Meeting Standards, Winning Markets

Regional Trade Standards Compliance Report

East Asia 2013

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IDE-JETRO

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This Regional Trade Standards Compliance Report (TSCR) for East Asia is the outcome of a strategic partnership and cooperation between UNIDO and IDE-JETRO that started in the spring 2012. The objective of this cooperation is to conduct joint research and to present new analytical approaches that help to gain insights about the challenges that East Asian developing countries face in complying with product quality and safety standards and regulations in agri-food trade towards both regional and global markets. UNIDO and IDE-JETRO intend that this work will lead to a series of such regional reports.

The present report was prepared by an IDE-JETRO team led by Kaoru Nabeshima (IDE-JETRO) and comprising Tsunehiro Otsuki (Osaka University), Aya Suzuki (University of Tokyo), Vu Hoang Nam (Foreign Trade University), Etsuyo Michida (IDE-JETRO), Romio Mori (JETRO), and Nanae Yamada (IDE-JETRO).

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Ms. Judy Hartley worked as editor and gave the final touch to this report.

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Comments and feedback on the report and the analyses undertaken are welcome and can be addressed to:
tradestandardscompliance@unido.org and
eastasia_tscr@ide.go.jp.

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Acronyms

ADI	acceptable daily intake
AQIS	Australian Quarantine and Inspection Service
AQSIQ	General Administration of Quality Supervision, Inspection and Quarantine, China
ASEAN	Association of Southeast Asian Nations
ASTAC	Ad Hoc Shrimp Trade Action Committee, United States
BAP	Best Aquaculture Practices
BMP	Best Management Practices
BRC	British Retail Consortium
CFA	Catfish Farmers of America
CFVG	French-Vietnamese Center for Management Education
CIQ	Commodity Inspection Quarantine Bureau, China
DDT	dichlorodiphenyltrichloroethane
DOC	United States Department of Commerce
EAP	ASEAN10 countries, China, Hong Kong (China) and Republic of Korea
FAO	Food and Agriculture Organization of the United Nations
FDA	United States Food and Drug Administration
GMP	Good Manufacturing Practice
GSO	General Statistics Office, Viet Nam
HACCP	Hazard Analysis and Critical Control Point
HS	Harmonized Commodity Description and Coding System
IDE	Institute of Developing Economies
ISO	International Organization for Standardization
JAS	Japanese Agriculture Standard Law
JETRO	Japanese External Trade Organization
MARD	Ministry of Agriculture and Rural Development, Viet Nam
MBV	monodon baculovirus
MHLW	Ministry of Health, Labour and Welfare, Japan
MNCs	multinational corporations
MRLs	maximum residue levels
NAFIQAD	National Agro-Forestry-Fisheries Quality Assurance Department, Viet Nam
NGO	non-governmental organization
OASIS	Operational and Administrative System for Import Support of the United States FDA
OHSAS	Occupational Health and Safety Advisory Services
PAD	Pangasius Aquaculture Dialogue
ppb	parts per billion
ppm	parts per million
PRC	People’s Republic of China
PRD	Pearl River Delta
RASFF	Rapid Alert System for Food and Feed, EU
SEAPRODEX	Sea Product Import-Export Corporation, Viet Nam
SQF	Safe Quality Foods
UNIDO	United Nations Industrial Development Organization
USITC	United States International Trade Commission
VASEP	Viet Nam Association of Seafood Exporters and Producers
VINAFIS	Viet Nam Fisheries Society
WTO	World Trade Organization
WWF	Worldwide Fund for Nature

Country abbreviations

Country Name	3-digit Country Code	2-digit Country Code
Brunei Darussalam	BRN	BN
Cambodia	KHM	KH
China, People’s Republic of	CHN	CN
Hong Kong, China	HKG	HK
Indonesia	IDN	ID
Japan	JPN	JP
Lao People's Democratic Republic	LAO	LA
Malaysia	MYS	MY
Myanmar	MMR	MM
Philippines	PHL	PH
Singapore	SGP	SG
Republic of Korea	KOR	KR
Taiwan Province of China	TWN	TW
Thailand	THA	TH
Viet Nam	VNM	VN

Foreword

Takashi Shiraishi

President

Institute of Developing Economies,
Japan External Trade Organization

Li Yong

Director General

United Nations Industrial
Development Organization

East Asian countries have been among the winners of globalization. In recent decades, a number of East Asian economies have, famously, managed to achieve export-led growth and been recognized for increasing their share in global industrial output and manufacturing trade. This has resulted in more domestic employment, wealth creation and poverty reduction. What has received less attention is that a number of these countries have also been quite successful in expanding their agricultural and food exports.

Yet, even East Asian countries continue to face challenges that prevent them from reaping the full benefits of market opportunities in both international and intra-regional trade. To do so, countries need to comply consistently with product quality and safety standards which play an increasingly important role in shaping international trade flows and which are among the main gatekeepers to accessing global markets or supply chains.

In this context, since 2008, UNIDO has taken up the task of systematically analyzing the challenges faced by developing countries as regards compliance with trade standards in the agri-food sector. The results of this work have been widely disseminated and published in UNIDO's *Trade Standards Compliance* (TSC) *Report* series and its *Trade Standards Compliance Footprints*.

Building upon a history of joint research on a variety of development issues including trade capacity-building since 2007, IDE-JETRO and UNIDO have recently entered into a fruitful collaboration to regionalize this trade standards analysis as a complement to the global TSC work. Such regionalized analyses take specific regional circumstances and conditions into account more effectively, which in turn allows for a more specific tailoring of policy recommendations. In preparing these studies, IDE-JETRO is contributing its expertise on supply chains and the trade challenges faced by developing countries in various regions and particularly in East Asia.

The publication of the present UNIDO–IDE-JETRO *Regional Trade Standards Compliance Report for East Asia* represents the first outcome of this collaboration. The Institute of Development Studies (IDS) in Brighton, United Kingdom, the main partner for the global TSC work, also contributed to this research.

With the publication of this regional TSC Report, our organizations aim to enhance transparency on trade standards and to increase awareness and understanding of compliance challenges among all stakeholders in East Asian countries, thereby facilitating and supporting the identification of country needs and priorities.

This TSC Report also represents a strategic decision-making support and policy guidance tool. It is intended to assist policymakers, private sector actors, donor agencies, and technical assistance organizations in taking more informed decisions regarding how to best strengthen the trade standards compliance performance of East Asian countries and how and where to make related investments. The report, thus, aims to support these stakeholders in the design and development of capacity-building programmes in the fields of trade and compliance.

We intend that this pioneering work by IDE-JETRO and UNIDO will lead to a series of regional reports. We are confident that the present and future regional TSC Reports will prove to be useful resource documents and provide important advocacy support for "smarter" and more targeted trade capacity-building and related quality infrastructure development. Ultimately, it is our hope that these reports and analyses, as global public goods, will contribute to stimulating trade and to increasing both the safety of consumers and the prosperity of producers in East Asia.

Executive Summary

Trends in exports and rejections of agricultural food products from East Asia

Since 2000, the value of agricultural and food exports from East Asia[1] has steadily increased, although the exports dipped substantially in 2009 reflecting the global slowdown. The growth was such that in 10 years the value of exports has almost doubled to US$149 billion, which is similar to the value of exports from Latin America.

Within East Asia, Japan represents a large market for agricultural and food exports. In this market, there are a number of East Asian countries that have experienced frequent rejections of their agri-food exports at Japanese ports. These rejections are the result of inspections undertaken by Japanese authorities and indicate that the products in the rejected shipment do not comply with the regulations prevailing in the Japanese market. Similarly, public authorities in other countries refuse and reject the import of agri-food products that are not compliant with their food quality and safety standards and requirements. This report focuses on agri-food products from East Asian countries and analyzes trends, patterns and root causes of such import rejections in four major international markets, namely Australia, the European Union (EU), Japan, and the United States (US).

Among the 10 countries with the highest number of such rejections in the Japanese market, five are from East Asia, including China, Viet Nam, Thailand, Republic of Korea, and Indonesia. Among the agri-food products rejected at Japanese borders, "fish and fishery products" and "fruits and vegetables" are rejected most frequently. Reasons for such rejections vary. The most common root causes of import rejections by Japanese authorities are bacterial contamination, inadequate hygienic condition/controls, and the presence of pesticide residues, mycotoxins, and food and feed additives.

When looking at the rate of rejections per US$ billion of imports (an indicator that is termed unit rejection rate) for Asian exporting countries, food and feed products originating from Japan, Philippines and the Republic of Korea are among the most frequently rejected in the Australian market. In the EU market, China, Thailand and Republic of Korea are among the countries with the highest number of rejections. In the United States market, Hong Kong (China), Republic of Korea, Singapore, Viet Nam and China have rather high rejection rates. So, interestingly, not only lower-income countries but also relatively higher-income countries such as Japan and Republic of Korea perform poorly in some markets. For instance, among Asian countries, Japan saw the largest number of rejections in the Australian market in 2010. Food exports from the Republic of Korea seem to struggle in the Australian, EU and United States markets.

There is also a variation in the predominant reasons for rejection across the four markets analyzed here. In Australia and the United States, non-compliance with labelling requirements results in significant levels of rejection while Japan does not reject for labelling reasons and the EU only makes relatively few rejections on this basis. In contrast, bacterial contamination is the most prominent reason for rejections in Japan. Rejections in relation to hygiene conditions are significant in the United States.

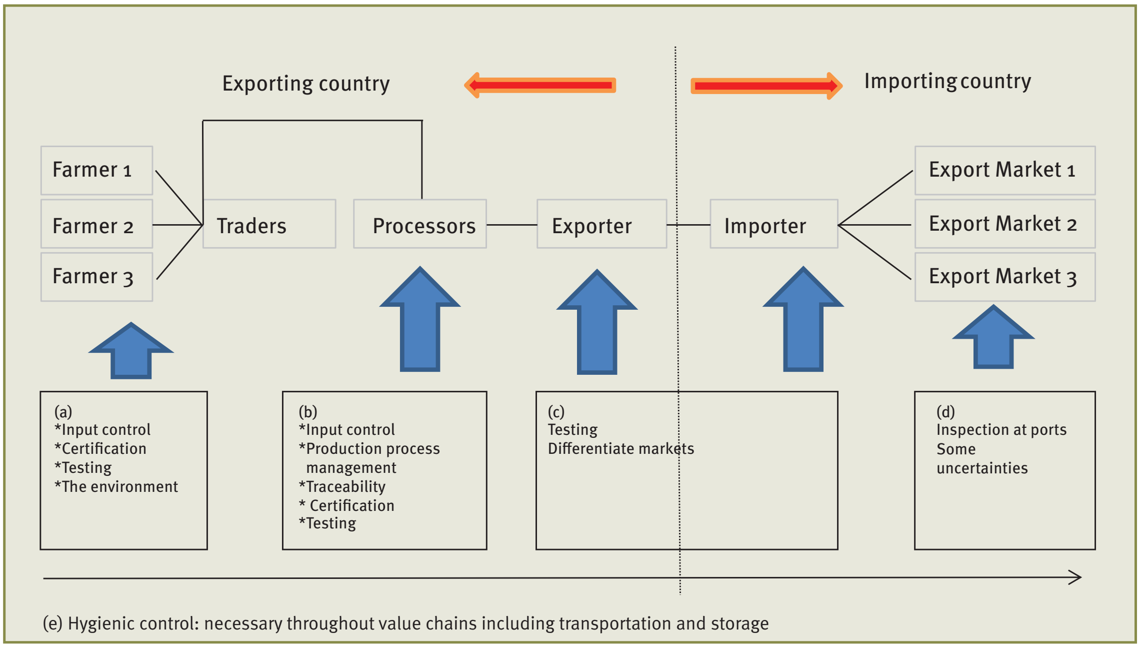
These rejection reasons all point to certain kinds of problems along the supply chain. Figure 1 displays a prototype of an agri-food supply chain, showing the different production stages and highlighting potential sources of non-compliance which possibly lead to rejections by authorities in the importing market. One of the big challenges for East Asia is that food processors cannot meet regulations/standards only with their own efforts but compliance often requires farmers and suppliers in the value chain to take measures as well. These farmers and suppliers could be (and typically are) located throughout the world. Hence, various requests to meet food safety regulations/standards need to be communicated well beyond borders.

Measures or incidents that lead to non-compliance with trade standards and international market requirements related to food quality and safety can occur at different stages along the supply chain, as follows (see also Figure 1):

(a) Pesticide residues, contaminants, mycotoxins, heavy metal, and veterinary drugs residues could enter to the food chain at the farming/growing/primary production stage. The occurrence of non-compliance at this stage of the supply chain may be related to the environment, input procurement or improper usage of these inputs.

1 In this report, we use the following abbreviation: EAP (East Asia and Pacific), LAC (Latin America and Caribbean), SSA (Sub-Saharan Africa), EU27 (EU 27 countries), SAR (South Asia), AUS (Australia), USA (the United States) and ROW (Rest of the World). This categorization follows the World Bank.

Figure 1: Prototype of agri-food supply chain - production stages and potential sources of non-compliance



Source: Author's own illustration

(b) Compliance issues related to bacterial contamination and hygienic conditions, food and feed additives, adulteration/ missing documents, packaging and labeling could occur at the processing stage of the value chain. To avoid or counter this, a proper production management for hygiene controls needs to be in place.

(c) Problems with regard to labeling and documents could occur at the trading stage. As some exporters have more than one market to sell products, they differentiate products depending on the quality grade and the requirements of export markets.

(d) At the final stage of the supply chain, problems can occur in the form of non-compliance with private standards and conducting tests required by buyers. Some uncertainties remain even after product testing is done because importing countries require different testing methods and sampling methods.

(e) Throughout the value chain, hygienic control is crucial. It is needed not only at farm and processors levels but also during transportation and storage. A well-functioning cold chain is also needed to ensure product quality.

The present report examines the challenges of East Asian countries related to the compliance of their agri-food exports with international market requirements and food quality and safety standards, as reflected in the occurrence of import rejections. The report also presents the following four in-depth case studies on important export commodities: frozen vegetables and eel exports from China; and *pangasius* and shrimp exports from Viet Nam.

Case Studies on Chinese Frozen Vegetables and Eel Value Chains

The value of Chinese agro-food exports grew rapidly after the late 1990s, and China's accession to the WTO in 2001 further accelerated this growth. The total export value in 2011 exceeded US$40 billion, 3.6 times that of 2000. As Chinese agriculture deepened its linkage to the global agro-food market and became a major exporter of all kinds of agro-food products, a number of disputes regarding food safety occurred and the Chinese government has started to pay more attention to food safety problems.

Frozen vegetables value chain

Looking at the vegetables sector, it can be observed that, in the past, Chinese agribusinesses invested in the processing stage and introduced cold chain facilities. Some large-scale foreign-invested firms obtained global certifications for sanitation management in the processing stage of the value chain to demonstrate compliance with Hazard Analysis and Critical Control Point (HACCP) requirements and ISO standards. But less attention was paid to the safety of production and procurement of inputs (e.g. raw vegetables) and this has led to significant problems regarding compliance.

The prevailing system was deemed insufficient to correct the problem by the Chinese government and the national General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) decided to solve the problem by allowing only large and uncontaminated land to be used for vegetable production aimed at exports. AQSIQ's Announcement on Inspection and Quarantine of Import and Export Vegetables was put into force in 2002 and specified that a vegetable export firm must have more than 20 hectares of farmland which is assembled into large plots with no prior contamination by banned substances; manage proper pesticide use; ensure traceability; and conduct sample inspection of chemical residuals. Export firms are not allowed to purchase vegetables from places other than registered farms; and each registered farm should have a technical extension officer called field man. This system is called the production base (PB). After the introduction of this system, small-scale processors and brokers who did not have access to PBs were shut out from lucrative export markets completely.

Processed eels value chain

In the case of processed eels imported from China, it was the discovery of antibiotic residues in processed eel in 2002 and the detection of residues of malachite green in subsequent years that raised red flags among Japanese authorities. These incidents have led Japanese authorities to implement monitoring inspections of eels exported from Guangdong province, which is the main cultured eel production site in China, and to temporary halt all exports from Guangdong province. As a result, exports of live and processed eels from China to Japan decreased dramatically.

These incidents of antibiotic and malachite green residues in Chinese eel revealed four basic problems. First, sales of agricultural chemicals and drugs are poorly managed in China. While the government bans sales and distributions of certain chemicals and drugs, these are still widely available in the domestic market. Second, even if proper agricultural chemicals, feeds and drugs are purchased, their applications, usages and dosages are not followed properly. Third, contamination of water for eel growing ponds and soil contamination from rotating several different crops and aquaculture are identified as another cause for rejections by importing countries. Sometimes this is beyond the control of farmers because contaminated water could be introduced to their ponds through flooding especially during the typhoon season. Fourth, there is a problem of mixing of eels from different producers with varying quality at the aggregation and processing stages. Large processing firms typically are vertically integrated and own growing ponds. Once the cultivation is done, eels are exported as live eels or sent to processing plants for further processing. In addition to eels from their own ponds, large firms also purchase from other ponds through middlemen. Small and medium processing firms typically do not have their own growing ponds but rely exclusively on middlemen for the supply of eels needed for processing. Many small and medium firms grow eels for sale in the Chinese domestic market where the standard is less stringent. Some firms buy these eels and mix them with eels meant for exports.

To solve these problems, the Chinese government is now considering revising the current "Regulations on Pesticide Administration". The envisaged revision would mandate the sellers of agricultural chemicals and drugs to keep sales records and to conduct inspections of these chemicals. It would also place licensing requirements on vendors of agricultural chemicals and drugs and it would mandate them to properly educate buyers in order to control the sales, distribution and use of agricultural chemicals and drugs.

To ensure the quality of ponds, the Chinese government requires that eels meant for exports are now grown in registered and certified ponds, and they are to be processed only in registered factories. Complementing these official efforts at controlling inputs and their usages is the increase in the frequency of inspections at various stages of production by both processing firms and government bodies. Some firms have invested in creating a specialized room for inspection, purchased necessary testing equipment, and hired specialized personnel. By doing so, firms can avoid high testing fees and are able to offer testing services to other firms to generate more revenue. In addition, measures like these help to introduce a traceability system.

Case Study on Vietnamese Pangasius and Shrimp Value Chains

Viet Nam is now among the top ten exporters of fish and fishery products and has moved up quickly in the ranking from the ninth rank in 2000 to the fourth in 2010. In 2010, Viet Nam was only after China, Norway, and Thailand in exporting fish and fishery products. Among Viet Nam's seafood exports, *pangasius* and shrimp play important roles. Yet, in recent years some of the seafood exports from Viet Nam have had difficulties in meeting the regulations of importing countries.

In Japanese ports, consignments of Vietnamese seafood have been the major target of intensive inspection in recent years. In May 2012, a shipment of shrimp to a Japanese port from Viet Nam was found to contain Ethoxyquin and this has triggered even more scrutiny regarding shrimp imports from Viet Nam by Japanese authorities. This incident was preceded by the detections in Vietnamese shrimps of Trifluralin in 2010 and Enrofloxacin in 2011. Both are banned substances in shrimp according to Japanese regulations. Shrimp exporters interviewed are expressing great concern over this issue and mentioned that many of the exporters are now refraining from exporting to Japan due to the fear of being detected once again. This could jeopardize future export growth in shrimp.

Data collected by EU, United States, Australian and Japanese authorities all point to relatively high incidents of rejections of Vietnamese fishery and aquaculture products. Over the last couple of years, 2,400 export consignments of Vietnamese fish and fishery products have been rejected by United States authorities (between 2002 and 2010), 422 shipments have been rejected by EU authorities (2002-2010) while Japanese and Australian authorities have refused market entry to 464 (between 2006-2010) and 206 Vietnamese shipments (2003-2010), respectively.

Among various agriculture commodities, fish and fishery products on average seem to face rather high rejection rates when scaled by US$ million imports (i.e. unit rejection rates). In the Japanese market, Viet Nam's unit rejection rate is the highest among all exporters of fish and fishery products while in the EU Viet Nam ranks ninth.

Looking at the root causes of non-compliance underlying the import rejections, one sees that fish and fishery products from Viet Nam are rejected for various reasons in the different markets. In the Japanese market, many rejections occur due to the presence of bacterial contaminants and veterinary drug residues. In the EU market, veterinary drugs residues, bacterial contamination, and detection of heavy metal appear to be problems. In the United States market, compliance with requirements related to hygienic conditions, bacterial contamination, and labeling seem to pose difficulties for Viet Nam fishery exporters. In the Australian market, the bulk of rejections is caused by bacterial contamination, labeling issues, and veterinary drugs residues. This tells us that various weak links exist in the supply chain of fishery and aquaculture products from Viet Nam.

A key problem of the Vietnamese fishery industry seems to lie in the improper usage of inputs. Intensive cultivation of *pangasius* has led to high frequency of disease and this, in turn, has increased the application of prophylactic therapeutic treatments. Similarly, intensive farming of shrimp has necessitated increasing usage of antibiotics.

Many processing firms in the Vietnamese *pangasius* industry have obtained certification on quality management systems such as HACCP, ISO 9001:2000, and SQF 2000. Shrimp processing firms typically also obtain various certificates. In addition, most of the exporters also have in-house laboratories to check chemical residue levels in the products destined for export markets. They test the residue level before purchasing from traders or smallholders and before shipping to export. In interviews conducted for this study, some Vietnamese exporters also mentioned the use of outside labs which can detect antibiotics more accurately for shipment to countries like Japan where the requirements are very stringent. Processors which have a special relationship with foreign importing firms (i.e., subsidiary firms, long-term suppliers, contractors) are in a better position to receive technical advice and information about the required standards relative to independent firms.

Over time, the *pangasius* industry has seen an increase in the number of large farms and a decline in the number of relatively small farms. It is noted that *pangasius* production is more capital intensive compared to other aquaculture production so that smaller farmers cannot compete with larger ones. Processors are shifting the sourcing from smaller farmers to larger ones because the latter can provide them with fish that are of higher quality and better meet standard requirements.

Meanwhile, in the shrimp industry, collectors and/or wholesale buyers collect shrimps from different grow-out farmers and mix them together. This makes it more difficult for the processing companies to trace out the shrimps and ensure their quality than when buying shrimps directly from contracted farmers.

Overall, the greatest difficulty of compliance appears to lie at the level of small-scale producers as there are a large number of them and many even do not know the relevant standards and what they require.

Various governmental and nongovernmental organizations are regulating and facilitating the development of the aquatic sector in Viet Nam. The Ministry of Agriculture and Rural Development (MARD) and provincial Departments of Agriculture and Rural Development are the central and local governmental agencies, respectively, that manage the development of Viet Nam's aquaculture industry. Under MARD, the National Agro-Forestry-Fisheries Quality Assurance Department (NAFIQAD) consisting of six regional centers in Viet Nam is in charge of food safety assurance and quality control in the aquaculture industry. Among their activities and responsibilities, one that is important to the seafood export sector is the regular implementation of monitoring inspections for harmful substances, which are conducted annually according to the "Residue Monitoring Programme for Certain Harmful Substances in Aquaculture Fish and Products". The monitoring programme is considered to follow the levels of requirements by the EU. Besides these state administration agencies, the Viet Nam Association of Seafood Exporters and Producers (VASEP) and the Viet Nam Fisheries Society (VINAFIS) play an effective role in promoting the development of the industry.

Summary of key findings and policy lessons

This report analyzes trends and patterns in rejections of agri-food exports from East Asian countries to the Japanese and other key international markets. Special attention is given to four commodities from two countries: frozen vegetables and eels from China; and *pangasius* and shrimp exports from Viet Nam. These case studies were chosen because they are significant export commodities for these countries that, at the same time, face difficulties in clearing inspections at ports.

One finding that clearly came out from looking at these four commodities and their supply chains is that export activities in these countries are increasingly vertically integrating. This is because to meet the standards set by importing countries (especially those of advanced countries), exporting firms need to put in place some kind of traceability system so that they can identify where the problem occurred and how to deal with such problems when faced with import rejections.

The implication of this trend to vertically integrate is the bifurcation of these industries into export-oriented and domestic-oriented segments. Those that are export-oriented are typically led by large firms that can invest in their own quality control and inspection equipment. They also tend to contract with large farmers for their inputs and provide technical assistance if necessary. In contrast, domestic-oriented firms do not have such capacity to strictly control the quality of their products to the level required by importing countries. Both in China and Viet Nam the government is putting in place stricter domestic standards regarding agricultural and food products, partly motivated by the requirements coming from the export sectors. As income rises, the demand for safer food will only increase also in the domestic markets. Action plans and measures to improve the quality of agricultural and food products should be initiated now so that even smallholder farmers can adjust their production processes to meet higher standards in both international and domestic markets. Without such efforts, small-hold farmers will be further left behind which could potentially lead to an increase in inequality between export- and domestic-oriented sectors, and also between rural and urban areas.

The case studies in these two countries reveal that throughout the supply chain, there are still knowledge gaps among different players with respect to the proper usage of agriculture chemicals and medicines. For cultured aquatic products, in addition to the knowledge on medicines, sufficient knowledge on feeds is also required. To improve upon this knowledge aspect, two efforts need to be undertaken. The first is to raise the awareness among farmers and processors on the proper usages of agriculture chemicals, medicines, and feeds. Such effort needs to be coupled with proper technical assistance so that farmers can readily apply their knowledge in practice. In addition to the awareness raising efforts, the distribution of these chemicals, medicines, and feeds needs to be controlled and recorded more stringently to enable traceability. Furthermore, this kind of efforts should not be restricted to certain sectors but should be applied to a wider variety of commodities if applicable to allow rotation of crops or aquatic products to be cultured and to prevent negative spillovers coming from other farming activities conducted nearby.

Some markets (notably the EU and the United States) put emphasis on obtaining internationally recognized certification (e.g. to ISO or HACCP standards) and this is becoming a necessary condition to export. These certificates work as signaling devices at the processing stage. While difficulties in obtaining such certificates differ across Asian export countries, public assistance to firms may be necessary.

Some firms find it difficult to continuously scan and gather information on the required rules and standards of importing countries, especially when these rules and standards are subject to frequent changes. Industrial associations or similar organizations should have enough capacities to follow the trends in these standards. What is important is that such effort should include not only notifying concerned actors on the changes in the rules and standards, but also to let these players know of anticipated changes in these standards so that they have enough lead time to prepare until changes take effect.

Finally, as the case of China illustrates, the presence of foreign direct investment often provides great benefit to the development of the local industry. Multinational corporations (MNCs) typically have enough experience and capacity to meet the requirements set by importing countries. In addition, they tend to provide necessary technical assistance to local producers so that their products can meet prevailing trade standards. Through these kinds of vertical technology transfer, the competitiveness of local industries can be greatly enhanced. Thus, in addition to strengthening the capabilities through domestic efforts, liberalization of foreign direct investment in this sector could be pursued simultaneously.

1. Analysis of Rejections of Asian Agri-food Exports to Global Markets

For developing countries, securing export markets for their agri-food products is an important source of economic growth and employment. However, to be successful, exporters need to meet the food safety and quality regulations and requirements imposed by the importing countries through sanitary and phytosanitary measures. Inability to meet public regulations results in shipments being rejected at the border. Many countries continue to experience challenges to consistently comply with quality and safety standards and requirements that prevail in international markets. Such instances of non-compliance are reflected in incidents where agri-food products that they want to export are rejected by authorities in the import market. These import rejections do not only have an immediate impact in the form of interrupted trade flows and foregone export revenues but might also harm the country's reputation as an exporter of a certain commodity or product group.

Furthermore, there have been increasing concerns on food safety issues in recent years because of a number of highly publicized "food scares" and "food scandals" both in developed and developing countries. As a consequence, related regulations and requirements have become more stringent. This can have a large impact on the exporters from developing countries, and their development prospects and their efforts to reduce poverty.

Identifying what causes import rejections will help exporting countries better comply with the food safety and quality standards of importing countries and reduce the number of rejections. The standards or requirements are often not uniform across countries. Rather, there are variations among countries reflecting differences stemming from climate, geography, people's tastes and other factors. Therefore it is necessary to determine whether products are rejected because of the standards or requirements imposed by a certain importing country or because of root causes that are common across different import markets. If commonalities and differences in reasons for rejection in different markets are identified, it is easier for exporting countries to understand what kinds of general measures to take to reduce rejections across markets and what specific measures are needed in certain markets. Yet, this issue has been rather neglected in economic research until recently because of paucity of data. Much of the previous research on quality compliance issues of agri-food product exports from developing countries is based on specific case studies.

In light of this situation, UNIDO has compiled an internationally comparable dataset on import rejections for major importing markets (the United States and the EU) and published the first Trade Standards Compliance Report (TSCR) (UNIDO 2010) in 2010. The data gathered and presented in the TSCR enabled stakeholders (including policymakers, international development organizations, donor agencies and researchers) to compare the performance of each country in terms of its trade standards compliance capabilities. The data also allow for an estimation of the financial implications of non-compliance. For instance, an estimated US$18 million worth of fish and fishery products exported from Asian countries to the United States market were lost in 2010 due to import rejections. From 2002 to 2010, the accumulated figure was US$285 million. Similarly, for other products, the lost opportunities loom large.

The present report builds on the previous TSCR while expanding the data coverage by adding Japan and Australia as importing markets. In addition, this report regionalizes the analysis by paying specific attention to exporting countries in East Asia. Countries examined in this report are: Brunei Darussalam, Cambodia, China, Indonesia, Japan, Republic of Korea, Lao People's Democratic Republic, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Viet Nam. The TSCR 2010 provided an analysis of global trends and patterns in import rejections in the agri-food sector. Meanwhile, the present regional report focuses on the performance of East Asian countries and analyzes their trade standards compliance capabilities in more detail, using the updated import rejection data compiled by UNIDO as well as providing in-depth case studies of selected agri-food supply chains in China and Viet Nam. Trade in agri-food products is organized through specific supply chains linking different stages of production and marketing, although such supply chains are shorter and simpler compared to those associated with manufactured goods. Because supply chains play an important role, the capacity to meet food safety standards rests on the capabilities of actors along the supply chain. The case studies in this report will examine each element in a supply chain in order to clearly identify the weak(est) links in a specific chain that may result in rejections in export markets. This kind of analysis will enable policymakers to identify the issues that warrant public interventions.

The structure of the report is as follows: chapter 1 provides an overview of overall trends in the export performance and trade standards compliance performance of East Asian countries in the agri-food sector. Chapter 2 examines the performance of East Asian countries in an important importing market in East Asia, namely the Japanese market. Chapters 3 to 5 look at specific agri-food product supply chains. Chapter 3 presents a case study on frozen vegetable exports from China. Chapter 4 provides a case study on the supply chain for cultured eels exported from China. Chapter 5 looks into seafood (*pangasius* and shrimp) exports from Viet Nam. The annexes provide more information for each country to complement the analyses provided in the report.

1.1 Introduction

As industrialisation has progressed in East Asia, agriculture's share in GDP declined from a substantial 22.1 per cent, on average, in 1990 to 15.6 per cent by 2000 and further to 11.9 per cent in 2010. The share of agricultural employment in total employment has also declined from 32.3 per cent in 2000 to 15.8 per cent in 2009. These figures imply that East Asia is rapidly turning away from agriculture. However, a country-by-country examination reveals that agriculture still plays an essential role in economic development in many East Asian countries although the way in which agriculture contributes to economic development differs across countries.

In high-income countries – namely, Brunei Darussalam, Japan, Singapore and Republic of Korea – the GDP share of agriculture is small (less than 3 per cent in 2010) whereas in low-income countries such as Cambodia and Lao People's Democratic Republic it is over 30 per cent, showing a high dependency on the agricultural sector (see Table 1.1). Table 1.1 shows that middle-income countries such as Thailand, Malaysia, Indonesia, the Philippines and Viet Nam are also highly dependent on agriculture, with its share in GDP ranging from 10 to 20 per cent. They are also active exporters of agricultural and food products. When we focus on the low- and middle-income countries in the region, the share of agricultural employment is still high, accounting for around 40 to 50 per cent. The importance of agriculture in creating employment is explicitly described by Richter (2006: 46) for Thailand:

While the importance of agriculture as job provider has declined across the country, agriculture remains the dominant employer, even during the off-season, still providing jobs to more than 45 to 50 per cent of workers in the north, northeast and south. The key sector that provides monthly wage jobs in the northeast, north or south is services rather than industry.

This tendency can be observed in other East Asian countries as well (see Figure 1.1).

Note: East Asia is defined as comprising Brunei Darussalam, Cambodia, Indonesia, Malaysia, Lao People's Democratic Republic, Myanmar, Philippines, Singapore, Thailand, Viet Nam, China, Hong Kong (China), Macao (China), Japan, Democratic People's Republic of Korea and Republic of Korea.

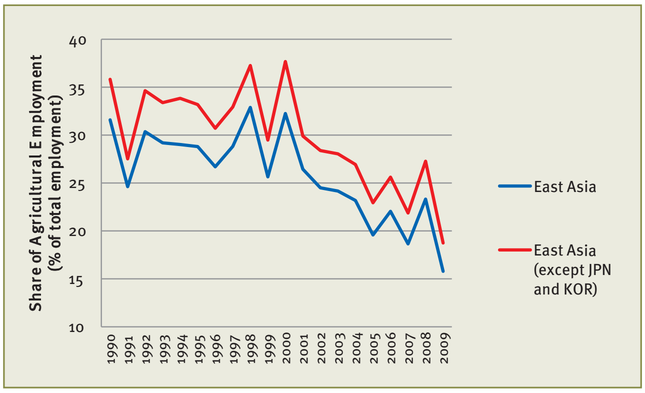
The importance and role of the agricultural sector can vary according to stage of economic development. The *World Development Report 2008* (World Bank, 2008) categorises the way that agriculture contributes to a country's economic development into three types: agriculture-based, transforming, and urbanised countries. In agriculture-based countries, which are typically low-income countries, agriculture itself contributes to economic growth due to its dominance in the country's production. In transforming countries, which are mostly middle-income agricultural exporting countries in East Asia, agriculture is no longer

Table 1.1: *Share of agricultural sector in GDP in East Asian countries (%)*

Country	1990	2000	2010
Brunei Darussalam	1.0	1.0	0.8
Cambodia	-	37.8	36.0
China	27.1	15.1	10.1
Hong Kong, China	-	0.09	-
Indonesia	19.4	15.6	15.3
Japan	2.1	1.5	1.2
Republic of Korea	8.9	4.6	2.6
Lao PDR	61.2	45.2	32.7
Macao, China	-	0	0
Malaysia	15.2	8.6	10.6
Myanmar	57.3	57.2	-
Philippines	21.9	14.0	12.3
Singapore	0.3	0.1	0.03
Thailand	12.5	9.0	12.4
Viet Nam	38.7	24.5	20.6
Average (all East Asia)	22.1	15.6	11.9
Average (Japan and Republic of Korea excluded)	25.5	17.6	13.7

Source: World Bank World Development Indicators database

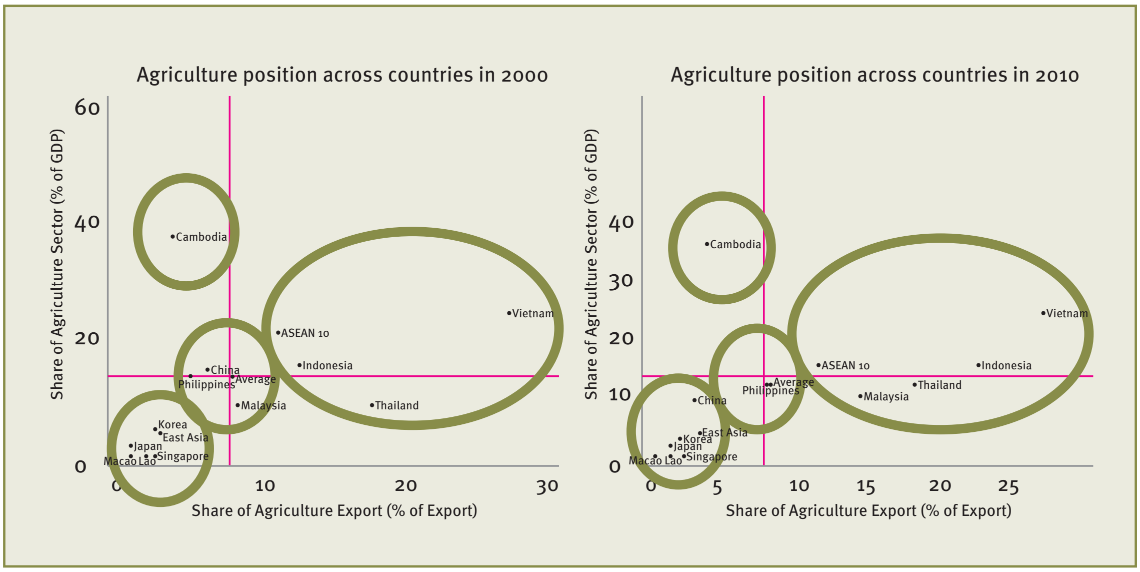
Figure 1.1: *Agricultural employment (per cent of total employment) in East Asia*



Source: World Bank World Development Indicators database

the engine of growth, but the engine of poverty reduction along with structural transformation (see Figure 1.2). In urbanised or industrialised countries, agriculture is a minor industry, but it remains important through its direct and indirect role in protecting the natural environment alongside further industrialisation. In agriculture-based countries such as Lao People's Democratic Republic, Cambodia and Myanmar, growth in their agricultural sectors through technological progress has considerably contributed to economic growth. As a result, economic growth has led to poverty reduction for the majority of their populations because poor people tend to be concentrated in rural areas. These countries mainly produce agricultural products for domestic consumption, as shown in Figure 1.2, because they do not have

Figure 1.2: Relevance of agriculture for the economy (2000 and 2010)



Source: World Bank World Development Indicators database

sufficient capacity to produce enough for export. Thus, growth in agricultural value added through adoption of advanced technology and new crops can serve as a key engine of economic growth, and it is an essential step towards becoming an active exporter of agricultural products.

