. Meanwhile, many developments had occurred in the fishery sector in Mauritius, the most important being the emergence of a SFH leading to an increase in the number of EU approved establishments and fishery exports to the EU.

Despite the afore-mentioned initiatives to improve the infrastructure for ensuring the safety of fish exports, the 2006 FVO mission still highlighted that recommendations pertaining to laboratory accreditation and legislation had not been fully implemented, although a new Food Act had been promulgated.

EU provided a moratorium of two years from 2004 for the food business operators to comply with the new SPS measures (Food Hygiene package). The second FVO mission (EU, 2006) to Mauritius also highlighted the fact that as far as fish products were concerned, the Food Act was not equivalent to the new EU legislation. There was no legal text regulating the organisation and functions of the competent authority. The staff involved in the inspection of fish processing establishments was also involved in a number of other tasks (EU, 2006) and this limited the time they devoted to fishery export control. There was limited awareness of the EU legal requirements and there were inappropriate inspection and audit procedures for assessing such requirements.

The mission report also indicated that there were problems at the level of sampling of fishery products during official controls for analysis and in the monitoring of lead, cadmium, polycyclic aromatic hydrocarbons and veterinary residues (EU, 2006). FVO inspectors further

pointed out that accreditation of the official laboratory had not been initiated.

Given the pressure from the importing market to meet its increasingly stringent food safety measures and the socio-economic importance of the fishery export sector to the Mauritian economy, the Government took the following policy measures following the 2006 FVO inspection mission:

1. Delivery of an Action Plan for Mauritius to remain on List I;
2. Amendment of the Fisheries and Marine Resources Act of 1998 to enable recognition of the competent authority and for equivalence to EU legislation;
3. Creation of a sea-food hub division;
4. Appointment of a food safety consultant to reorganise seafood export control and to train staff of seafood hub division in inspection and auditing techniques;
5. Preparation of sampling, inspection, approval, certification and procedural manuals;
6. Preparation of an annual programme for inspecting establishments and fishing vessels and taking fish, water and ice samples;
7. Request sent to the EU to provide technical assistance for training of staff of the competent authority (inspection, sampling, EU legislation) and those working in the reference laboratories
8. Construction of a new food testing laboratory to increase testing capability and initiate accreditation and designation of the official laboratories for analysis of fishery products for export (interviews with key informants; EU, 2006; MOAIF, 2006).

The recent modifications made at the level of the competent authority in the fish sector following the 2006 FVO mission to Mauritius highlights the importance of having the right institutional infrastructure. The findings also indicated the importance of having the appropriate resources at the level of inspection, sampling, certification and testing.

A follow-up inspection took place in 2008 “to verify the extent to which proposed corrective actions taken following recommendations made in the report of the 2006 mission have been implemented and to verify the extent to which official controls currently in place guarantee that Mauritian fish products destined for the EU are produced in conditions equivalent to the requirements laid down in Community legislation” (EU, 2008). The mission team observed that some progress had been made since the previous mission, namely with respect to adaptation of legislation, staff recruitment, training and conducting of controls in a manner equivalent to EU requirements. Nevertheless, a number of deficiencies for example, the inadequate legal infrastructure, remained to be addressed, which the competent authority undertook to address urgently [according to annex 1 of FVO follow-up mission report, (EU, 2008).

Table 3. RASFF notification for Mauritian fishery products.

REF.	Date	Product	Source of contamination
2002.BNG	05.12.2002	Tuna-fresh chilled	Histamine
2003.376	14.11.2003	Tuna fish	Mercury
2004.CGL	20.10.2004	Tuna loins	Histamine
2005.AIR	10.02.2005	Sliced blue shark	Mercury
2006.BCD	05.05.2006	Fresh swordfish	Mercury
2007.BZY	23.08.2007	Fresh swordfish	Mercury
2007.BZY	24.09.2007	Fresh swordfish	Mercury
2007.0865	23.11.2007	Fresh swordfish	Mercury/parasitic infestation

Source: European Commission (2008).

