

AN ANALYSIS OF TRADE AND ENVIRONMENT IN SEAFOOD PROCESSING SECTOR IN VIETNAM: STATUS, CHALLENGES AND IMPLICATIONS

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Abstract

Seafood processing is one of the five key export items that have contributed to Vietnam's GDP growth in recent years. Vietnam's accession to World Trade Organization (WTO) and participation in many multilateral trade agreements has boosted the country's trade activities, including seafood exports. However, Vietnamese seafood processing enterprises also face increasingly strict technical barriers in terms of food safety and hygiene, traceability, factors of sustainable development as well as related anti-dumping lawsuits cases. This paper introduces and analyses the relation between trade and environment in the seafood sector in Vietnam. The study lays out environmental considerations and identifies market access barriers in export markets for the seafood-processing sector. It then analyses the various government policies and private sector strategies currently to improve world market access. The paper then considers implications to improve export competitiveness and environmental sustainability for Vietnamese seafood sector, now and in the future.

Keywords: Trade And Environment, Seafood Processing Sector, Sanitary And Phytosanitary Standards (SPS), Free Trade Agreement (FTA), Pressure- State- Response Model, Vietnam.

1. INTRODUCTION

Since initiating an economic reform process in 1986, Vietnam has achieved impressive economic growth. Within the last decade, the average growth rate in Vietnam was 7.2 percent, with GDP doubling to reach US\$ 362.2 billion in 2021 (World Bank, 2021). While many factors have contributed to these achievements, the most important has been the growth of the export sector. Vietnam has gone from a closed economy to an open economy with established trade relations with over 100 countries worldwide. Vietnam's integration in the world economy has been marked by its accession to APEC, ASEAN, and AFTA and WTO. Vietnam has signed more than free trade agreements (FTA) (Ministry of Trade, 2020). During the last decade, Vietnam's exports to the ASEAN trade bloc have increased by 20 percent annually. Export turnover in

2021 reached US\$ 336 billion, a 60 -fold increase from 1995 (Ngoc, 2022; Le and Nguyen, 2019).

Currently, processed seafood products are one of the six major export items in term of value in Vietnam. Over the past decade, this industry has emerged as a dynamic sector, making a strong contribution to exports and GDP. In 2021, the export value of seafood products was US\$ 8.9 billion, accounting for nearly 3 percent of Vietnam's total export value (Vietnam Economic Times, 2022). Vietnam's accession to the WTO and signing of a series of bilateral and multilateral FTA has brought opportunities for seafood products to penetrate the world market, as countries know more about Vietnam. Businessmen from other countries are more interested in the import and export of Vietnamese goods, including seafood products. In addition, the more preferential tariffs, origin of goods, non-tariff barriers and the benefits of fair and equal treatment have created conditions for Vietnamese seafood products to be competitive on the international market (Le and Truong, 2019). However, one of the major challenges for Vietnam in order to boost export and increase the competitiveness of its aqua products is to increase compliance with the strict standards for sanitary and phytosanitary (SPS) reasons and environmental protection required by developed countries, especially the European Union, the United States and Japan. While there are significant costs involved in complying with these standards, Vietnam can benefit from meeting these requirements as its state management capacity and export competitiveness will be strengthened, people's health will be improved and natural resources will be used more sustainably. In other words, SPS and environmental requirements in international trade bring both challenges and opportunities for Vietnam's sustainable development. However, to date, information on and implications of this interaction are still lacking.

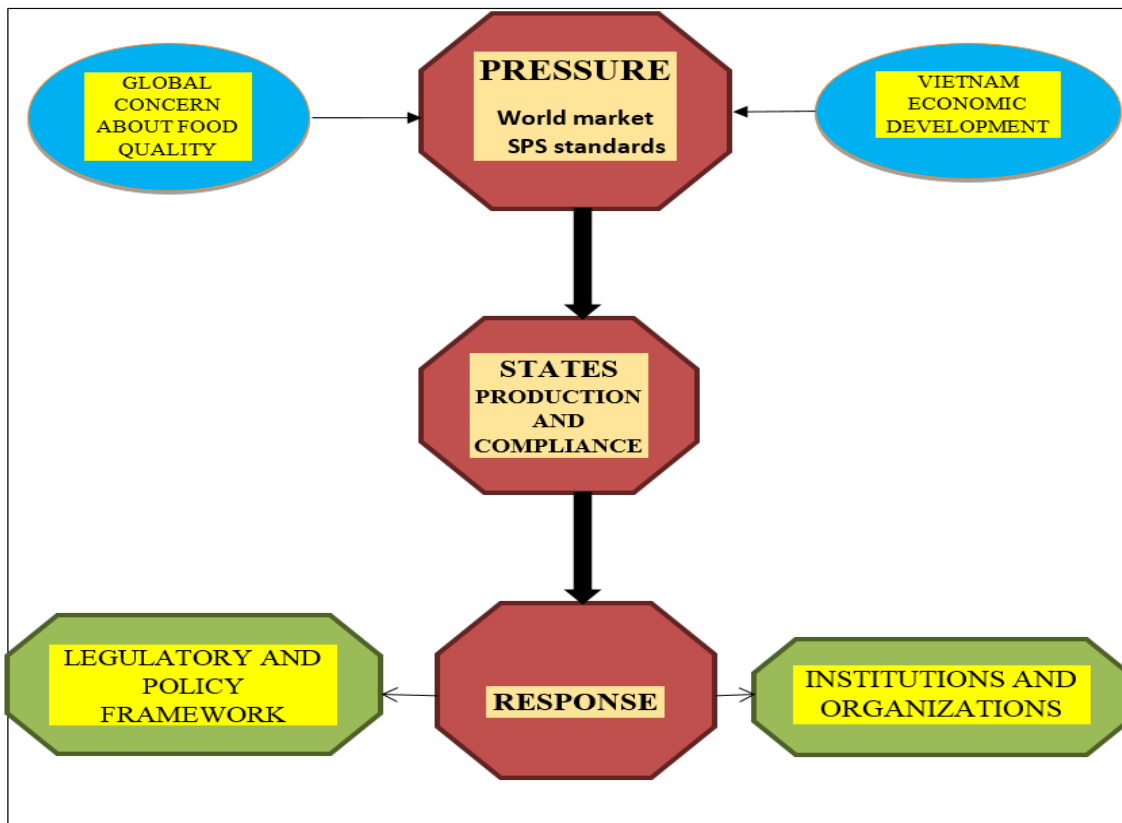
This paper introduces and analyses the relation between trade and environment in the food processing industry in Vietnam. Focusing specifically on the seafood sector, it addresses the central question: What barriers in terms of sanitation and environment standards are Vietnam's exports of aqua products facing and what has been done to overcome these barriers? The study first lays out environmental considerations and identifies market access barriers in export markets for the seafood processing sector. It then reviews and analyses the various government policies and private sector strategies currently in place in Vietnam to improve market access and environmental sustainability of seafood production based on environmental and health grounds. Finally, the study considers the implications of the analysis for government, private and international policies targeted to improve export competitiveness and environmental sustainability for the Vietnamese seafood sector, now and in the future.