Thailand, Viet Nam, the Philippines, and Indonesia as well as China, are categorised as transforming countries according to *World Development Report 2008* (World Bank, 2008), and have exhibited rapid economic growth through industrialisation. While industrialisation primarily benefits the urban population, rural poverty tends to be less severe than in the pre-industri-

Table 1.2: GDP share of food processing industry in East Asian countries (%)

Year	Countries										
	Cambodia	China	Hong Kong, China	Macao, China	Indonesia	Japan	Republic of Korea	Malaysia	Philippines	Thailand	Viet Nam
1991	-	4.77	-	0.27	5.54	2.37	2.90	2.71	8.29	2.61	-
1992	-	4.35	-	0.21	5.51	2.47	2.81	2.76	7.58	-	-
1993	4.71	4.34	-	0.23	5.20	2.46	2.70	2.58	8.23	5.92	-
1994	-	4.72	-	0.26	4.72	2.48	2.56	2.49	7.50	4.76	-
1995	1.90	4.56	-	0.23	4.59	2.45	2.32	2.73	7.36	-	-
1996	-	5.07	-	0.27	4.14	2.41	2.37	2.45	6.59	6.37	-
1997	-	5.31	-	0.30	-	2.37	2.27	2.37	6.44	-	-
1998	-	5.14	-	0.34	5.33	2.50	2.43	-	8.16	7.66	5.19
1999	-	4.90	-	0.34	5.12	2.59	2.48	3.04	6.56	-	-
2000	1.11	4.62	0.24	0.38	4.99	2.54	2.33	2.47	-	5.95	5.60
2001	-	4.49	0.28	0.39	6.08	2.51	2.15	2.59	7.03	-	-
2002	-	4.50	0.32	0.31	5.59	2.58	2.04	2.54	-	5.76	-
2003	-	4.22	0.29	0.20	7.07	2.51	1.94	2.53	5.98	-	-
2004	-	3.87	0.27	0.19	6.95	2.46	2.02	2.38	-	-	-
2005	-	3.95	0.25	0.17	6.84	2.37	1.82	2.74	5.66	-	-
2006	-	3.90	0.27	0.17	7.03	2.28	1.71	2.64	5.28	5.50	-
2007	-	3.88	0.30	0.29	6.94	2.30	-	2.52	2.51	-	-
2008	-	-	0.28	0.25	-	-	-	-	2.56	-	-

Source: World Bank World Development Indicators database

Table 1.3: Share of food processing industry in manufacturing in East Asian countries

Year	Countries										
	Cambodia	China	Hong Kong, China	Macao, China	Indonesia	Japan	Republic of Korea	Malaysia	Philippines	Thailand	Viet Nam
1991	53.17	14.67	10.18	1.87	25.97	8.91	10.58	10.60	32.76	9.26	-
1992	20.02	13.30	10.09	1.80	25.09	9.63	10.56	10.71	31.33	-	-
1993	-	12.77	10.29	2.59	23.33	10.18	10.06	9.96	34.70	19.96	-
1994	-	14.05	12.68	3.16	20.23	10.70	9.39	9.34	32.26	16.10	-
1995	-	13.54	10.50	3.10	19.00	10.58	8.41	10.34	32.01	-	-
1996	-	15.12	11.80	3.50	16.18	10.37	8.87	8.80	28.88	21.43	-
1997	-	16.00	10.33	3.73	-	10.28	8.61	8.37	28.91	-	-
1998	-	16.15	11.62	3.68	21.32	11.08	8.89	-	34.80	24.81	30.30
1999	-	15.51	7.93	4.00	19.69	11.70	8.83	9.84	27.96	-	-
2000	6.56	14.39	7.16	4.87	18.00	11.43	8.26	7.99	-	17.70	30.19
2001	-	14.18	9.04	4.45	20.92	12.01	8.09	8.82	28.52	-	-
2002	-	14.34	11.38	3.30	19.45	12.49	7.79	8.68	-	17.10	-
2003	-	12.84	10.99	3.59	25.03	11.97	7.52	8.44	24.27	-	-
2004	-	11.97	10.77	4.06	24.78	11.58	7.30	7.85	-	-	-
2005	-	12.15	10.27	4.36	24.96	10.98	6.60	9.24	23.55	-	-
2006	-	11.85	11.57	10.19	25.54	10.71	6.32	8.98	22.34	15.69	-
2007	-	11.81	14.48	12.01	25.64	10.83	-	9.07	-	-	-
2008	-	-	14.42	-	-	-	-	-	-	-	-

Source: World Bank World Development Indicators database

alisation period because industrialisation is often made possible by sufficient agricultural productivity. Agriculture no longer plays the prominent role that it did in the early stages of development in these countries. Thus, it is more appropriate to view growth in the agricultural sector as a means of reducing poverty and inequality, particularly between rural and urban areas in the transforming countries. History tells us that the growth success stories in England, the United States, Japan, and Republic of Korea were initiated with an increase in agricultural productivity and this view is postulated by a number of studies. Most importantly, the agricultural sector provides labour for the manufacturing sector (e.g., Johnston and Mellor, 1961).

Furthermore, transforming countries tend to be actively engaged in agricultural and food export on account of their technological capacity and comparative agricultural advantage, even though their main strategic interest is in moving towards manufacturing production. Thus, it is important for the region and other regions to liberalise trade through reduction of tariff and non-tariff barriers so that these countries can take full advantage of export opportunities.

At the initial stages of industrialisation, the food processing industry typically emerges and serves as a primal buyer of agricultural products. In East Asia, the food processing industry accounted on average for 2.7 per cent of GDP and 14.0 per cent of manufacturing industry in 2007. In agriculture-based countries, the GDP share of the processing industry is very low (for example, 1.1 per cent in Cambodia), but in transforming countries the share ranges from roughly 2 to 5 per cent (see Table 1.2 and Table 1.3). The food processing industry also employs a large number of workers in terms of total manufacturing employment. It has strong backward linkages with the agricultural sector, and the growth of the food processing sector leads to growth of the agricultural sector (Anriquez and Stamoulis, 2007).

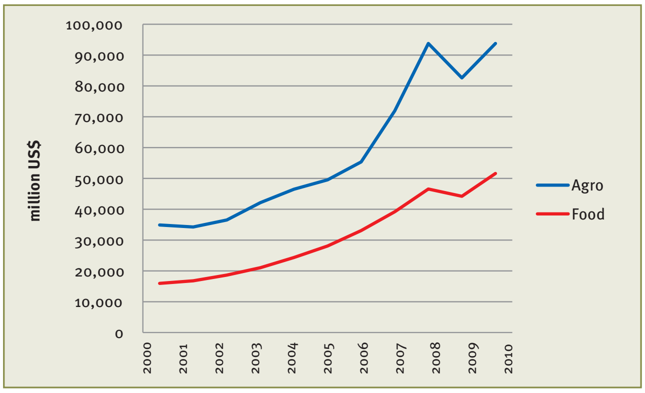
1.2 Trends in agricultural and food product exports from East Asia

Since 2000, the value of agricultural and food exports from East Asia[1] has steadily increased, although exports dipped substantially in 2009 reflecting the global slowdown. The growth was such that in ten years the value of exports almost doubled. When agricultural and food products are separated, the trend is similar, with the value of agricultural products about twice that of the food exports. In fact, both move almost hand-in-hand (see Figure 1.3). In terms of total exports, agricultural and food products account for only 2.3 per cent and 1.3 per cent of exports in East Asia[2], respectively (see Table 1.4). Relative to other countries or regions, the share of these products in total exports is rather small, reflecting the fact that the bulk of East Asia's exports are dominated by manufactured goods. In contrast to East

1 This report uses the following abbreviations: EAP (East Asia and the Pacific); LAC (Latin America and Caribbean); SSA (Sub-Saharan Africa); EU27 (EU 27 countries); SAR (South Asia); AUS (Australia); US (the United States); and ROW (Rest of the World). These categories reflect World Bank practice.

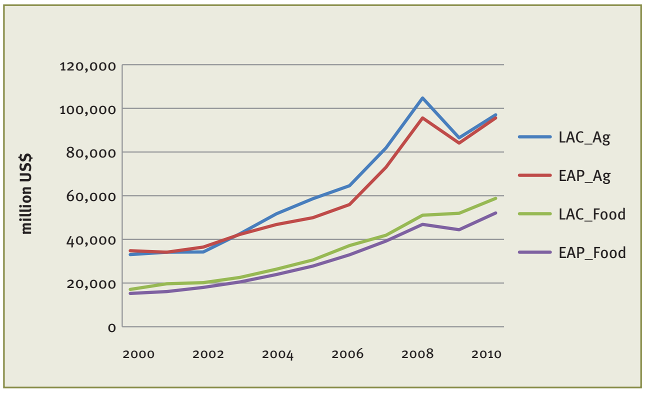
2 East Asia consists of ASEAN10 countries (Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, The Philippines, Singapore, Thailand, Viet Nam), China (including Hong Kong), Japan and Republic of Korea.

Figure 1.3: Trends in agricultural and food exports from East Asia, 2000-2010



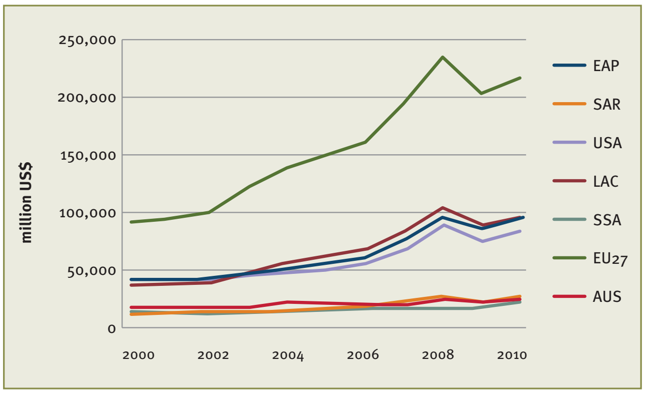
Source: UN Comtrade database

Figure 1.6: Comparison of agricultural and food product exports for LAC and EAP



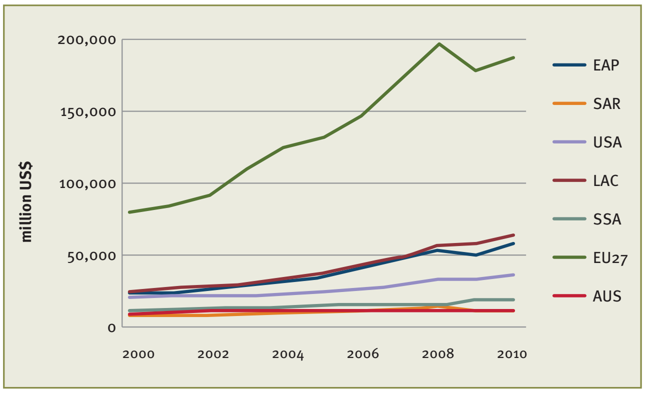
Source: UN Comtrade database

Figure 1.4: Agricultural exports by region



Source: UN Comtrade database

Figure 1.5: Food exports by region



Source: UN Comtrade database

Asia, Latin American countries rely heavily on agricultural and food product exports. Close to one fifth of exports from Latin American countries comes from agricultural and food products (see Table 1.4). Other countries and regions also rely on exports of agricultural goods and/or food products.

Although the shares of agricultural and food product exports are small in East Asia, in value terms, East Asia's exports of agricultural and food products are substantial. The EU is by far the largest exporter of agricultural and food products in the world (see Figure 1.4 and Figure 1.5). After the EU, East Asia is the second or third largest exporting region in the world, competing head-to-head with Latin American countries. In fact, East Asia and Latin America export similar amounts of agricultural and food products (see Figure 1.6). Even though East Asian countries export widely to many countries, for agricultural and food exports the regional market of East Asia is the main market. In 2010, close to half (47.5 per cent) of agricultural and food exports from East Asia were destined for East Asian countries, followed by 11.8 per cent to the EU and 10.5 per cent to the United States (see Table 1.5). Although the export share to the East Asia region has declined by 8.3 per cent since 2000, in terms of absolute export values, East Asia itself is still the major market and is rapidly growing (see Figure 1.7). At country level, agricultural and food exports from China (including Hong Kong) to the East Asian market are the largest (see Table 1.6). Special attention should be given to frozen fishery products and frozen vegetable products because they account for a significant proportion of exports from East Asian countries (in 2009 frozen fishery products accounted for 17.6 per cent of foodstuff exports from East Asia and frozen vegetable products for 7.4 per cent (see Table 1.7)). China is a

Table 1.4: Share of agriculture/food in total exports (%), 2010

	EAP	AUS	EU27	LAC	SAR	SSA	US	ROW
Agriculture	2.3	8.7	4.6	11.3	7.9	6.2	6.9	**3.7**
Food	1.3	2.1	3.8	6.9	2.0	5.1	2.5	**2.3**
Ag + Food	3.6	10.8	8.2	18.2	9.9	11.3	9.4	**6.0**
Other	96.4	89.3	91.7	81.8	90.1	88.8	90.6	94.1

Source: UN Comtrade database

Table 1.5: Export market shares of EAP in 2010 (%)

	Agriculture	Food	Agriculture + Food
Total Export Value	US$95,781,988	US$52,964,880	US$148,746,868
AUS	0.9	3.0	1.6
EAP	44.7	52.7	47.5
EU27	12.7	10.2	11.8
LAC	1.9	1.8	1.9
SAR	11.3	2.0	8.0
SSA	4.6	2.2	3.8
US	8.5	14.1	10.5
ROW	15.4	14.0	14.9
Total	100.0	100.0	100.0

Source: UN Comtrade database

Table 1.6: Exports from EAP countries (including Japan) to the EAP region in 2009 (US$1,000)

Agriculture		Food	
Total	36,954,990	Total	23,078,8002
China (incl. Hong Kong)	12,798,299	China (incl. Hong Kong)	8,692,790
Indonesia	5,706,039	Thailand	4,935,365
Malaysia	5,912,405	Singapore	2,801,643
Thailand	4,558,444	Malaysia	1,858,311
Viet Nam	4,098,922	Indonesia	1,363,946
Republic of Korea	1,303,970	Republic of Korea	1,296,740
Japan	1,064,869	Japan	1,151,994
Singapore	762,033	Viet Nam	638,476
Philippines	738,053	Philippines	333,977
Myanmar	NA	Myanmar	NA
Cambodia	11,956	Cambodia	5,560

Source: UN Comtrade database

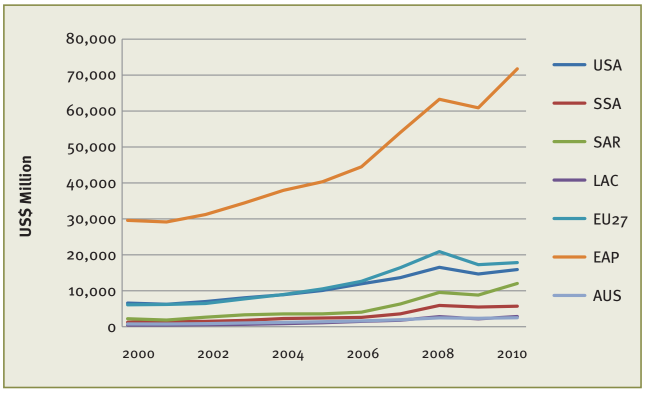
Table 1.7: Vegetables and fish exported to all regions from EAP countries in 2009 (US$1,000)

	Vegetables 7.4% of Agriculture		Fish/Shrimps/Eels 17.6% of Agriculture
Total	6,251,024	Total	14,933,252
China (incl. Hong Kong)	5,491,024 (87.8%)	China (incl. Hong Kong)	5,575,876 (37.3%)
Indonesia	60,477 (1.0%)	Viet Nam	3,313,391 (22.2%)
Thailand	589,030 (9.4%)	Thailand	3,255,106 (21.8%)
Viet Nam	48,556 (0.8%)	Indonesia	1,337,594 (9.0%)
Malaysia	45,249 (0.7%)	Republic of Korea	513,284 (3.4%)
Singapore	7,430 (0.1%)	Malaysia	367,960 (2.5%)
Japan	6,295 (0.1%)	Japan	372,068 (2.5%)
Republic of Korea	1,744 (<0.1%)	Philippines	98,992 (0.7%)
Philippines	1,219 (<0.1%)	Singapore	98,980 (0.7%)

Note: Vegetables include codes 0710 and 2004 of the Harmonized Commodity Description and Coding System (HS). The HS codes for fish are 030269, 030379, 030410, 030420 and 030490; 030613, 030623 and 160520 for shrimps; and 030192, 030266 and 030376 for eels.

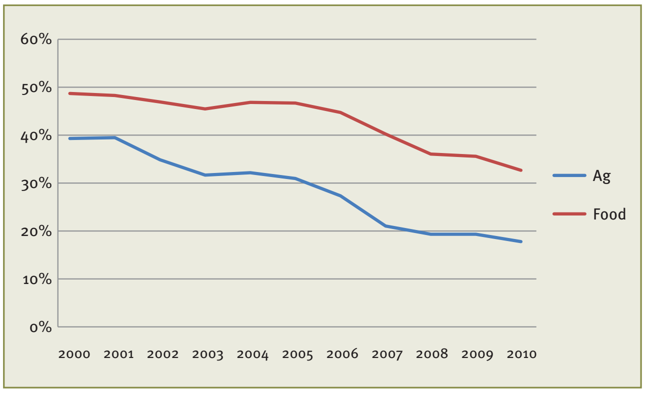
Source: UN Comtrade database

Figure 1.7: *Value of exports to various regions from East Asian countries, 2000-2010*



Source: UN Comtrade database

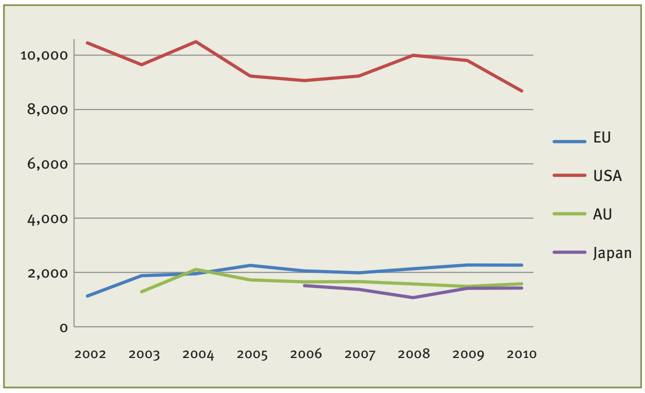
Figure 1.8: *Share of the Japanese market in exports from East Asia, 2000-2010*



Source: UN Comtrade database

leading exporter of both frozen fishery and vegetable products in East Asia. Within East Asia, Japan is a main importer of both agricultural and food products. In 2010, the Japanese market represented 20 per cent of the market for agricultural exports from East Asian countries and one-third of food product exports (see Figure 1.8). In addition, the Japanese market is considered to be highly sophisticated (i.e. exporters and sellers can expect higher margins) and also to have stricter standards. Success in the Japanese market can be a sign of better competitiveness in other markets. Because the Japanese market is a significant market in East Asia, this report emphasises Japanese import rejections of shipments coming from other East Asian countries.

Figure 1.9: *Number of food and feed import rejections in four markets*



Note: Data for Australia start from 2003, data for Japan start from the latter half of 2006.

Source: UNIDO dataset and analysis, based on EU RASFF, US OASIS, AQIS, and Japanese MHLW data

1.3 General trends in import rejections of East Asian agri-food products

Figure 1.9 shows the numbers of import rejections in four key international markets between 2002 and 2010. The United States records the highest number of rejections of around 8,000 to 10,000 each year while the EU, Australia and Japan reject around 1,000 to 2,000 consignments of imported food every year.

As the number of rejections depends, amongst other things, on the number of imports, the frequency of rejections per import value, the so-called unit rejection rate (UNIDO, 2010), is a more telling indicator than the absolute numbers. Table 1.8, thus, compares this unit rejection rate across the four markets. Australia rejects food and feed products most frequently among the four markets with 214 detentions per US$ billion imported, followed by 86 for the United States, 22 for Japan, and 17 for the EU.

The frequency of rejections varies among the importing countries for various reasons. Among these, the most important is that types of imported food and feed products vary across markets. In Australia, imports of beverages accounted for 0.7 per cent of Australia's total import value in 2010 and these are the largest category within the food sector, followed by preserved food (0.4 per cent), baking-related products (0.4 per cent), and fish and seafood (0.3 per cent). In the EU, fish and seafood (0.9 per cent) form the largest import category among food products followed by edible fruits (0.8 per cent), and nuts, spices, coffee and tea (0.5 per cent). In Japan, fish and seafood account

Table 1.8: *Import rejection frequency of food and feed in the four markets in 2010*

	Japan	Australia	EU	USA
Import value (US$ million)	61,421	6,974	125,436	99,258
Rejections	1,338	1,492	2,171	8,513
Unit rejection rate (Rejections per US$ billion)	22	214	17	86

Source: UNIDO dataset and analysis, based on EU RASFF, US OASIS, AQIS, and Japanese MHLW data

Table 1.9: Import rejection cases by product category in 2010

Product category	Australia		EU		United States		Japan	
	Cases	Share (in %)	Cases	Share (in %)	Cases	Share (in %)	Cases	Share (in %)
Beverage	188	11.8	43	2	504	6.0	172	12.9
Cereals and bakery products	349	22.0	111	5.1	1,164	13.9	195	14.6
Confectionery and sugar	44	2.8	37	1.7	829	9.9	139	10.4
Dairy	94	5.9	26	1.2	329	3.9	19	1.4
Fats and vegetable and animal oils	26	1.6	17	0.8	32	0.4	19	1.4
Feed materials	0	0.0	116	5.3	206	2.5	0	0.0
Fish and fishery products	237	14.9	421	19.4	1,627	19.4	295	22.0
Food additives	0	0.0	0	0	35	0.4	18	1.3
Fruits and vegetables and products	207	13.0	425	19.6	2,053	24.5	231	17.3
Herbs and spices	77	4.8	205	9.4	889	10.6	41	3.1
Meat and meat products	18	1.1	88	4.1	14	0.2	95	7.1
Nuts, nut products and seeds	75	4.7	522	24	159	1.9	104	7.8
Other processed foods	272	17.1	159	7.3	527	6.3	9	0.7
Other products of animal origin	1	0.1	1	0	0	0.0	1	0.1
Total	**1,588**	**100**	**2,171**	**100**	**8,368**	**100**	**1,338**	100

Source: UNIDO dataset and analysis, based on EU RASFF, US OASIS, AQIS, and Japanese MHLW data

Table 1.10: Reasons for import rejections in 2010, rankings in parentheses

Reason for rejection	Australia	Japan	United States	EU
Labelling	1,165 (1)	0	5,843 (1)	16 (13)
Bacterial contamination	219 (2)	311 (1)	1,350 (5)	253 (4)
Adulteration/missing document	218 (3)	8 (9)	1,472 (4)	166 (6)
Other contaminants	89 (4)	32 (7)	188 (7)	132 (7)
Pesticide residues	73 (5)	265 (3)	738 (6)	347 (2)
Heavy metal	25 (6)	11 (8)	38 (9)	71 (9)
Mycotoxins	39 (7)	149 (5)	26 (10)	679 (1)
Veterinary drugs residues	20 (8)	86 (6)	180 (8)	58 (11)
Additive	21 (9)	178 (4)	1,816 (3)	291 (3)
Hygienic condition/controls	0	287 (2)	2,046 (2)	238 (5)
Other microbiological contaminants	0	0	N/A	123 (8)
Packaging	N/A	0	13 (12)	40 (12)
Others	41	11 (8)	19 (11)	69 (10)
Total	1,910	1,338	13,729	2,483

Note: Reasons for rejections are sorted according to Australia's ranking of reasons. The number in parentheses indicates the rank.

Source: UNIDO dataset and analysis, based on EU RASFF, US OASIS, AQIS, and Japanese MHLW data

for most food imports, making up 1.7 per cent of total imports, followed by meat (1.2 per cent) and cereals (1.0 per cent). In the United States, beverages are the largest product category consisting of 0.8 per cent, then fish and seafood (0.6 per cent), edible fruit and nuts (0.5 per cent) and spices, coffee and tea (0.3 per cent) follow. As Table 1.9 shows, rejection frequency differs across food products, which might lead to different rejection frequencies across countries with different product import structures. Secondly, as discussed earlier, food safety standards and related requirements, including those regarding labelling and packaging, differ between countries. Table 1.10 shows the reasons for rejection in the four major importing markets in

Table 1.11: Fifteen countries with the most frequent agri-food import rejections and their import shares in 2010 (%)

Rank	Japan		Australia		EU		United States	
		Import share		Import share		Import share		Import share
1	**China**	**14.0**	**China**	**6.9**	Iran	0.3	Mexico	15.4
2	United States	24.4	**Japan**	**0.6**	Turkey	3.5	India	1.9
3	**Viet Nam**	**1.7**	India	1.6	**China**	**5.2**	**China**	**6.4**
4	**Thailand**	**6.1**	United States	10.6	India	3.0	UK	2.2
5	Ghana	0.2	**Thailand**	**7.0**	United States	7.6	Canada	16.6
6	Ecuador	0.3	Italy	4.1	**Thailand**	**2.6**	**Viet Nam**	**2.0**
7	**Indonesia**	**1.8**	**Philippines**	**0.4**	Brazil	8.4	Dominican Republic	0.5
8	Italy	1.2	**Rep. of Korea**	**0.7**	Argentina	4.2	**Thailand**	**4.2**
9	**Rep. of Korea**	**2.9**	**Malaysia**	**4.1**	**Viet Nam**	**2.1**	**Japan**	**0.8**
10	Canada	6.4	**Viet Nam**	**2.9**	**Indonesia**	**3.1**	**Indonesia**	**2.4**
11	India	1.5	**Indonesia**	**1.8**	Egypt	0.6	**Rep. of Korea**	**0.5**
12	France	2.6	France	3.2	Ghana	0.3	**Philippines**	**1.2**
13	**Philippines**	**2.0**	UK	3.2	Morocco	2.8	France	3.5
14	Brazil	4.0	South Africa	0.9	Ukraine	1.6	Italy	3.5
15	Australia	7.1	Sri Lanka	0.4	Nigeria	0.6	Pakistan	0.1

Note: Ranking is according to total cases during 2006–2010 for Japan, 2003–2010 for Australia, 2002–2010 for the EU, and 2002–2010 for the United States

Source: UNIDO dataset and analysis, based on EU RASFF, US OASIS, AQIS, and Japanese MHLW data, UN Comtrade

2010. For example, Australia does not list packaging as a reason for rejection while the EU does not list "other microbiological contaminants". Moreover, among the consolidated list of reasons, their composition is diverse across the four markets. While Australia and the United States record labelling as the most frequent reason for rejection, Japan reports no cases of rejection through non-compliance in labelling and the EU reports very few problems related to labelling. The weights and stringency of each rejection reason vary across countries; some markets have more stringent food safety standards than others and some markets have more detailed labelling requirements and so on. Thirdly, the methods used to check, sample and test can also differ. Fourth, the frequency of inspections also differs across markets.

1.4 Performance of Asian countries in the major markets

To improve capacity to meet the standards imposed by an importing country, the commonalities and differences in rejections across markets need to be analyzed. Specifically, one needs to examine in detail the reasons for rejections to identify rejection reasons that are common across the importing countries and those that are specific to certain markets. By identifying common challenges across importing markets, an exporting country could take effective general measures to enhance competitiveness across the markets. In addition, some markets have specific requirements that exporting countries are finding difficult to meet, in which case it is in the interests of exporting countries to pinpoint the exact causes of these difficulties in order to overcome them.

Table 1.12: Rejections per US$ billion imported for food and feed exports from Asian countries in 2010

	Japan	Australia	EU	US
Cambodia	0	0	0	0
China	29	298	45	150
Hong Kong, China	18	888	0	431
Indonesia	40	215	6	142
Japan	-	1,972	11	183
Republic of Korea	22	1,649	32	363
Lao PDR	150	0	0	0
Malaysia	5	85	5	60
Myanmar	47	106	0	0
Philippines	15	1,111	8	162
Singapore	8	18	0	231
Thailand	30	108	36	75
United States	11	127	16	-
Viet Nam	111	164	27	181

Source: UNIDO dataset and analysis, based on EU RASFF, US OASIS, AQIS, and Japanese MHLW data

Table 1.11 lists the 15 countries with the most frequent agri-food import rejections in each importing market to show the relative performance of exporting countries. Among Asian countries, China, Indonesia, Thailand and Viet Nam tend to experience more rejections across the four major markets. Comparing the rejection rates and import shares reveals that the number of rejections is not well correlated with the import shares. For example, in the three importing markets of Japan, Australia and the EU, China ranks higher than the United States in terms of the number of rejections, despite the fact that there are more imports from the United States than from China in these markets. Similarly, in Japan and the United States, Viet Nam is reported to have higher rejection rates than Thailand, Republic of Korea and France, all of which have larger import shares than Viet Nam in these markets.

Rejections per US$ billion imported or rejection rates for Asian exporting countries are calculated in Table 1.12. In the Japanese market, Lao People's Democratic Republic and Viet Nam have higher rejection rates relative to other exporting countries. In Australia, food and feed products exported from Japan, Republic of Korea and the Philippines are most frequently rejected. In the EU, China, Thailand and Republic of Korea have relatively more rejections. Most of the Asian countries perform relatively well against their competitors in one market and less well in other markets. And there is a variation of rejection frequency across the four markets. Interestingly, relatively higher-income countries such as Japan and Republic of Korea perform poorly in some markets. For instance, among Asian countries, Japan saw the largest number of rejections in the Australian market in 2010 while Republic of Korea seems to struggle in the Australian, EU and United States markets.

Table 1.13 to Table 1.20 show the reasons for rejections of agri-food exports from Asian countries across four markets. Some characteristics of the markets can be observed. In Australia and the United States, non-compliance with labelling requirements results in significant levels of rejection while Japan does not reject for labelling reasons and the EU only makes relatively few rejections on this basis. In contrast, bacterial contamination is the most prominent reason for rejections in Japan. Rejections in relation to hygiene conditions are significant in the United States. Let us now look more closely at the individual East Asian countries' performance.

Cambodia has relatively few rejections in each market (see Table 1.13): One case for the EU in 2002–2010, one case for Japan in 2006–2010, two cases for Australia in 2003–2010 and 10 cases for the United States in 2002–2010. Among the reasons for rejection, bacterial contamination is common across all four markets.

China experiences far more rejections than Cambodia (see Table 1.14). Every year, the number of rejections is 317 for Australia, 238 for the EU, 369 for Japan and 1,080 for the United States on average. Reasons for rejection of Chinese exports vary among the four markets. The most frequent reason for rejection in the EU is detection of mycotoxins, while bacterial contamination as well as pesticide residues are more frequently cited in Japan. The United States rejects Chinese exports most frequently for non-compliance with hygienic standards while Australia rejects most frequently for labelling non-compliance.

For Indonesia, the average number of rejections each year is 40 for the EU, 375 for the United States, 38 for Japan and 59 for Australia. In the United States, bacterial contamination and hygienic condition/control are among the top reasons for rejections. In Japan, veterinary drugs residues and bacterial contamination are the most important causes of import rejections. The major reason for rejection in the EU is detection of heavy metals as well as veterinary drugs residues (see Table 1.14).

For Lao People's Democratic Republic, there are no rejection cases reported in Australia, the EU or United States. There were only three cases recorded in Japan during 2006–2010. The top rejection reason is pesticide residues (see Table 1.15).

For Malaysia, the annual average number of rejections is 17 for the EU, 85 for the United States, four for Japan, and 63 for Australia. In both the EU and Japan, bacterial contamination and additives are the major reasons to reject Malaysian imports (see Table 1.16). Labelling is the most frequent reason given in Australia.

For Myanmar, the number of rejections is small: 12 for the United States; eight for Australia; two for the EU; and 17 for Japan. Labelling is the most frequent reason for rejection in the United States and Australia. Veterinary drugs and other contaminants are the most frequent reasons cited by the EU while in Japan, major rejection reasons are pesticide residues and mycotoxins (see Table 1.17).

For the Philippines, the number of rejections is 343 for the United States, 76 for Australia, 27 for Japan and 16 for the EU. Adulteration and/or missing documents are among the top rejection reasons for the United States, Australia, and the EU (see Table 1.18). Japan rejected a lot of Philippine products because of bacterial contamination.

For Thai exports, 392 rejections for the United States, 119 for the EU, 110 for Japan and 97 for Australia are recorded every year on average. Among those rejections, bacterial contamination is the most frequent reason in Japan, the EU, the United States and Australia (see Table 1.19). Pesticide residues are also an important reason for rejection in the EU, Japan and Australia. Veterinary drugs residues matter in the EU. Hygienic condition/controls are problems in the United States and Japan. Labelling is the most frequent reason cited in Australia.

For Viet Nam, the number of rejections is 64 for Australia, 81 for the EU, 113 for Japan and 512 for the United States on average. Bacterial contamination is a common reason for rejection in all four countries (see Table 1.20). In addition to these rejections, veterinary drugs residues are the major reason for rejections in Japan and the EU. Reflecting market characteristics, non-compliance with hygienic conditions in the United States and labelling in Australia are frequent reasons for rejections.

Rejection reasons such as bacterial contamination, pesticide residues and veterinary drugs residues indicate that compliance issues have their origin at the farming stage of the production process. And these appear among the most frequent reasons for rejections of food exported from developing countries, including in East Asia.

To compare the situation between developed countries and developing countries, Japan, Republic of Korea, and Singapore are taken as examples. For Japan as an exporter, the number of rejections is 473 for the United States, 148 for Australia and 75 for the EU. The most frequent reason cited in the United States and Australia is either non-compliance with labelling require-

Table 1.13: ***Reasons for import rejections of agri-food products from Cambodia (%)***

	Mycotoxins	Additives	Bacterial contamination	Veterinary drugs residues	Pesticide residues	Other contaminants	Heavy metals	Adulteration/missing document	Hygienic condition/ controls	Other microbiological contaminants	Labelling	Packaging	Others
EU	0	0	100	0	0	0	0	0	0	0	0	0	0
US	0	0	20	10	0	10	0	0	30	NA	30	0	0
JPN	100	0	0	0	0	0	0	0	0	0	0	NA	0
AUS	0	0	50	0	0	0	0	0	0	0	50	0	0

Note: The recorded period is 2002–2010 for the EU and United States, 2003–2010 for Australia and 2006–2010 for Japan. The number represents the share of rejection reasons in each market.