Rapid alert system for food and feed notifications pertaining to fish exported from Mauritius to the EU

Another way of assessing the problems faced by the Mauritian fishery export sector is by making an inventory of the RASFF notifications. A number of notifications pertaining to fish and fishery products from Mauritius have been posted since 2002 on the RASFF website (Table 3).

If a company receives an alert notification more than three times, then it is delisted. All eight alerts for Mauritius related to chemical contamination. In three out of eight alerts, the mercury level was found to be above the recommended limit. There is some indication that Mauritian exporters need to set up better internal quality assurance procedures, for example, screening systems, to prevent products with high mercury or histamine contents from reaching the European market.

DISCUSSION AND CONCLUSION

The Mauritian fish supply chain has evolved into an export-oriented one and this has implied massive investment from the private and public sectors. But this rapid growth in the fishery export to the EU and the investment diverted towards uplifting of the food safety compliance strategy were not sufficiently paralleled by the concomitant upgrading of the export-oriented agro-food safety infrastructure. Echoes of press articles and FVO missions (EU, 2006; 2008) to Mauritius recount that certain problems are being faced in this sector. Given this background, this paper examines how Mauritius is faring as a fishery products exporter to the EU.

Based on the documentary analysis and interviews with key informants, it was found that there were many differences between EU regulations and the local legislation. There were also many differences between the administrative arrangements for SPS matters in Mauritius and the EU and this could negatively impinge on fish exports to the EU.

New EU SPS measures imposed by the EU were stricter, setting out principles and responsibilities,

organisational arrangements and procedures for decision-making in the area of food safety. The application of the new EU regulations to all stages of production of food and feed for export implies that additional costs have been incurred by operators to be able to export to the EU. In addition, the EU imposes new requirements on the competent authority.

Furthermore, a comparison with the domestic food control system with the system set up for controlling fish exports to the EU also shows that dual standards operate, not only do different standards and regulations apply, but also different *modus operandi* exist for inspection and certification. In addition to the existing local legal and institutional requirements for fishery products, companies that exported to the EU had to be approved by the competent authority.

In the near future, demonstration of compliance with a number of SPS measures will be required, for instance, Commission Regulation 1881/2006 on levels of mercury, cadmium and lead. Hence it is important that analytical facilities be ready and that the tests be also accredited. It is foreseen that a number of costs would have to be met to upgrade the public sector. Otherwise this could endanger the local fish export industry. The major cost centres could include the appointment of a consultant for reviewing the food control legislation, recruitment and training of additional staff at the level of the competent authority and testing laboratories, refresher training courses for officers working at the competent authority and testing laboratories, purchase of equipment and consumables for sampling and testing, maintenance of the auditing and sampling programme and laboratory accreditation.

It is apparent that not all the issues raised in the different FVO mission reports have been dealt with. Other developing countries exporting fishery products to the EU have promptly improved their infrastructure, for example Ghana, as pointed out by an FVO visit carried out in 2005. These countries strengthened their competent authority and inspection system, upgraded the hygiene level at the processing establishments and implemented food safety assurance systems in between two FVO

visits, for example, Kenya and Bangladesh (Wilson and Abiola, 2003; Balagadde, 2003). These countries have rapidly brought in 'fire-fighting' measures in fear of losing a lucrative market (Henson and Jaffee, 2008). This difference in responsiveness can be accounted for by the fact that the latter have been affected by bans.

Mauritius as a fish exporter has not met with serious problems such as import bans unlike Bangladesh, India, Uganda, Kenya, Tanzania and Mozambique probably because the volume of fish exports was low until 2004 and the status of compliance with EU requirements were considered to be adequate. This could explain why the compliance strategy adopted by the local fish export industry was predominantly reactive. Although "firefighting" is required when there is an immediate food safety risk or a ban, this should not be the norm. Instead, compliance with food safety requirements of a particular market should be embodied within a broader policy with specific strategic responses both at the micro and macro levels. The aforementioned shows there was limited pro-activeness in the local fishery export.

One instance where Mauritius has adopted a proactive stance with respect to compliance with new EU SPS measures was the creation of a SFH committee. This platform has significantly reduced information asymmetry and transaction costs, by allowing the prompt identification and solving of issues impeding the further expansion of the sector. This has led to some regulatory-induced innovation and the subsequent upgrading of processing facilities to required food safety standards. It also allowed the communal follow-up of issues raised in the 2006 and 2008 FVO reports on Mauritius.