2. METHODOLOGY AND MATERIALS

In this paper, we use the PSR model (Pressure- State- Response) to analyses the status and challenges of trade and environment in seafood export in Vietnam. PSR framework for the assessment is based on the idea of causality: external world market regulations

pressures on the seafood sector in Vietnam in terms of compliance and production (state). The sector responds to these regulations through policies and management solutions (response). In this analytical model, pressure reflects the impact of SPS in the world market, especially in the USA, EU and Japan. State reflects the status of seafood production under world regulation on SPS. Response represents measures taken by societies facing standards and regulations such to adapt with the requirements of world market (Lindahl, 2015; Hoi 2021).

Figure 1: PSR Model For Study Analysis



Data and materials were gathered through existing reports and interviews with seafood management officials, environmental managers, specialists and seafood producers. The initial phase was the examination of analytical reports by professionals working in the agriculture field, especially seafood processing sector and SPS regulations. These reports are coming from the Government of Vietnam (2017), the Ministry of Health – MOH (2019), the MARD (2020), the Agriculture and Rural Development Policy and Strategy Institute –IPSARD (2016) and WHO (2019). In addition, the authors have met with stakeholders in management and production of seafood sectors and discuss with them about SPS and adaptation.

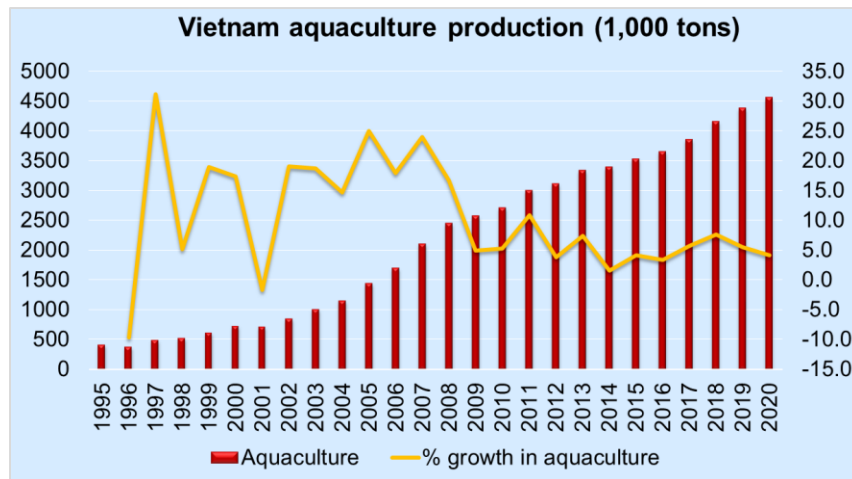
3. RESULTS

3. 1. Overview of the seafood sector in Vietnam

The food-processing sector is a large and rapidly growing industry in the Vietnamese economy. In 2021, value-added in the food processing sector was estimated to be about US\$ 8.5 billion, representing about 3.5 percent of GDP and 31 percent of agricultural value-added (Chau, 2020). The contribution of food processing to GDP appears to be growing. In 1995, seafood processing represented just 2.5 percent of GDP, but over the period 1995 to 2020, value-added in this sector has grown 12 percent annually, while GDP has grown only 7 percent annually (Vietnam Economic Times, 2022).

The output and value of processed seafood products in Vietnam have continuously increased over the years, with the average growth rate of the number of processed seafood products reaching 5.16%/year and the average growth rate reached 11.8%/year. This is reflected in the increase in the number of establishments, the size of the facility and the ability to supply raw materials as well as the increasing market demand, especially in the segment of deep-processed products has high VAT. In 2019, the total design capacity of processing facilities is estimated at 3.0 million tons of products/year. Actual processing capacity reaches 70% of design capacity on average, generating more than 2.1 million tons of products/year, equivalent to about 5.5-6 million tons of raw materials/year that are put into processing. 75% of the total output, the remaining 25% of the total raw material output is served fresh and exported fresh (Le and Truong, 2019).

Figure 2: Vietnam Aquaculture Production 1995-2020



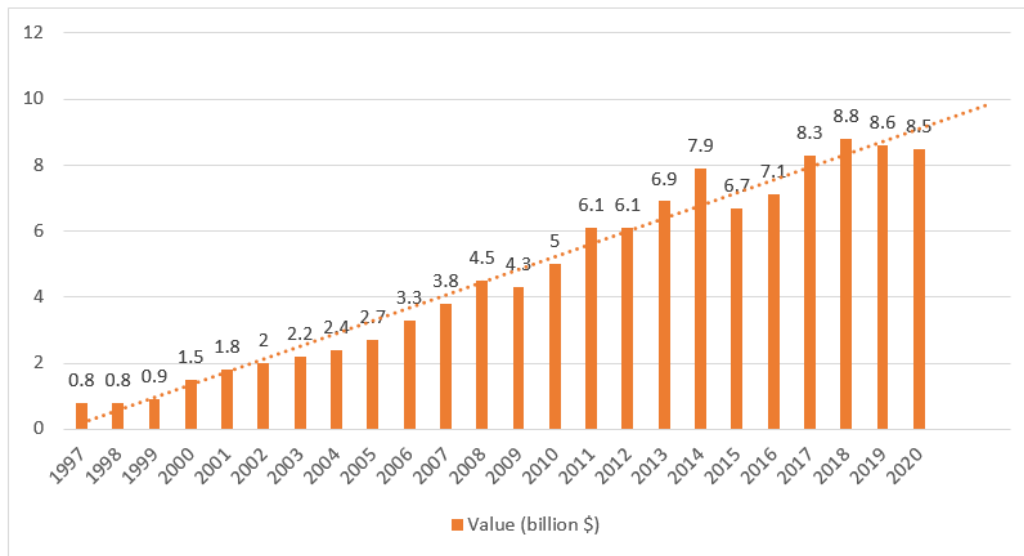
Source: VASEP (2020)

In recent years, there has been a rapid growth in the number and capacity of seafood processing establishments for export. In 2010, the whole country had 533 units; by 2018 it has 784 export processing facilities, by October 2020, the total number of establishments eligible for food safety certification is 815. The Vietnam National Sea

Products Corporation (Seaprodex), a State owned company, is the biggest processing and exporting enterprise (Le and Truong, 2019; Phuong, 2018).