Source: UNIDO dataset and analysis, based on EU RASFF, US OASIS, AQIS, and Japanese MHLW data

Table 1.14: ***Reasons for import rejections of agri-food products from China (%)***

	Mycotoxins	Additives	Bacterial contamination	Veterinary drugs residues	Pesticide residues	Other contaminants	Heavy metals	Adulteration/missing document	Hygienic condition/ controls	Other microbiological contaminants	Labelling	Packaging	Others
EU	30.0	15.3	3.2	13.9	1.4	8.5	4.0	10.6	3.4	4.1	1.2	0.9	3.6
US	0.1	19.6	4.9	7.9	5.0	2.5	0.1	15.3	24.1	NA	19.9	0.2	0.5
JPN	6.7	15.1	26.5	15.9	23.5	2.2	0.2	2.1	2.9	0.1	0.0	0.1	4.7
AU	4.1	1.0	7.2	3.6	2.4	0.9	8.4	5.4	0.4	0.0	61.9	NA	4.8

Note: The recorded period is 2002–2010 for the EU and United States, 2003–2010 for Australia and 2006–2010 for Japan. The number represents the share of reasons for rejections in each market.

Source: UNIDO dataset and analysis, based on EU RASFF, US OASIS, AQIS, and Japanese MHLW data

Table 1.15: ***Reasons for import rejections of agri-food products from Indonesia (%)***

	Mycotoxins	Additives	Bacterial contamination	Veterinary drugs residues	Pesticide residues	Other contaminants	Heavy metals	Adulteration/missing document	Hygienic condition/ controls	Other microbiological contaminants	Labelling	Packaging	Others
EU	7.6	12.0	7.6	20.4	0.6	14.0	26.3	0.6	3.1	5.0	0.3	0.3	2.2
US	0.2	4.9	24.4	4.3	0.0	4.4	0.0	11.1	38.8	NA	11.8	0.0	0.1
JPN	4.8	3.7	26.1	33.5	9.6	4.8	0.0	0.0	16.0	0.0	0.0	0.0	1.6
AUS	8.7	1.5	5.9	0.4	1.3	7.8	6.1	7.8	0.0	0.0	59.0	1.5	NA

Note: The recorded period is 2002–2010 for the EU and United States, 2003–2010 for Australia and 2006–2010 for Japan. The number represents the share of rejection reasons in each market.

Source: UNIDO dataset and analysis, based on EU RASFF, US OASIS, AQIS, and Japanese MHLW data

Table 1.16: Reasons for import rejections of agri-food products from Lao People's Democratic Republic (%)

	Mycotoxins	Additives	Bacterial contamination	Veterinary drugs residues	Pesticide residues	Other contaminants	Heavy metals	Adulteration/missing document	Hygienic condition/ controls	Other microbiological contaminants	Labelling	Packaging	Other
JPN	25.0	0.0	0.0	0.0	75.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Note: The recorded period is 2006–2010 for Japan. The number represents the share of rejection reasons in each market.

Source: UNIDO dataset and analysis, based on EU RASFF, US OASIS, AQIS, and Japanese MHLW data

Table 1.17: Reasons for import rejections of agri-food products from Malaysia (%)

	Mycotoxins	Additives	Bacterial contamination	Veterinary drugs residues	Pesticide residues	Other contaminants	Heavy metals	Adulteration/missing document	Hygienic condition/ controls	Other microbiological contaminants	Labelling	Packaging	Others
EU	4.0	13.9	44.4	7.3	0.7	13.9	0.7	4.6	0.7	2.6	2.0	0.0	5.3
US	0.0	10.2	10.5	3.7	0.1	1.7	0.0	27.7	21.5	0.0	24.4	0.0	0.1
JPN	5.0	45.0	35.0	5.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AUS	4.2	0.0	7.8	0.2	1.2	0.6	1.2	3.4	1.2	0.2	78.1	NA	2.0

Note: The recorded period is 2002–2010 for the EU and United States, 2003–2010 for Australia and 2006–2010 for Japan. The number represents the share of rejection reasons in each market.

Source: UNIDO dataset and analysis, based on EU RASFF, US OASIS, AQIS, and Japanese MHLW data

Table 1.18: Reasons for import rejections of agri-food products from Myanmar (%)

	Mycotoxins	Additives	Bacterial contamination	Veterinary drugs residues	Pesticide residues	Other contaminants	Heavy metals	Adulteration/missing document	Hygienic condition/ controls	Other microbiological contaminants	Labelling	Packaging	Others
EU	0.0	0.0	0.0	58.8	0.0	35.3	0.0	0.0	0.0	5.9	0.0	0.0	0.0
US	0.0	0.9	11.7	0.0	0.0	0.9	0.0	0.0	16.2	NA	70.3	0.0	0.0
JPN	29.4	0.0	0.0	0.0	58.8	11.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AUS	6.5	0.0	0.0	0.0	0.0	4.8	0.0	6.5	0.0	NA	67.7	NA	14.5

Note: The recorded period is 2002–2010 for the EU and United States, 2003–2010 for Australia and 2006–2010 for Japan. The number represents the share of reasons for detentions in each market.

Source: UNIDO dataset and analysis, based on EU RASFF, US OASIS, AQIS, and Japanese MHLW data

Table 1.19: *Reasons for import rejections of agri-food products from the Philippines (%)*

	Mycotoxins	Additives	Bacterial contamination	Veterinary drugs residues	Pesticide residues	Other contaminants	Heavy metals	Adulteration/missing document	Hygienic condition/ controls	Other microbiological contaminants	Labelling	Packaging	Others
EU	17.0	22.0	3.5	7.8	0.0	19.1	3.5	19.1	2.1	0.0	0.7	1.4	3.5
US	0.1	13.7	7.3	0.0	0.4	2.8	0.0	26.2	28.1	NA	21.2	0.2	0.1
JPN	1.5	15.0	52.6	0.0	17.3	3.8	1.5	0.0	5.3	0.8	0.0	0.0	2.3
AUS	5.6	0.3	1.1	0.0	0.2	4.8	2.5	15.1	0.3	0.0	67.9	NA	2.3

Note: The recorded period is 2002–2010 for the EU and United States, 2003–2010 for Australia and 2006–2010 for Japan. The number represents the share of rejection reasons in each market.

Source: UNIDO dataset and analysis, based on EU RASFF, US OASIS, AQIS, and Japanese MHLW data

Table 1.20: *Reasons for import rejections of agri-food products from Thailand (%)*

	Mycotoxins	Additives	Bacterial contamination	Veterinary drugs residues	Pesticide residues	Other contaminants	Heavy metals	Adulteration/missing document	Hygienic condition/ controls	Other microbiological contaminants	Labelling	Packaging	Others
EU	2.2	11.7	25.8	17.9	23.6	5.9	5.1	0.9	1.6	2.0	0.1	0.5	2.7
US	0.1	8.4	13.2	0.6	2.2	0.7	0.0	20.9	31.9	NA	21.9	0.0	0.1
JPN	6.9	6.8	53.8	2.7	11.3	1.5	0.0	0.0	16.8	0.0	0.0	0.0	0.2
AUS	NA	0.4	5.7	1.0	5.2	9.2	2.8	5.8	1.8	0.0	63.0	NA	2.1

Note: The recorded period is 2002–2010 for EU and United States, 2003–2010 for Australia and 2006–2010 for Japan. The number represents the share of rejection reasons in each market.

Source: UNIDO dataset and analysis, based on EU RASFF, US OASIS, AQIS, and Japanese MHLW data

Table 1.21: *Reasons for import rejections of agri-food products from Viet Nam (%)*

	Mycotoxins	Additives	Bacterial contamination	Veterinary drugs residues	Pesticide residues	Other contaminants	Heavy metals	Adulteration/missing document	Hygienic condition/ controls	Other microbiological contaminants	Labelling	Packaging	Others
EU	3.2	10.8	23.4	27.3	2.1	9.1	8.4	2.5	3.9	4.8	0.3	0.6	3.7
US	0.7	8.7	23.6	3.8	0.4	4.6	0.0	10.6	25.4	NA	21.6	0.0	0.5
JPN	1.2	5.7	25.8	52.8	8.9	0.2	0.0	0.0	4.1	0.0	0.0	0.4	1.1
AUS	1.4	2.7	25.1	8.6	1.0	3.9	1.8	2.1	0.2	0.0	51.7	NA	1.6

Note: The recorded period is 2002–2010 for the EU and United States, 2003–2010 for Australia and 2006–2010 for Japan. The number represents the share of rejection reasons in each market.

Source: UNIDO dataset and analysis, based on EU RASFF, US OASIS, AQIS, and Japanese MHLW data

Table 1.22: ***Reasons for import rejections of agri-food products from Japan (%)***

	Mycotoxins	Additives	Bacterial contamination	Veterinary drugs residues	Pesticide residues	Other contaminants	Heavy metals	Adulteration/missing document	Hygienic condition/controls	Other microbiological contaminants	Labelling	Packaging	Others
EU	1.3	52.0	0.0	4.0	6.7	6.7	17.3	6.7	0.0	0.0	0.0	0.0	5.3
US	0.0	9.2	2.2	0.0	0.2	0.5	0.0	44.6	8.4	NA	34.9	0.0	0.0
AUS	0.0	0.1	2.5	0.1	0.3	3.0	0.2	25.1	0.0	0.0	67.1	NA	1.5

Note: The recorded period is 2002–2010 for the EU and United States, 2003–2010 for Australia. The number represents the share of rejection reasons in each market.

Source: UNIDO dataset and analysis, based on EU RASFF, US OASIS, AQIS, and Japanese MHLW data

Table 1.23: ***Reasons for import rejections of agri-food products from The Republic of Korea (%)***

	Mycotoxins	Additives	Bacterial contamination	Veterinary drugs residues	Pesticide residues	Other contaminants	Heavy metals	Adulteration/missing document	Hygienic condition/controls	Other microbiological contaminants	Labelling	Packaging	Others
EU	1.0	26.2	5.8	6.8	1.9	3.9	9.7	8.7	1.0	1.0	1.9	3.9	28.2
US	34.6	12.8	4.8	0.0	0.9	0.7	0.0	37.0	9.0	NA	34.6	0.0	0.2
JPN	0.6	12.8	42.8	1.1	33.3	0.0	0.0	1.1	5.6	0.0	0.0	0.0	2.8
AUS	0.0	0.6	5.1	0.0	1.3	2.1	0.0	15.7	0.9	0.0	72.9	NA	1.3

Note: The recorded period is 2002–2010 for the EU and United States, 2003–2010 for Australia and 2006–2010 for Japan. The number represents the share of rejection reasons in each market.

Source: UNIDO dataset and analysis, based on EU RASFF, US OASIS, AQIS, and Japanese MHLW data

Table 1.24: ***Reasons for import rejections of agri-food products from Singapore (%)***

	Mycotoxins	Additives	Bacterial contamination	Veterinary drugs residues	Pesticide residues	Other contaminants	Heavy metals	Adulteration/missing document	Hygienic condition/controls	Other microbiological contaminants	Labelling	Packaging	Others
EU	9.2	4.2	0.8	0.8	0.0	3.4	75.6	0.8	0.0	0.0	0.0	0.0	5.0
US	1.1	3.7	13.7	0.0	0.0	19.2	0.0	13.7	37.3	NA	11.4	0.0	0.0
JPN	14.3	71.4	0.0	0.0	0.0	0.0	0.0	14.3	0.0	0.0	0.0	0.0	0.0
AUS	1.6	0.5	1.6	1.1	3.3	1.6	2.7	0.5	1.6	0.0	83.2	NA	2.2

Note: The recorded period is 2002–2010 for the EU and United States, 2003–2010 for Australia and 2006–2010 for Japan. The number represents the share of rejection reasons in each market.

Source: UNIDO dataset and analysis, based on EU RASFF, US OASIS, AQIS, and Japanese MHLW data

ments or adulteration/missing documents (see Table 1.21). Meanwhile, in the EU, additives and heavy metals are among the most common reasons for rejections.

For Republic of Korea, the average number of rejections is 379 for the United States, 66 for Australia, 36 for Japan and 11 for the EU. Labelling and adulteration/missing documents are again the major reasons for Australian and United States rejections (see Table 1.22). Among other major reasons, improper use of additives for the EU, detections of mycotoxins for the United States and bacterial contamination and pesticide residues for Japan need to be noted.

For Singapore, the number of rejections is 30 for the United States, 23 for Australia, 13 for the EU and 7 for Japan. The most frequent reason for Australia is labelling non-compliance. Heavy metals provoke the most rejections in the EU while in Japan it is the improper use of additives (see Table 1.23).

So, to sum up, for relatively higher-income countries, knowledge and implementation of importer food safety standards such as labelling and documentation are the major source of problems. In addition, reflecting the fact that exports from these countries are concentrated more in processed foods with higher value added, non-compliance with additive requirements is a common reason for rejections.

In general, the distribution of rejection reasons reflects the characteristics of export product categories and suggests which food production processes can be upgraded to meet import standards. In the next section, we therefore delineate the relationship between supply chain management and its implications for standards compliance.

1.5 Potential pitfalls along the supply chain

While the total value of agricultural and food products exported from East Asia has steadily increased, it is mainly driven by intra-regional trade, and export growth to key markets in developed countries such as the EU, the United States, Japan and Australia is slower. One of the reasons is that these markets require exporters to meet tighter mandatory food safety regulations established by public authorities as well as standards set by various private and international entities. As we have seen, rejections of agriculture and food products exported from Asia have occurred due to non-compliance with national/regional mandatory food safety regulations for various reasons such as pesticides, microbacteria and hygiene standards. Judged by import rejection rates, cases of non-compliance are not an insignificant phenomenon. Therefore, to win key markets, meeting regulations has remained a major challenge. Moreover, food safety regulations imposed by importing countries are becoming increasingly stringent over time, especially in developed countries. In addition, driven by consumer demand and competition among larger supermarket chains in the developed countries which aim to differentiate their products from others (Henson and Reardon, 2005), various private standards have been introduced, especially in the EU. In an environment where regulations and standards become stricter, it is important for developing countries in Asia to be compliant and competitive food suppliers to the important markets such as the United States, EU, Australia and Japan by meeting their regulations and standards. This report has assumed the task of examining the challenges facing Asian farmers and food producers and of outlining possible action plans and measures to tackle compliance problems in order to improve product quality and meet market requirements. In the following, we will look at the issue of compliance (capacity and challenges) through a supply chain lens.As was highlighted in previous sections, the most common reasons for rejections of agri-food imports cited by Australian, EU, Japanese and United States authorities are bacterial contamination, pesticide residues, other contaminants and mycotoxins.

Figure 1.10 summarizes the root causes and possible sources of these problems along food value chains.

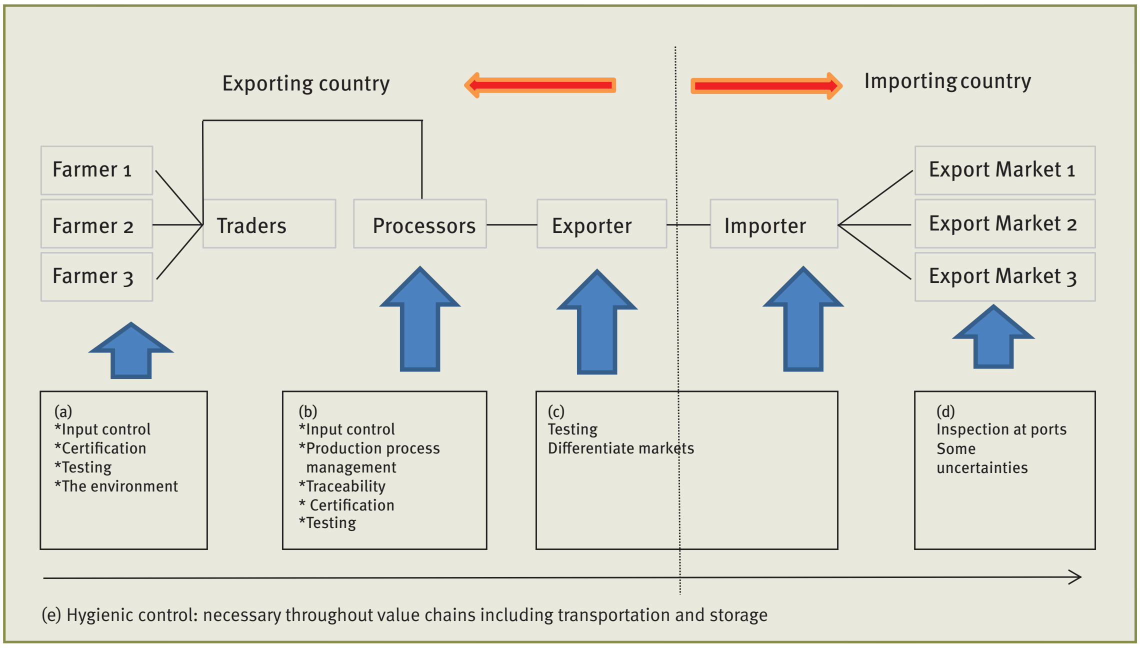
In a globalised world, suppliers of materials such as feed for fish or pesticides for agro products are located around the globe and supply of such inputs may come from domestic producers or foreign ones. For example, in a typical shrimp product value chain in Viet Nam, feed is imported from Chile or Peru, chemicals from Canada and other inputs are from domestic markets. Cultured shrimps are finally exported to multiple markets overseas. One of the big challenges for East Asia is that a processor cannot meet import regulations and/or standards on its own; it is often necessary for farmers and suppliers along the entire value chain to take measures as well. Various requests to meet food safety regulations and standards need to be communicated well beyond an exporter's national borders.

As can be seen in Figure 1.10, issues of non-compliance can emerge at different stages of the supply chain, as follows:

(a) Pesticide residues, contaminants, mycotoxins, heavy metals, veterinary drug residues could all enter the food chain at the the farming/growing/primary production stage. This is primarily related to input procurement. Let's start with the processor. The processor procures inputs from farmers, say shrimp farms. In order for their processed food to comply with regulations/standards, the processor needs to procure from farmers who grow shrimps in a compliant way. If farmers are not familiar with requirements or do not recognise their importance, they may be tempted to use prohibited but cheap pesticides, antibiotics, feed and so on. In this way, contaminants exceeding permitted levels can be introduced into the food chain through farmer inputs. Insufficient knowledge or recognition of inputs and regulations is definitely among the key explanations for import rejections.

    There are further reasons for inadequate input control. For instance, even if farmers are familiar with the requirements, they might not know the good substitutes. As the Viet Nam case study shows, shrimp feed is imported from Chile and Peru because domestic feed isn't suitable for growing quality shrimps, but mycotoxins have been introduced through the imported feed. Despite being aware of the problem, it is not easy for farmers to find a better substitute and it takes time for farmers to reduce the contamination level by changing inputs. Another example relates to a tea leaves processor who only procures tea leaves from domestic small-scale farmers. When the tea processor tried to sell the products to a brand company, excessive levels of pesticides and mi-

Figure 1.10: Prototype of agri-food supply chain - production stages and potential sources of non-compliance causing rejections



Source: Authors' own illustration

crobacteria were found. Despite the processor knowing the problem, the processor has no way of changing the farming methods used by many small-scale farmers (Michida and Nabeshima 2012). In developing countries, producers, especially small and medium producers, are often not well equipped with the financial and technical capacity to comply with foreign import regulations or standards. A clean environment that can accommodate food production that satisfies regulations is a must. However, owning land with good soil and having access to safe and clean water is usually beyond the reach of many farmers/processors. As a consequence, small-scale farmers can lose access to the regulated markets.

(b) Compliance issues related to bacterial contamination and unhygienic conditions, improper use of additives, adulteration/missing documents, packaging and labelling could occur at the processing stage of the supply chain. Beyond procuring adequate inputs, processors need to install proper production management for hygiene control. To do so, buyers might ask processors as well as farmers to obtain various certifications such as for HACCP (Hazard Analysis and Critical Control Point). Also there are private standards such as GlobalGAP and the British Retail Consortium (BRC), which are often applied in the EU market. Certifications like these help buyers to determine and confirm that the processor installed processing management properly, and that hygiene controls are therefore in place. Meeting private standards helps reduce import rejections at port. However, certifications are not always easy to obtain, especially for small-scale processors and farmers. Moreover, obtaining and renewing certifications involve cost.

Similarly, in order to make sure products do not contain excessive levels of contaminants, processors need to test their products before sale. As testing fees can be very expensive and sweep out all the profit, small- and medium-scale farmers/processors are not willing to test unless it is absolutely necessary. Moreover, small-scale processors may not able to bear the high cost of testing.

When a test result shows a product has some contaminants, how do processors deal with the problems? Processors using inputs from various farmers need to sort out the source of the problem. To do so, a traceability system is important to track which farmers or inputs cause the problems so that the problematic inputs can be separated. Yet, developing a traceability system takes time and this is another hurdle for processors in developing countries like Viet Nam.

(c) Problems with regard to labelling and documents could occur at the trading stage of the supply chain. As some exporters sell to more than one market, they differentiate products depending on the grade quality and other requirements of export markets.

(d) At the final stage of the supply chain, problems can occur in the form of non-compliance with private standards and conducting tests required by buyers Some uncertainties remain even after products are tested and exporters and the products are found to meet the regulation thresholds. However, different countries use different testing and sampling methods which means that, even if pre-shipping testing does not reveal contaminants, testing in the importing country (e.g. at the port) could still reveal problems. Testing helps processors to meet regulations/standards, but it is complementary to reliable value chain management.

(e) Throughout the value chain, hygiene control is essential. It is needed not only at the farm and processor levels but also during transportation and storage. Moreover, to ensure product quality it is also important to develop and properly manage the cold chain.

Asian exporting countries continue to face many challenges in attempting to reduce import rejections of their agri-food products. The challenges seem to differ across export markets. While EU markets or buyers often require processors to obtain certifications, Japanese buyers do so less. The causes for rejections also vary across exporting countries and some countries manage better than others. In terms of reducing rejection, China seems to have had some success, as we will see in the case studies to follow. In China, the whole food chain has been put under strict public control, covering clean soil farmland, processing, and exports. This seems to imply, however, that small-scale farmers will have little or no chance to enter the export market.

The Viet Nam case study, on the other hand, shows that there are many small-scale farmers involved in food chains, which creates problems if some contaminants cannot be well controlled, thus jeopardising whole supply chains. At the same time, accommodating small-scale farmers and processors is important for policymakers in terms of economic development and poverty reduction. Otherwise, they will gradually be pushed out of the food chain for regulated markets.

Before moving on to the case studies, in the next chapter, we examine more closely the trends in import rejections in the Japanese market.

2. Analysis of Japanese Import Rejections of Asian Agri-food Products

Given that Japan is only about 40 per cent self-sufficient in foods (based on caloric intake), 60 per cent of foodstuffs are imported, implying that Japan is a large market for agricultural and food products. In 2010, about 2 million items of food, additives, equipment, containers and packages and toys[3] (weighing 31.8 million tons in volume) entered Japan for commercial purposes. Some of these are inspected to ensure their safety before entry into Japan (MHLW, 2012). In addition to paying attention to foods imported into Japan, Article 8 of the Food Sanitation Act (1947) stipulates that food business operators (including importers) must recognise their own responsibility for food safety and take appropriate measures at each stage of the food supply process to ensure it. The Act also requires food business operators to retain detailed records relating to the imported foods. The Japanese Ministry of Health, Labour and Welfare (MHLW) provides guidelines[4] to food business operators in how to conduct voluntary safety controls to ensure food safety. Article 55 specifies that repeated violation of the food safety regulations can lead to suspension of or ban on importation by the food business operators (MHLW, 2012).

The guidelines to importers and food business operators suggest that they should make sure that food is manufactured and processed in compliance with the laws and regulations of the exporting countries. In addition, the standard of establishments, facilities and equipment of the manufacturer should be at least equal to the standards concerning establishments, facilities and equipment stipulated in related Japanese laws and ordinances. This also covers hygiene control in manufacture and introduction of the HACCP system is recommended (MHLW, 2008).

Once the quality of manufacturing and processing has been controlled, importers should confirm that the food (including raw materials) complies with the specifications and standards of the Japanese laws. This includes proper use of food additives, sterilisation, drug substances, preservatives, agricultural chemicals, veterinary drugs and feed additives. Furthermore, even if monitoring is done in the exporting countries, importers should confirm the results by importing and testing samples inside Japan whenever necessary (MHLW, 2008).

To ensure that food imported complies with Japanese laws, importers are encouraged to provide education and guidance on Japanese food hygiene regulations. Importers should also dispatch technicians or other personnel to local establishments whenever necessary to harmonise levels of technology, knowledge and awareness with respect to Japanese food hygiene regulations. Furthermore, importers should retain all relevant documentation so that the condition of imported foods can be confirmed at all times (MHLW, 2008). Thus, the guidelines to food business operators pay specific attention to the management of food safety across the value chain.

The next section describes briefly the regulatory system in place in Japan for imported food safety, and is followed by an analysis of rejections of imports from East Asian countries.

2.1 Imported food safety inspection system in Japan

The food safety regulations in Japan are governed by the Food Safety Basic Act of 2003 (Act No. 48, 2003) and the MHLW is in charge of ensuring the safety of foods imported into Japan. The responsibilities of the MHLW include promotion of awareness of food safety during the production, manufacture, and processing of foodstuffs in exporting countries; provision of information on Japanese food safety regulations to embassies located in Japan and to importers; publication of the information through the MHLW website; holding bilateral discussions with exporting countries;[5] conducting onsite inspections; and provision of technical support. In addition, the MHLW conducts onsite inspection at facilities in exporting countries to verify safe management practices if necessary. The MHLW also has the authority to enforce an import ban on food products from a certain country or those produced by a certain manufacturer. It can also ban or suspend importation of foods manufactured by a firm that has repeatedly violated the food safety regulations (MHLW, 2012).

The MHLW conducts regular inspections based on the guidelines (Article 28 of the Act) and in line with a schedule laid out in Schedule 1 of the "Development of Imported Foods Monitoring and Guidance Plan for FY2012". According to the interim report for the Inspection Results of the Imported Foods Monitoring and

3 The Food Sanitation Act (1947) also covers toys (Article 68 of the Act) targeted at children under the age of six years because these toys can be in contact with the mouth or accidentally ingested.

4 These are listed in Schedule 2 of the "Development of Imported Foods Monitoring and Guidance Plan for FY2012" (MHLW, 2012).

5 For instance, in May 2010, the first ministerial-level international conference on Japan–China Food Safety Promotion Initiative was held and the "Memorandum on Japan–China Food Safety Promotion Initiative" was signed by the ministers in Japan and China (MHLW, 2012).

Guidance Plan for FY2011, there were notifications of more than 1 million imports (weighing 13 million tons) from April to September 2011. Of these notifications, around 11.5 per cent were inspected, resulting in identification of 619 violations (MHLW, 2012).

The MHLW also conducts "enhanced inspections" when violations (such as residues of agricultural chemicals) are identified. In such cases, for a limited time period the MHLW will inspect foods exported from the violating country more frequently and more thoroughly.[6] If no similar violations are found within one year or 60 additional inspections, the inspections will return to normal. In addition, the MHLW will inspect those foods that are imported into Japan for the first time when accidents were reported during transportation or in other circumstances (MHLW, 2012).

Furthermore, Article 26 of the Act stipulates that the MHLW can order additional inspections of imported foods manufactured by the same manufacturer, processed by the same processor or imported from the same exporting country when certain foods have caused or are likely to cause health-related problems[7] or when aflatoxin, pathogenic micro-organisms, or other severe contaminations are found (MHLW, 2012).[8]

In the case of repeated offences such as detections of banned substances or excess levels of substances in foods from the same manufacturer, same processor, or imported from the same country, the MHLW can order inspections of all or part of the imported foods concerned, taking into account regulations and safety control in the exporting country, and its past history of compliance (MHLW, 2012).

Inspections ordered in accordance with Article 26 can be cancelled in a number of ways. The first is when the MHLW has determined that the exporting country has taken preventive measures, such as investigation of causes, issuance of new regulations corresponding to the results of investigations and enhancement of controls on agricultural chemicals and inspection systems,[9] and such measures are deemed to be effected through bilateral discussions,[10] onsite inspections or inspections at the time of import. If no such violation is found for two years from the most recent violation or when there is no further violation found after more than 300 inspections within one year of the violation, then the inspection orders can be cancelled.[11] However, enhanced inspections will be conducted for a limited time to ensure no future violations. If violations are found again, the inspection orders will be re-issued immediately (MHLW, 2012).

Articles 8 and 17 of the Act can ban the import of food produced in a specific country or area by a specific business entity, if the violation rate stands above approximately 5 per cent of the overall number of inspections and it is highly likely that this rate will persist in future because of the state of food sanitation controls in the exporting country. In order to ensure public awareness, Article 63 of the Act stipulates that the MHLW will promptly publish the names of importers who have violated the Act as well as the names of the violating imported foods (MHLW, 2012).

2.2 General trends in import rejections of agrifood products at Japanese ports

Table 2.1: *Top 10 countries with reported cases of Japanese import rejections, 2006–2010*

Rank	Country	Cases
1	China	1,646
2	United States	804
3	Viet Nam	563
4	Thailand	548
5	Ghana	338
6	Ecuador	202
7	Indonesia	188
8	Italy	184
9	Republic of Korea	180
10	Canada	138

Source: UNIDO dataset and analysis, based on EU RASFF, US OASIS, AQIS, and Japanese MHLW data

Between 2006 and 2010, there were 6,365 cases of rejections at various Japanese ports reported by the MHLW. Table 2.1 lists the 10 countries with the highest number of import rejections in Japan. China tops the list with 1,646 cases in this five-year span. The number of rejections of Chinese exports is more than double that of United States exports. Of course, Japan imports quite a large quantity of agricultural and food items from these countries so the number of rejections for these countries is bound to be relatively large compared with other countries (see Table 2.2). Among the top 10 countries, five are from East Asia: China, Viet Nam, Thailand, Republic of Korea, and Indonesia (in ranking order).

6 In fact, ethoxyquin was discovered in cultured shrimp imported from Viet Nam. Because of this, the enhanced inspection of shrimp imports from Viet Nam was ordered (30 per cent sampling) (Notification by the Imported Food Inspection Services, 2012/05/18, www.forth.go.jp/keneki/kanku/syokuhin/tsuuchi/2012/5/18_2.pdf).
7 For instance, in April 2012, the Chinese government discovered that certain drugs manufactured in China had used industrial gelatin (which contains chrome) supplied by Chinese firms. The Chinese government has subsequently identified and released the names of the offending manufacturers. Given this news, the MHLW alerted quarantine stations to halt imports of gelatin products and any products that contain gelatin manufactured by the identified offending firms (www.mhlw.go.jp/topics/yunyu/other/2012/dl/120601-02.pdf).
8 One of the most recent cases is the presence of methoxyfenozide (used in insecticides) in blueberries imported from the United States in June 2012 (www.mhlw.go.jp/topics/yunyu/kensa/2012/dl/120607-01.pdf). Similarly, aflatoxin was found in Sichuan pepper imported from China in June 2012 (www.mhlw.go.jp/topics/yunyu/kensa/2012/dl/120604-01.pdf). Accordingly, the MHLW ordered enhanced inspections of these commodities from these countries.
9 For instance, an enhanced inspections for ham imported from a particular manufacturer in Italy was listed in March 2012 (www.mhlw.go.jp/topics/yunyu/kensa/2011/dl/120330-01.pdf).
10 For instance, Chinese government approves eel farming firms for exports (www.mhlw.go.jp/topics/yunyu/kensa/2012/dl/120615-01.pdf).
11 For instance, green peas from Viet Nam and Oolong tea leaves from China were taken off the list in June 2012 after no violations were found (www.mhlw.go.jp/topics/yunyu/kensa/2012/dl/120621-01.pdf).

Table 2.2: Shares in food/agriculture imports in Japan (%)

	2006	2007	2008	2009	2010
United States	22.0	24.07	28.13	25.45	24.19
China	17.25	15.46	11.73	13.27	13.97
Thailand	5.0	4.81	5.31	6.0	5.97
Republic of Korea	2.4	2.22	2.19	2.73	2.9
Viet Nam	1.9	1.65	1.56	1.67	1.61
Indonesia	1.84	1.72	1.56	1.82	1.77
Philippines	1.78	1.78	2.03	2.55	1.94
Malaysia	1.0	1.35	1.56	1.4	1.48
Singapore	0.64	0.69	0.78	0.76	0.77

Note: Food and agricultural imports are calculated as taking Chapters 1 to 23 (excluding Chapter 6) of the Harmonized System.

Source: UN Comtrade database

Table 2.3: Trends in the number of Japanese import rejections, 2006–2010

Country	2006		2007		2008		2009		2010	
	Rank	Cases	Rank	Cases	Rank	Cases	Rank	Cases	Rank	Cases
China	1	474	1	430	1	225	1	270	1	247
United States	2	236	3	122	2	105	2	172	2	169
Viet Nam	3	130	2	165	4	74	5	77	3	117
Thailand	4	118	4	101	3	101	4	117	4	111
Ghana	6	60	9	32	14	17	3	154	5	75
Brazil	17	10	14	20	16	12	15	22	6	50
Italy	9	29	11	23	9	33	7	50	7	49
Indonesia	11	24	6	59	11	26	11	35	8	44
Rep. of Korea	11	24	8	38	7	50	12	28	9	40
Canada	19	8	22	5	15	14	6	71	9	40
India	8	30	17	8	12	20	9	40	11	37
Spain	26	4	19	6	13	19	17	15	13	30
Australia	15	11	15	19	21	5	18	11	14	28
Colombia	-	0	-	0	44	1	13	25	14	28

Note: Sorted by 2010 rankings.

Source: UNIDO dataset and analysis, based on Japanese MHLW data

Table 2.3 lists the rank and number of Japanese rejections of exports from major agricultural and food exporting countries. The table is sorted by the 2010 rankings. What is notable is that the top four countries – China, the United States, Viet Nam and Thailand – have had problems with port rejections from 2006 to 2010. It seems that the rejections of Chinese exports are more frequent relative to the values of Chinese shipments. For instance, at least in terms of shares, the United States is the largest trading partner of Japan in agricultural and food products, yet the United States has fewer import rejections than China (see Table 2.2). Similarly, although the value of imports from Viet Nam is relatively small, the number of rejection cases is high (see Table 2.3), implying possible difficulties in Viet Nam in terms of meeting the required standards of importing countries.

Among East Asian countries but excluding China, Viet Nam and Thailand, Indonesia, and Republic of Korea seem to experience most port rejections.

2.2.1 Overview of rejected products

The largest group of agricultural and food commodities rejected by Japanese authorities is "Fish and fishery products", accounting for more than one-quarter of all import rejections (see Table 2.4). This is followed by "Fruits and vegetables" (21 per cent), "Cereals and bakery products", "Nuts and edible seeds", and "Herbs and spices". Seafood and fruits and vegetables, thus, account for by far the largest proportions of Japanese import rejections.

Table 2.4: Common commodity groups rejected at Japanese ports, 2006–2010

	Commodity	Cases
1	Fish and fishery products	1,686
2	Fruits and vegetables	1,308
3	Cereals and bakery products	920
4	Nuts and edible seeds	425
5	Herbs and spices	199
6	Other processed food	89

Source: UNIDO dataset and analysis, based on Japanese MHLW data

The trend in the number of cases and ranking of product groups that are often rejected at Japanese ports is fairly stable. "Fish and fishery products" and "Fruits and vegetables" were consistently the two product groups most frequently rejected during the period from 2006 to 2010 (see Table 2.5). These are followed by "Cereals and bakery products", "Nuts, and edible seeds", and "Herbs and spices".

Among East Asian countries exporting fish and fishery products to Japan, exports from China have been rejected the most frequently between 2006 and 2010 (see Table 2.6). Other countries experiencing significant numbers of rejections include Viet Nam and Thailand. In terms of shares, the rejections of exports from the abovementioned three countries account for three-quarters of all rejections in fish and fishery products.