The Government also played a lead role in implementing strategies to emerging international food safety requirements, by recruiting a consultant in fishery health/quality. As noted by Vieira and Traill (2007) such support from the public sector to the export supply chain facilitates adoption of standards and regulations. This strong public-private partnership does prompt more proactive responses. This partnership has also been successful in India where, through prompt Government intervention, processing facilities were forced to upgrade their facilities (Henson and Jaffee, 2008). On the other hand, countries like Senegal, Kenya, Nicaragua and Thailand (World Bank, 2005) which have not adopted such a concerted approach, have in general been more reactive in their responses to FVO assessments, thus somewhat eroding their competitive advantage. This difference in national strategic responses could be explained by the socio-economic importance given to the fish export sector in the Mauritian Government's agro-food export policy.

The increased stringency of SPS measures has resulted in a new agro-food trade landscape. This has undoubtedly been a barrier to some exporters from developing countries, but it has offered an opportunity for the competitive positioning of Mauritian fishery exporters. Nevertheless, our study has shown that there are some

non-conformances in the fish export supply chain that have to be resolved for Mauritius to fully exploit the potential of the fishery export sector. The institutional approach adopted by Mauritius to comply with the EU regulatory reform has generally been affected in a reactive manner. This should change towards a more proactive one. Such a proactive approach would give greater ability to manage compliance and would also offer 'first mover advantage', for instance facilitating compliance with upcoming private voluntary standards. Proactive approaches would minimise the risk of a breach in the agro-food safety export system that could, depending on the severity of the breach have consequences that could range from the loss of entry of non-complying firms to a complete country ban.

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REFERENCES

- Ababouch L (2004). International regulatory framework for fish safety and quality in assessment and management of seafood safety and quality. FAO Fisheries Technical Paper No. 444. Food and Agriculture Organisation, Rome.
- Abila RO (2003). Food safety in food security and food trade. Case study: Kenyan fish exports. 2020 vision for food, agriculture, and the environment. Focus, 10(8).
- Anders SM, Caswell JA (2009). Standards as barriers versus standards as catalysts: assessing the impact of HACCP implementation on US seafood imports. Am. J. Agric. Econ., 91(2): 310-321.
- Balagadde S (2003). Fish safety and quality assurance- Uganda's experience [online]. Geneva: International Organisation for Standardisation. Available from: www.iso.org/iso/livelinkgetfile?lInNodeId=21857&lVol [Accessed 6 July 2009].
- Beghin JC, Bureau J (2001). Measurement of sanitary, phytosanitary and technical barriers to trade. Organisation for Economic Cooperation, Paris.
- Bigsby H, Whyte C (2000). Quantifying phytosanitary barriers to trade. In: Hooker, N. and Murano, E. (Eds.), Interdisciplinary Food Safety Research. CRC Press, pp. 69-85.
- Calvin L, Krissoff B (1998). Technical barriers to trade: a case-study of phytosanitary barriers and US-Japanese apple trade. J. Agric. Res. Econ., 23(2): 351-366.
- Cato J (1998). Economic issues associated with seafood safety and implementation of seafood HACCP programs. Food and Agriculture Organisation, Rome.
- Cato JC Lima dos Santos CA (1998). European Union 1997 seafood safety ban: the economic impact on Bangladesh shrimp processing. Mar. Resour. Econ., 3(3): 215-227.
- Cato J, Subasinghe S (2003). Food safety in food security and food trade: the shrimp export industry in Bangladesh. Focus, 10 (9 of 17).
- CBI (2005). EU market survey: fishery products [online]. Netherlands: Centre for the promotion of imports from developing countries. Available from: <http://www.cbi.nl> [Accessed 11 July 2009].
- CSO (various years). Digest of Agricultural Statistics. Central Statistics Office, Republic of Mauritius.
- CTA (2003). Study of the consequences of the application of sanitary and phytosanitary measures on ACP countries. Centre Technique Agricole, Wageningen
- Disdier ACE, Fontagne L, Mimouni M (2008). The impact of regulations on agricultural trade: evidence from the SPS and TBT Agreements.