The seafood processing industry also plays an important role in Vietnam's exports. Although born very early, Vietnam's fisheries until the middle of the last century still bore the imprint of a type of natural economic activity, self-sufficiency, self-sufficiency, labor. Fishery activities are only considered as a side occupation in agricultural production. Since the 1950s, assessing the increasingly significant position and contribution those fisheries can bring to the national economy, along with the process of economic recovery and development in the North, the Party and Government state has begun to pay attention to the development of fisheries and to form state management agencies in this field. A new perspective on fisheries. Since then, the fisheries sector has gradually formed and developed as an economic - technical industry with an increasing role and contribution to the country (D-Fish, 2011). From 1997-2020, the number of seafood exports increased 11 times, the average annual growth rate was 10%, from 758 million USD to 8.5 billion USD.

Figure 3: Vietnam seafood number of products



Source: VASEP (2020)

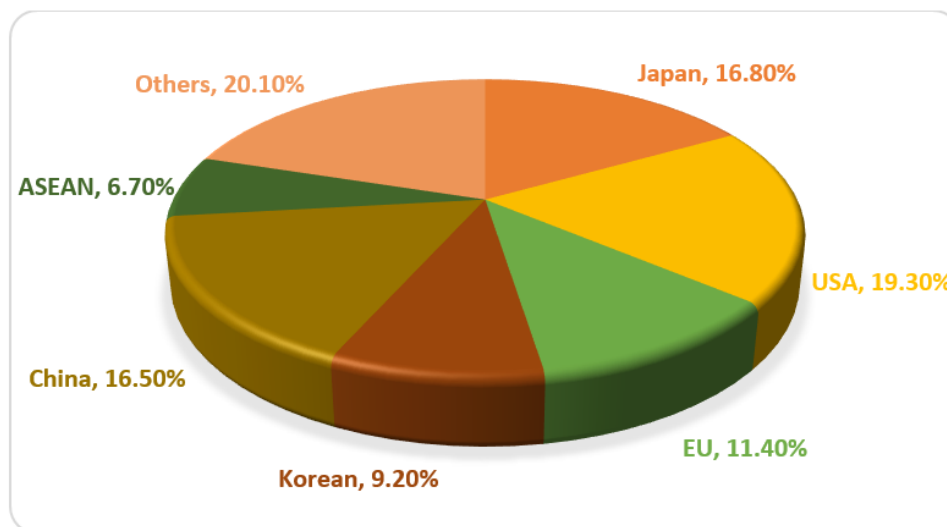
In term of products, products for export are mainly shrimp, phantasies, tuna and krill. Shrimp exports took the highest proportion, the highest growth, and the most stability. From 1998-2020, shrimp exports increased more than eight times, from 457 million USD to 3.73 billion USD per year; the average annual growth rate was 10%. The proportion of total assets increased: from 36% to 50%. Pangasius exports increased 162 times, from 9.3 million USD to 1.5 billion USD; the average annual growth rate was about 26%. However, the rate then dropped from 32% to 18%. Seafood exports took approximately 30-35% of total seafood exports. From 1998 to 2020, turnover increased ten times from

315 million USD to 3.2 billion USD; the average annual growth rate was 11% (VASEP, 2020; Le and Truong, 2019).

In term of market, Vietnam exports seafood to more than 160 markets around the world. The top 10 markets include the US, EU, Japan, China, Korea, ASEAN, Australia, UK, Canada, Russia, accounting for about 92-93% of Vietnam's total seafood exports. In the top six major markets (USA, EU, Japan, China, Korea, and ASEAN), in recent years, exports to the EU have slowed down to 960 million USD due to COVID-19 and Brexit, to ASEAN and Korea have been stable. Exports to the US and Japan also maintained positive growth at 1.87 billion USD and 1.21 billion USD respectively in 2020 (VASEP, 2021). The following graph illustrates the percentage of main import market of Vietnam's seafood in 2020.

While the traditional markets still make an important role in Vietnam seafood export, the opportunities to enter these markets are becoming increasingly difficult because of highly strict food standards, origin traceability, and anti-dumping duties. Recently, more barriers for Vietnamese catfish export to the US given by the introduction of Farm Bill and the requirement of IUU fishing in the EU took effect since 2010 give lots of obstacles for Vietnam seafood. As a result, Vietnamese seafood exporters have explored other easier markets to deal with such as China. The export volume to China increased sharply by more than 2 times within 5 years (Hambrey and Carleton, 2015; Phuong, 2019).

Figure 3: Main Import Market of Vietnam's Seafood



Source: VASEP (2020)

3.2. Market access barriers for the seafood-processing sector

Over the course of the past decade, Vietnam's fisheries industry has been confronted with several challenges in boosting exports and increasing competitiveness. It has been

faced with the task of conforming to the requirements on food hygiene and environment imposed by major developed country markets.