However, if the number of rejections is normalised by the value of imports, a different story emerges. Even though China had the largest number of rejections, this was influenced by the size of the imports. When the values of imports are taken into account, the rejection rates for Chinese fish and fishery products are similar to those for other countries in East Asia. Once normalised by the value of imports, products from Viet Nam and to some extent the Philippines are rejected more often (see Figure 2.1). In particular, the rejection rates for Vietnamese fish and fishery products were high in 2006 and 2007. The rejection rate improved drastically in 2008 and 2009, but increased again in 2010.

How do East Asian countries fare relative to other countries? Are products from East Asia more likely to be rejected relative to their import shares compared with other countries? Figure 2.2 plots the natural logarithm of the share of Japanese rejections of fish and fishery products against the natural logarithm of the share of imports from all exporting countries between 2006 and

Table 2.5: Trends in products with large numbers of Japanese import rejections, 2006–2010

	2006		2007		2008		2009		2010	
	Cases	Rank	Cases	Rank	Cases	Rank	Cases	Rank	Cases	Rank
Fish and fishery products	410	1	452	1	277	1	252	2	295	1
Fruits and vegetables	286	2	274	2	222	2	295	1	231	2
Cereals and bakery products	250	3	161	3	119	3	195	3	195	3
Nuts and edible seeds	84	4	74	4	72	4	91	4	104	4
Herbs and spices	49	5	38	5	26	5	45	5	41	5
Other processed food	38	6	17	6	7	6	18	6	9	6

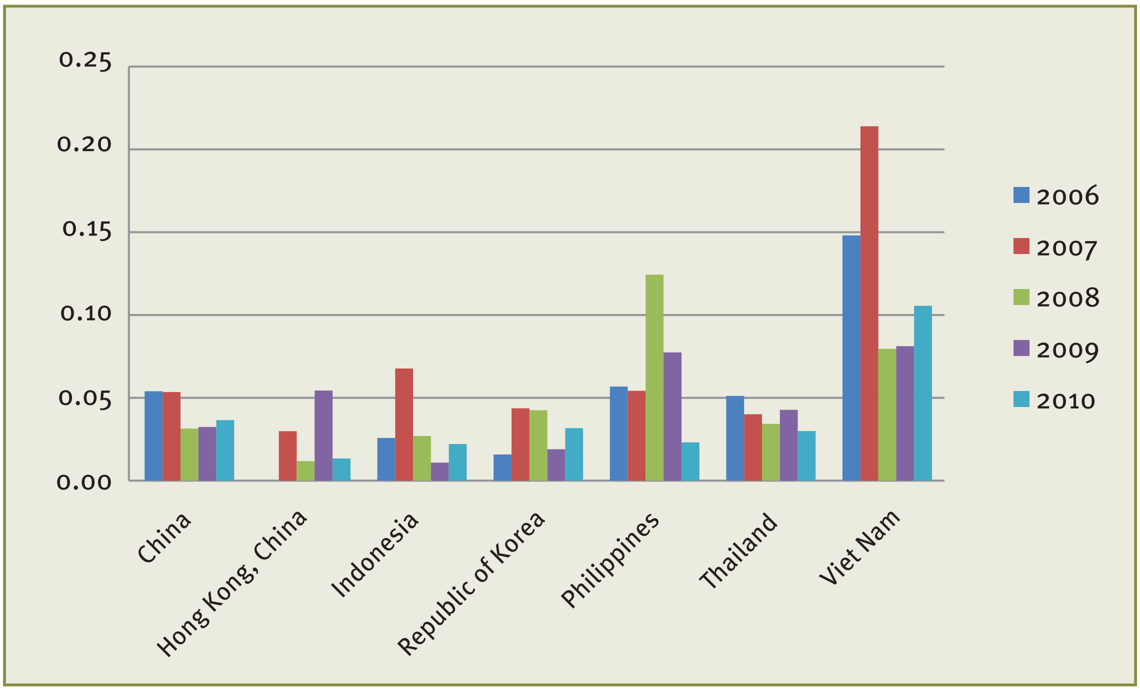
Note: Sorted by 2010 rankings.

Source: UNIDO dataset and analysis, based on Japanese MHLW data

Table 2.6: Number of Japanese import rejections of fish and fishery products, 2006–2010

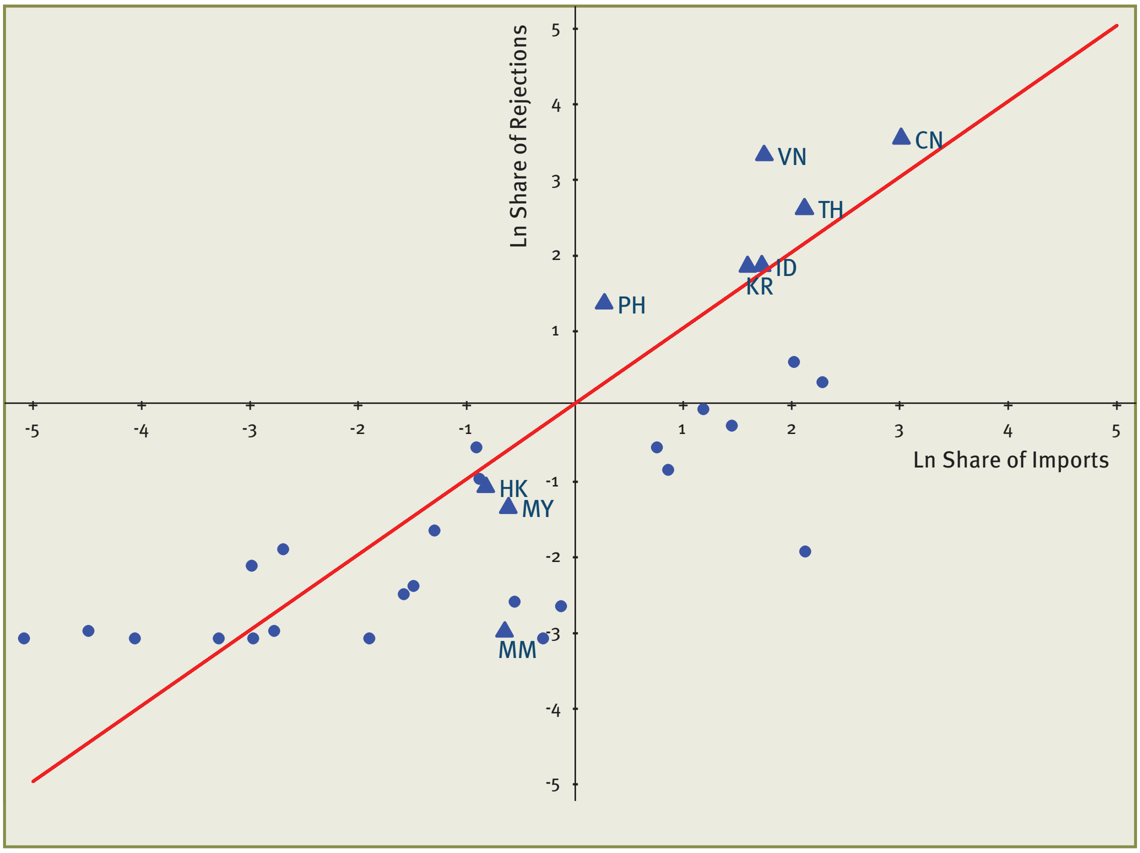
Country	2006	2007	2008	2009	2010	Average
Brunei Darussalam	0	0	0	0	0	0
Cambodia	0	0	0	0	0	0
China	170	145	76	73	96	112
Hong Kong, China	0	1	1	1	2	1
Indonesia	18	47	20	8	17	22
Republic of Korea	9	23	27	13	25	19
Lao PDR	0	0	0	0	0	0
Malaysia	1	1	0	2	0	1
Myanmar	1	0	0	0	0	0
Philippines	10	9	24	11	4	12
Singapore	0	0	0	0	0	0
Thailand	49	39	38	47	38	42
Viet Nam	117	147	60	57	83	93

Figure 2.1: Japanese import rejections of fish and fishery products per US$ million imports, 2006–2010



Source: UNIDO dataset and analysis, based on Japanese MHLW data

Figure 2.2: Relationship between the shares in Japanese imports and rejections in fish and fishery products, 2006–2010



Note: Share of imports and share of rejections are averages between 2006 and 2010 and converted into natural logarithms. East Asian countries are represented by the triangle marker and other countries by dots.

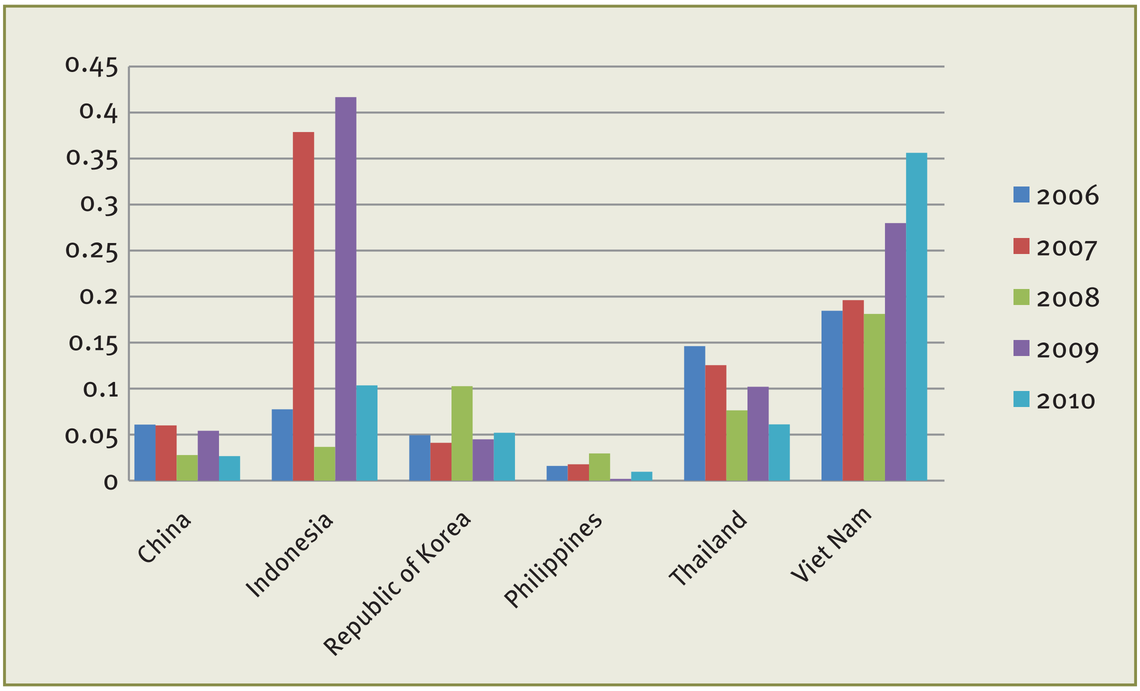
Source: UNIDO dataset and analysis, based on UN Comtrade and Japanese MHLW data

Table 2.7: Number of Japanese import rejections of fruit and vegetable products, 2006–2010

Country	2006	2007	2008	2009	2010	Average
Brunei Darussalam	0	0	0	0	0	0
Cambodia	0	0	0	0	0	0
China	137	131	55	104	63	98
Hong Kong, China	1	2	0	1	0	1
Indonesia	2	10	1	11	3	5
Republic of Korea	8	7	18	8	10	10
Lao PDR	0	1	1	0	0	0
Malaysia	0	2	0	0	0	0
Myanmar	0	1	2	0	0	1
Philippines	10	12	27	2	9	12
Singapore	0	0	0	0	1	0
Thailand	31	27	19	26	17	24
Viet Nam	5	5	5	8	11	7
Total	216	203	158	180	122	176

Source: UNIDO dataset and analysis, based on Japanese MHLW data

Figure 2.3: Japanese import rejections of fruits and vegetables per US$ million imports, 2006–2010



Note: Excluded Brunei Darussalam, Cambodia, Hong Kong (China), Lao People's Democratic Republic, Malaysia, Myanmar, and Singapore.

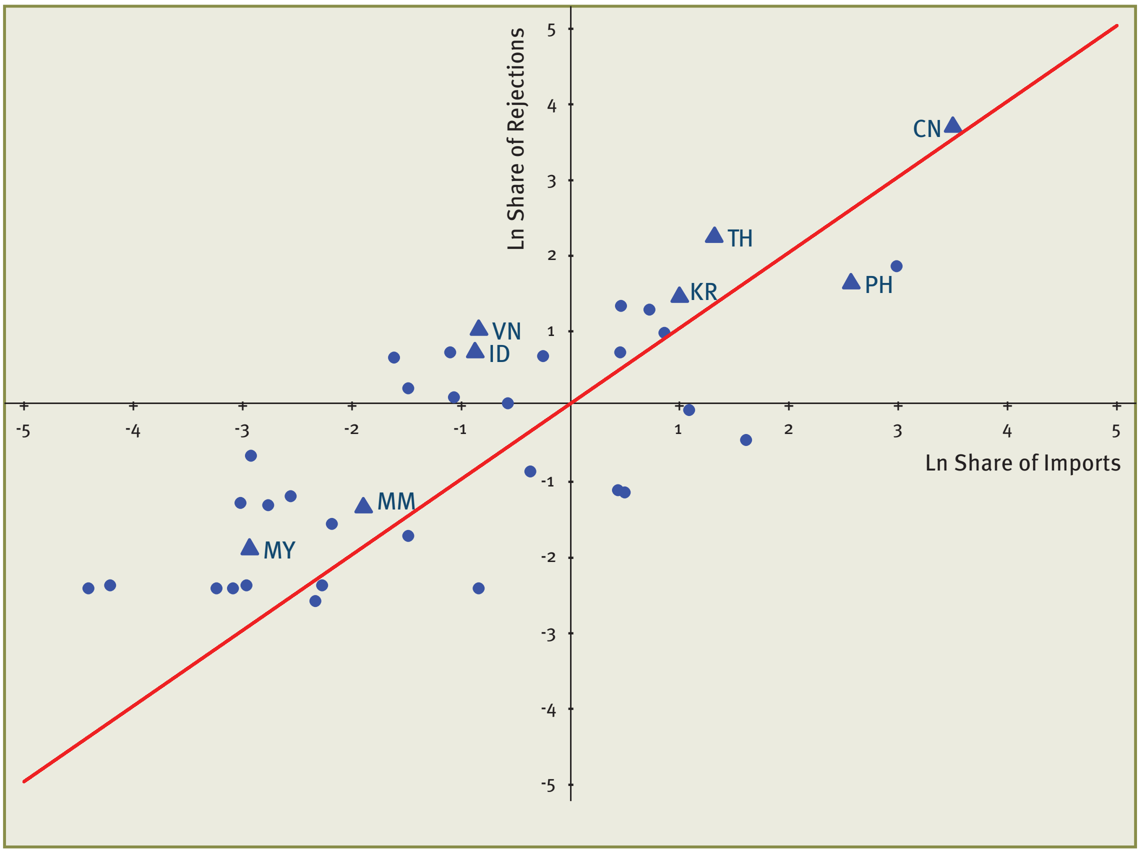
Source: UNIDO dataset and analysis, based on Japanese MHLW data

2010.[12] As a reference, a 45-degree line is also drawn. Those points located above (below) the 45-degree line mean that imports from these countries are rejected more (less) often than suggested by the share of imports. Figure 2.2 shows that China, Viet Nam and the Philippines seem to experience more rejections relative to the size of their exports. The rejection rates of fish and fishery products from Hong Kong (China), Thailand, Republic of Korea and Indonesia seem to be in line with their shares. Imports from Myanmar so far have done well in this regard but it is also a very minor exporter.

As with fish and fishery products, the number of Japanese rejections of fruit and vegetable products between 2006 and 2010

12 For details on the calculation of this relative rejection rate, see UNIDO (2010: chapter 1).

Figure 2.4: Relationship between import shares and rejections in fruit and vegetable products



Source: UNIDO dataset and analysis, based on UN Comtrade and Japanese MHLW data

was largest for products imported from China (see Table 2.7). In fact, the rejections of fruit and vegetable products from China accounted for 37.5 per cent of all rejections of fruits and vegetable products. A trend that can be seen from Table 2.7 is that the number of rejections of products from China has been decreasing during this period. As with fish and fishery products, products from Thailand and Viet Nam are also frequently rejected.

In terms of rejections of fruit and vegetable products per value of imports, rejection rates of products from Indonesia, Viet Nam and Thailand are rather high (see Figure 2.3), although the rejection rate for Thailand has come down significantly. As with fishery products, rejection rates in Viet Nam are relatively high.

Comparing the performance of East Asian countries to other countries, fruit and vegetable products imported from East Asian countries tend to experience more than their fair share of rejections (see Figure 2.4). With fruit and vegetable products, many countries seem to lie above the 45-degree line, unlike the case with fish products, suggesting that controlling and ensuring the required quality and food safety may be harder for fruit and vegetable products. Only the Philippines manages a lower level of rejection relative to its exports. Other countries, especially Thailand, Viet Nam, and Indonesia, seem to have a hard time clearing quarantine and inspections at Japanese borders.

2.2.2 Reasons for rejections

Next, we will examine the reasons for rejections at Japanese ports. Among various reasons for rejections at Japanese ports, six reasons account for 94 per cent of them. The most frequently cited reason is "Bacterial contamination", accounting for 23 per cent, followed by "Pesticide residues" (22 per cent), "Additives"(13 per cent), "Mycotoxins" (13 per cent), "Hygienic condition/controls" (12 per cent), and "Veterinary drugs residues"(11 per cent) (see Table 2.8). Bacterial contamination occurs mainly because of unsanitary conditions at the point of production (including processing factories) and/or during transport. Improper use of additives or use of prohibited additives will result in these products being rejected at the port. The problem with pesticide and veterinary drugs residues occurs because of the inappropriate use of pesticides and drugs at the farms as the first stage of production. If the raw materials have problems with pesticide or veterinary drug residues, then this will continue to affect processed products made from these raw materials. Thus, the problems of import rejections are the problems of supply chain management. The final exporter (whether of raw agricultural materials or processed food items) has to ensure the quality and safety of the product. This would require a good product quality control system throughout the supply chain. We examine this issue in more detail in Chapter 3 (frozen vegetable products from China), Chapter 4 (eel products from China) and Chapter 5 (*pangasius* and shrimp products from Viet Nam).

Table 2.8: Reasons for Japanese import rejections, 2006–2010

Reason for Rejection	Year						
	2006	2007	2008	2009	2010	Total	%
Bacterial contamination	306	277	260	277	311	1,431	22.5
Pesticide residues	329	303	181	318	265	1,396	21.9
Additive	269	169	94	143	178	853	13.4
Mycotoxins	269	145	137	124	149	824	12.9
Hygienic condition/controls	31	54	115	282	287	769	12.1
Veterinary drugs residues	160	230	115	103	86	694	10.9
Other contaminants	24	32	37	41	32	166	2.6
Adulteration/missing document	5	29	15	14	8	71	1.1
Heavy metal	3	3	2	4	11	23	0.4
Packaging	0	2	4	0	0	6	0.1
Others microbiological contaminants	0	0	0	2	0	2	0.0
Labeling	1	0	0	0	0	1	0.0
Others	28	44	26	20	11	129	2.0

Source: UNIDO dataset and analysis, based on Japanese MHLW data

Table 2.9: Trends in food product groups rejected for "bacterial contamination", 2006–2010

	2006	2007	2008	2009	2010	Total
Fish and fishery products	188	166	139	139	145	776
Fruits and vegetables	44	41	50	55	45	235
Herbs and spices	2	2	3	1	3	11
Nuts and edible seeds	3	0	0	1	4	8

Source: UNIDO dataset and analysis, based on Japanese MHLW data

Table 2.10: Countries with a large number of rejections for "bacterial contamination", 2006–2010

	Number of rejections
China	437
Thailand	295
Viet Nam	145
Italy	81
Republic of Korea	77
Philippines	70
Indonesia	49
France	36
Spain	29
United States	27

Source: UNIDO dataset and analysis, based on Japanese MHLW data

Looking at the trends in reasons for rejections during 2006 and 2010 suggests that the number of rejections due to "Hygienic condition/controls" have increased quite rapidly since 2007. The number of rejections due to heavy metals, packaging and labels is quite low and there is no discernible trend associated with them.

Among various food product groups, fish and fishery products are by far the most often identified offenders in relation to bacterial contamination, followed by fruit and vegetable products (see Table 2.9). Other product groups are rarely rejected for this reason.

Looking at these overall trends, it is apparent that many exporters have experienced port rejections especially in fish and fishery products, and fruit and vegetables (including processed products of these). These exporters also seem to have troubles with bacterial contamination, maintaining hygienic conditions throughout the supply chain, and procuring safe and proper raw materials (either for direct exports or for processing). In addition, reflecting the large volume of trade in agricultural goods and food, among East Asian countries, China, Viet Nam, and Thailand are some of the countries with frequent violations.

When we focus on the countries of origin of food products rejected because of bacterial contamination, six out of the worst offenders are from East Asia, and the product categories with the highest rejection rates are seafood and fruit and vegetables. The rest are countries with significant exports of meat products (see Table 2.10).

Table 2.11 shows the trend in food product groups rejected for "hygienic conditions and control" reasons. Fruit and vegetables are rejected most frequently among these food products.

Table 2.11: Trends in food product groups rejected for "hygienic conditions", 2006–2010

	Year					
	2006	2007	2008	2009	2010	Total
Fruits and vegetables	2	17	48	27	17	111
Nuts and edible seeds	2	2	3	1	3	11
Herbs and spices	2	2	2	1	0	7
Fish and fishery products	1	0	0	1	0	2

Source: UNIDO dataset and analysis, based on Japanese MHLW data

Table 2.12: Countries with a large number of rejections for "hygienic conditions", 2006–2010

	Number of rejections
Ghana	131
United States	107
Thailand	92
Canada	51
China	48
Brazil	37
Colombia	33
Indonesia	30
Ecuador	28
Viet Nam	23

Source: UNIDO dataset and analysis, based on Japanese MHLW data

Some East Asian countries such as Thailand, Indonesia, and Viet Nam have experienced a high incidence of import rejections in Japan due to insufficient hygienic conditions (see Table 2.12). In addition to these East Asian countries, countries from Latin America (Brazil, Colombia, and Ecuador) and from Africa (Ghana) as well as the United States and Canada have experienced a high incidence of import rejections in Japan. Coffee, cocoa beans, rice, wheat, and other grains are the dominant products to be rejected because of improper hygiene conditions. A typical reported cause is moisture damage to products, which could occur either before loading or during transport.

Table 2.13 lists food groups that were rejected because of pesticide residues between 2006 and 2010. Two of the largest product groups are "Fruits and vegetables" and "Nuts and edible seeds". Although the numbers were initially small, the number of cases with pesticide residues is increasing in "fish and fishery products" and this product group is now ranked third.[13]

Table 2.13: Trends in food product groups rejected for "pesticide residues", 2006–2010

	Year					
	2006	2007	2008	2009	2010	Total
Fruits and vegetables	128	115	62	146	87	538
Nuts and edible seeds	21	23	6	30	36	116
Fish and fishery products	12	14	13	9	48	96
Herbs and spices	13	19	4	22	14	72

Source: UNIDO dataset and analysis, based on Japanese MHLW data

Table 2.14: Countries with a large number of rejections for "pesticide residues", 2006–2010

	Number of rejections
China	386
Ghana	204
Ecuador	173
Thailand	62
Republic of Korea	60
Ethiopia	54
United States	53
Viet Nam	50
Canada	47
India	39

Source: UNIDO dataset and analysis, based on Japanese MHLW data

Countries experiencing a large number of Japanese import rejections because of detection of pesticide residues are listed in Table 2.14. China tops the list, followed by Ghana and Ecuador. China is one of the largest exporters of seafood and vegetable products to Japan. Viet Nam is also one of the major exporters of seafood to Japan. Ghana and Ecuador experience these problems with cocoa beans.

2.2.3 Selected focus on China, Viet Nam, and Thailand

Next, we focus our attention on three countries in East Asia: China, Viet Nam and Thailand. These three countries experience the most import rejections in Japan. A brief overview of the trend in import rejections of agricultural and food products from East

13 The detection of pesticides in fish and fishery products may be caused by intrusion of water contaminated with pesticides into growing ponds for fish and fishery products.

***Table 2.15:** Trends in food product groups of Chinese exports rejected in Japan, 2006–2010*

	2006	2007	2008	2009	2010
Fish and fishery products	170	145	76	73	96
Fruits and vegetables	137	131	55	104	63
Nuts and edible seeds	44	38	23	21	20
Herbs and spices	19	15	7	3	7
Cereals and bakery products	24	44	12	7	7
Other processed foods	8	7	5	13	4

Source: Calculated by authors using MHLW data

***Table 2.16:** Reasons for Japanese rejections of Chinese food products, 2006–2010*

	Number of rejections
Bacterial contamination	437
Pesticide residues	386
Veterinary drugs residues	262
Additive	248
Mycotoxins	111
Others	78
Hygienic condition/controls	48
Other contaminants	36
Adulteration/missing document	34
Heavy metal	3
Packaging	2
Others microbiological contaminants	1
Labeling	0

Source: UNIDO dataset and analysis, based on Japanese MHLW data

Asian countries at Japanese ports is provided in Annex B, followed by detailed country-level information from Annex C to L in alphabetical order.

Table 2.15 lists the number of rejections of food product groups exported by China. The table demonstrates that two food product groups account for the bulk of the rejections. These are: "Fish and fishery products" and "Fruit and vegetables and products".

For various reasons, Chinese products suffer from problems associated with "Bacterial contamination", "Pesticide residues"and "veterinary drug residues" (see Table 2.16). These have been consistently problematic for food products exported from China, although the number of detections of these violations has been declining. Rejections associated with "Additives" have decreased significantly in number, suggesting that Chinese firms may have learned and adapted to the regulations concerning allowed additives in Japan.[14]

In the case of Viet Nam, the largest number of rejections is found in the "Fish and fishery products" food group (see Table 2.17). While still small in number, rejections of "Fruits and vegetables and products" have been increasing since 2009.

In terms of the reasons for rejections, "veterinary drugs residues" have accounted for the largest share, followed by "Bacterial contamination" and "pesticide residues" (see Figure 2.5). We examine the problem associated with "veterinary drugs residues" in more detail in Chapter 5.

As with China, the most frequently rejected categories among those exported from Thailand include "Fish and fishery products" and "Fruits and vegetables" as well as "Cereals and bakery products" (see Table 2.18).

Thai products are rejected mainly because of "Bacterial contamination", "Hygienic condition/controls" and "Pesticide residues" (see Figure 2.6). Furthermore, the number of rejections due to poor "Hygienic condition/controls" has been increasing since 2009, highlighting a potential problem area in the future.

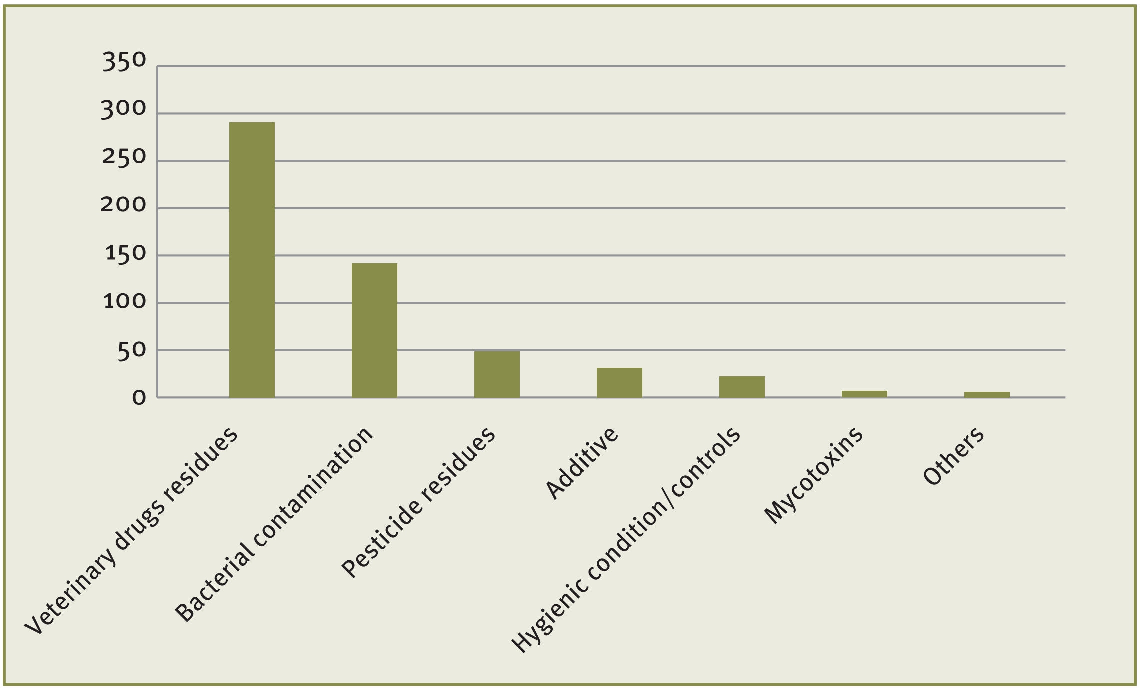
14 It is also possible that Chinese firms have diverted those products with additives prohibited in the Japanese market to other markets.

***Table 2.17:** Trends in food product groups of Vietnamese exports rejected in Japan, 2006–2010*

	2006	2007	2008	2009	2010
Fish and fishery products	117	147	60	57	83
Fruits and vegetables	5	5	5	8	11
Nuts and edible seeds	2	1	0	0	0
Herbs and spices	2	1	0	0	2
Cereals and bakery products	2	8	5	1	2
Other processed foods	2	0	0	0	0

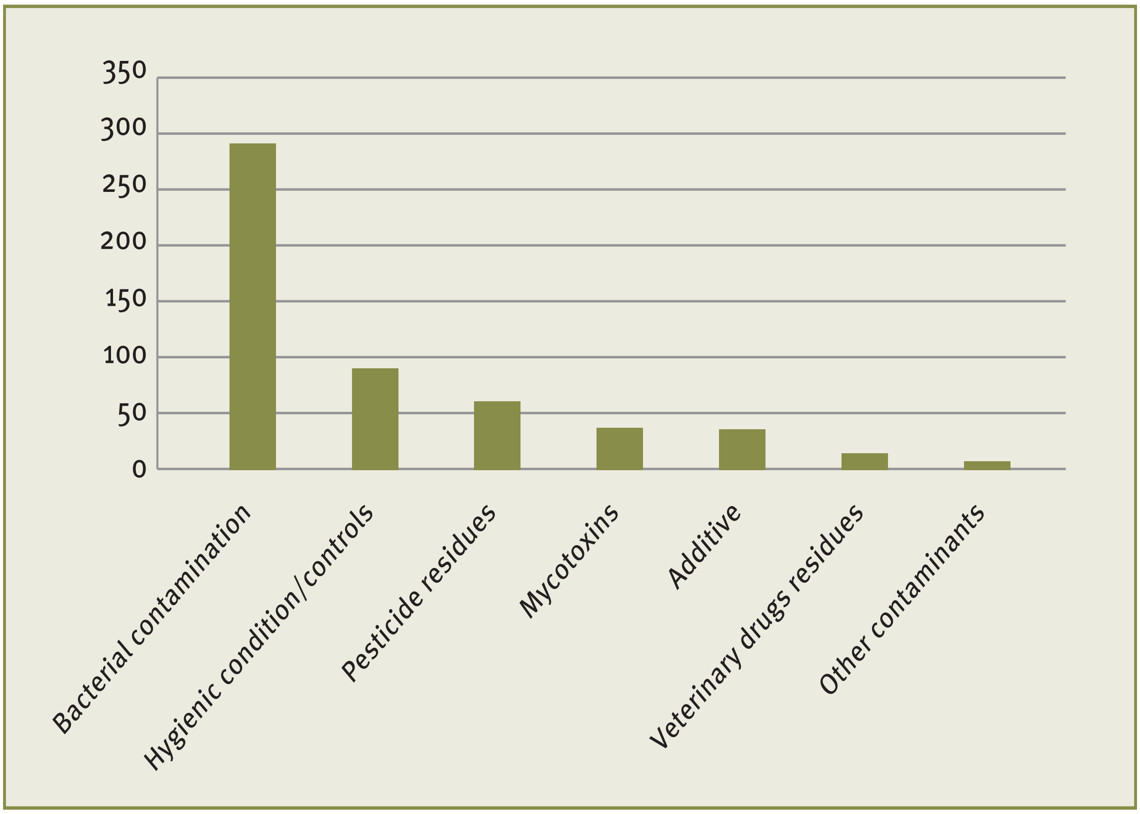
Source: UNIDO dataset and analysis, based on Japanese MHLW data

Figure 2.5: *Reasons for Japanese rejections of Vietnamese food products, 2006–2010*



Source: UNIDO dataset and analysis, based on Japanese MHLW data

Figure 2.6: *Reasons for rejections of Thai food products in Japan, 2006–2010*



Source: UNIDO dataset and analysis, based on Japanese MHLW data

Table 2.18: Trends in food product groups of Thai exports rejected in Japan, 2006–2010

	2006	2007	2008	2009	2010	total
Fish and fishery products	49	39	38	47	38	211
Cereals and bakery products	19	21	24	29	34	127
Fruits and vegetables	31	27	19	26	17	120
Herbs and spices	5	5	3	4	5	22
Other processed foods	5	0	0	1	0	6
Nuts and edible seeds	1	1	0	0	1	3

Source: UNIDO dataset and analysis, based on Japanese MHLW data

The overview of rejection cases at Japanese ports reveals that many East Asian countries are facing problems in complying with the regulations in Japan. This problem is typically found in the two food product groups: "Fish and fishery products" and "Fruits and vegetables and products". Among the reasons for rejections, "Bacterial contamination", "Veterinary drug residues", and "Pesticide residues" seem to be persistent for food product exports from East Asian countries to Japan. In the following chapters, we will take a closer look at exports of vegetable and fishery products from China (see Chapters 3 and 4), and fishery product exports from Viet Nam (see Chapter 5). These chapters will examine in some more detail the import rejections and underlying compliance challenges along the value chains of frozen vegetables and eel products from China and *pangasius* and shrimp products from Viet Nam. These case studies will illuminate some of the difficulties that firms and supply chains in these countries have in complying with the regulations of importing countries, particularly in Japan.

3. Case Study: Chinese Frozen Vegetable Exports

3.1 Introduction

In late 2001 and 2002, Chinese frozen spinach imported by Japan was found to contain residues of the pesticide chlorpyrifos. In August 2002, the Japanese government issued advisory notices to halt imports of Chinese frozen spinach, but this stopped the imports of all frozen vegetables from China into Japan. In February 2003, the Japanese market was reopened to imports of frozen vegetables from China, though it closed again because new tests revealed continued problems with the same pesticide (Calvin, Hu, Gale and Lohmar, 2006). This incident put food safety at the top of the agenda regarding imports from China to Japan.

This case study focuses on exports of frozen vegetable products from China (with a particular focus on the Japanese market), analyzes the factors associated with the rejections of these products at Japanese ports, and remedial actions taken by producers in China. The remainder of this section provides a brief overview of vegetable production in China and the way in which China has been participating in exports of these products. The next section will closely examine the frozen vegetable sector in China, identify causes for import rejections, and the actions taken by the Chinese government and by producers, processors, and exporters to improve the quality of frozen vegetable exports.

After the Opening-up and Reform policy in the late 1970s, the new economic regime called *Household Production Responsibility System* spread all over rural China by the early 1980s. This decreed that the right to use farmland should be distributed to individual farmers while the right to own farmland was given to each village. This new system, which led to the appearance of numerous small-scale household farming units, stimulated farmers' willingness to produce, which had long been depressed under the Peoples' commune system. By the mid-1990s China achieved almost sufficient domestic food production, which made it possible for China, a country with a huge population to feed, to aggressively open its door to the global agricultural market.