- Am. J. Agric. Econ., 90(2): 336–350.
- EC (2002). Regulation (EC) No 178/2002 of the European Parliament and of the Council, Official J. Eur. Union, European Commission, Brussels.
- EC (2004). Regulations (EC) No 852/2004, 853/2004 and 854/2004 of the European Parliament and of the Council of 29 April 2004 on the hygiene of foodstuffs, Official Journal of the European Union, European Commission, Brussels.
- EU (1998). Fishery products evaluation mission [online]. Mauritius report. Pp. 7-11. August 1998. Brussels: European Union. Available from: http://ec.europa.eu/food/fvo/rep_details_en.cfm?rep_id=1550 [Accessed 10 August 2009].
- EU (2006). Report of a mission carried out in Mauritius from 23 to 27 January 2006 in order to assess the public health controls and the conditions of production of fishery products [online]. Brussels: European Union. (DGSANCO/8155/2006). Available from: http://ec.europa.eu/food/fvo/rep_details_en.cfm?rep_id=1550 [Accessed 23 August 2009].
- EU (2008). Final report of a mission carried out in Mauritius from 05 February to 14 February 2008 in order to evaluate the control systems in place governing the production of fishery products intended for export to the European Union (Follow up) [online]. Brussels: European Union. (DG SANCO/ 8155/2006). Available from: http://ec.europa.eu/food/fvo/rep_details_en.cfm?rep_id=1550 [Accessed 23 December 2009].
- European Commission (2006). Food and Veterinary Office [online]. European Commission, Brussels. Available from: http://europa.eu.int/comm/food/fvo/how_en.htm [Accessed 17 July 2010].
- European Commission (2007). Food and Veterinary Office [online]. European Commission, Brussels. Available from: http://ec.europa.eu/food/fvo/inspectprog/policy_papers/index_en.htm [Accessed 23 August 2010].
- European Commission (2008). Rapid Alert system for food and feed [online]. European Commission, Brussels. Available from: <http://ec.europa.eu/food/food/rapidalert/archive> [Accessed 23 November 2010].
- FAO (2005). Causes of detention and rejection in international fish trade [online]. FAO Fisheries Technical Paper No 473, Rome: Food and Agriculture Organisation. Available from: http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/008/y59 [Accessed 29 June 2009].
- FAO (2009). Fisheries and Marine Resources Act. Fisheries and Marine Resources (Export of Fish and Fish Products) Regulations (No. 2) 2006. Available from: <http://faolex.fao.org> [Accessed 23 November 2009].
- Fisheries Division (1998). Annual report. Ministry of Agro-Industry and Fisheries, Mauritius.
- Henson SJ (2008). The role of public and private standards in regulating international food markets. *J. Int. Agric. Trad. Dev.*, 4(1): 63-81.
- Henson S, Jaffee S (2008). Understanding developing country strategic responses to the enhancement of food safety standards. *Wld. Eco.*, 31(1): 1-15.
- Henson S, Loader R (2001). Barriers to agricultural exports from developing countries: the role of sanitary and phytosanitary requirements. *Wld. Dev.*, 29(1): 85-102.
- Henson S, Loader R, Swinbank A, Bredahl M (1999). The impact of sanitary and phytosanitary measures on developing country exports of agricultural and food products. In: *Proceedings of the conference on agriculture and the new trade agenda in the WTO 2000 negotiations, 1-2 October 1999 Geneva, Switzerland.*
- Henson S, Loader R, Swinbank A, Bredahl M, Lux N (2000). Impact of sanitary and phytosanitary measures on developing countries. Centre for Food Economics Research, Reading.
- Henson S, Mitullah W (2004). Kenyan exports of Nile Perch: the impact of food safety standards on an export-oriented supply chain. Policy Research Working Paper 3349. World Bank, Washington.
- Henson S, Saqib M, Rajasenan D (2005). Impact of sanitary and phytosanitary measures on exports of fishery products from India: the case of Kerala. World Bank, Washington.