At present, the biggest challenge for Vietnam's seafood exports is to meet the requirements in the US and the EU concerning the level of antibiotic and chemical residuals in aqua products (Phong, 2018; Mai, 2020). Chemical and biological antibiotic products have been used in various stages of culturing, processing and preserving seafood in Vietnam. They help to increase productivity and production and food efficiency, as well as reduce death rates and diseases. However, at the same time, higher concentrations of these antibiotics may have negative effects on human health, product quality and the environment. For these reasons, importers impose strict regulations and standards on the permissible levels of residuals of antibiotics and chemicals in seafood products. With its strict SPS requirements, the EU has been an exceedingly tough market for Vietnam's exported seafood. EU laws and regulations ban completely the use of 10 antibiotics (zero residue is permissible) used in the seafood industry and regulate maximum residue limits (MRL) for the use of 10 other antibiotics. The use of some of these antibiotics is claimed to not only harm human health, but also to pollute the environment. Thus, food imported into the EU needs to be examined thoroughly for antibiotic or chemical residuals (under EU regulation No. 96/23). The EU also has restrictions on the use of food additives in food and seafood processing. The US and Japan also have strict requirements on the content of antibiotic and chemical residuals in seafood. The American legal system is complex; in addition to the Federal Food, Drug and Cosmetic Act, each State has its own food law in place. The US Food and Drug Administration (FDA) is authorized to enforce the national food laws as well as monitor the import and distribution of medicines and food nation-wide. Currently, the FDA has banned the use of 11 kinds of antibiotics (zero residue is permissible) and stipulated the MRL for other antibiotics. To ensure strict compliance with these requirements, the US requires all seafood processing factories in the exporting country to implement Hazard Analysis Critical Control Point (HACCP) management systems. Japan imposes similar standards on food hygiene and the environment and also requires Vietnamese export enterprises to use HACCP. Japan has banned 38 additives in producing and processing seafood.

Challenges for seafood exporters in Vietnam to meet SPS requirements

Firstly, it is a complex process for Vietnamese seafood exporters to understand the food hygiene and environmental requirements in individual importing markets, as well as consumer chains. To export their products, seafood enterprises are faced with sophisticated and volatile layers of standards set by national and international governmental bodies, in addition to private entities. In 2003, a survey of export enterprises in different sectors showed that only 17 percent of Vietnamese enterprises understood the requirements set by Japan, 14 percent comprehended the EU standards, and only 8 percent grasped the US standards. The survey also found that 43 percent of the information on these requirements came from official Vietnamese government

documents from the relevant ministries (VASEP, 2020). While the provision of information is a key task of government, it is important for industry to develop independent information sources to avoid export losses. For instance, in 2003, a number of Vietnam's seafood exports to the US were rejected and destroyed for being contaminated with fluoroquinolones. Notwithstanding the fact that this substance had been banned in the US since 1997, the Ministry of Fisheries of Vietnam (MOFI) still allowed its use in limited quantities (Hanh, 2020).

Secondly, the diversity of standards in place in Vietnam's export markets is impressive. Although there are some common trends in food safety regulations in industrialized countries, they have not adopted common product standards or process and inspection requirements. As Vietnamese enterprises expand their export markets, the diversity of the requirements the industry needs to meet also increase. For instance, at present, the US permits the use of six kinds of antibiotics and 18 types of chemical substances in cultured aquatic products. The EU has published a list of banned substances and substances with limited use (Nguyen Van Tai, 2015). What needs to be emphasized is that while the US bans completely the use of some antibiotics, such as fluoroquinolones, the EU allows a limited use for this drug. This causes significant difficulties for Vietnam, a country with small-scale production, since it is currently not feasible to develop separate aquaculture areas for different export markets (Phong, 2018).

Thirdly, hygiene and environmental standards have become increasingly stringent in response to scientific evidence and consumer concern. According to Mai (2020), the EU plans to expand the zero residue policy from the current 10 antibiotics to 26 antibiotics in 2016. In general, it takes at least three years for Vietnam to put in place changes in international SPS requirements due to its cumbersome management mechanisms and poor management capacity (Phong, 2018). In the near future, the application of GAP and ISO 14000 are likely to be obligatory for Vietnamese seafood export processing enterprises. Compliance with these requirements will entail significant investments for SMEs, which comprise 70 percent of the seafood processing factories. Moreover, the compliance costs will significantly reduce their competitiveness (Tuong, 2021). In addition, the EU often lowers the detected limits for antibiotic residue when upgrading its inspection facilities. At present, the detected limit of the EU is the lowest (0.003 ppb), while the US accepts 1 ppb and Canada allows 0.3 ppb. Since 2001, the EU has been using new inspection devices (LC-MS/MS). The EU is able to detect very small quantities of antibiotic residue, whereas the Vietnamese facilities are only equipped with the more affordable and less precise LC-MS devices (Phong, 2018; Mai, 2020).

Lastly, the costs of compliance for the Vietnamese seafood industry are significant and impact on its competitiveness as well as its ability to gain market access. Both the EU and the US apply strict inspection procedures on Vietnam's seafood products throughout the production chain. In April 2004, the EU adopted a package of hygiene requirements that includes fishery products. Imported products must comply with the new rules that entered into force on 1 January 2006. Third countries from which the EU authorizes

imports of fishery products are classified into two categories. The first category contains a list of the “fully-harmonized” countries that have been audited by an EU inspection team. The second category consists of “pre-listed” countries whose control systems have yet to be inspected by the EU. Prior to 1999, Vietnam was in category 2 of the previous EU classification system, with all seafood imports from Vietnam subject to inspection. Since 1999, Vietnam was placed in category 1 (Mai, 2020).

In the US market, all Vietnam’s seafood exports must go through the FDA’s automatic inspection system, which can reject any products and enterprises that fail to meet its requirements (An, 2002). Both the EU and the US regularly inspect Vietnamese seafood production process and processing factories which export to their markets. In the event of non-compliance, the EU and the US take measures to restrict imports. Common measures applied by the EU on Vietnamese seafood imports include withdrawing preferential tariff rates, banning imports, destroying the goods, reducing import quotas, returning goods to the exporters and removing exporters from the list of enterprises that are able to export to the EU. Similar sanctions are applied by the US. The most common sanctions include placing the exporter found to be in non-compliance on the warning net OASIS, or destroying or returning the goods to the exporters if there is a commitment of the authorized agency in the importing country (NAFIQAVED, 2006).