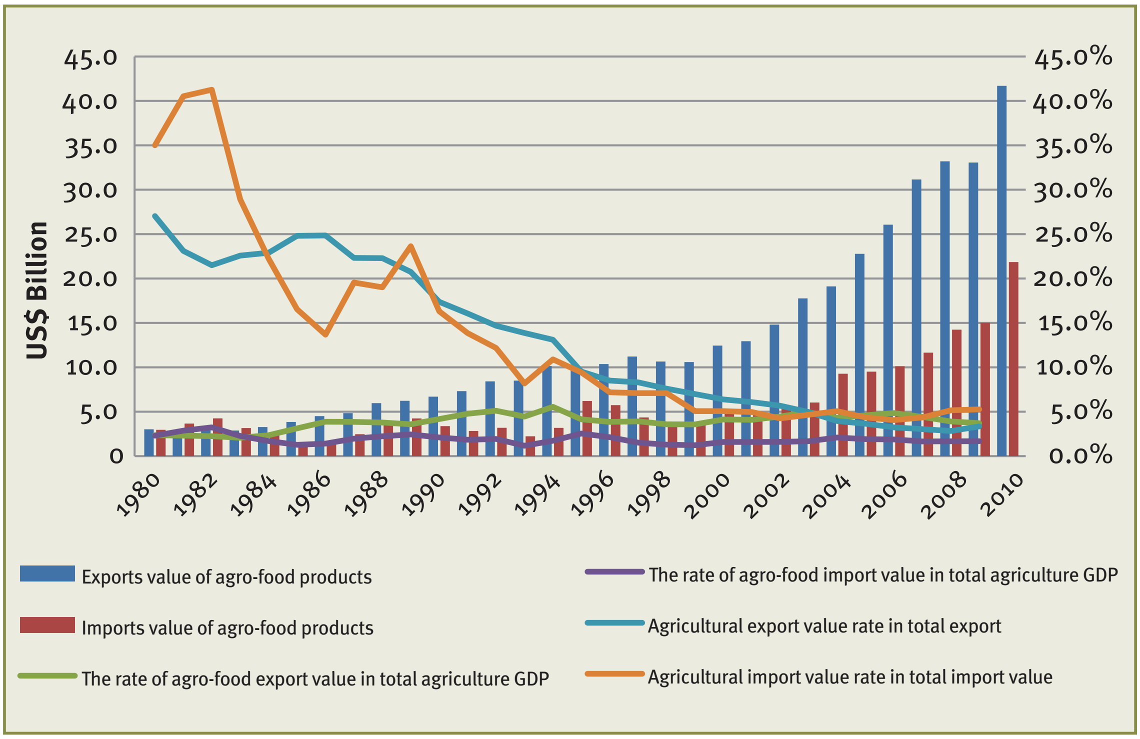
The institutional reforms liberalising the international agro-food trade in the late 1980s led to a rush of foreign investments in the agricultural processing sector, although only authorised trading companies were allowed to participate. Japan, the largest agro-food importer in the world, was the chief investor in coastal China, followed by Republic of Korea, Taiwan Province of China, and Singapore. Japan initially invested in Shandong province – the largest agricultural production region in north China – and later spread to Jiangsu, Guangdong, Fujian and other coastal provinces endowed with good access to ports. These foreign agribusiness firms encouraged local farmers to grow crops specifically for importers' markets by providing them with a holistic package of production materials including seeds, pesticides and technical assistance, which is the so-called *Development and Import* strategy.

In combination with this development of the food processing industry led by foreign-financed agribusiness, a series of drastic rural institutional reforms, including distribution liberalisation for agricultural products since the 1990s, encouraged further development of agribusiness. Since the late 1990s, one of the main strategies of Chinese agricultural policy has always been the development of agribusiness and food processing industries to add value to agricultural products by utilising the abundance of low-cost labour to ameliorate domestic income disparity between agriculture and other industries. The Chinese government promoted the development of agribusiness and the agricultural vertical integration system by providing lead firms and farmer organizations with tax incentives and subsidies. This policy is specified in the *Agricultural Industrialization Policy*. The main purpose of this policy is to create leading agribusinesses which in turn lead large-scale farmers or local farmers' cooperatives and their member farmers. This policy has contributed to the development of agribusiness since the late 1990s.

Chinese agro-food export value has grown rapidly since the late-1990s, and China's accession to the World Trade Organization (WTO) in 2001 accelerated this growth. Figure 3.1 indicates trends in the value of Chinese agro-food exports and imports during the 30 years from 1980 to 2010. The value of exports in 2000 was US$12 billion, more than four times that in 1980, about US$3 billion in nominal terms. In the 2000s the WTO accession accelerated the growth, with the total export value in 2011 exceeding US$40 billion, 3.6 times that of 2000. While the share of agro-food exports in total agricultural GDP had been stable, at around 3 to 5 per cent over time, the share of agro-food export value in total national export value decreased dramatically from 26.7 per cent to 3.3 per cent in the same time period because of the rapid growth of manufacturing export industries.

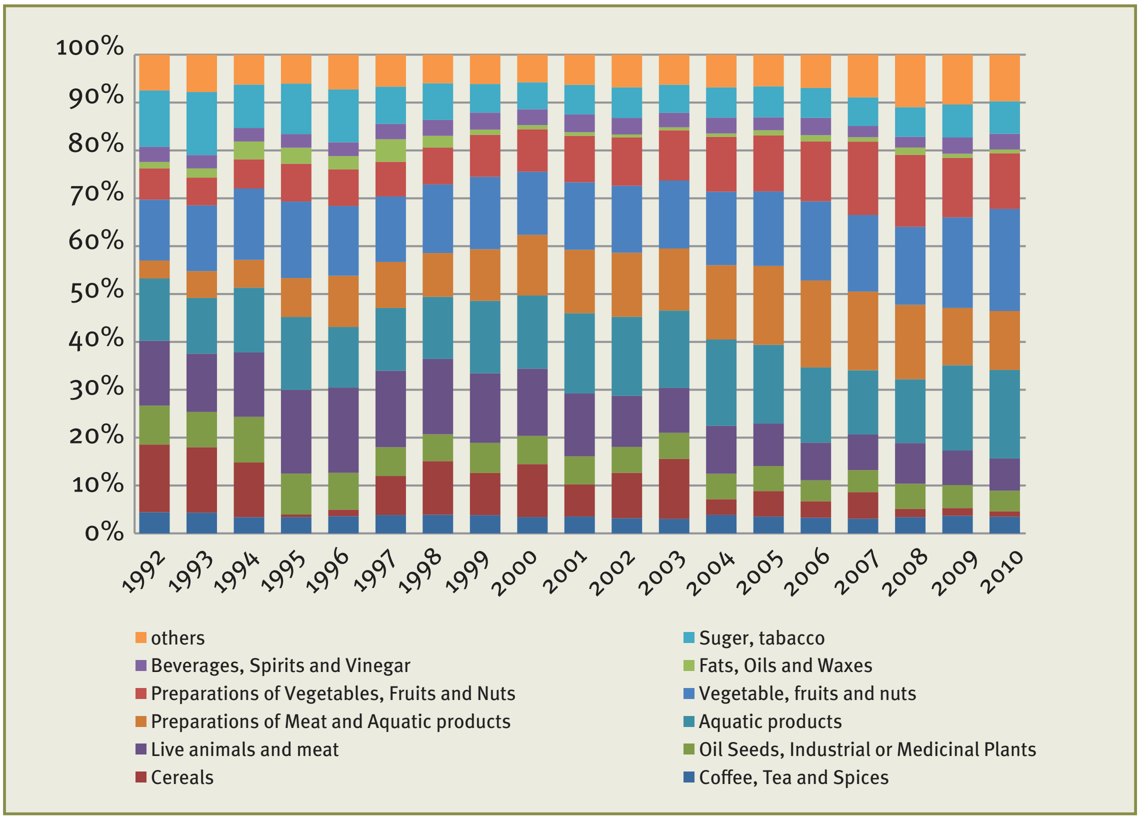
Figure 3.2 shows trends in the composition of agro-food export values from 1992 to 2010. From this figure, it can be seen that the share of raw materials has decreased during this period, while various kinds of processed products grew rapidly. In 1992, raw

Figure 3.1: Chinese agro-food trade trends, 1980–2010



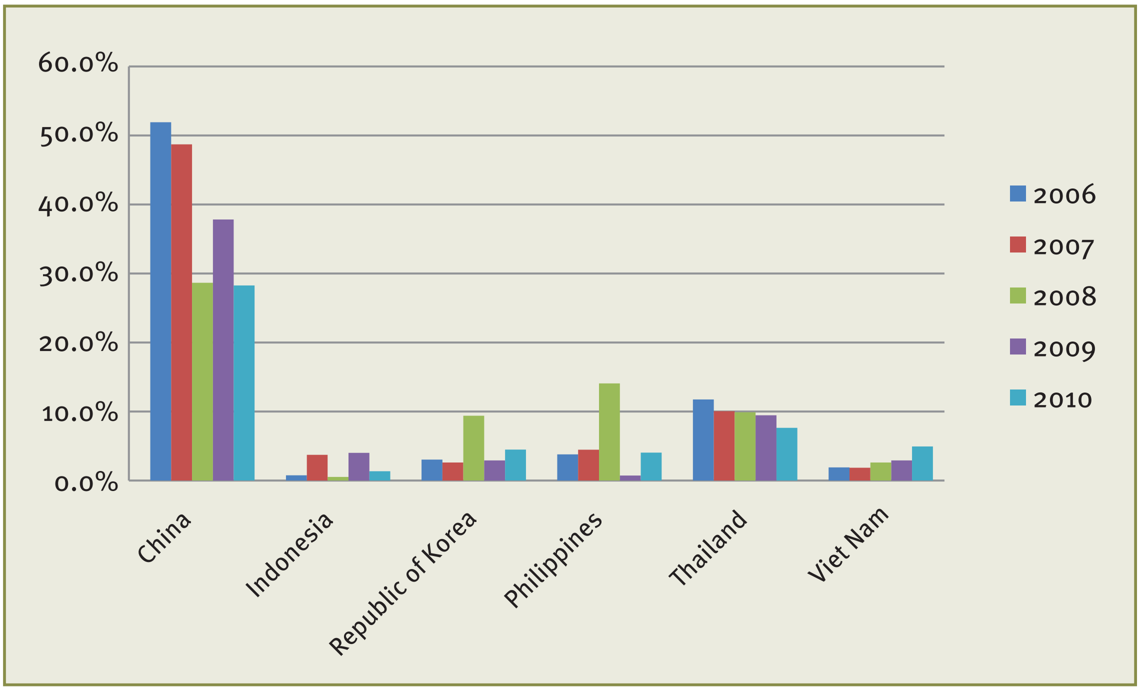
Source: National Statistical Bureau of China, Ministry of Agriculture (China), various years

Figure 3.2: The composition of Chinese agro-food exports (in value terms), 1992–2010



Source: National Statistical Bureau of China, Ministry of Agriculture (China), various years

Figure 3.3: Share in Japanese rejections of Fruit and Vegetable products among selected East Asian countries, 2006–2010



Note: Excludes Brunei Darussalam, Cambodia, Hong Kong (China), Lao People's Democratic Republic, Malaysia, Myanmar, and Singapore.

Source: UNIDO dataset and analysis, based on Japanese MHLW data

agricultural products including coffee, tea and spices, cereals, oil seeds, industrial or medical plants, live animals and meat accounted for 40.2 per cent of exports. This dropped to 15.7 per cent in 2010. In contrast, the share of various processed products of meat, vegetables and aquatic products has increased. For instance, the sum of fresh vegetables and preparations of vegetables and fruits grew from 19.3 per cent in 1992 to 33.0 per cent in 2010. Within vegetable and fruit exports, the share of the preparations was 33.9 per cent of the values in 1992, peaked at 48.9 per cent in 2007, and then decreased to 35.3 per cent.

The share of fish and other aquatic products has remained stable during this period, at about 12–16 per cent of total export value. The ratio of preparations of meat and aquatic products accounted for 3.6 per cent in 1992, then touched 10 per cent in the late 1990s, peaked at 18.2 per cent in 2006 and then started to decline to 11–12 per cent in the late-2000s. This declining tendency is partly because of the adoption in 2006 by the Japanese government of a *Positive List System for Agricultural Chemical Residues in foods,* which will be referred to in detail later.

As Chinese agriculture deepened its linkage to the global market and became a major exporter in the global agro-food market, a number of disputes regarding food safety occurred. In the 2000s successive serious incidents regarding the safety of Chinese agro-food products occurred. In the Japanese market, imported fruits and vegetables from China are rejected more frequently than those from other East Asian countries (see Table 2.7).

Under pressure from the international community, the Chinese government has placed more emphasis on food safety and has started to establish more efficient and effective controls over the entire food supply chain in China.

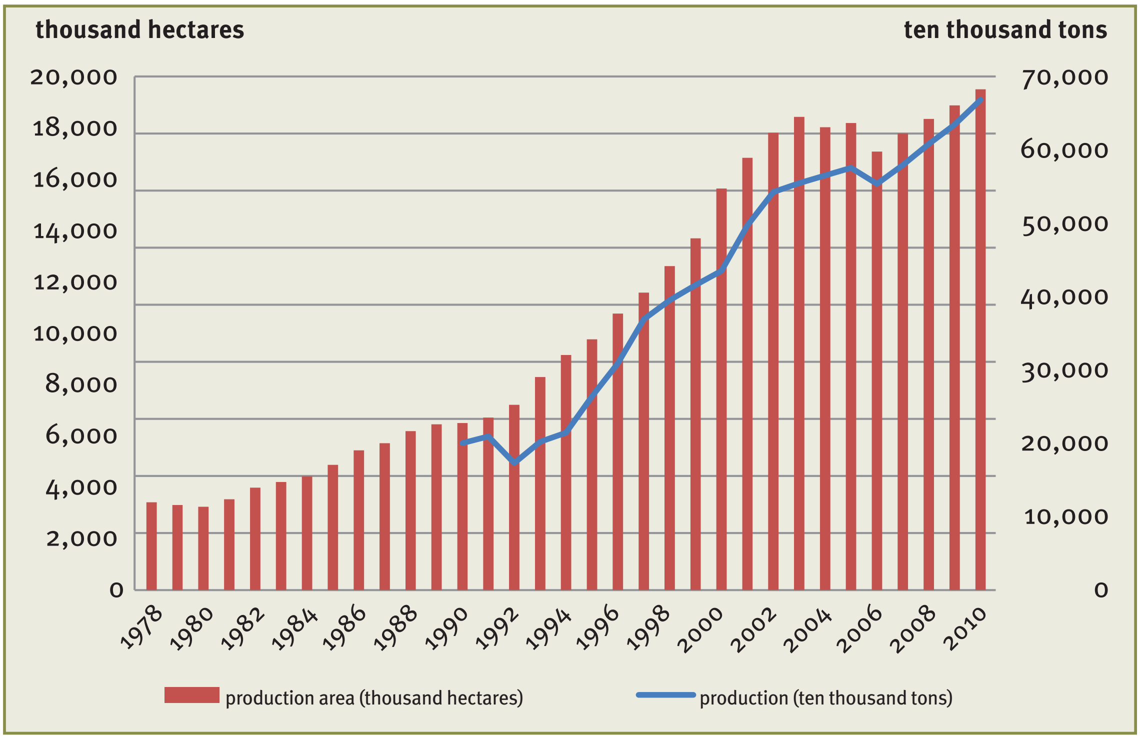
In this chapter and the next, we will analyze two typical Chinese export items, frozen vegetables and eels, as examples of products or value chains with serious food safety problems in the 2000s in the international market. These chapters aim to clarify the basic characteristics of production, distribution and export of each item, how exporting firms manage supply chains to control and ensure the quality, the potential export capacities, and implications for necessary policy actions.

3.2 Production and distribution of vegetables in China

3.2.1 Domestic production of vegetables

Since the introduction of a market economy, the area under production and the output of vegetables in China have steadily increased (see Figure 3.4). The total area for vegetable cultivation was 3,330,000 hectares in 1978. Within 12 years, the cultivation area doubled and the rate of increase accelerated during the 1990s. In 2010, the total cultivation area reached 19 million hectares, nearly six times as large as that in 1978. The quantity of production has also increased very rapidly, to 651 million tons in 2010, which was about 3.8 times as much as in 1978 (195 million tons).

Figure 3.4: Vegetable production trends in China, 1978–2010



Source: Ministry of Agriculture (China), various years

Among vegetables, leaf vegetables are the most popular, accounting for 35.1 per cent of the cultivation area and 36.0 per cent of output. This is followed by solanaceous crops (this includes tomatoes and aubergines) with 14.7 per cent of the total production area and 16.1 per cent of total production. The third variety is root vegetables, accounting for 14.1 per cent and 14.1 per cent, followed by cucumbers and gherkins at shares of 11.5 per cent in area and 12.9 per cent in output, respectively.

The top five production areas in 2009 were located in Shandong, Henan, Guangdong, Sichuan and Hebei provinces. Their shares were 9.5 per cent, 9.1 per cent, 6.2 per cent, 6.2 per cent, and 6.1 per cent of total vegetable production area, respectively. The majority of the main production areas are located in the coastal areas where soils are more fertile and with better access to international markets.

3.2.2 Vegetable distribution system in China for the domestic and global markets

After the introduction of a market economy, the distribution of agricultural products was liberalised in a step-by-step manner. Since 1988, the government has been promoting the establishment of agricultural wholesale markets. According to the *2010 China Agricultural Development Report,* more than 70 per cent of vegetables, fruits and aquaculture are now distributed through wholesale markets.

However, there still are still more than 250,000 *free markets* at the end of 2008, although the number is declining slowly.

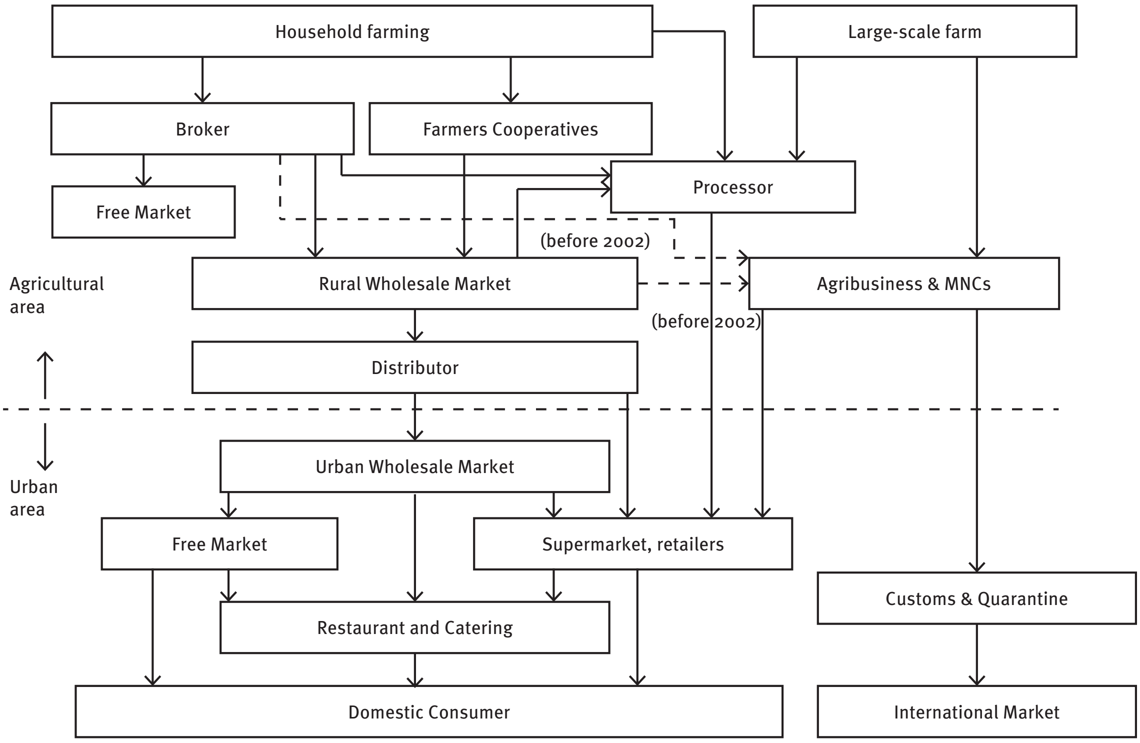
The vegetable distribution system in China since the 1980s is shown in Figure 3.5. Agricultural products for international markets (on the right of the figure), especially the products for developed countries which require higher quality standards, are basically separated from those for the domestic market (on the left) in the process of production, processing and distribution. It should be emphasised that most Chinese vegetables and their products are consumed locally, and in increasing amounts along with income growth, while only a small percentage of the production is exported, though this is a sizeable amount compared with other foreign countries. The major players and their functions in the Chinese vegetable distribution system regarding products for domestic and international markets will be described separately below.

Products for the Chinese domestic market

The main vegetable producers for the domestic market can be divided into two types. The first type are small-scale farmers. According to the *Second Chinese Agricultural Census* in 2006, the average cultivated land area per household is only 0.55 hectares. There are also *large-scale farmers*, although their number is still small. This is because the development of contract farming remains limited, partly because of the still underdeveloped food processing industry and farmland rental market. Only 10.8 per cent of a household's farmland was rented from the land market on average and only 12.2 per cent of farmers participate in the farmland rental market.

Most farming households sell their vegetables to *Brokers* who visit villages in harvest season to purchase their products.

Figure 3.5: ***Vegetable distribution system for domestic/global markets in China***



Source: Authors' own illustration

Some of the brokers are local farmers who entered into the distribution business. The brokers then sell the vegetables to wholesale markets and processors. Some vegetables would be sold to a local free market or fairs for local consumption. Some of the farmers are members of *Farmers' Professional Cooperatives* (FPCs), that will be elaborated later, and sell their products to them, though the shares of vegetables sold through FPCs are rather small currently.

According to the *2010 China Agricultural Development Report*, rural wholesale markets handle vegetables from 60 per cent of the total vegetable production area. About 80 per cent of the rural wholesale markets are located in the east and central areas of China. They work as hubs of horticulture products, and from them these products are distributed to urban wholesale markets, supermarkets and other retailers and traditional free markets in large and medium cities via distributors. Registered wholesale markets are equipped with quality control (safety check) facilities and, according to the *Policy on Market Entrance Permission of Vegetables* based on the *Law of PRC on Quality and Safety of Agricultural Products*, local officials can implement compulsory pesticide residual inspection by random sampling at rural and urban wholesale markets and large retailers that deal with vegetables.

Agribusiness firms engaging in the processing and distribution of food products usually procure their materials from *large-scale farms* on contract, their own farms, or from *rural wholesale markets* (only in the case of the domestic market). The domestic market for processed vegetables is still underdeveloped because only a limited number of agribusinesses are equipped with cold storage and processing facilities. In addition, at this stage of development, most domestic consumers prefer fresh vegetables and fruits rather than highly processed products such as frozen vegetables and other preparations, apart from younger generations with a high enough income level and living in large cities such as Beijing and Shanghai.

Since the early 1990s, supermarkets have spread throughout large cities in China and the value of supermarket sales of horticultural products already exceeds that for exports, though traditional outlets still remain important (Wang *et al.,* 2009). The Chinese government promoted the conversion of traditional wet markets to supermarkets and the development of direct trade between farms or farmers' cooperatives and supermarkets in order to streamline the current thick-layered distribution system in China to improve efficiency and safety control along the supply chain.

Chinese products for the international market

The year 2002 saw a dramatic change in the procurement system for exports in the agriculture business. This was the year when spinach imported from China was found in Japan to contain excessive amounts of agricultural chemical residues. After the incident, export firms were restricted to the use of materials from registered producers according to the *AQSIQ Announcement on Inspection and Quarantine of Import and Export Vegetables* enforced in 2002. This specified that a vegetable export firm must purchase vegetables from a registered large-scale farm called a *Production Base (PB)* that satisfies certain conditions (PB will be referred to later in this chapter. Before 2002, some exporters bought materials from rural wholesale markets, from brokers, or from farmers directly. After 2002, small-scale processers and brokers who did not have access to PBs were completely shut out from lucrative export markets.

As for agribusiness firms, only the firms that have import and export licences are allowed to make contracts with foreign traders, though the application processes have become much easier than before. With respect to frozen vegetables and highly processed preparations of vegetables, export agribusinesses have created an integrated quality management system starting from production in PBs, processing, packing and all the way through to the shipping process. The main exporters of frozen vegetables are large-scale agribusinesses who also have large PBs, processing facilities with strict temperature control, and chemical residual inspection facilities.

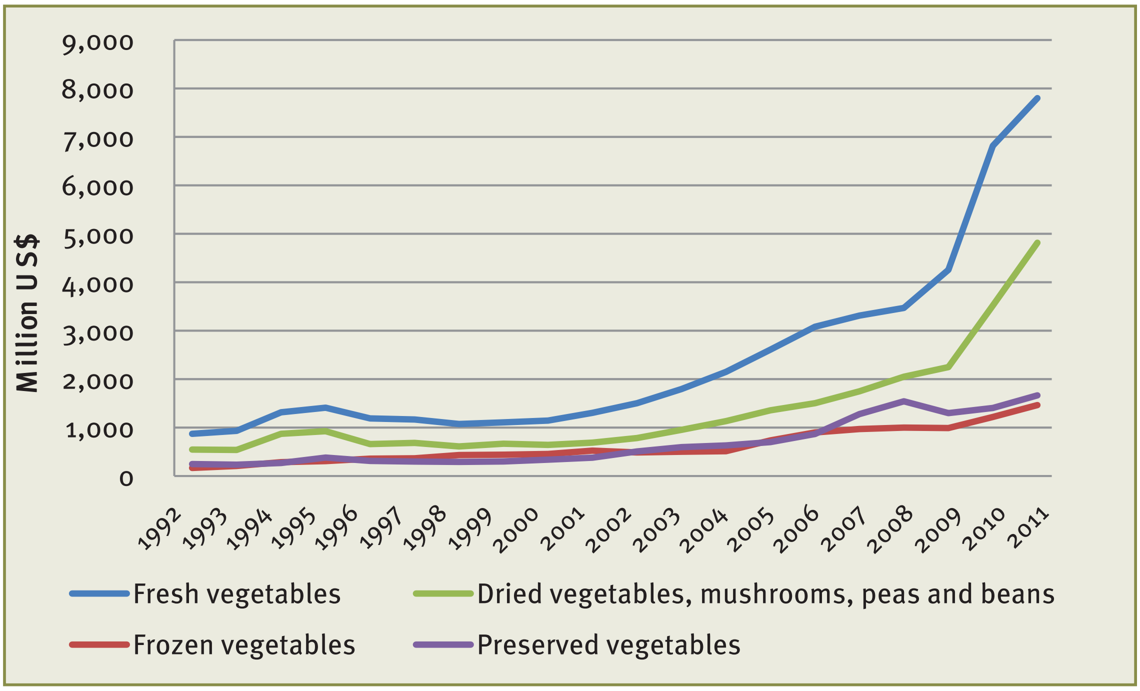
In 2003, there were more than 13,000 food processing firms engaging in some export activities. Of these, 836 enterprises had annual export values of more than US$5 million, and 60 per cent of them are vertically integrated from production, processing, and through to export. One of the largest such exporters is A Groups in Shandong province, which originated from a so-called rural township enterprise (TVE) in the 1980s and later grew into a group of companies including dozens of domestic and foreign-invested firms. One-sixth of frozen spinach exports from China are produced by them (Oshima, 2007). In Shandong, foreign investment in the food processing sector is quite active, most being investments from Japan and Taiwan Province of China, and specialising in export to the Japanese market. At present, exports of frozen vegetables are dominated by such large-scale agribusinesses with PBs that can guarantee the quantity, quality and safety of materials, this being the strongest advantage of such enterprises.

3.3 Exports of Chinese vegetable products

The composition of vegetable products exported from China has undergone several changes since it began in the late 1980s. Initially, Chinese exports consisted of mainly preserved or pickled products. Then the development of domestic infrastructure enabled China to export fresh vegetables in the early 1990s, starting with the vegetables requiring least preservation, such as garlic, ginger or root vegetables, and expanding to a wider range of varieties later. As the main importer, Japan deepened its dependence on Chinese fresh and processed vegetables produced at lower prices. In the mid-1990s Japanese frozen food companies and trading companies invested in Shandong province and other coastal area and started to export vegetables to Japan in accordance with the *Development and Import* strategy.

Figure 3.6 shows the export trends of various vegetable product groups after 1992. Among these products, *fresh vegetables* have remained the major category, growing rapidly during the 2000s,

Figure 3.6: ***Exports of various vegetable product groups from China (in US$ value)***



Source: UN Comtrade

In this report, the category of Fresh vegetables includes HS codes 0701, 0702, 0703, 0704, 0705, 0706, 0708, 0709, 0714, 0910; Frozen vegetables comprise HS codes 0710, 071490, 2004; Dried vegetables, mushrooms, peas and beans include HS codes 0712.39-010, 0712, 0713; Preserved vegetables include HS codes 2001, 2002, 2003.

with the speed of growth skyrocketing after 2009. *Dried vegetables* have a similar trend to *fresh vegetables*. The growth of *frozen vegetable* exports saw slower growth compared with the above two commodities, growing by 2012 to more than US$1.4 billion, a level 14 times higher than that in 1992. The share of frozen vegetables has not been increasing since 2006. This is partly because of the decrease in exports to Japan, the biggest importer of frozen vegetables, after the introduction of the *positive list system* in May 2006. The share of each product group in total vegetable export values in 2011 were as follows: fresh vegetables are dominant, accounting for about half of the total value, followed by dried vegetables (31 per cent), preserved vegetables (10 per cent), and frozen vegetables (9 per cent).

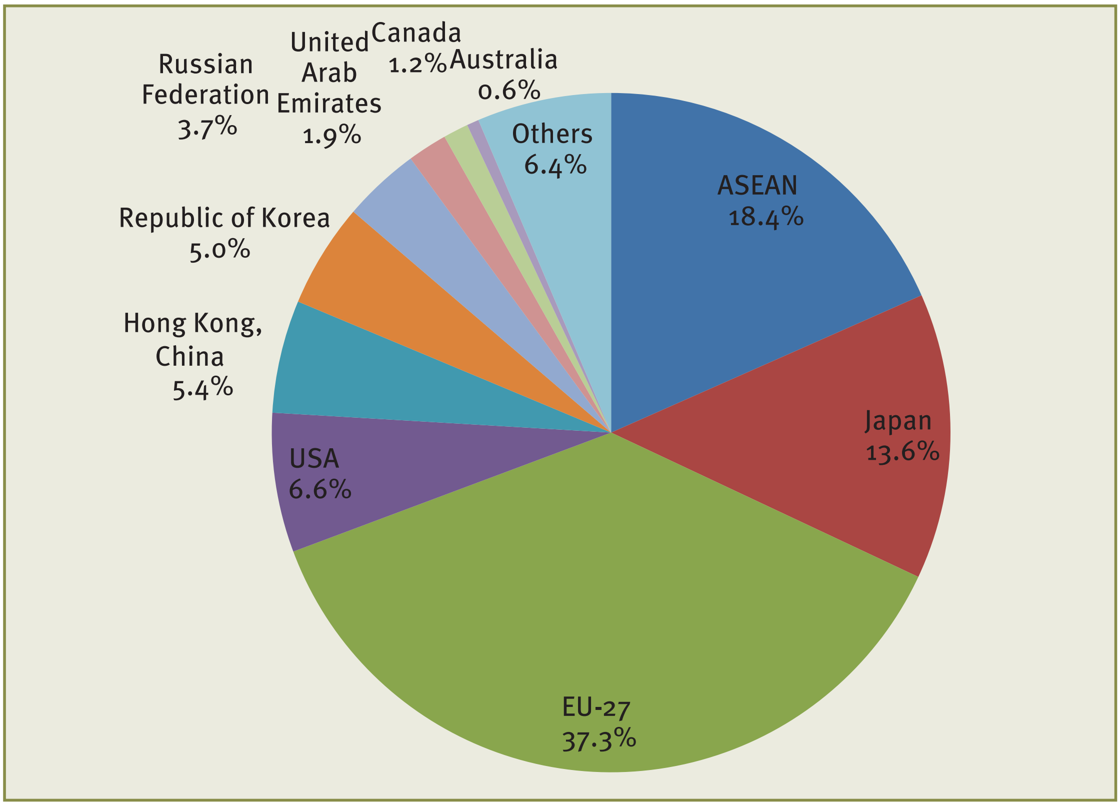
3.3.1 The distribution of major importing countries for Chinese vegetable products

The major overseas market for Chinese fresh vegetables is East Asia, accounting for more than 40 per cent, followed by the EU, the United States, Russian Federation and the Middle East (see Figure 3.7). Japan had been the largest importer of Chinese vegetables – both fresh and frozen – until 2008, although after the introduction of the *positive list system* in May 2006 the value started decreasing.

Japan adopted the *Positive List System for Agricultural Chemical Residues* in 2006. The *positive list system* established maximum residue limits (MRLs) for 799 agricultural chemicals for thousands of commodities, and imported foods cannot exceed these MRLs. If the imported food is found to contain a chemical which is not on the list, it cannot exceed 0.01 parts per million (ppm). This new policy required exporters to apply the strictest quality controls in the world and created a new challenge for Chinese exporters. Only the exporters who had been producing frozen vegetables for Japan for years survived. These firms either had good connections with Japanese customers or had Japanese investors. In most cases, these firms had investments from Japanese frozen food producing companies and trading companies, and they could prepare for the new standard beforehand by collecting the latest information and enjoying technical assistance from Japan.

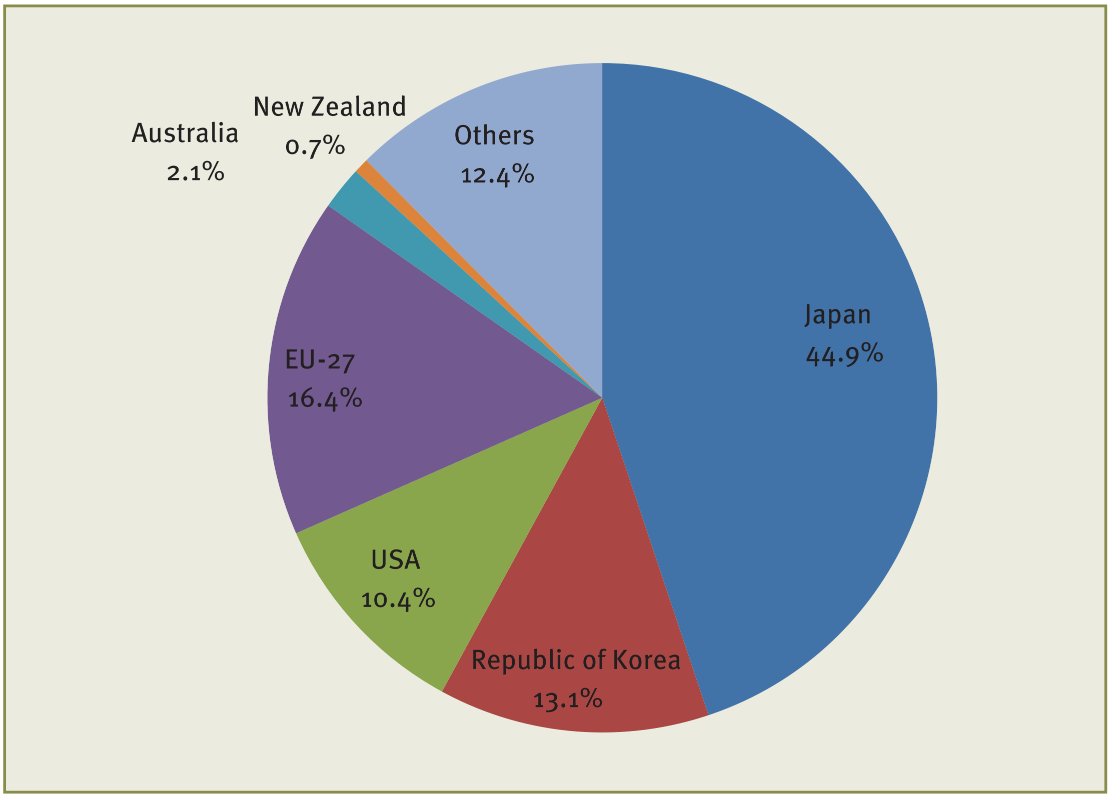
Fresh vegetable exports to new importers – mainly ASEAN countries, especially Malaysia and Thailand – increased dramatically in values as a result of gradual tariff reductions on agricultural products after 2005 under the ASEAN–CHINA FTA (ACFTA) scheme. Russian Federation imports Chinese vegetables through border trade mainly from the three northeastern provinces (Agriculture and Livestock Industries Corporation (ALIC), 2011).