- Huss HH, Ababouch L, Gram L (2004). Assessment and management of seafood safety and quality. FAO Fisheries Technical Paper No. 444. Food and Agriculture Organisation, Rome.
- Jaffee S, Henson S (2005). Agro-food exports from developing countries: the challenges posed by standards. World Bank, Washington.
- James S, Anderson K (1998). On the need for more economic assessment of quarantine/SPS policies. Paper 98-02, Centre for International Economic Studies, University of Adelaide, Australia.
- Jha V (2002). Strengthening developing countries' capacities to respond to health, sanitary and environmental requirements: a scoping paper for South Asia, [online]. Canada, International Development Research Centre. Available from: http://www.idrc.ca/en/ev-93088-201-1-DO_TOPIC.html [Accessed 12 November 2009].
- L'Express (2007). Atteindre les normes européennes: un must. *L'Express*, 14 Mars, pp.1 Mauritius.
- Mehta R, George J (2003). Processed food products exports from India: an exploration with SPS regime. Technical Report Project Output, Economics, ACIAR Project, RSPAS, ANU Food Safety Issues, Trade and WTO Rules.
- MOAIF (2006). Export of fish and fishery products to the EU. Visit of W. Marsman [online]. Available from: http://www.gov.mu/portal/sites/moa/site/fish_eu.htm [Accessed 9 June 2009].
- MOAIF (2009). Seafoodhub [online]. Available from: http://www.gov.mu/portal/site/fisheries/menuitem.54ad71aa92747d4e7f7a98ada0208a0c/?content_id=1d440c625fe98110VgnVCM1000000a04a8c0RCRD [Accessed 26 December 2009].
- MOF (various years) Annual Report, Ministry of Fisheries, Republic of Mauritius.
- Moenius J (1999). Information versus product adaptation: the role of standards in trade. Mimeo.
- MOF (2007). Budget speech. Ministry of Finance, Port-Louis.
- MOH (1998). Food Act 1998. Government Gazette, pp. 64 13 June 1998, Ministry of Health and of the Quality of Life, Port-Louis.
- MOH (2008). Food regulations, [online]. Port-Louis, Ministry of Health and of the Quality of Life. Available from: <http://www.gov.mu/portal/goc/moh/> [Accessed 28 February 2009].
- Nanyaro S (2006). Technical assistance related to fisheries sector: experience from the United Republic of Tanzania [online]. World Trade Organisation, Geneva. Available from: www.wto.org/english/tratop_e/spse/wkshop_march06_e/ta_fisheries.ppt [Accessed 6 July, 2009].
- Neeliah SA, Goburdhun D, Neeliah H (2009). National food control systems: lessons from Mauritius. *Ecol. Fd. Nutr.*, 48(2): 1–20.
- OECD (1999). Food safety and quality: trade considerations. Organisation for Economic Cooperation and Development, Paris.
- Otsuki T, Wilson JS, Sewadeh M (2001). Saving two in a billion: quantifying the trade effect of European food safety standards on African exports. *Fd. Pol.*, 26(5): 495-514.
- Thornsbury S (1998). Technical Regulations as Barriers to Agricultural Trade. Thesis (Ph.D.), Virginia Polytechnic Institute.
- Thornsbury S (1999). Political Economy Determinants of Technical Barriers to U.S. Agricultural Exports. Food and Resource Economics Department University of Florida/Indian River Research and Education Center. American Agricultural Economics Association, Nashville.
- UNCTAD (2005). Costs of agri-food safety and SPS compliance: United Republic of Tanzania, Mozambique and Guinea: tropical fruits selected commodity issues in the context of trade and development. United Nations Conference on Trade and Development, Geneva.
- Vieira LM, Trill B (2007). The role of standards in international trade: evidence from Brazilian beef exports to the EU markets. *J. Int. Dev.*, 19(6): 723-863.
- Wilson JS, Abiola VO (2003). Standards and Global trade: A Voice for Africa. World Bank, Washington.
- World Bank (2005). Food Safety and Agricultural Health Standards: Challenges and Opportunities for Developing Country Exports. World Bank, Washington.
- World Bank (2009). World Development Indicators 2009, World Bank, Washington.