3.3. Environmental impacts caused by the seafood export sector in Vietnam

The rapid development of Vietnam’s aquaculture and seafood exports has caused several environmental issues in the short term and the long term, such as mangrove forests degradation, biodiversity loss, ecological imbalance, and environmental pollution and disease epidemics. One of the most serious environmental problems has resulted from the pressure of expanding aqua farming on natural resources in coastal areas, especially mangrove forests. Of the 408,500 hectares of mangrove forests in Vietnam in 1943, only 110,000 hectares remain (Thu, 2014; Thuoc, 2015). During the period 1983-2020, the total area of shrimp farming in the Mekong Delta increased by 35 times, with the loss of 15,000 hectares of mangrove forest annually (Thang, 2021). According to Thu (2014), most of the mangroves destroyed in the 1990s were due to aquaculture development, particularly following the shift in government policies to allow the transformation of inefficient agricultural land into aquaculture. After 2000, deforestation slowed down in response to strict government measures and the recognition that sediment zones in mangrove forests are not suitable for shrimp farming. However, forest destruction to make room for aquaculture continued to occur. According to Graaf and Xuan (2018), a hectare of mangrove forest in Vietnam provides about 450 kilograms of seafood per year, with economic values up to \$US 3,000. Forest degradation not only results in loss of direct value, but also indirect value, such as from the reduction of biodiversity and erosion and salinization of agricultural land, which in turn threatens aquaculture and sustainable development.

Together with the degradation of mangroves, environmental pollution has increased in many zones of intensive aquaculture. There have also been shortages of freshwater and

a reduction in underground water supply in sandy shrimp farming zones (Nhuong, 2004). With the development of intensive farming, the use of shrimp feed, drugs and chemicals increases proportionately. As a result, excess shrimp feed and untreated waste results in the pollution of rivers and coastal habitats, destroying the ecological balance and reducing biodiversity. In addition, the spread of epidemic diseases is also a key concern. During the period 1994-1995, there was an epidemic that spread to the southern provinces of Vietnam, which affected approximately 85,000 hectares of shrimp and resulted in a net loss of VND 249 billion. In 2001 and 2002, shrimp diseases continued to threaten and cause great damage to farmers in the Mekong Delta. The outbreak of disease was found to be connected with environmental factors, as well as lack of insufficient quality control of shrimp seed. It was estimated that only 10 percent of the shrimp seed in Central Vietnam met sufficient quality standards. Therefore, low quality shrimp seed contributed to massive loss of shrimps in the Mekong Delta (2004).

Seafood processing has caused serious environmental impacts. Main pollutants from processing factories include both dissolved solid and liquid waste. With an annual capacity of 380,000 tons, the sector has discharged 180,000 tons of solid waste and 1.2 million cubic meters of waste water annually into the environment (Le and Truong, 2019). By 2003, 58 percent of 364 seafood processing plants failed to meet environment protection requirements (Mai, 2020), mainly due to the lack of appropriate waste water treatment facilities. In addition, these facilities discharged a considerable amount of CO₂ and chlorofluorocarbons (CFCs), which not only damaged the environment but also contributed to an increase in greenhouse gases that destroy the ozone layer.

Lastly, the quantity of off-shore and high seas seafood has been reduced due to unregulated fishing and poor fisheries management. Several species of high value fish have become seriously threatened, with 17 species threatened with extinction. Of the 57 species of fresh water fish which have suffered the same fate, eight are regarded as endangered (Thang, 2021). In addition to unregulated off-season fishing, destructive fishing methods are a main contributing factor to the decrease in fish stocks, such as fishing with dynamite, electric shocks or toxic chemicals. The operation of trawlers, each of which discharges between 200 and 300 kilograms of waste a day, is also contributing to coastal pollution (Hoi, 2021). In order for Vietnamese seafood exports to remain competitive it is necessary for the industry to improve – and demonstrate – good environmental performance through the adoption of environmental management systems through the life cycle of seafood production and processing.

3.4. Strategies of Vietnam for compliance with international SPS in the seafood industry

Legal and regulatory reforms

The high levels of antibiotic residues in Vietnamese seafood exports to the EU and the US from 2001 to 2020 resulted in significant economic loss for Vietnamese enterprises and reduced the reputation and competitive capacity of Vietnam's seafood in the world

market. This situation was in large part due to the poor management of chemicals, veterinary drugs and biological products in all steps of the seafood life cycle, from the production of seed, feed, harvest, preservation, pre-processing, transport to processing and product marketing (Hanh, 2020). Before this situation, the Government had promulgated Directive No.07/2002/CT-TTG of 13 September 2002 on 'Strengthening management of the use of antibiotics, chemicals in production and trading of animal origin food'. The Government had also issued Decree No.07/2003/ND-CP on 'Regulation on administrative punishment of violations in aquaculture for illegal use of banned chemicals and drugs'. To implement this regulation, the Ministry of Agriculture and Rural Development (MARD) has issued Decision No.28/2002/QD-BNN regarding 'The ban on the import, production and trading of some chemicals, antibiotics and the use of veterinary drugs' and Decision No.17/2004/QD-BNN regarding 'The list of veterinary drugs allowed to manufacture, export, pack, circulate and use with limits in Vietnam'. Together with MARD, the MOFI, a State agency in charge of seafood management has also issued Decision No.01/02/QD-BTS regarding 'The ban on the use of some chemicals, antibiotics in seafood production and trading'. Under this Decision, the Ministry bans the use of some antibiotics the residues of which the US and EU stipulates must be zero, especially NF and CAP. Due to insufficient up-dating of information, drugs, such as FRZ, which were banned in the US, have not been put on the Ministry's list of banned chemicals and antibiotics.

Hence, in 2004, Vietnam's seafood exports to the US were continuously found to be infected with residues of banned drugs. Before that situation, MOFI issued Decision No.07/2005/QD-BTS of 24 February 2005 regarding 'The list of chemicals and antibiotics banned from use or with limited use in seafood production and trade'. To meet the requirements in importing markets, this list of chemicals and antibiotics has been updated to include the current regulations and standards of the US, the EU and the international standards contained in the Codex Alimentarius of the Food and Agriculture Organization (FAO) and the World Health Organization (WHO). In addition, Vietnam has progressively reformed its legal system to build the base to ensure market access and the environmental sustainability of food and seafood production. The Environment Law is the foundation for Vietnam's system of laws on environmental protection. After being amended in 2005, the Environment Law has put in place regulations similar to those in the EU and the US on environmental protection in food and seafood production and processing (Articles 14, 16 and 19). The Fishery Law, enacted in 2003, is an important legal document for the sustainable management and development of fisheries resources. The Fishery Law sets concrete regulations for environmental protection in fish capture, aquaculture and seafood processing. It also contains mechanisms to implement the law, such as through environmental planning and establishing sea conservation areas, and sets out the division of ministerial responsibility for sustainable fisheries resource management.