Figure 3.7: ***Distribution of importers of Chinese fresh vegetables in 2011 (in value)***



Source: UN Comtrade database

Figure 3.8: Distribution of importers of Chinese frozen vegetables in 2011 (in value)



Source: UN Comtrade database

As with fresh vegetables, Japan has been the largest importer of Chinese frozen vegetables, although Japan's share has declined from 71 per cent in 2002 to 44.9 per cent in 2011. The second largest importer in 2011 was the EU (16.4 per cent), followed by Republic of Korea (13.1 per cent), and the United States (10.4 per cent). As with fresh vegetables, frozen vegetables are also exported to developing countries, where the standards are less strict. However, the demand for frozen vegetables typically is higher in developed countries than in developing countries.

Since detecting residual agricultural chemicals in Chinese-produced vegetables in 2002, Japan has banned imports from China several times and has introduced stricter standards for imported products. Hence Chinese exporters have diversified their export markets to avoid the risk, some of them shifting to markets in developing countries or even shifting to focusing solely on the domestic market, where quality standards are less strict than for export products. However, more and more prosperous Chinese residents are demanding safer and higher-quality food. This tendency continued after the introduction of the positive list system in 2006.

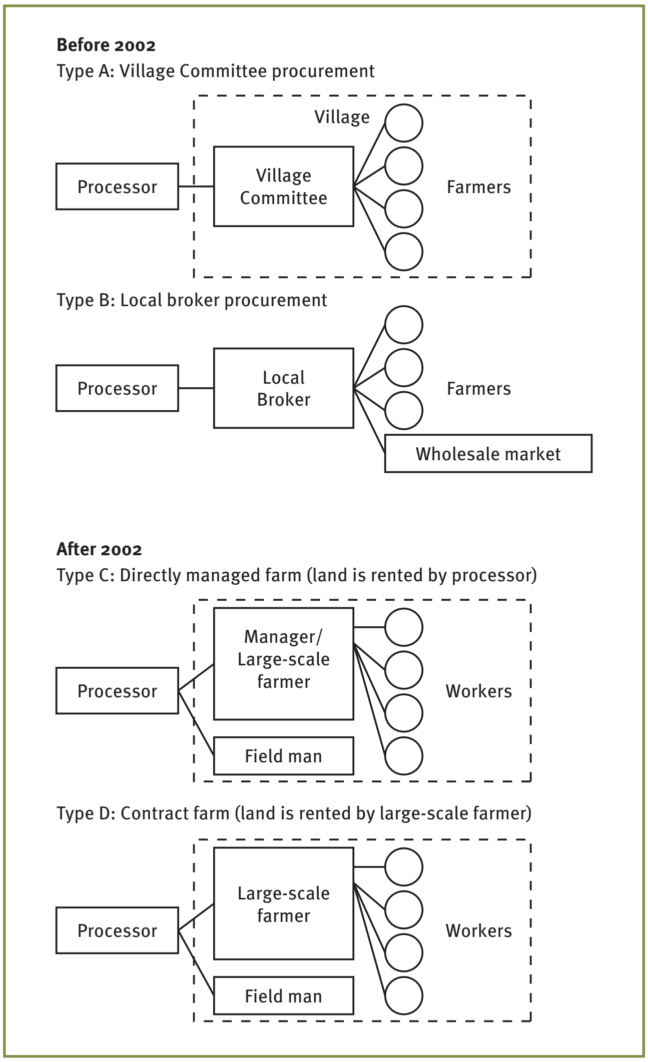
After the adoption of the positive list system in Japan in 2006, the China Inspection and Quarantine Service (CIQ) required exporters to double-check export commodities by CIQ and by private inspection centres before shipping. Some processors without any self-inspection facilities have to request inspection by other processing firms' inspection centres or private inspection companies specialised in inspecting export products. The costs of safety inspections have risen as the number of items to be checked increased and the variety of standards diversified. These cumbersome procedures and high costs have forced some firms to shift export markets to those with less strict standards.

Some exporters, mostly with Japanese or Taiwanese investors, have long engaged in producing products aimed at the Japanese market. Because the requirements and specifications for Japanese customers are so precise, these firms cannot easily change their products and destination markets. As part of this study, various Chinese vegetable producing and processing firms were interviewed in 2012. One of them had Taiwanese investors. Another had investors from Taiwan Province of China, Japan and China. For these two firms, more than 90 per cent of their frozen vegetables are exported to Japan, and the remainder are exported to EU and ASEAN countries. The third firm interviewed – a large domestic group company with investors of various nationalities – shifted their focus to the domestic market by diversifying away from horticulture crops, although one key advantage that this firm possesses is its food safety control system that was transferred by the foreign investor.

3.4 Supply chain management by multinational corporations

The incidents in Japan in 2002 regarding residual pesticides in Chinese frozen vegetables dramatically changed supply chain management by Chinese exporters. After the incidents, the national General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) directed the China Inspection and Quarantine Service (CIQ) at provincial and city levels to report countermeasure plans for food safety control. Among various proposals submitted by CIQs, the idea of constructing large-scale farms specialised for export suggested by the Shandong Yantai CIQ was adopted. *AQSIQ Announcement on Inspection and Quarantine of Import and Export Vegetables* was enforced in 2002 and specified that a vegetable export firm must have more than 20 hectares of farmland, which must be assembled into large plots with no prior contamination by banned substances; must manage proper pesticide use; ensure traceability; conduct sampling inspection of chemical residuals; must not purchase vegetables from places other than registered farms; and each registered farm should have a technical extension officer called a *Field Man*, and so on. This system is called the *Production Base*. The costs of ensuring food safety, including land rental fee and inspection fees, became a large burden for exporters.

Figure 3.9: *Procurement systems for vegetables for export processors in Shandong before and after 2002*



Source: *Sakazume, Park and Sakashita (2006), partly supplemented by interviews with three export enterprises in Yantai, Shandong by author in June 2012*

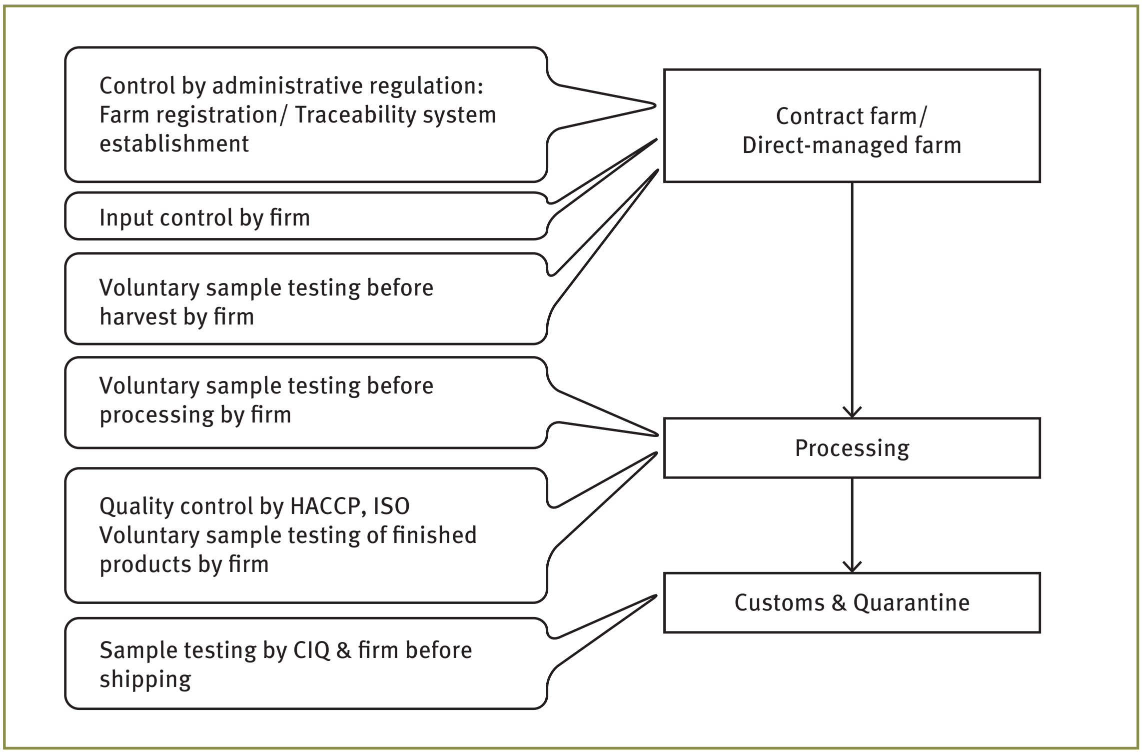
Before the 2002 incident, agribusinesses invested in the processing stage and introduced cold chain facilities. Some large-scale foreign-invested firms obtained global certifications for sanitation management in the processing process, such as Hazard Analysis and Critical Control Point (HACCP) and ISO (International Organization for Standardization), but less attention was paid to the safety of the production and procurement stages.

Figure 3.9 shows the change of procurement system for fresh vegetables for export processors in Shandong province before and after 2002, based on extensive interviews with several export enterprises by Sakazume, Park and Sakashita (2006), partly supplemented by fieldwork by the author in the same area. Before 2002, most agribusinesses procured fresh vegetables from village committees (Type A) or from rural free markets via brokers (Type B). Export processors collected the vegetables through loose production contracts with nearby villages in which farmers produced the vegetables. In this way, production quality control was left completely to farmers and traceability was very weak, though the processors provided basic technical assistance by sending officials to villages. At that time, another procurement method was Type B or local broker procurement from a rural free market. Traceability was not possible with this approach either. Even before 2002, some of the large agribusinesses had directly managed large-scale farms, though the aim of running such farms was mainly to stabilise the quality and quantity of materials, not to avoid the problems associated with residual agricultural chemicals.

After 2002, export materials were required to be produced on authorised plots of land, and export processors abandoned former procurement systems and constructed new systems as Type C and D show in the figure. According to the *AQSIQ Announcement on Inspection and Quarantine of Import and Export Vegetables* enforced in 2002, all export processors must now use vegetables from registered farmlands of appropriate size and with the right conditions. Because of this requirement, export processors either have to rent land from nearby villages by aggregating smaller plots or contract with large-scale farmers who have their own rented land.[15] In Type C, a processor rents farmland and directly manages the production by providing a manager employed by the firm or a specialised large-scale farmer who is made responsible for daily management of production and quality control based on the firm production plan. The *Field Man* is a technical extension official who is responsible for technical assistance to the manager and workers (usually the

15 According to the Chinese Land Management Law, farmland is owned by *Rural Collectives*, or municipal villages, except for some land owned by government. Farmers only have the right to use land.

Figure 3.10: *Inspection system for export vegetables*



Source: Author, partly based on Mori (2009)

villagers). On the one hand, if the manager is provided by the firm, the quality control level tends to be better, so this kind of arrangement is usually adopted for leaf vegetables which require a higher management level. However, in this scheme, the enterprise takes all the risks with regard to production, and the costs for land rental and administration are large. On the other hand, if the farm is managed by an individual farmer, a part of the risk is shared with him by requiring deposits to be paid to the processor, to mitigate against the risk of poor production skills or detection of pesticide residues in the vegetable.

In Type D, production is contracted to individual farmers, and essential technical assistance is provided by the processor. Type D is used when the farmer can afford to rent large enough plots of land and trusts and has a good relationship with the village that the farmer is renting from. This method offers the loosest control over quality and is adopted only for vegetables with lower risk levels, such as root vegetables. In this type, the *Field Man* does not stay on the farm all the time but regularly checks production from each plot when needed.

In all types, most of the production materials such as seeds, pesticides and fertilisers are provided by the processing firm. Many of the former brokers who are now shut out from the export channel have become managers of the newly formed farms, since they are familiar with the required quality controls for vegetables for export and also have a trusting relationship with export firms.

Figure 3.10 shows the flow of a supply chain for vegetable exports and its supply management by the government and firms. All along the supply chain from the farm to the exporting port, the vegetables are checked voluntarily three to four times by firms. Export processors usually check the vegetables in the PBs before harvest through random sampling. If excessive amounts of chemical residues are found, the processor would not harvest all the plot's vegetables, and would abandon the crop or, if possible, sell it to another market. Some processors check the harvested vegetables again before sending to the processing factory. Third, processed products will be checked before shipment. Finally, local CIQs check the products at the port. Some large export processors in Shandong have already established their own inspection centres for checking product safety. Some of these inspection centres are even authorised by the local CIQ and have the ability to test for all substances targeted by the importing countries to eliminate the risk of being rejected and shipped back after inspection in the destination country.

3.5 Conclusions and policy implications

China has the potential to expand vegetable exports to markets in developed countries, but only if it improves quality and meets importers' standards, although export to developing countries with less strict standards has already increased rapidly. The Chinese government started to deal seriously with food safety problems in both the domestic and global markets in the early 2000s. It aims to improve the quality and thus competitive edge of products to expand exports, which was originally motivated by pressures from importers of Chinese agricultural products. According to the "National plan for the development of vegetable production regions (2009–2015)" issued by the Ministry of Agriculture, five main vegetable production regions for the domestic market and three regions for vegetable exports were identified and the government is said to support the development of these areas intensively.[16] The plan aims to increase the export and processing rates of vegetables, and to raise the per capita incomes of local farmers by providing necessary support through infrastructure construction and technical extension.

The major hurdle for domestic food processors, most of them small in size, to participating in export activities to markets in developed countries is the large initial investment needed to create a vertically integrated system that enables firms to implement stricter supply chain management. Such vertically integrated systems include: the acquisition of large areas of farmland with suitable conditions and high rental fees; the construction of a processing system specialised for a target market; continuous monitoring of the rules and regulations of importing countries since these often change; and the costs associated with inspections. What is more, rapidly increasing domestic wages and shortage of labour are occurring in the coastal area, making Chinese products less competitive relative to products from other countries. Some domestic processors may feel that shifting their focus to the domestic vegetable market is more attractive.

The transportation infrastructure, especially a reliable cold chain linking production regions to ports, is also crucial for export products that need accurate temperature control. At present, cold chains for frozen vegetable exports in China are all provided by exporters because of the lack of domestic cold chain facilities. The National Develop and Reform Commission issued "Guidelines for the development plan for agro-food cold chain" in June 2010 and started to tackle the reform of domestic cold chains. According to the guidelines, the annual distribution of fresh agro-food products in China was about 400 million tons, while the ratio of distribution by cold chain in horticulture, meat and aquaculture reached 5 per cent, 15 per cent and 23 per cent, and the rate of those chilled reached 15 per cent, 30 per cent and 40 per cent respectively. The availability of cold storage chambers is still not sufficient and only 0.3 per cent of the container trucks are equipped with temperature control facilities. What is worse, the facilities are ageing and urgently need refurbishments.

Finally, domestic firms are limited in their ability to search for suitable customers. As the safety of Chinese food products became one of the most sensitive issues in the international market, an allergic reaction by some foreign consumers is frequently observed. To try to overcome this, most Chinese agro-food exporters targeting the Japanese market have one or two Japanese staff to improve communication with Japanese buyers who were very anxious about their consumers' suspicions about the safety of imported food. Even though the Japanese market may be exceptionally sensitive and strict, if new domestic processors are starting to consider exporting frozen vegetables, technical support, not only for production and processing, but also for marketing know-how, is essential. Some policy implications for better management of the quality and safety of export agro-food products in China follow.

- *Assistance with the development of large-scale producers and contract farming*: Currently, the development of large-scale farming and contract farming is limited in China, while small-scale family farming remains dominant. To improve the efficiency, quality and safety control of Chinese food, reductions in the number of channels and layers of distribution will be most effective. What is more, this will also bring about better traceability. As we have seen earlier, producers for the domestic and international markets are completely separate and detached from each other. There is only limited production for international markets by large-scale farmers who have contracts with exporting firms. In the domestic market, most family household farmers sell their products directly to local brokers. In the latter case, farmers are not well organised and extension services for farmers on production techniques and knowledge of correct usage of production materials including pesticides and other chemicals, are very limited. Some possible solutions to this problem follow.

- *Support for the development of leading firms*: As we have seen in this report, the development of agro-food exporting and processing firms led to the expansion of contract farming and this in turn led to improvement in quality control at the production stage in coastal areas. Empowering small- and medium-sized firms to enter the agro-food business would improve domestic food safety, though contracts between agro-food firms and farmers should be reasonable to protect the income of farmers. Essential technical and financial support should be provided to these new entrants to the international market. However, for some importing countries with specific, strict standards, only large-scale foreign-invested firms specialising in particular products for the targeted market survived after several food safety incidents and policy changes.

- *Land market development*: When a firm starts contract farming for export, the most critical problem is how to acquire a large, contiguous piece land that is free of contaminants. Currently, farmland rental market development is not very common in China. Farmers usually lease or rent land use rights at very low prices to other farmers. In most cases, land transactions occur among relatives. Sometimes they usually let the renter cultivate their land for free, although national land policy allows farmers to trade land use rights at a reasonable price based on the market. The reason why landowners are not willing to rent their land use rights to others when agriculture is less profitable than other jobs is that they regard their land use rights as an important insurance and they tend to lend them to those within their personal network, or a reliable person such as a relative. This phenomenon is partly because of the lack of an adequate formal social security system for rural residents, including financial and insurance services. As a result, most large-scale land aggregations are implemented by villages (collectives) that have legal ownership of rural land, and then these aggregated pieces of land would be rented to firms.

16 The three export regions are: 114 cities and counties located in the southeast coastal area including Shandong, Fujian, Zhejiang, Guangdong, Jiangsu, Liaoning, Hebei, Tianjin, Shanghai and Guangxi provinces; 31 cities and counties in the northwest inner regions including Xinjiang, Gansu, Ningxia, Inner Mongolia, Shanxi and Shanxi provinces; 16 cities and counties in the northeast area including Jilin, Heilongjiang and Inner Mongolia.

An intermediate platform to provide information on rent and lending is required for the development of a land rental market, and implementation of a social security system for rural residents is also an emergent and urgent task so that they easily can sell their land use rights.[17]

- *Technical assistance and information services for farmers*: Current provision of formal agricultural technical extension services in China is very weak.[18] Most farmers are not able to receive such services even for very basic training on how to properly use pesticides or chemical fertilisers. Furthermore, they seldom have the chance to acquire information on the latest variety of profitable crops or how to grow them. The only time farmers come across such information is when they participate in contract farming with large processing firms. In that case, technical extension specialists are typically sent to farmers to teach them and monitor their production processes. The capability of private technical extension services (farmers' cooperatives, for example) still remains weak, and government support is required to both empower public extension services and develop private sector service providers.

- *Financial support for large-scale farming*: Large-scale farming for international markets is a rather risky business in China at present because of the unstable price of agricultural products, weather variability, high land rental prices and frequent changes of import countries' standards. Large-scale producers should be supported with rural finance services like long-term or low-interest loans.

- *Investment in cold chain facilities*: Investment in cold chain facilities is necessary for further export development because currently export firms have to invest in these themselves, increasing production costs. To maintain product quality and prevent port rejections because of bacterial and microbial issues, construction of an infrastructure for proper temperature control throughout the supply chain is crucial and urgently needed.

- *Strict control of pesticides and other production input materials*: While basic regulations on materials such as pesticides and fertilisers exist, the distribution channels for these materials are complex in China and completely uncontrolled in most parts of China. Farmers usually buy their production materials from nearby shops or unspecified brokers, some of may sell illegal, poisonous or inferior quality materials. Some farmers are even willing to buy banned pesticides for immediate results so that they can sell their products at higher prices by improving their appearance. Official strict control on these materials with credible enforcement, as well as punishment for violators, is required.

17 The need to reform and establish a national social security system in China has been identified as a major issue for a long time (see for instance, World Bank, 1997). This issue is made more urgent by a rapidly ageing population. If the current fertility rate continues, the Chinese population is expected to peak in 2026 and start to decline thereafter. While other countries – mainly advanced countries – are facing problems associated with an ageing population, the problem facing China is more severe since she will be faced with this problem at a relatively low income level (*The Economist*, 2012). For the current discussion on pension reforms in China, see World Bank and DRC (2012).

18 For a review of this, please see Gao and Zhang (2008). Hu *et al*. (2009) find that separating commercial activities and extension services from the provider greatly improves the actual delivery of extension services to farmers. In addition, more inclusive agriculture extension services are found to be more effective in China (Hu *et al*., 2012).

4. Case Study: Chinese Eel Exports

4.1 Introduction

While currently the high price of eels is stealing the headlines in Japan – the country with the highest consumption of eels – a more significant problem is food safety issues related to imported eels. More than 90 per cent of live and processed eel imports in Japan come from China. Ever since malachite green[19] was detected in eels imported from China in 2003, among other incidents (see Chapter 3), there has been a renewed focus on the safety of imported food, especially from China.

In 2003, antibiotics were found in processed eels imported from China. This is a violation of the Food Safety Act in Japan, and inspections were ordered. As a result, the volume of imports from China dropped significantly. In 2004, some signs of recovery were seen, but in August 2005 malachite green was found in eels imported from China, and this has led to inspections monitoring eels imported from Guangdong province, the main cultured eel production site in China, and this caused a temporary halt in all imports from Guangdong. In June 2006, the MHLW adopted the positive list system. Eel imports from China increased in the first half of 2006 to avoid the risk of bans imposed under the new system but in the latter half of 2006 import volumes tumbled. Around the same time in 2006, the media widely reported on the questionable safety of eels imported from China.[20]

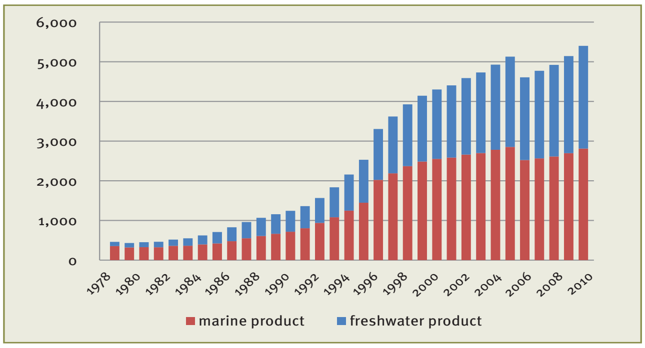
Box 4.1 Preparation for the Japanese Positive List System

In preparing for the transition to a *positive list system* in Japan, the Ministry of Commerce of the People's Republic of China (PRC) and the China Chamber of Commerce of Foodstuffs and Native Produce produced a risk assessment of Chinese agricultural and food exports to Japan.[21] The assessment report analyzed the impact of the Japanese positive list system on 11 products (green onions, tea leaves, live and processed eels, *matsutake* mushrooms, *shiitake* mushrooms and others) and grouped them into four different categories based on the likelihood of violating Japanese food safety requirements. According to this report, live and processed eels were classified as products at most risk. Nonetheless, the imports of eels from China increased a little in 2006, mainly reflecting the rush to export eels from China before implementation of the positive list in June. Also, the demand cycle of eel consumption in Japan contributed to this. The high demand season for eels is from April to July and by August the demand subsides.

China is the largest eel-producing country in the world. Since the opening of her economy, China has steadily increased production of both freshwater and marine products (see Figure 4.1). Japan has been the largest export market for Chinese seafood products, accounting for about one-fifth of total exports, followed by the United States and the EU (see Figure 4.2). Eels account for about 8 per cent of aquatic product exports from China (see Table 4.1).

Japan consumes the largest amount of eels in the world, accounting for 70 per cent of global consumption (Japan Times, 2012). At its peak in 2000, Japan consumed 160,000 tons of eels but in 2011 the shipment volume of eels declined to 56,000 tons in the face of rising eel prices.[22]

Figure 4.1: ***Production of seafood products in China, 1978–2010***

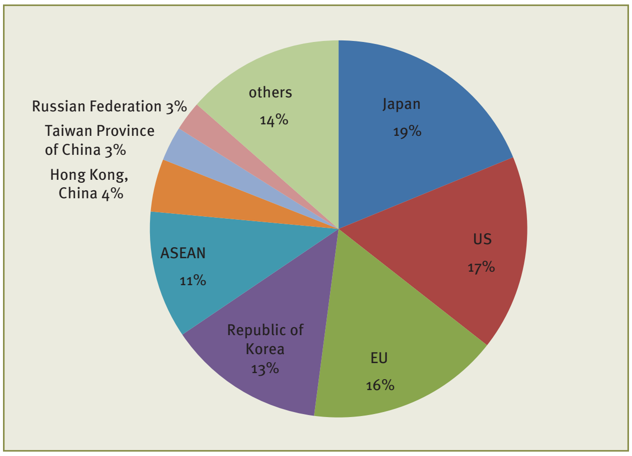


Source: Ministry of Agriculture (China) (2009)

19 Malachite green is a synthetic antibacterial drug. This substance has been banned from food in the United States since 1981 and in the EU since 2002. Similarly, Japan bans the use of this substance in food.
20 Since 2002, eels imported from China have committed a number of violations. First, it was the detection of antibiotics in eels, followed by detection of malachite green. China has strengthened its domestic effort to improve food safety by certifying eel culture ponds and processing factories, but problems persist to date.
21 See www.china-embassy.or.jp/jpn//jmhzs/t254123.htm (in Japanese).

22 From the Eel Growers Association, www.wbs.ne.jp/bt/nichimanren/yousyoku.html

Figure 4.2: Main export markets for Chinese seafood products in 2010 (volume base)



Source: Bureau of Fisheries Ministry of Agriculture (China), various years

Table 4.1: Main fish and seafood products exported from China in 2010

Items	Percentage in total export value of seafood products	Amount (10,000 tons)	Value (US$100 million)
Shrimp	16.3	21.61	15.36
Shellfish	12.3	26.07	11.58
Tilapia	10.7	32.28	10.06
Eel	8.4	4.52	7.9
Pseudosciaena crocea	2.2	5.01	2.07
Others	50.1	134.81	47.24
Total	100.0	224.3	94.21

Source: Bureau of Fisheries Ministry of Agriculture (China), various years

This case study focuses on live and processed eel exports from China and analyzes the factors associated with rejections of these products at Japanese ports. In the following sections, we examine trends in trade in these products; document causes of the rejections at Japanese ports by the MHLW; provide overviews of policies implemented by Japan and China to secure the safety of these products; and analyze conditions currently facing cultured eel producers and processors in China.

4.2 Trends in trade in live and processed eels

4.2.1 Trends in exports of live eels from China

Trends in live eel exports in terms of volume and unit prices from 2008 to the first half of 2012 are shown in Table 4.2. Since 2008, live eel exports from China have been decreasing. In 2008, China exported 14,369 tons of live eels to Japan, but the amount has decreased to less than one-third in 2012 (although the figure is only for the first half of 2012). The main cause of this decline in exports is the short supply of leptocephali (eel fry). In general, eels used for food consumption are either Japanese eels (Anguilla japonica) or European eels (Anguilla anguilla). The eel market is fairly unstable, influenced greatly by changes in natural conditions and the overfishing of leptocephali. This results in wide fluctuations in eel prices. Although in the past eel prices have seen several steep rises, the year 2012 witnessed the most significant price rise. This instability is caused by the lack of a cost-effective way to artificially incubate eels and secure enough leptocephali. To arrest the rapid decline of the European eel, the leptocephalus of the European eel has been designated as a protected species under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (the Washington Convention) in 2007 following an EU proposal. Because of this, trade in the European eel has been highly restricted and this in turn led to higher demand for Japanese eels, leading to higher prices. Accompanying the decrease in volume, the unit price of eels has been rising. In 2008, the unit price was $12.65. By 2012, the unit price had more than trebled to US$44.58.

The top destination for live eel exports from China is Japan. The share exported to Japan was 66.1 per cent in 2009. Even though the overall volume is decreasing, the proportion of exports destined for Japan increased to 85.9 per cent in the first half of 2012. The reason for this increase in the Japanese share of the exports is the rising prices in the Japanese market. The unit price for the Japanese market was $13.41 in 2009, but this has increased to $47.81 in 2012. The other major export markets are Hong Kong (China) and Republic of Korea. These three mar-

Table 4.2: Trends in Chinese live eel exports, 2008–2012 (first half)

Importer	2008		2009		2010		2011		2012	
	volume (tons)	unit price (US$/ton)	volume (tons)	unit price (US$/ton)	volume (tons)	unit price (US$/ton)	volume (tons)	unit price (US$/ton)	volume (tons)	unit price (US$/ton)
Total	14,369	12.65	10,591	11.37	8,672	15.69	5,107	27.66	2,052	44.58
Japan	9,982	14.23	7,002	13.41	6,116	18.13	4,270	30.33	1,763	47.81
Hong Kong, China	1,956	7.45	1,759	7.98	1,203	10.92	632	17.70	253	25.20
Republic of Korea	2,431	10.53	1,809	6.86	1,353	8.92	203	13.60	13	29.80

Note: Data are the aggregation of volumes from January to December. For 2011, the data are from January to November, and for 2012, from January to June.

Source: Department of Foreign Trade, PRC Ministry of Commerce

kets account for almost all of the exports of live eels from China. However, the Republic of Korea has been unable to import live eels from China since May 2011 because the prices offered in its market were lower than those prevailing in the other markets.

4.2.2 Trends in exports of processed eels from China

The exports of processed eels from China increased steadily until 2007, reaching 48,187 tons in 2007 (see Table 4.3). In 2008, the export volume decreased to 28,650 tons, recovering to 32,088 tons in 2008 and 36,485 tons in 2010. However, in 2011, it decreased again to 35,221 tons. Even though the data for 2012 are only for the first half of 2012, the expectation is that the declining trend will continue. The reason for a more gradual decline in exports of processed eels compared to live eels is because processed eels can be frozen for storage.

As with live eel exports, the Japanese market is the largest destination for processed eels. However, exports to the United States and Russian Federation are increasing recently, mainly because of the rising popularity of Japanese cuisine in these markets. Until 2006, the Japanese market accounted for more than 80 per cent of processed eel exports from China. Since 2007, the Japanese share of the exports has been in decline. The Japanese market share was 57.0 per cent in 2008, increased to 69.1 per cent in 2009 but declined again to become 60.8 per cent in 2011 and 57.6 per cent in 2012. In contrast, the shares of the United States and Russian Federation were only 3.3 per cent and 0.7 per cent in 2005 respectively, but have seen tremendous growth since then so that, in 2011, the United States and Russian market shares were 11.1 per cent and 9.6 per cent, respectively. Meanwhile, Hong Kong's market share has seen a decline from 8.1 per cent in 2008 to 4.4 per cent in 2011.

The movement of unit prices for processed eels is opposite to the trend in volumes, as can be seen in Table 4.4. Unit values have been increasing since 2007, particularly since 2010. The unit price in 2011 was about double of that in 2009 and the inflation trend was continuing to 2012. The reason for the ever higher prices for processed eels is twofold. First, the supply of leptocephali was low in recent years and, second, the anticipation is that the supply of leptocephali will not improve in future. Worse, the expectation is for an ever dwindling supply of leptocephali because of overfishing.[23] Unlike the case with live eels, there is little difference between unit prices in the Japanese mar-

23 The United States is considering putting all species of eel under the Washington Convention. Currently only the European eel is listed.

Table 4.3: *Trends in Chinese processed eel exports, 2006–2012 (first half) (tons)*

Importer	2006	2007	2008	2009	2010	2011	2012
Total	46,646	48,187	28,650	32,089	36,485	35,221	18,002
Japan	38,874	37,197	16,338	22,175	23,371	21,427	10,382
United States	2,452	2,560	3,176	2,901	4,424	3,896	2,130
Russian Federation	811	1,742	1,903	1,944	2,765	3,369	2,534
Hong Kong, China	769	2,296	1,805	835	976	1,548	882
Ukraine	NA	NA	NA	294	498	609	NA
Republic of Korea	241	582	1,056	884	938	529	122
Singapore	180	434	457	475	686	381	128
Canada	NA	NA	288	477	306	350	NA

Note: Data are the aggregation of volumes from January to December. For 2012, from January to June.

Source: Department of Foreign Trade, PRC Ministry of Commerce

Table 4.4: *Trends in unit values of processed eel exports, 2006–2012 (first half) (US$/kg)*

	2006	2007	2008	2009	2010	2011	2012
Total	12.6	11.9	12.6	12.8	18.0	25.6	34.3
Japan	12.8	11.9	12.9	12.9	17.9	25.3	34.4
United States	10.8	11.3	12.7	12.6	18.5	28.8	40.4
Russian Federation	10.8	12.0	12.6	13.1	18.5	27.5	36.0
Hong Kong, China	10.3	13.5	15.1	14.7	19.8	28.5	22.5
Ukraine	NA	NA	NA	12.6	18.7	26.0	NA
Republic of Korea	9.7	12.6	10.4	12.0	19.2	24.5	25.6
Singapore	12.3	13.9	15.9	14.7	19.9	28.3	37.1
Canada	NA	NA	13.5	12.3	19.8	29.9	NA

Note: Data are the aggregation of volumes from January to December. For 2012, from January to June.

Source: Department of Foreign Trade, PRC Ministry of Commerce

Table 4.5: Number of Japanese import rejections of fish and fishery products, 2006–2010

Country	2006	2007	2008	2009	2010	Average
Brunei Darussalam	0	0	0	0	0	0
Cambodia	0	0	0	0	0	0
China	179	154	82	81	110	121
Hong Kong, China	0	1	1	1	2	1
Indonesia	18	47	20	8	17	22
Republic of Korea	9	23	27	13	25	19
Lao PDR	0	0	0	0	0	0
Malaysia	1	1	0	2	0	1
Myanmar	1	0	0	0	0	0
Philippines	10	9	24	11	4	12
Singapore	0	0	0	0	0	0
Thailand	49	39	38	47	38	42
Viet Nam	117	147	60	57	83	93

Source: UNIDO dataset and analysis, based on Japanese MHLW data

ket and elsewhere. This is because the costs associated with maintaining the food safety and quality of processed eels does not differ significantly across markets. In addition, processed eels destined for the Japanese market use both Japanese and European eels.

4.3 Import rejections by Japan and underlying reasons for rejections

The purpose of this section is to analyze past cases of import rejections in an attempt to uncover the underlying reasons for such rejections and food safety violations. A particular focus will be on the analysis of live and processed eels exported from China to Japan. The Japanese MHLW publicises on its website information on imported shipments in violation of food safety regulation detected through regular inspections at various entry ports.[24] The information provided by the MHLW includes the reasons why food safety violations occurred, firms responsible for production, and importing firms. Based on these data, we analyze at which stage of production the violations were probably caused.

Table 4.5 lists the number of import rejections of fish and fishery products reported by the MHLW between 2006 and 2010. It shows that China experienced the most rejections throughout the period. However, China is also the largest trading partner of Japan and, as a consequence, Japan imports large quantities of products including fish and fishery products from China. Figure 2.1 above displays the number of rejections scaled by the amount of imports. Using this measure shows that imported fishery products from China do not face rejections as frequently as those from Viet Nam and the Philippines. Nonetheless, the frequency of rejection is higher compared to Indonesia, Republic of Korea, and Thailand.

24 See www.mhlw.go.jp/english/topics/importedfoods/index.html.

4.3.1 Live eels

Since June 2006, there have been 39 violations associated with live eel imports from China to Japan with 23 import rejections in 2006 alone. The number of rejections was reduced to 10 in 2007, and since then only a handful of cases have been found. Within the last six years, detections of malachite green have been the major reason for rejections. Other causes include detections of furazolidone (AOZ), dicofol and endosulfan. In some cases, the reasons for rejections include mixing live eels with accumulated malachite green among those without; residues of these drugs and chemicals in the soils where culture ponds are located; use of eels with accumulated malachite green as feed; and runoffs of agricultural chemicals into culture ponds (see Mori, Nabeshima and Yamada (2013) for details).