The Decree-Law on food hygiene and safety was issued in 2003 by Vietnam's National Assembly. This was the first time in Vietnam that there was an overarching legal

document to unify the management of food hygiene and safety nation-wide. The aim of the Decree-Law is to ensure food hygiene and safety during the process of production and marketing. This Decree-Law prohibits illegal actions in aquaculture and food processing that have negative impacts on human health. In 2004, the National Assembly promulgated the Veterinary Decree-Law under which animals and animal products are subject to quarantine when imported into or exported out of Vietnam must be controlled by the competent veterinary agencies.

Reform of institutional structures and responsibilities

The Decree-Law on food hygiene and safety promulgated by the National Assembly in 2003 clearly distinguishes the components of the system for food hygiene and safety management in Vietnam. The main governmental agencies involved include the Ministries of Health, Industry, Fisheries, Agriculture and Rural Development, Science and Technology, Trade, Police, Information and Culture, and Finance. The system is divided into three sub-systems, composed of: (i) the Health Ministry, which is the leading agency responsible for guiding and coordinating with other ministries and sectors in the management of food hygiene and safety, under the specialized guidance of the National Agency for Food Hygiene and Safety established in 2001; (ii) the professional ministries including the Ministries of Fisheries, Science and Technology, and Agriculture and Rural Development; and (iii) other supporting ministries. According to Decree No.43/2003/ND-TTG, the Ministry of Fisheries (MOFI) is in charge of implementing sustainable fisheries management, including the management of food hygiene and safety, fishery veterinary mechanisms and the quality of seafood exports. In the 1990s, there existed overlapping competence between State agencies in the control and certification of the quality of seafood exports. In 1994, MOFI issued Decision No.648/QD-BTS to establish the National Fisheries Quality Assurance Center (NAFIQACEN) to control and certify seafood quality and hygiene in the fisheries sector from capture, aquaculture, processing and preservation to transport, export and domestic consumption in Vietnam.

Following economic integration and trade liberalization reform since 2000, the volume of Vietnam's exported seafood has increased dramatically. In 2003, in order to simplify and unify the management system, MOFI issued Decision No.07/2003/QD-BTS to establish the National Fisheries Quality Assurance and Veterinary Directorate (NAFIQAVED). Previously, the management of seafood quality and hygiene was assumed by NAFIQACEN, while the management of feed, veterinary drugs, chemicals and bioproducts serving aquaculture was undertaken by the Department for Fisheries Resources Conservation. The establishment of NAFIQAVED has permitted the management of seafood quality, safety, hygiene and veterinary drugs to be concentrated in one agency, making the management unified from the central to the local level. This model also corresponds with the food management models in Vietnam's export markets.

Increasing conformity assessment of the supply chains

Over the past decade, Vietnam has implemented regulatory reforms to enable its seafood exports to meet the requirements of importing markets through inspecting and control seafood quality, safety, hygiene and veterinary measures. From 1997 to 2001, NAFIQACEN conducted 2,608 checks on the condition of food safety and hygiene in 260 processing plants in the fisheries sector (Lam, 2002). In 2005, NAFIQAVED conducted 488 inspections of industrial-scale seafood processing enterprises (i.e. almost 100 percent of processing enterprises) and certified the quality of 426,000 tons of exported seafood (i.e. 80 percent of the total of exports were certified). Compared with 2000, the number of inspected parameters increased by 13 (2 micro-organism parameters, 10 antibiotics and 1 chemical parameter). NAFIQAVED has also drafted 28 standards on food hygiene and safety for seafood production and business (NAFIQAVED, 2006). At present, NAFIQAVED's laboratories in Vietnam have attained the ISO 17025 certification (Mai, 2004).

The management of seafood quality and hygiene is gradually moving to encompass the entire production process according to the precautionary principle. Since 1998, NAFIQACEN has implemented the programme of controlling the safety and hygiene of bivalve in the harvesting areas. In 1999, this programme was carried out in five harvesting areas in two provinces, with the number of controlled areas increasing to 12 (5 provinces) in 2001. In 2001, 185,000 tons (95 percent of the total output) of bivalves were controlled (Lam, 2002). Since 1999, NAFIQAVED has also implemented the programme of controlling toxic residues in aquaculture. As of 2005, the control of antibiotic residue has been carried out in 141 concentrated culture areas in 35 provinces (NAFIQAVED, 2006). Vietnam has also enhanced the control of input raw materials used by processing plants, plants producing feed, veterinary drugs, and bio-products used for aquaculture. In 2005, NAFIQAVED inspected 32,000 tons of raw seafood, an increase of three times as compared to 2003. NAFIQAVED also inspected 63 percent of the chemical hygiene parameters for feed in aquaculture (NAFIQAVED, 2020). MOFI has also requested all processing plants of companies dealing with the export of seafood to the US and the EU to build an obligatory Critical Control Point (CCP) at raw material receiving areas in their HACCP in order to control the residue of toxicants prior to use in the processing line (Minh, 2002).

Supplying information and supporting enterprises

In recent years, the Vietnamese Government has paid more attention to information diffusion and to supporting seafood enterprises. MOFI is closely coordinating with the Foreign Ministry and the Trade Ministry to continuously collect and update information on the standards and regulations affecting the seafood industry. Regulations collected and issued by the Government, MOFI and MARD are published and regularly up-dated on the MOFI and NAFIQAVED websites. Every month, NAFIQAVED publishes the control results of local Fisheries Departments and its provincial branches to the aquaculture units in order to ensure hygiene and safety for seafood and to avoid economic

loss caused by poor quality of raw materials. Every year, the MOFI coordinates with the Vietnam Chamber of Commerce and Industry (VCCI), the American Chamber of Commerce (AMCHAM) and the European Chamber of Commerce (EUROCHARM) to organize workshops and training courses to disseminate knowledge on the management of food hygiene and safety and the environment to aquaculture firms and seafood producing and exporting enterprises. For example, in 2005, NAFIQAVED organized a workshop on the veterinary drugs whose use was banned or limited, a training course on regulations on good aquaculture practices (GAP); a workshop introducing the application of managing aquaculture according to HACCP; and a workshop on seafood exports to the US market.