Leucomalachite green is created when a living being metabolises malachite green, which is a synthetic antibacterial agent. Malachite green has been used as a dyestuff and anti-mould agent for ornamental fish. It is also used in forensic science, mainly for detection of latent blood. In Japan, malachite green in cultured seafood and foodstuffs is banned by the Pharmaceutical Affairs Law. A study conducted by the Food Safety Committee of Japan in November 2005 on the effects of malachite green and leucomalachite green on human health revealed no conclusive evidence for cancer risks associated with these substances. However, similar experiments on rodents suggest that these substances could be carcinogenic and genotoxic. Also, the recommendation was that it is not appropriate to set an acceptable daily intake (ADI) for malachite green and leucomalachite green.

In China, malachite green was included on the “list of banned drugs and chemicals for the use in animals mainly as food consumption” in May 2002. After this inclusion, the use of malachite green was completely banned. However, the cases involving leucomalachite green do not seem to stop. In the United States and the EU, the carcinogenic potential of malachite green was identified as early as the 1970s. The United States banned its use for food in 1981 and the EU (along with Norway) in 2002.

Endosulfan is a chlorine-based agricultural chemical, used mainly as an insecticide and anti-mould agent. This chemical is effective on a wide range of insects and its superior bioaccumulation characteristics produce long-lasting effects. This in turn makes its use controversial. Because of its toxicity to human health, the use of this chemical was negotiated under the Stockholm Convention in April 2011 and ratified. The ban will take effect in 2012, but many countries including the United States and the EU have already banned its use. The MHLW reported that the detection of endosulfan in live eels imported from China came from the agricultural runoffs containing endosulfan from nearby farms pouring into culture ponds.

Dicofol is a pesticide (especially effective on red spider mites) closely related to DDT (dichlorodiphenyltrichloroethane). Furazolidone is a synthetic antibiotic. Even though it is an effective antibiotic, it has been identified as a possible carcinogenic and this prompted the United States Food and Drug Administration (FDA) to ban its use in 1991.

4.3.2 Processed eels

Between the second half of 2006 and the first half of 2012, Japanese authorities rejected 50 shipments of processed eels from China, half of them because of the detection of leucomalachite green. Other cases of rejections involved detections of coliform (seven cases), enrofloxacin (seven cases), and three cases with furazolidone (there were several cases with multiple violations). So, even for processed eels, violations due to leucomalachite green are the most frequent. In addition to these chemical residues, there were seven cases with coliform violations related to the sanitary conditions of the factories. Enrofloxacin is an antibiotic mainly used for domestic animals (such as pigs and rabbits). Reported side effects of enrofloxacin include skin rashes and vomiting. In Japan, the use of enrofloxacin as a food additive is prohibited.

Based on publicly available data,[25] the reasons for leucomalachite green violations are: accidental inclusion of products that were rejected by prior inspections; accidental inclusion of live eels that have been inspected on behalf of other farms; leftovers from the previous year; lack of proper management at the eel culture farm; accidental inclusion of eels destined for the Chinese market; soil contamination by malachite green; soil contaminations by other drugs and chemicals; and storing eels to regulate shipment volumes.

4.3.3 Summary

From looking at the rejection data made public by the MHLW, the reasons for food safety violations of live and processed eels originate mainly at the eel culture farm. The predominant reason for violations for live and processed eels is the detection of chemicals such as malachite green that are prohibited in food. This could be caused by the shortage of leptocephali. Since completely artificial breeding of eels is still impossible, eel culture firms need to rely on a steady supply of leptocephali. However, in recent years, these have been in short supply, prompting firms to make sure that as many as possible of them grow. This in turn leads to excessive use of medicines and chemicals. Relative to this, violations (such as coliform) caused at the factory or in transit are few in number. In addition, there are several cases where agricultural chemicals have spilled over into ponds where eels are cultured. In the next section, we focus our attention on quality control at the eel culture farm.

4.4 Eel production in China

4.4.1 Moving locations of main production sites

From the 1970s to the 1990s live eels imported by Japan mainly came from Taiwan Province of China. But with rapid economic development in Taiwan Province of China and associated appreciation in land prices in Taiwan Province of China, many eel culture farms were converted to other uses. In addition, manufacturing facilities that sprung up near eel culture farms caused severe water pollution. At the same time, with the opening of China to the global market, China has become an attractive place for eel culture because of abundant cheap land available for eel culture, suitable climate conditions, and ease of exports from China. Gradually the centre of eel culture has moved from Taiwan Province of China to mainland China.

In the 2000s, those Taiwanese eel culture farmers chose Guangdong province as the favourite place for relocation of their activities. Guangdong province is located in the coastal area of China. Especially important was the existence of the mouth of the Pearl River there, where the leptocephali swim up from the ocean into the river. This meant that leptocephali could be caught and eel culture ponds could be established along with processing factories. The agglomeration of eel industries appeared in Shunde, located in the western part of the Pearl River Delta (PRD). However, with the rapid economic growth of Shunde, the concentration of eel culture ponds has shifted to Taishan, farther westward in the Pearl River Delta in search of cheap abundant land.

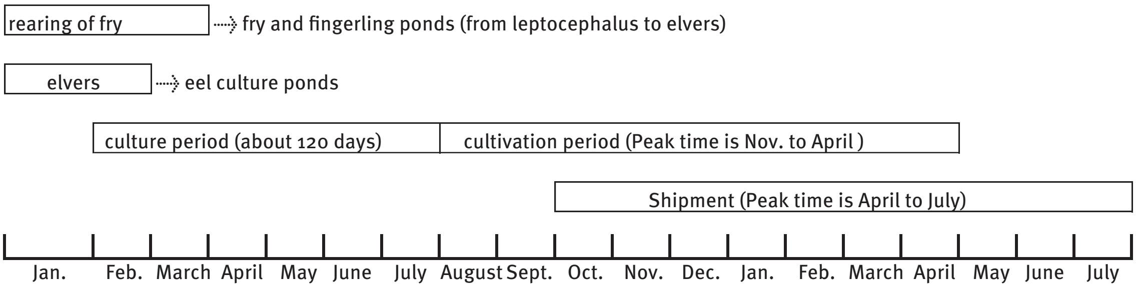
4.4.2 The characteristics of eel production in China

In the latter half of the 2000s, eel production spread from Guangdong and Fujian provinces to Shandong and Jiangxi provinces. In China, it is mostly firms that are involved in eel industries, rather than farmers. However, in some areas, large farmers with enough financial resources operate eel culture ponds. Culturing or processing eels requires substantial capital and smallholder famers cannot enter this industry in China.

Two of the main producing regions, Guangdong and Fujian, differ in their characteristics. Guangdong province mainly rears Japanese eels. In contrast, Fujian province specialises in European eels. Because Guangdong province produces Japanese eels, their products (live and processed eels) are mainly destined for the Japanese market. The necessary technologies for eel culture and processing came from Taiwan Province of China. Since the reason for relocation of production from Taiwan Province of China to mainland China was lack of available land in Taiwan Province of China, the land areas for eel culture oper-

25 See information from the MHLW available at www.mhlw.go.jp/topics/yunyu/tp0130-1ae.html.

Figure 4.3: Timeline of eel culture



Source: Author's illustration based on interview with Firm Y

ated by Taiwanese firms are fairly large in Guangdong province. As their products are for the Japanese market, the unit prices of their products are also high. About 70 per cent of eel industry firms in Guangdong specialise in exports. The remaining 30 per cent or so produce mainly for the Chinese domestic market. Since Guangdong province is subtropical with warm temperatures throughout the year, culture ponds are located outdoors.

By contrast, Fujian province specialises in European eels, which are not marketed widely in Japan, so firms there do not export live eels to Japan but instead focus on processed eel exports. There are a number of small to medium firms culturing leptocephalus in Fujian and many firms export to the United States, Russian Federation and the EU. Also, more firms produce for the Chinese domestic market than is the case in Guangdong province. Because the distance between Taiwan Province of China and Fujian is small, some Taiwanese firms also established their operations in Fujian. However, since the late 2000s, Chinese firms with ample financial resources have entered the industry. Since the average temperature in Fujian is lower than in Guangdong, eel culture is mainly done indoors.

4.4.3 The schedule of eel culture

The eel lifecycle is still very much a mystery. However, what is known is that they are spawned somewhere in the ocean, and leptocephali swim along the Kuroshio Current (the Japan Current) and make their way northward from the Philippines, Taiwan Province of China, and to Japan. There are specialised dealers for leptocephali and eel culture firms buy leptocephali from them. A brief schedule of eel culture is shown in Figure 4.3. The "Eel Year" starts in August, lasting until July in the following year. The reason why it starts in August is that by that time, eels are large enough to be harvested and shipped. It takes about a year for eels to grow from leptocephali to elvers, and from elvers to eels. There are about 5,000 leptocephali per kilogram, but about 4–5 grown eels per kilogram. Leptocephali are typically caught in November and put into rearing ponds during December. From the end of January to the beginning of February, they are grown in ponds, and by August, they are ready for cultivation.

4.5 Case study of Firm Y

Firm Y is a large firm with local headquarters located in Shunde, Guangdong. Originally it was established in Taiwan Province of China as a seafood processing firm. It started to export live eels from Taiwan Province of China to Japan in 1985. In 2001, it established a local subsidiary in Shunde, Guangdong with an initial capital of US$5.65 million to start processing live eels. In 2004, it started operating eel culture ponds in China and from 2005 it has cultured eels from leptocephali to fully grown eels. In 2006 it cultured 5 million pieces, and in 2007 3 million pieces. In addition to four directly managed ponds, Firm Y procures live eels from 16 different firms (see Table 4.6). Some of these live eels are processed, and some are exported to Japan.

Firm Y employs about 200 workers at Shunde location, 120 of whom are working in the processing plant. The plant covers 50,000m^2, of which the building area is 25,000m^2. The plant has obtained HACCP and ISO 9000 certification and is also certified by the EU. The plant produces roasted eel (long kabayaki, skewered kabayaki, and cut kabayaki).

4.5.1 Production process

The Firm Y site comprises a processing plant, fry ponds and inspection buildings. Firm Y purchases leptocephali of Japanese eels from specialised dealers and rears them in their ponds till they are elvers. It transports the elvers by trucks to their growing ponds located in Taishan which takes about two hours.

The size of each Firm Y growing pond is about 10–15mu.[26] Each pond can hold 3,000 eels. Alongside the growing ponds, this firm also has a processing plant. Feed for the eels is prepared by this firm itself in order to assure the feed safety and quality. Some small- and medium-scale eel culture firms buy feedstuffs of unknown quality (and ingredients) from outside vendors and this can lead to food safety and quality violations down the road.

Firm Y manages the drugs and medicines for the eels through a specific warehouse for these chemicals which it established right next to the administrative office. The warehouse is kept locked at all times and only certain personnel have the right to unlock the warehouse. These specialised personnel are responsible for keeping the records of drug use and inventories in the

26 Mu is a traditional way of measuring land areas in China. One mu is about 0.067ha.

Table 4.6: Basic characteristics of eel culture of firms dealing with Firm Y

	Location	Size of ponds (10,000m²)	Annual output (tons)	Number of fry ponds (10,000 pieces)
Firm 1	Zhongshan City	75.4	500	220
Firm 2	Taishan City Doushan Township	60.0	750	200～300
Firm 3	Taishan City Doushan Township	66.6	1,100	400～500
Firm 4	Taishan City Doushan Township	22.0	300	200
Firm 5	Shunde District Lundun Township	20.0	200	80～100
Firm 6	Shunde District Lundun Township	8.9	150	50
Firm 7	Taishan City Doushan Township	70.0	2,000	800
Firm 8	Shunde District Junan Township	16.8	150	50～62
Directly managed pond 1	Sanshui City	35.0	500	20
Firm 9	Taishan City Chonglou Township	21.4	200	80
Firm 10	Taishan City Duanfen Township	53.2	800	300
Firm 11	Taishan City Doushan Township	20.0	200	80
Firm 12	Shunde District	33.3	500	200
Firm 13	Taishan City Haiyan Township	53.3	370	150
Directly managed pond 2	Enping City Hengbei Township	30.0	200	75
Directly managed pond 3	Enping City Hengbei Township	23.0	200	75
Firm 14	Taishan City Chixi Township	40.0	700	200
Directly managed pond 4	Taishan City	23.0	300	130
Firm 15	Zhongshan City Minzhong Township	25.0	500	200
Firm 16	Taishan City Wencun Township	26.0	550	150

Source: Author's compilation based on interview with Firm Y

firm's tailor-made electronic system in order to establish drug use traceability. Firm Y also hires security guards to safeguard the chemical warehouse and eel ponds to prevent thefts. According to the managers of Firm Y, a large firm such as this can invest in the facilities and processes necessary to control eel quality and safety. However, smaller firms may not have enough resources for these investments, and their quality control falls short of export quality. Many of these smaller firms, thus, concentrate on the Chinese domestic market instead.

One of the main concerns when raising eels is the outbreak of diseases. Diseases tend to occur from spring to fall when temperature fluctuations are more volatile.

Exports of live eels from Firm Y are based on eels raised in their own ponds where the quality of eels can be assured and traced. Firm Y procures eels from outside growers for processed eel exports. There are 16 firms that Firm Y procures eels from. They are all located in the PRD region. The capacity of their ponds is 35.82 million pieces of leptocephalus. Firm Y provides technical assistance to these outside growers. The main assistance is in the use of feeds: what kind of feeds to buy; from where to buy the feeds; the timing of feeding; and the amount of feeding. This kind of technical assistance to outside growers is necessary to ensure eel quality.

4.5.2 Manufacture and export of processed eels

Table 4.7 lists the typical steps associated with eel processing. When Firm Y prepares eels for processing, the first thing it does is to check the eels for agricultural chemicals, drug residues and the existence of heavy metals. They do this voluntarily to ensure that the quality of eels used for inputs meets the safety regulations of the export market. After eels pass the inspection, they are cut, cleansed, and charcoal-broiled. After the initial broiling, taste inspection is conducted to check for flavour, smell, texture, and aesthetic qualities (four human senses). After this taste inspection, the eels are steamed and broiled again.[27] This point marks the end of primary eel processing. Depending on customer requests, the firm also provides secondary processing which involves cutting processed eels suitable for sushi and *Unaju* (eel bowl), and *Uzaku* (eel and cucumber salad). Customers typically requesting secondary processing include grocery stores, Gyudon chains,[28] and convenience stores.

The processed eels are then vacuum-sealed, frozen, and packed in a box. Once these boxes are loaded onto trucks, they go through Shunde Government Export Quarantine on their own site and are exported from Shunde port to Japan via Hong Kong

27 This is a typical preparation method for the Kanto region of Japan. In the Kansai region, eels are prepared without steaming.
28 Gyudon, literally beef bowl, is a very popular Japanese dish. It can be found in many Japanese restaurants and some fast food chains specialise exclusively in it.

(China). Live eels are transported from Taishan to Guangzhou Airport and from there exported by air to Narita Airport in Tokyo. Those destined for Nagoya or Kansai Airports are exported from Guangzhou Airport via Shanghai Airport.

4.5.3 Inspections of eels

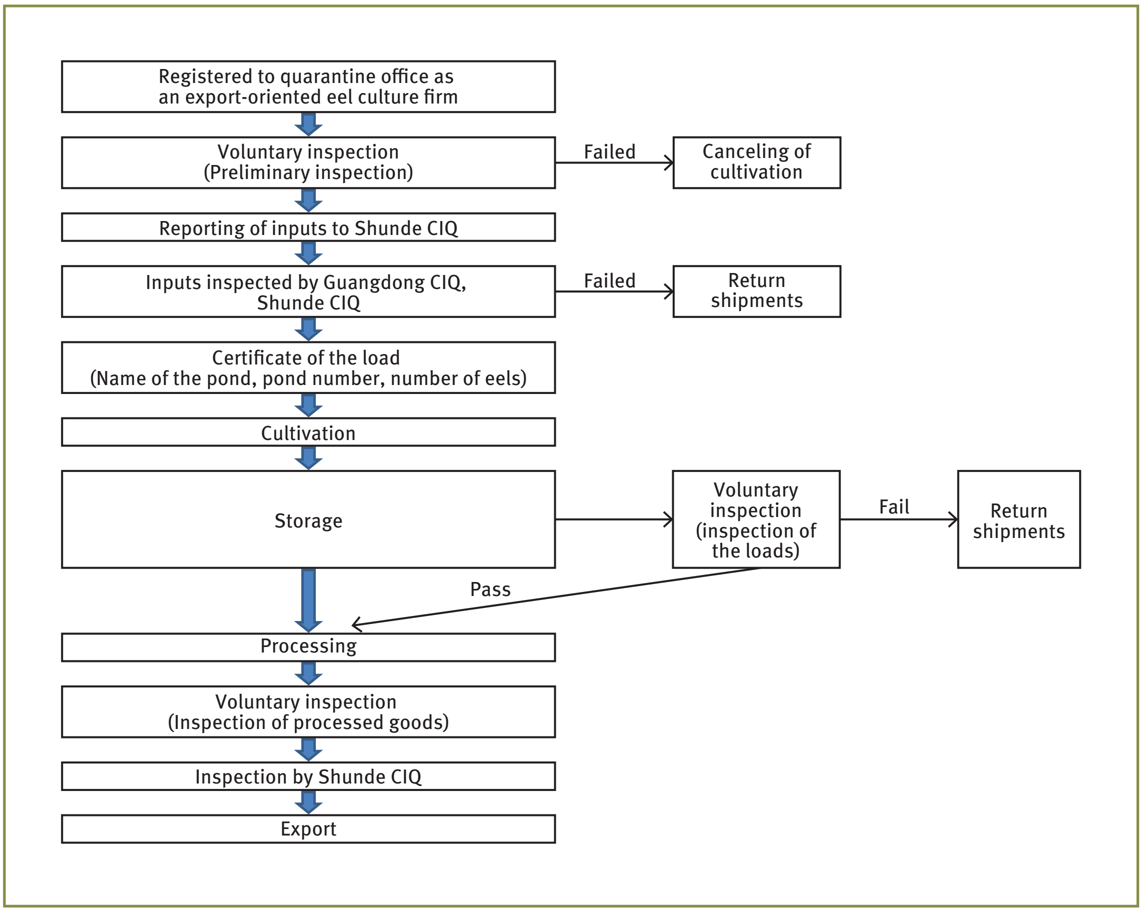
Figure 4.4 shows the flow of inspections along the production line for processed eel products by Firm Y. Growing ponds listed in Table 4.6 were registered as "growing ponds for exports" at Guangdong China Inspection and Quarantine Service (CIQ). Firm Y conducts sample inspections of eels from outside growers. Once these eels pass inspection, Firm Y buys them and reports them to Shunde CIQ, where their processing factory is located, as inputs into goods for export. If eels do not pass Firm Y's inspection, Firm Y may cancel cultivation of eels from that pond, or purchase these eels for products destined for the Chinese market or to sell them to eel traders. The inspection standards at this stage are based on the standards of Guangdong CIQ but modified by Firm Y.

Table 4.7: *Steps in eel processing*

	Stages	Processes	Location
1	culture	purchase of fry	Shunde
2		rearing of fry (in-house facility)	
3		culturing of elvers (vertical buckets, 150 pieces/bucket)	
4		transfer of elvers to own ponds (own trucks)	Taishan
5		cultivation (from own ponds)	
6	input procurement	transfer of adult eels from ponds to factory (own truck)	Shunde
7		purchase of adult eels from outside growers (trucks of logistics firms)	
8		storage in vertical buckets (for one day, removal of mud, weighing, cutting tails)	
9	inspection	voluntary inspection for agricultural chemicals, drugs, heavy metals (two days)	
10	primary processing	cutting of eels, cleansing	
11		butterflied and skewered	
12		charcoal-broiled	
13		check temperature of meat	
14		check for taste	
15		steam	
16		*kabayaki* (additional broiling)	
17		rapid freeze (50 minutes)	
18	(secondary processing)	defrost	
19		cut based on customer orders	
20		vacuum-sealed	
21		inspection	
22		rapid freeze (120 minutes)	
23	inspection	metals inspection	
24	shipping	sorting	
25		sorting by lot (5kg, typically 43 pieces)	
26		boxing, labelling	
27		loading onto trucks	
28		record and photograph the shipment	
29	export	China Export quarantine	
30		To Hong Kong, China (from Shunde to Hong Kong takes one day, ships every Friday)	Hong Kong, China
31		loaded into containers	
32		arrival at Japan (from Shunde to Japan takes 6 days, arriving on Thursdays)	Japan

Source: Author's illustration based on interview with Firm Y

Figure 4.4: Flow of inspections for processed eels in China



Source: Author's illustration based on interview with Firm Y

Box 4.2: Cooperation between Japan and China on improving the safety of food products exported from China: Registration requirements for eel culture and eel processing plants in China

There have been a number of cases where antibiotics and agricultural chemical residues that are banned from food products in Japan have been discovered in live and processed eel products imported from China. In principle, importation of eels is fully liberalised in Japan; however, if one wishes to import live eels and processed eel products for commercial purposes, importers need to notify the Office of Import Food Safety of the MHLW in line with the Food Sanitation Act. For those reported imported commodities, if the Office finds it necessary to verify that these commodities meet safety standards, these commodities would need to be inspected. If no violations were found, the approval letter will be returned and the importer would submit this along with other documentation to the Customs office.

In Japan, there were a couple of cases where "eel laundering" (fraudulent claims on eel origins, which would greatly affect the price) was discovered. To counter these kind of claims, eel products sold in Japan now have to attach proper labels based on the Japanese Agriculture Standards (JAS) Law. For live eels, the labelling standards follow those for fresh and aquatic products. For processed eels, it will depend on the type of products. For imported food, the country of origin needs to be clearly specified. After the "eel laundering" incidents, the revised JAS Law (revised in May 2009) introduced strict punishments associated with fraudulent claims on the country of origin. The revised JAS Law now requires processed food products to bear a label specifying the country of origin of the raw materials and also sets stricter standards on quality and safety.

Within this context, there have been a number of cases where malachite green was detected in live and processed eel products exported from China to Japan. For those products identified as containing malachite green, the MHLW conducts "ordered inspections" based on the provisions of Paragraph 3, Article 26 of the Food Sanitation Law. In addition, processed eel products (roasted eels and processed eel liver products) detected as containing enrofloxacin are also subject to ordered inspections. Because the volume of eel product exports to Japan plummeted after these incidents, the Chinese government launched a registration system to certify eel-growing ponds and processing plants to prevent the use of malachite green in the entire eel production for exports.

In contrast, for inspections for the agricultural chemical residues oxolinic acid (mainly used as antibiotics) and sulfamethazine (growth-enhancing chemicals), if the following conditions are met, the agreement between China and Japan is that these products do not need to go through ordered inspections. The conditions are that the raw materials (live eels) must come from registered eel-growing ponds; products must be processed in registered processing firms; and, for oxolinic acid, must be certified by the CIQs.

In 2012, there were 86 registered eel culture firms for live eels in China, of which 66 are located in Guangdong and 13 are in Fujian. There are 382 firms registered as eel culture firms exclusively for processing and 55 processing plants are registered in China.

After this, there are random sampling inspections of eels by Guangdong and Shunde CIQs. If the eels pass inspection, then Firm Y initiates the export process by obtaining the certificates and starting cultivation of the cultured eels. Once the eels arrive at the processing factory in Shunde by truck, they are sorted according to size. At this stage, Firm Y conducts further inspections. If eels purchased from outside growers fail inspection, they are returned to the growers. If eels grown in ponds managed by Firm Y fail, they are directed to eel products meant for the Chinese domestic market or sold to eel traders. Those that pass inspection will be processed for export.

During the processing stage, Firm Y conducts inspections as noted in Table 4.7. The main focus of inspection during this stage is on metals detection. Once products pass all these inspections, they go through final inspections by Shunde CIQ, which has jurisdiction over the port of Shunde, from where this firm exports. The export inspection is conducted by Shunde CIQ officials within Firm Y's facility. The inspection of live eels for export is conducted by Taishan CIQ, where the growing ponds are located.

4.5.4 Inspection of growing ponds by the Chinese government

The CIQ inspections are conducted at three different stages: before purchase; at the time of purchase; and at the time of export. CIQs also conduct additional random inspections on the management and chemical usage of registered growing ponds for live and processed eels destined for the Japanese market. The standards adopted by CIQs for each inspection are listed in Table 4.8.

Table 4.8: Products inspected by CIQs

1. Before purchase	
Inspections for residual synthetic antibacterial drugs (HPLC method)	
Sulfonamide	100ppb
Oxolinic acid	10ppb
Enrofloxacin	20ppb
Malachite green	2ppb
Leucomalachite green	2ppb
Furazolidone	0.5ppb
Semicarbazide	0.5ppb
(Monitoring inspection: CP: 0.3ppb; CIP: 20ppb; NOR: 20ppb)	
Inspections for heavy metals (AAS method)	
Mercury	300ppb
Cadmium	50ppb
Once these inspections have been passed, eels can be ordered.	
2. At the time of purchase	
Inspections for residual synthetic antibacterial drugs (HPLC method)	
Oxolinic acid	10ppb
Enrofloxacin	20ppb
Malachite green	2ppb
Leucomalachite green	2ppb
Furazolidone	0.5ppb
Semicarbazide	0.5ppb
Furaltadone	0.5ppb
Nitrofurantoin	0.5ppb
Monitoring inspection	
Sulfonamide	100ppb
Oxolinic acid	10ppb
Chloramphenicol	0.3ppb
Ciprofloxacin	20ppb
Norfloxacin	20ppb
Endosulfan	2ppb
Inspections for heavy metals (AAS method)	
Mercury	300ppb
Cadmium	50ppb
Once these inspections have been passed, eels can be exported to Japan	

3. At the time of export	
Inspections for residual synthetic antibacterial drugs (HPLC method)	
Oxolinic acid	10ppb
Enrofloxacin	20ppb
Malachite green	2ppb
Leucomalachite green	2ppb
Furazolidone	0.5ppb
Semicarbazide	0.5ppb
Furaltadone	0.5ppb
Nitrofurantoin	0.5ppb
Inspections for residual synthetic antibacterial drugs (GC method)	
Endosulfan	2ppb

Note: HPLC is high performance liquid chromatography; AAS is atomic absorption spectrometry; GC is gas chromatography; ppb denotes parts per billion.

Source: Author's compilation based on interview with Firm Y

4.5.5 Investments in inspection and testing infrastructure

Since 2005, Firm Y has strengthened its own inspection capability. There are two reasons why Firm Y has invested in doing this. First, the costs of inspection by outside vendors have increased substantially and this made it economical for Firm Y to own its own testing equipment. Second, by having in-house testing facilities, Firm Y can offer inspection services to other firms, generating additional cash flow. Firm Y has invested in creating a specialised room for inspections, purchased necessary testing equipment and hired specialist personnel.

Firm Y had enough financial resources to invest in its own testing facility. However, only a handful of eel-related firms have sufficient means to purchase rather expensive equipment. The price of some equipment is as high as US$1 million. Firm Y owns testing equipment that even Shunde District AQSIQ does not possess.

In the inspection room, Firm Y possesses testing equipment for chloramphenicol, for various metals, for malachite green, and for AOZ (oxazolidone), as well as liquid chromatography equipment (purchased in April 2006) and gas chromatography equipment (purchased in October 2006). In addition to purchasing testing equipment, Firm Y also strengthened its internal inspection routine to check for micro-organisms (such as coli form, staphylococcus, salmonella), water quality and chemical residues.

4.5.6 Traceability

Firm Y has created an electronic system which makes the processing history and inspection results available to potential buyers and governments within and outside China. In this system, a user can input an inspection number and it will produce the history of processing carried out. The production lot number is 15 digits, composed of the pond number; eel grower number; production management number; and the date of production. In addition to this, Firm Y also publishes the history of drug usage on their website. Users can input the drug record number and find the name of the drug used in the pond where the eels came from; the dosage of drug applied; and the date of usage. By using these two systems, users can search the records on water use in the growing ponds, drug usage, feed records and preserved samples by production lot.

4.5.7 The causes of residues of agricultural chemicals and drugs

Japanese import rejections of live and processed eels peaked in 2006 and have decreased since then. In addition to official MHLW reports on the reasons for the rejections (mainly presence of prohibited chemicals), the authors also interviewed the CEO of Firm Y about the possible causes of chemical residues in eels. During the interview, seven possible causes were identified.

First is impatience on the part of eel growers. It takes a certain period of time for eels to metabolise drugs and growers should therefore wait for a set time after drugs were applied before releasing eels into ponds. But some growers do not wait long enough and release eels prematurely into ponds, leading to drug residue problems.

Secondly, some growers do not know how to apply drugs appropriately. Some growers give too much drugs, which eels cannot metabolise so the drug starts to accumulate in their bodies.

Third, application of inappropriate feeds and drugs such as those containing malachite green continues. In addition, some feeds circulating in the market may contain inappropriate ingredients.

Fourth, water contamination of eel ponds can occur when typhoons hit the region. Guangdong and Fujian provinces are regularly hit by typhoons. Severe rainfall and associated floods can cause water from agricultural fields, irrigation, ponds for shrimp and other fish to run into eel ponds. These waters could contain substances that are prohibited in eels.

Fifth is the problem of soil contamination. Some eel growers rotate the type of seafood for culture, especially when leptocephali are hard to get. Some of the eel growers are shifting to shrimp and blowfish culture. In addition, rich farmers sometimes operate a seafood culture business on the side, and determine what to grow depending on the market price movements of various seafoods. When a farmer grows shrimp, the typical length of the contract with the buyer is for two to three years. Because cultured shrimp is mainly for the Chinese domestic market, the quality control and management of the ponds are not as strict as for exported eels. Various kinds of drugs and chemicals could be used and they could accumulate in the soil. When these ponds are converted into eel-growing ponds, problems associated with contaminated soils could arise.

Sixth, there is a problem of mixing eels from different producers. Many small and medium firms grow eels for the Chinese domestic market. Some firms buy these eels and mix them with eels meant for export.

Finally, the problem with a lack of proper management of agricultural chemicals and drugs persists. Even though the laws concerning management of agricultural chemicals and drugs are enacted and regulations are updated, enforcement of these laws and regulations is still wanting. On the production side, the problem of usage of copy-products and inferior products still exists. At the distribution and retail stage, there are a number of cases when these chemicals and drugs are sold to those sectors prohibited from using them and, in some cases, mixing of other materials and products. On the user's side, there are still a number of growers who do not understand the proper usage of these chemicals and drugs. As for malachite green, even though it is now banned in China, it can still be purchased quite freely from small agricultural shops or over the internet. The Chinese government is now considering revising the "Regulations on Pesticide Administration" (Promulgated by Decree No. 216 of the State Council of the People's Republic of China on May 8, 1997, amended in accordance with the Decision of the State Council on Amending the Regulations on Pesticide Administration on November 29, 2001). The revision would mandate sellers of agricultural chemicals and drugs to keep sales records and conduct inspection of these chemicals; it would require a licence to sell agricultural chemicals and drugs; and it would mandate sellers of these drugs and chemicals to properly educate the buyers.

4.6 Case study of Firm T

Firm T is a middleman with investors from Taiwan Province of China, located in Taixi, the western part of the Pearl River Delta. Their main line of business is the sale and purchase of eels for processing. The firm originally moved from Taiwan Province of China to Shunde in 2002. As the growing ponds were migrating towards Taixi, the firm also moved their local headquarters to Taixi four years ago. Firm T purchases cultured eels from growers in Taixi, sorts them according to size, and sells them to processing firms. There are ten firms like Firm T in Taixi. Of these ten firms, five (including Firm T) specialise in eels for processing. Of these five firms, only Firm T is a foreign-invested firm and the rest are domestically owned firms.

In 2012, leptocephali were in a short supply and their price increased from 3RMB to 45RMB. Reflecting the rising prices of leptocephali, the price of eels that Firm T buys also increased to 45–50RMB per piece in 2012 compared with only 12–13RMB per piece in 2011. Typically middlemen can make about 3RMB/kg profit, but in 2012 the expectation is that profit will be almost zero. The amount of eels for processing that Firm T handles has not changed significantly between 2011 (600–700 tons) and the first half of 2012 (200–300 tons), but it has declined compared to 2010.

4.6.1 Distribution of eels

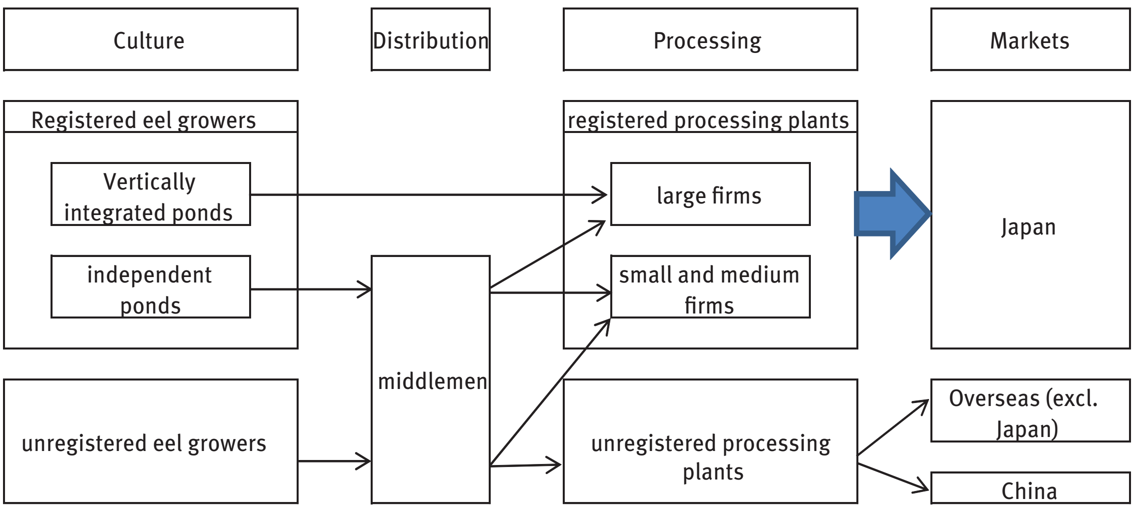
Figure 4.5 shows the various routes associated with distribution of eels in China. Specialised firms catch leptocephali and sell these to eel growers. Large firms typically grow leptocephali into elvers in different growing ponds from where the elvers become fully grown eels. Small and medium firms typically grow leptocephali and elvers in the same location.

Large processing firms typically are vertically integrated and have their own growing ponds. Once cultivation is complete, eels are exported as live eels or sent to processing plants for further processing. In addition to eels from their own ponds, large firms also purchase from other ponds through middlemen. Small and medium processing firms do not typically own growing ponds; they rely exclusively on middlemen for eels to process and sell them to the Chinese domestic market.

4.6.2 The quality control problem from the perspective of middlemen

Firm T purchases eels from eel growers and transports these eels to processing plants using their own trucks. Typically, the time taken from purchase to delivery of eels to processing plant is less than nine hours. This is to keep the eels fresh. Since operating and managing growing ponds is costly, only a handful

Figure 4.5: Distribution routes for live and processed eels in China



Source: Author, based on interviews with local firms of processing firms own growing ponds. While these large integrated firms take quality control matters into their own hands, small and medium firms rely on middlemen to control eel quality. As traders, they need to ensure that they can deal with a large quantity of eels. At the same time, the ability to secure enough high-quality eels is also important. At this point, if processed eels are rejected at the ports of importing countries, the responsibility (including liability) lies on the shoulders of the traders, not on the processing firms. Processing firms will discontinue business with traders who supplied lower-quality eels. Even though processing firms purchase eels from outside growers, they do not provide any technical assistance to those growers. It is the traders who need to ensure that eels grown in these ponds are of high quality and, in a sense, traders face most risk. Because of this and to secure enough high-quality eels, these traders provide essential information to eel growers. However, even with the best of intentions, when eel production is low or there are high costs and prices, these traders may be forced to purchase lower-quality eels. This in turn could lead to rejections at the ports of importing countries down the road.

4.7 Conclusions and policy implications

The purpose of this case study is to shed light on the underlying reasons for rejections of live and processed eels exported from China to Japan. Using publicly available data from the Japanese MHLW and field surveys in China, we examined possible causes and suggest the following conclusions:

First, the analysis of MHLW data reveals that rejections of live and processed eels were mainly caused by detections of malachite green in eels. Other reasons for rejections are also related to the use of drugs in eel-growing ponds. Because of this, the most fruitful remedial actions can be taken at the eel-growing ponds, especially regarding proper management of drugs and chemicals. This is especially so for processing firms and independent eel culture firms.