Applying good aquaculture practices

At present, many countries, in particular the US and the EU are applying the procedures of Good Agriculture Practices (GAP) in seafood production and aquaculture to limit the environmental effects of the production process and to guarantee food hygiene and safety for consumers. According to the Ministry of Fisheries' assessment, the US and the EU are likely to enact regulations on the application of the GAP in aquaculture. In advance of this development, MOFI has implemented experimental GAP programmer's nation-wide. In 2014 and 2001, NAFIQAVED carried out an experimental GAP programme for the intensive and extensive culture of monotone at six points of six key fisheries provinces (NAFIQAVED, 2020). The results of this programme are being compiled in an instruction manual to guide the application of the GAP in the intensive and extensive P.monodon culture. MOFI is also drafting regulations for inspecting and certifying culture areas that meet GAP standards, which will be disseminated across the country. MOFI has so far implemented these measures in 12 safe culture areas (without antibiotic residue) in 9 provinces. The investment cost for each area was VND 5 billion, of which VND 2 billion was spent on equipment to test for antibiotic residues and microorganisms during the culture process in accordance with GAP procedures.

4. IMPLICATIONS AND RECOMMENDATIONS

4.1. Implications for coping options with SPS for seafood industry in Vietnam

According to the VASEP (2020), when facing SPS and environmental barriers in export markets, the private sector generally responds by using a strategy of "exit, voice and compliance". In Vietnam, exporting enterprises have applied this approach to cope with regulations set by importing countries in order to enhance exports and increase the market share and competitiveness of Vietnamese seafood products.

Exit option

In the face of strict SPS and environmental standards in the US and the EU, many exporting enterprises have chosen to "exit" these countries and have moved to new markets with less strict technical barriers and SPS control measures. Since 2003, some enterprises have moved their exports to the Japanese market, which

has less strict environmental and hygiene standards than the US and the EU. Moreover, in general, the Japanese relationship with Vietnamese seafood processing companies is conducted with a long-term view, emphasizing quality and freshness, rather than focusing specifically on hygiene standards. Japanese trading houses generally are involved in the design and implementation of contracts to ensure the quality and hygiene of seafood imports. According to Japanese law, the importing company is responsible for cases of poisoning or other problems related to seafood (Lindahl, 2015). Thus, the risks and punishment applied in standard violations in Japan are fairly small. Recently, Vietnamese exporters have explored the Korean market despite its rather high SPS standards. Korea has inspected and consequently recognized that Vietnam's testing laboratories have attained ISO 17025 or the equivalent standard for the control of chemical and antibiotic residues. As a result, exports from Vietnam are not subject to re-control upon arrival in Korea. At present, 266 Vietnamese seafood enterprises are allowed to export to the Korean market (NAFIQAVED, 2020). Vietnam is also developing the export of seafood to China and Chinese Taipei as their standards are less strict than the US and the EU.

Voice option

To cope with market access barriers, exporters can use a "voice" strategy, by gathering in groups and using a common voice to protect the group's interests and change laws or react to standards through negotiation or protest. The Vietnamese Association of Seafood Exporters and Producers (VASEP) was established in 1993 to represent and protect the interests of Vietnam's seafood exporters. With 185 members, the Association frequently organizes annual meetings, conferences to unify objectives and activities; for example, the Association has organized classes to disseminate regulations on food hygiene and safety and the application of HACCP. VASEP has also set up specialized clubs, such as the Catfish club and the Shrimp Committee in order to establish cooperation between enterprises producing the same category of goods. It also organizes the sector to settle issues of common concern, such as fighting against the introduction of extraneous matters into raw seafood, supporting the application of sustainable management systems in aquaculture, such as GAP and HACCP (Mai, 2020). In 2013, VASEP represented member enterprises in proposing that MOFI submit recommendations to the National Assembly to define the crime of introducing extraneous matters into raw seafood as 'an economic security sabotage crime' and to establish mechanisms to severely punish these acts in order to protect the interests and sustainable production of exporting enterprises (Dung, 2015).

VASEP has also developed long-term relationships with overseas seafood associations, exporters and distributors to enlist the support of consumer allies and to lobby to protect Vietnamese trade interests. At present, VASEP is a member of the ASEAN Aquaculture Federation (AAF), the US Fisheries Association, the Singapore Fisheries Association and INFOFISH (Mai, 2020). In 2013, the AAF with the participation of VASEP, criticized the EU for imposing 'the zero residues' standard on nitro furans in shrimps as not being in conformity with international standards. Representatives of

AAF member countries have been unanimous in their efforts to have the EU loosen the permissible antibiotic levels limits for ASEAN seafood imports. VASEP has cooperated with many multilateral and bilateral food and seafood organizations, such as FAO, GLOBEFISH, ITC, SIPPO, JETRO, MPDF, GAA and MSC in helping to improve the competitiveness of small and medium enterprises (SMEs).

Compliance option

Vietnamese exporting enterprises attach great importance to complying with the standards set by their main export markets. Firstly, to raise the capacity to control the quality of the raw material inputs in the processing of seafood products, VASEP has closely cooperated with local fisheries associations and the fishing community to build safe shrimp rearing areas, as well as strengthen the control of the local suppliers of raw materials. VASEP also supports activities to teach fishermen and farmers how to use antibiotics in aquaculture and seafood preservation, as well as coordinates with the provinces to expand production of environmentally friendly goods from Vietnam. Several enterprises have shifted to feed produced by foreign enterprises or by joint venture companies located in Vietnam, such as Cargill, Khanh Hoa, which apply HACCP to ensure the quality of feed from being infected with banned antibiotics, chemicals or micro-organisms. In parallel with the objective of strengthening the control of raw material inputs, the export processing plants have made large investments in food hygiene, safety and environmental management systems to be able to export their products to the US, EU and Japan. According to NAFIQAVED (2020), of the total of 488 industrial-scale establishments involved in seafood production and trading in Vietnam, 350 plants have applied and been acknowledged to have attained the HACCP standard (i.e. they are allowed to export products to the US and Japan), 54 percent of plants have been granted the GMP certificate and 16 percent have been certified to attain the environmental management standard ISO 14000. In Vietnam, 20 enterprises have purchased the ELISA machine to check antibiotic residues in seafood production (Mai, 2020). Other enterprises have taken the initiative to hire NAFIQAVED to conduct regular tests of their products prior to export in order to decrease the risk of rejection in export markets. Vietnam has witnessed a great degree of success in adapting to increased standards in its major export markets. The EU has placed Vietnam on the list of Group 1 of seafood exporting countries. At present, there are 171 enterprises in Vietnam allowed to export their products to the EU, 350 enterprises to the US, 295 to China, 266 enterprises to Korea and 279 enterprises to Canada. As a result of improved control and certification of exported seafood, the rate of goods which have been rejected has decreased from 2.3 percent in 2013 to 1.1 percent in 2014 to 0.7 percent in 2015. The problem of exported seafood infected with CAP and NF has been basically overcome. Vietnam's programme to control toxic residues in cultured products was acknowledged by the EU in 2020. The FDA has also approved the application of the programme to implement HACCP in cultured seafood processing enterprises (NAFIQAVED, 2020; Chau, 2020).

4.2. Recommendations for the government sector

Finalize management mechanisms and legal documents

- Issue a joint ministerial Decree between MARD, MOFI and the Ministry of Health on the preparation of a list and management mechanism for banned veterinary medicines and antibiotics. At present, MOFI has banned 17 kinds of antibiotics, while MARD has only banned five kinds. A joint Ministerial Decree will help to remove the difference in management mechanisms and harmonize activities among ministries. It is also necessary to strengthen the capacity of the staff of the Customs Office and the Market Management Department to enable effective inspection of imports and circulation of veterinary medicines, chemicals and biological products.
- Identify as a crime the act of adding banned substances into aqua products in the civil code, while rectifying Decree No.70/2003/ND-CP on punishments of these crimes.
- Enact an environment protection programme for the fishing industry to prioritize the sustainable development of the sector in line with Resolution No. 41/NQ/TU issued by the Vietnam Political Bureau in 2003 on a national strategy for environment protection in the process of industrialization and modernization.
- Develop a national model for the management of antibiotics, chemical and biological products in the seafood sector. Currently five ministries, namely MOFI, MARD, and the Ministries of Health, Industry, and Trade are responsible for the management of chemical substances and antibiotics, which has resulted in overlapping authority between ministries at both the local and central level. It would be optimal to shift responsibility to an agency specializing in pharmaceutical management similar to the FDA of the US so as to have a unified national management mechanism. Continue to improve management tools
- Establish a coding system to trace the origin of products. In the coming years, major importing markets are likely to issue regulations on tracing of origins and quality of products. This requires MOFI to establish such a system basing on international standards, starting with the provision of information to enterprises to increase their understanding of the significance of such a system.
- Set up a sustainable management plan for fishing and aqua culturing for major catching areas, while taking into account the specific socio-economic developmental priorities of each locality. Support enterprises to meet hygiene and environmental regulations and standards
- Enhance financial assistance to the seafood sector, targeting SMEs involved in aqua product processing to encourage capital investment in applying HACCP or ISO 14000 management systems or in installing pollution treatment devices. The Government should provide access to capital sources and preferential financing to encourage SMEs to increase food safety and environment protection.
- Establish an agency specializing in collecting and distributing fisheries information under MARD. This agency should work closely with the Trade Ministry, AMCHARM, EUROCHARM, VCCI and international standard setting bodies to collect, study, analyze and forecast new standards on hygiene and the environment in Vietnam's

major importers. This agency could also be in charge of establishing official information channels and directing information to enterprises and fisheries management agencies at different levels. This proposal is based on the fact that information provided by the government needs to be most reliable and important for enterprises.

4.3. Recommendations for the private sector

- Seafood exporting enterprises should establish a long term sale strategy, taking into account the cost and effect of regulations on environment protection and food safety in different importing countries and international organizations.
- Seafood processing enterprises should cooperate with the production units or material supplying companies to set up producing and processing consortiums and then apply HACCP, GAP or ISO 14000 throughout the entire production chain to ensure the strict observation of food safety and environmental quality from 'the fishing pond to the eating table'.
- VASEP should play an important role to coordinate with managing agencies to organize seminars to help exporting enterprises understand clearly the requirements and criteria for food safety and the environment in importing markets. Moreover, VASEP should also coordinate with VCCI to run training courses on applying management systems such as HACCP, GAP and ISO 14000 for enterprises.
- VASEP should also coordinate with NAFIQAVED to establish standards and inspect products for antibiotic residues and to finalize standards on food safety and hygiene for seafood producing and processing enterprises.

5. CONCLUSIONS

Vietnamese seafood exports have been increasing rapidly and have made a significant contribution to the country's economic development over the last few years. However, this sector is now faced with complex SPS and environmental standards in its main export markets of the EU, the US and Japan.. Market access for Vietnamese seafood exports has been affected by rigorous and ever-changing standards. Compliance with these standards has placed a heavy burden on Vietnamese exporters, which are mainly SMEs. The cost of compliance has also reduced the competitiveness of Vietnam's seafood industry. In response to stricter market access requirements, the government and private sector in Vietnam has undertaken a number of strategies to secure the entry of its exports. These measures include reforming the legal and regulatory framework, putting in place institutional change, restructuring the supply chain to increase control over the entire production cycle, as well as applying management systems, such as HACCP and ISO 14000. However, this case study shows that the dominant approaches are mostly compliant and defensive for both government and the private sector. For the government, SPS standards have been upgraded mainly in response to regulatory changes in the EU and the US, or based on demands from major customers. Most of the efforts to comply with stricter standards are made at the time standards come in to force as opposed to in anticipation of regulatory change. This approach affords less potential

to manage compliance in a manner that brings about strategic gains and positive social spillovers. For the private sector, there are some cases of exporters adopting proactive and offensive strategies; these firms have foreseen the direction of food safety standards and have made significant efforts to upgrade controls to meet the standards ahead of their competitors. However, this has not been the case in general. In addition, some attempts have been made to exert the “voice” of the private sector in response to market access restrictions imposed by the US and the EU despite the reactive mode of industry as a whole. Finally, it needs to be fully recognized that adopting quality SPS standards and environmental management systems to improve exports, enhance competitiveness and ensure sustainability is not just a technical issue. The accompanying socio-political and cultural dimensions are vital to ensure solutions are developed through imaginative policies, administrative reorientation, institutional arrangements, an informed population and the participation of all stakeholders. It is only through a participatory framework that the ground will be laid for the sustainable development of the Vietnamese seafood sector.

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CONTRIBUTION

All authors have participated in conception, design, analysis and interpretation of the data; drafting the article, revising it critically for important content; and approval of the final version.

ACKNOWLEDGEMENT

This study is funded by the National Economics University, Vietnam