For processed eels, there were a number of cases with coliform detections. Improvements in sanitary conditions at the processing plants are essential to weed out this kind of problem.

Large firms tend to be vertically integrated and they manage and operate their own growing ponds. However, directly managed ponds cannot supply enough eels and even large firms need to rely on traders to obtain additional inputs from independent eel growers. By doing so, the processing firms cannot directly manage and ensure the quality of eels. The responsibility for this quality control is shifted to traders and this can be a source of problems down the road and needs to be addressed. However, changes in business practices are hard if not impossible to implement through policy.

Instead, policies should focus on providing technical assistance to independent eel growers so that they understand and can fully implement quality control. Similar kinds of training can be offered to traders. Funding for this kind of activity could be mobilized by the eel grower association locally to could cover the cost of technicians and/or advisers who would be stationed in Taixi to provide technical assistance to small- and medium-sized growers. In addition, agricultural chemicals and drugs could be managed by independent operators who can keep track of usage of these chemicals by individual growers.

Even if the system of quality control is strengthened in the eel-growing industry, if basic inputs such as drugs and other chemicals are mislabelled or product imitations are widely available, then the whole effort could be for naught. For this reason, tougher enforcement of product imitations, especially feeds and agricultural chemicals and drugs, is essential.

Finally to raise awareness of the importance of quality control, an “eel-growing manual” could be produced and distributed to small and medium firms and traders, along with requiring each eel grower to post a schedule of proper drug application on their sites.

5. Case Study: Vietnamese Frozen Pangasius and Shrimp Exports

5.1 Introduction

With market liberalisation in 1990, Viet Nam expanded its export volumes and was ranked as the fourth largest exporter of seafood in the world in 2010 (FAO, 2012). Viet Nam exports to as many as 153 countries, including very high-end markets in developed countries. Among Viet Nam's seafood exports, *pangasius* and shrimp play important roles. Yet, in recent years, some seafood exports from Viet Nam have faced difficulties meeting the regulations of importing countries.

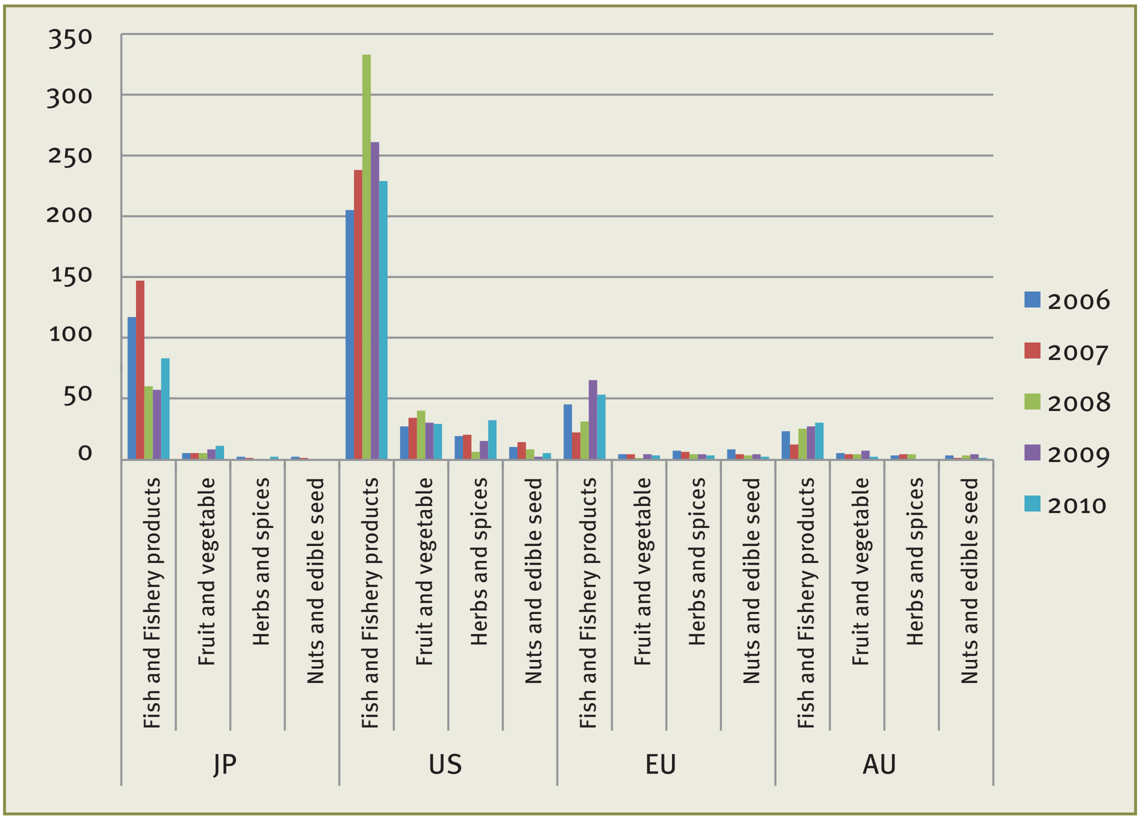
At Japanese ports, Viet Nam seafood imports have been the major target of intensive inspection in recent years. In May 2012, one shipment of Vietnamese shrimp to a Japanese port was found to contain ethoxyquin and this triggered more scrutiny of shrimp imports from Viet Nam by Japanese authorities. This incident was preceded by detections of trifluralin in 2010 and enrofloxacin in 2011. Both are banned substances in shrimp according to Japanese regulations. Shrimp exporters interviewed

Table 5.1: *Rejections of Vietnamese agri-food exports at major markets*

Market	Viet Nam's Rank	Cases	Period
Japan	1	563	2006–2010
United States	6	3,443	2002–2010
EU	9	613	2002–2010
Australia	10	418	2003–2010

Source: UNIDO dataset and analysis, based on EU RASFF, US OASIS, AQIS, and Japanese MHLW data

Figure 5.1: *Number of rejections by major agriculture commodity group for Vietnamese products exported to four markets, 2006–2010*



Source: UNIDO dataset and analysis, based on EU RASFF, US OASIS, AQIS, and Japanese MHLW data

for this case study are expressing great concern over this issue and mentioned that many exporters are now refraining from exporting to Japan for fear of being rejected once again. This could jeopardise future export growth in shrimp.

The detection of ethoxyquin in shrimp was a result of improper use of feeds. That is, the shrimp feed contained this substance for which Japanese authorities have rather strict limits. The detection of ethoxyquin points to a potential problem in the supply chain management of shrimp, especially at the early stage of shrimp culture. For the grown shrimp to pass inspection, the entire growth process needs to be well managed to avoid introduction of any banned or problematic substances. At the very least, these detections at the Japanese border suggest that Vietnamese shrimp growers may have some problems at the early stage of shrimp culture. This type of problem may not be limited to Vietnamese exports to Japan but may also apply to other important markets such as the EU and the United States. Improper management of feeds in the shrimp industry is also indicative of similar kinds of problems for other aquaculture products.

The data provided by the EU, United States, Australian and Japanese authorities all point to relatively high incidents of rejections of Vietnamese agri-food products (see Table 5.1). In these four markets, Viet Nam figures prominently among countries with large numbers of rejections during the periods concerned.

Among various agriculture commodities, fish and fishery products from Viet Nam seem to face rather high rejection rates when looking at the overall number of rejections (see Figure 5.1) and even when scaled by US$ million imports on average (see Table 5.2). In the Japanese market, Viet Nam ranks top in average rejection rates in fish and fishery products. In the EU, Viet Nam ranks 9th.

Table 5.2: *Average rejections of fish and fishery product imports from Viet Nam (per US$ million imports)*

Market	Average Rejections (per US$ million imports)	Period
Japan	0.13	2006–2010
United States	0.37	2002–2010
EU	0.15	2002–2010
Australia	0.20	2003–2010

Source: UNIDO dataset and analysis, based on EU RASFF, US OASIS, AQIS, and Japanese MHLW data

A closer look at the reasons for rejections across these four markets reveals that fish and fishery imports from Viet Nam are rejected for various reasons. In the Japanese market, veterinary drugs residues and bacterial contamination seem to be major problems (see Table 5.3). In the EU market, veterinary drug residues, bacterial contamination, and heavy metals seem to be the problem. In the United States market, hygienic conditions, bacterial contamination, and labelling seem to pose difficulties for imports from Viet Nam. In the Australian market, the problem arises from bacterial contamination, labelling and veterinary drug residues.

Depending on the market, the problems faced by Vietnamese exports differ slightly. This may reflect several different factors such as different border enforcement regimes for specific issues, differences in the composition of Viet Nam's export basket to different markets, and the inability of exporters to meet the regulations in all markets, and so on. However, the numbers in Table 5.3 tell us that various weak links exist in the supply chain of agriculture products from Viet Nam. In the upstream supply chain, contaminations of various kinds (veterinary drugs and pesticide residues and bacterial and other contaminants) are not well controlled. In some cases, detections of heavy metals (possibly because of water pollution) also suggest that production is not well controlled or tested. Problems with hygienic conditions may be present throughout the supply chain. In the United States and Australian markets, issues surrounding labelling, which would occur close to the end of the supply chain, seem to cause many problems. Thus, various problems may exist throughout the Vietnamese supply chain for fish and fishery products.

Considering that these import rejection data are only a small fraction of the total rejections that happen along the value chain, the total amount of seafood products that do not meet international standards seem to be quite high.

What is unclear is why this is the case. With 37 years of export experience, Viet Nam is no longer an amateur in this field. Import rejections are costly, not only because of the actual costs of unsold products and shipment back to the exporting country, but also because it hurts the reputation of the country as an exporter. With increasing global competition and high standards, maintaining a good reputation is critical to attract consumer demand. Why have Vietnamese exporters not been able to reduce the rate of rejections? What are the bottlenecks? Along the fish and fishery products value chain, various stakeholders are operating, from raising fish seed to processing fish at the factory for export. What are the measures taken at each stage to comply with the required standards? What should be done to improve the situation and who should be responsible?

Another unclear aspect is that with increasingly stringent international standards and a growing number of certifications, who is hurt the most along the value chain? Complying with standards requires improvement in quality management systems. Who is to bear those costs? What are the effects on various stakeholders along the value chain? Are there differences in the effects of these impacts depending on the product or characteristics of the value chain?

This chapter examines these questions in detail for the frozen seafood export sector in Viet Nam. Viet Nam was chosen as a case study because of its fast-growing and changing economy and the fact that it has a high rate of import rejections. In particular we pick up two sectors, the shrimp and *pangasius* (catfish) export industries, since these are the major exported products, dominating 39.8 per cent and 30.1 per cent of Viet Nam's seafood export value in 2011 respectively (VASEP, 2011). In addition, since these industries largely rely on aquaculture, quality management is more important than with wild fishing. Although it is a specific case, the process of analysing this sector is generally applicable to same sectors in other countries.

Table 5.3: Reasons for import rejections of Vietnamese fish and fishery products in selected markets

	Japan	EU	United States	Australia
Bacterial contamination	145	127	961	121
Other contaminants	1	24	209	13
Additives	32	33	120	0
Pesticide residues	50	4	0	-
Adulteration/missing document	0	7	103	2
Hygienic condition/controls	23	20	981	1
Mycotoxins	7	0	-	0
Packaging	2	2	0	-
Veterinary drug residues	297	172	170	44
Labelling	0	2	349	77
Heavy metals	0	61	0	7
Others	6	6	21	1
Other microbiological contaminants	0	26	-	-
Total	563	484	2,914	266

***Source:** UNIDO dataset and analysis, based on EU RASFF, US OASIS, AQIS, and Japanese MHLW data*

The next section describes the brief history of and current trends in these industries. The third and fourth sections explain the value chain structures and production processes for the *pangasius* and shrimp sectors. Section five discusses what quality and safety requirements are set by importing countries and section six discusses the major compliance challenges for exports from Viet Nam. Conclusions and policy recommendations follow.

5.2 History and current trends

5.2.1 Overview of the seafood sector in Viet Nam

Viet Nam has 3,260 km of coastline and more than 3,000 islands with an area of inland and territorial waters of 226,000km^2 and an area of 1 million km^2 of Exclusive Economic Zone, providing favourable natural conditions for the development of the aquaculture sector. There is a long history and tradition in Asia in general and Viet Nam in particular of growing rice and fish together on the same plot of land or on adjacent plots. In Viet Nam, there is a traditional saying that “rice and fish are like mother and children”.

In fact, the aquaculture sector has been considered one of the priority sectors for agricultural diversification, economic development, and poverty reduction in Viet Nam. The seafood production value in 2010 accounted for more than 35 per cent of the total production value of the entire agriculture, forestry and fisheries sector – a large increase from around 16 per cent in 2002. This sector contributed more than 7 per cent of the GDP in 2010[29], generates incomes through exports, and creates jobs for about three million people, which is about one twenty-fifth of the total population of Viet Nam (Tung, Thanh and Phillips, 2004).

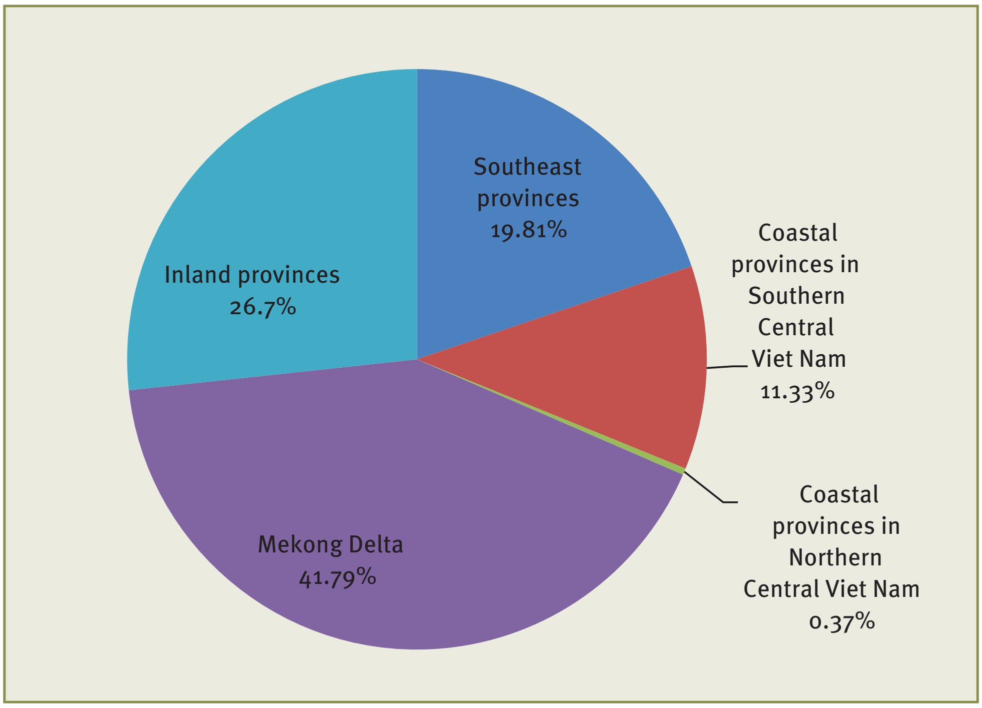
The Mekong River delta, which is a flat wide plain located in southern Viet Nam, is the main aquaculture production area. The delta lies along the last part of the lower section of the Mekong River, which is the world’s second richest river basin in terms of biodiversity. Before pouring into the East Sea, the Mekong River reaches the delta through nine estuaries and a dense canal network. The river’s unique interaction with Tonle Sap Lake in Cambodia provides young fish to the delta downstream. According to Baran, Starr and Kura (2007), the Tonle Sap Lake has 23 fish species whose annual migrations are triggered by changes in water levels. Every year, this region is flooded, bringing new organic matter from upstream. This area contributed more than 41 per cent to the total export value of seafood products in the whole country in 2011 (see Figure 5.2).

Three stages of development

There were three major periods in the development of the aquaculture sector in Viet Nam. During the first period from 1957 to 1980, there were few state-owned processing companies in the industry. The first one was Halong Canned Seafood, which was established in 1957 in northern Viet Nam. Later on during this period, ten more processing companies were set up in southern Viet Nam. In 1978, the Sea Product Import-Export Corporation (SEAPRODEX) was established and became the largest state-owned seafood processing and exporting company in Viet Nam. The second period from 1980 to 1990 saw the establishment of more than 100 state-owned sea food processing companies belonging to SEAPRODEX all over the country. The third period is

29 This was calculated by the author using data from the General Statistics Office of Viet Nam, www.gso.gov.vn/default_en.aspx (accessed July 2012).

Figure 5.2: Seafood exports from different regions of Viet Nam in 2011



Source: VASEP (2011)

Table 5.4: World seafood producers (in million tons)

Countries	2000	2002	2004	2006	2008	2010
China	21.52	24.14	26.57	29.86	32.73	36.73
India	1.94	2.19	2.80	3.18	3.85	4.65
Viet Nam	0.50	0.70	1.20	1.66	2.46	2.67
Indonesia	0.79	0.91	1.05	1.29	1.69	2.30
Thailand	0.74	0.95	1.26	1.35	1.33	1.29
Bangladesh	0.66	0.79	0.91	0.89	1.00	1.31
World Total	32.42	36.78	41.90	47.28	52.93	59.87

Source: FAO (2011) and FAO (2012)

Table 5.5: Water surface area for seafood production in Viet Nam (in thousand hectares)

	2000	2002	2004	2006	2008	2010
TOTAL	641.9	797.7	920.1	976.5	1052.6	1066.0
Area of sea and brackish water	397.1	556.1	642.3	683.0	713.8	728.5
Area for fish	50.0	14.3	11.2	17.2	21.6	26.5
Area for shrimp	324.1	509.6	598.0	612.1	629.2	645.0
Area for mixed and other aquatic products	22.5	31.9	32.7	53.4	62.7	57.0
Area for breeding	0.5	0.3	0.4	0.3	0.3	0.0
Area of fresh water	244.8	241.6	277.8	293.5	338.8	337.5
Area for fish	225.4	232.3	267.4	283.8	326.0	324.5
Area for shrimp	16.4	6.6	6.4	4.6	6.9	7.0
Area for mixed and other aquatic products	2.2	0.4	1.1	1.7	2.2	2.3
Area for breeding	0.8	2.3	2.9	3.4	3.7	3.7

Source: General Statistics Office, www.gso.gov.vn/default_en.aspx (accessed July 2012)

Figure 5.3: *Total capacity of Vietnamese offshore fishing vessels (thousand CV)*

Note: CV is cheval vapeur, i.e., horsepower.

Source: General Statistics Office, www.gso.gov.vn/default_en.aspx (accessed July 2012)

Figure 5.4: *Export value of Vietnamese fishery products (US$ million)*

Source: General Statistics Office, www.gso.gov.vn/default_en.aspx (accessed July 2012)

Table 5.6: *Major export products of Viet Nam*

	Unit	2006	2007	2008	2009	2010
Crude oil	Thous. tons	16,442.0	15,062.0	13,752.3	13,373.0	7,977.0
Electronic parts, computers and their parts	US$ million	1,807.8	2,165.2	2,640.3	2,763.0	3,590.2
Articles of plastic	US$ million	452.3	709.5	933.7	867.4	1,049.3
Electrical wire and cable	US$ million	705.7	882.3	1,009.0	891.8	1,311.1
Footwear	US$ million	3,595.9	3,999.5	4,769.9	4,071.3	5,122.3
Textiles, sewing products	US$ million	5,854.8	7,732.0	9,120.5	9,065.6	11,209.7
Fine art products	US$ million	119.5	217.8	385.5	1,296.2	...
Coffee	Thous. tons	980.9	1,232.1	1,060.9	1,183.0	1,218.0
Rice	Thous. tons	4,642.0	4,580.0	4,744.9	5,969.0	6,886.0
Wood and wooden products	US$ million	1,943.1	2,384.6	2,767.2	2,989.3	3,435.6
Fishery products	US$ million	3,358.0	3,763.4	4,510.1	4,255.3	5,016.3
Of which:						
Frozen shrimps	US$ million	1,262.8	1,387.6	1,315.6	1,293.3	...
Frozen fish	US$ million	1,083.4	1,379.1	1,968.7	1,766.9	...
Frozen cuttlefish	US$ million	92.5	60.8	64.8	82.7	...

Source: General Statistics Office, www.gso.gov.vn/default_en.aspx (accessed July 2012)

from 1990 up to now. Economic reform policies (*Doi Moi)* started in 1986 and became effective in the 1990s, creating favourable conditions for the production and export of aquaculture products.[30] Reforms included trade liberalisation, provision of transferable land use rights, and encouragement of the private sector including household enterprises. In this period, the number of seafood processing and exporting enterprises has increased considerably. These private enterprises have been competing with and replacing the state-owned enterprises in processing and exporting aquaculture products.

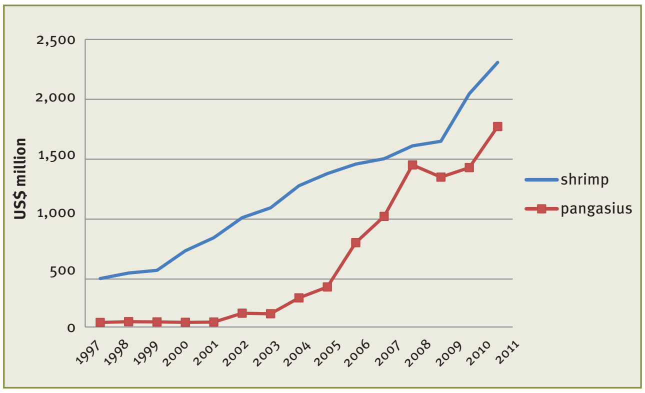
30 *Doi Moi* (reform policy) was officially enacted by the Sixth Party Congress in December 1986 when Viet Nam faced an economic crisis and needed policy reforms aimed at reducing macroeconomic instability and accelerating economic growth. The Sixth Party Congress started replacing the centrally planned economy with a system of bureaucratic centralised management based on state subsidies, and moving towards a market-oriented economy with the encouragement of the private sector. More details can be found in Kien and Heo (2008).

Growth in production and exports

Since then the aquaculture sector has had remarkable success in both production and export. In the world of seafood production, Viet Nam ranks third, after China and India (see Table 5.4). There has been a substantial growth in aquaculture production in Viet Nam. In 1997, the seafood production was only 40,000 tons, which is less than one tenth of that in 2000. In 2010, the production was more than five times that of 2000.

Such increases in production were possible because Viet Nam has a growing domestic resource base and only imports a limited amount of inputs for its aquatic production. In 2010, Viet Nam had to import only around 150 tons of seafood, which accounted for 5.6 per cent of its total production output (VASEP, 2011). Between 2000 and 2010, the area for seafood production increased constantly (see Table 5.5).

Figure 5.5: Export value of shrimp and pangasius (1997–2011)



Source: VASEP (2009, 2011)

Also contributing to the expansion of the production base has been a significant increase in the capacity of offshore fishing vessels in Viet Nam during the last ten years (see Figure 5.3).

The increase in production led to a remarkable increase in export value of Vietnamese aquatic products (see Figure 5.4). Despite a slight decrease in the value of aquatic exports in 2009 due to the global financial crisis, the export value reached a new record in 2010 at more than US$5 billion.

In recent years, fishery products have become one of the major export items of Viet Nam (see Table 5.6), accounting for more than 7 per cent of the total export value of Viet Nam in 2009.[31]

31 This was calculated by the author using data from the General Statistics Office of Viet Nam, www.gso.gov.vn/default_en.aspx (accessed July 2012).

Table 5.7: Top ten exporters of seafood products

Countries	2000		2010	
	Export value (US$ million)	World export market share	Export value (US$ million)	World export market share
China	3,603	6.5%	13,268	4.3%
Norway	3,533	6.3%	8,817	2.9%
Thailand	4,367	7.8%	7,128	2.3%
Viet Nam	1,481	2.7%	5,109	1.7%
United States	3,055	5.5%	4,661	1.5%
Denmark	2,756	4.9%	4,147	1.3%
Canada	2,818	5.1%	3,843	1.2%
Netherlands	1,344	2.4%	3,558	1.2%
Spain	1,597	2.9%	3,396	1.1%
Chile	1,794	3.2%	3,394	1.1%
World Total	55,750		308,562	

Source: FAO (2012)

Table 5.8: Ten leading importers of Vietnamese aquatic products (US$ million)

Rank	Importers	Jan–Mar 2012	Compared to the same period of 2011 (%)
1	EU	260.4	-7.9
2	United States	253.9	+18.7
3	Japan	228.6	+34.1
4	Republic of Korea	109.2	+24.1
5	China and Hong Kong	82.8	+24.7
6	ASEAN	69.9	+17.4
7	Mexico	35.9	+19.2
8	Canada	31.4	+6.6
9	Australia	36.9	+42.3
10	Russian Federation	22.6	-9.0
	Others	192.3	+22.3

Source: VASEP (2012a)

Table 5.9: Three Vietnamese aquatic products with the largest export values in 2008

Destination markets	Largest	Second largest	Third largest
EU	*Pangasius*	Frozen shrimps	Cephalopods
United States	Frozen shrimps	*Pangasius*	Tuna
Japan	Frozen shrimps	Cephalopods	Other saltwater fish
Republic of Korea	Frozen shrimps	Cephalopods	Other saltwater fish
China and Hong Kong	Frozen shrimps	*Pangasius*	Dried saltwater fish
ASEAN	*Pangasius*	Frozen shrimps	Dried saltwater fish

Source: VASEP (2009)

Out of the total export value of fishery products, frozen shrimp and frozen fish accounted for nearly 72 per cent in 2009, indicating that shrimp and fish, of which *pangasius* is the most important product, are two important export products in the aquaculture sector of Viet Nam. In fact, there has been a remarkable increase in the export value and export volume of *pangasius* and export value of shrimp in recent years (see Figure 5.5).

As a result, Viet Nam is now among the top ten exporters of fish and fishery products and has moved up quickly in the ranking from the ninth rank in 2000 to the fourth in 2010 (see Table 5.7). In 2010, Viet Nam was only outranked by China, Norway, and Thailand in exporting fish and fishery products.

Major destinations

The increase in production was also in parallel with great diversification of export markets. Export markets have been expanded to more than 150 countries worldwide including major markets such as the EU (in particular Germany, Spain, Italy and The Netherlands), the United States, China, ASEAN countries, Russian Federation, and Australia in 2011 (see Table 5.8). Before 2000, Japan had been the largest market. The United States has become a more important market, especially since the Viet Nam–United States Bilateral Agreement came into force in 2001. In 2002, Viet Nam ranked second after Thailand in exporting shrimps to the United States.

In the major markets for Vietnamese aquatic products including the EU, the United States, Japan, Republic of Korea, and China and Hong Kong (China), Viet Nam exports mainly shrimps and *pangasius* (see Table 5.9)

Regarding the two most important aquatic export products, major countries that were importing shrimps from Viet Nam in the first quarter of 2012 were Japan, the United States, the EU, China and Hong Kong (China), Republic of Korea, Australia, and Canada (VASEP, 2012a). Major countries that were importing Vietnamese *pangasius* in the first nine months of 2011 were the EU, the United States, Mexico, Brazil, Russian Federation, Australia and Saudi Arabia (see Table 5.10).

The United States used to be the largest importer of Vietnamese *pangasius*. However, since the application of anti-dumping tariffs by the United States, the share of *pangasius* exported to this market in terms of the total exported *pangasius* products has declined substantially, leading to the increasing importance of other markets such as the EU and Russian Federation (see Figure 5.6 and Box 5.1).

Current challenges

Despite fast expansion in the past and effective and encouraging government policies, the seafood sector is facing three major bottlenecks: dwindling resources; quality and safety issues; and difficulty in expanding export markets (VASEP, 2011). These bottlenecks have various causes:

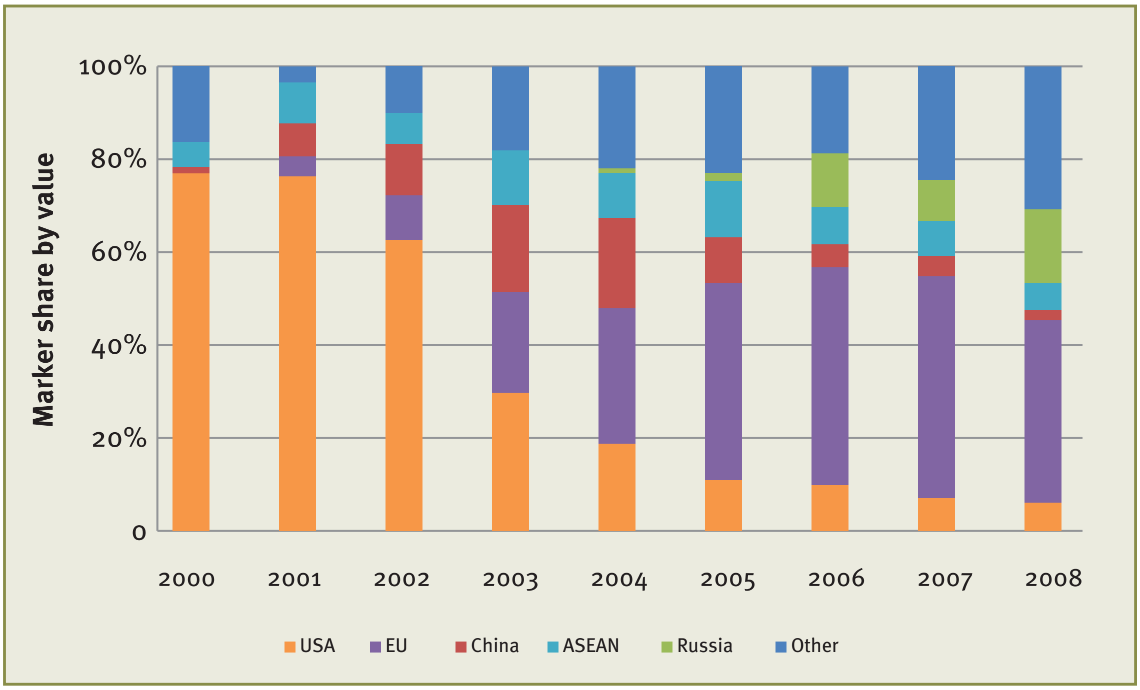
- Marine fish stock has been reduced because the coastal area has been overfished with unsustainable fishing methods for many years;
- Fishing has become more difficult because of instability in weather conditions and rising fuel prices, labour, capital and other costs;

Table 5.10: Share of import markets for Vietnamese pangasius (%)

Destination Markets	Share
EU	30%
United States	16%
Mexico	5%
Australia	3%
Saudi Arabia	3%
Russian Federation	3%
Brazil	3%
Ukraine	2%
UAE	2%
Singapore	2%
Hong Kong, China	2%
Colombia	2%
Canada	2%
Egypt	2%
The Philippines	1%
Others	20%

Source: VASEP (2011)

Figure 5.6: Destinations for Vietnamese pangasius exports



Source: Khiem et al. (2010: 15)

- The quality of broodstock has been downgraded because selection has not been managed appropriately;
- Prices of imported feed and other inputs keep increasing over time;
- Disease outbreaks have been more frequent and serious;
- Inappropriate usage of chemicals, antibiotics, and pesticides;
- Planning of aquaculture production has not been appropriate;
- Farmers and processors lack management knowledge, information, capital and technology, deterring them from expanding their business and improving the quality of their products;
- Fish prices in the international market have been fluctuating wildly;
- Various trade barriers, especially non-tariff barriers such as anti-dumping measures (see later sections for details), have been set up in many countries that import Vietnamese aquaculture products; and
- More complicated quality and safety standards have been increasingly applied in developed countries.

5.2.2 History of and trends in the *pangasius* industry

Production of *pangasius* dates back more than 50 years and takes place only in the Mekong River delta, which is the main area of freshwater fish production in Viet Nam. The *pangasius* in Viet Nam belong to genus *Pangasius*, which includes *Pangasius hypoththalmus*, *Pangasius bocourti*, and several other species that are called "catfish" in English (Phillips, 2002). *Pangasius* is mainly grown in freshwater provinces of the Mekong River delta including An Giang, Dong Thap, Can Tho and Vinh Long. Before 1975, *pangasius* used to be domestically consumed and exported to markets such as Hong Kong (China), Singapore and Taiwan Province of China. It started to be exported to Australia in the mid-1980s and to the United States and Europe in the mid-1990s.

Viet Nam is the world largest producer of pangasius, which is low-priced freshwater fish. There are two *pangasius* species in commercial aquaculture in the Mekong River delta: *Pangasius bocourti* (*Basa* in Vietnamese), and *Pangasius hypophthalmus* (*Tra* in Vietnamese) (hereinafter called *pangasius*). These two *pangasius* species originated from the former, farmed in cages in this region a few decades ago. Compared with *Pangasius hypophthalmus*, *Pangasius bocourti* has a longer production cycle, which is eight months compared to six months for *Pangasius hypophthalmus*, requires better water quality, and has a lower dress-out weight, which is the amount of fish required to produce one kilo of fillet. Despite the fact that *Pangasius hypophthalmus* is of lower quality, it has gradually replaced *Pangasius bocourti* and accounts for 95 per cent of *pangasius* production. While *Pangasius hypophthalmus* has increasingly been exported, *Pangasius bocourti* is mainly for the local market. In 2002, only 72 per cent of *Pangasius hypophthalmus* was exported (Young and Son, 2002). In 2007, that percentage had increased to 90 per cent (VASEP, 2009).

In 2011, there were more than 230 *pangasius* exporters in Viet Nam. Vietnamese *pangasius* was exported to more than 130 countries with an export volume of 600,000 tons and an export value of US$1.8 billion. The major exported product was frozen *pangasius* fillets (VASEP, 2011).

5.2.3 History of and trends in the shrimp industry

Shrimp growing has a longer history than *pangasius* and dates back about 100 years. In fact, brackish water aquaculture in both southern and northern Viet Nam is dominated by shrimp farming. The Mekong River delta is the most important region for cultivating aquaculture products in general and shrimp in particular. According to Le (2012), Black Tiger prawn is the major aquaculture product in Viet Nam with a cultivation area of 570,000 hectares covering 94 per cent of the total brackish and marine culture area. In Viet Nam, the Mekong River delta is the most important area, accounting for around 80 per cent of the farming area and the same percentage of production of Black Tiger prawn. The Whiteleg shrimp, *Penaeus vannamei*, was only introduced in 2000.

The expansion of shrimp production really took off only after the 1990s due to advancements in technology allowing the production of artificial shrimp seed, and the opening of the Vietnamese economy to international trade following the *Doi Moi* policy implemented in 1986. The government policy that allows the conversion of rice fields and salt pans into shrimp ponds was considered one of the important factors contributing to the development of this industry.

Shrimp products for exports include block frozen shrimps, canned shrimps and processed shrimps. Of these, block frozen shrimps account for the largest proportion of total export value. Processed shrimps are, however, gradually expected to overtake traditional frozen shrimps in the future. Apart from being exported, shrimps are sold in the domestic markets. Big cities in Viet Nam are destinations for fresh and boiled shrimps.

In 2011, the export value of Vietnamese shrimps reached a new record of US$2.4 billion. Of these, which Black Tiger shrimps accounted for 59.7 per cent and Whiteleg shrimps accounted for 29.3 per cent of the total export value of aquaculture products. Vietnamese shrimps were exported to more than 91 countries (VASEP, 2011).

Box 5.1: Cases of international dispute over Vietnamese *pangasius* and shrimps

As a milestone in the course of its development, the *pangasius* industry in Viet Nam was the subject of an anti-dumping case in the United States market in 2003. Viet Nam started exporting *pangasius* to the United States in 1996 and its market share in 2002 was 12 per cent. Vietnamese *pangasius* was famous in the United States market for its quality, taste and especially low price, which was only 50 per cent of United States catfish. Because of competition from the Vietnamese *pangasius*, the price of the United States catfish dropped remarkably: the price of whole Ictalurus fish fell from US$1.65 to US$1.25/kg, and for Ictalurus fillet from US$4.5 to US$3.8/kg (Tung, Thanh and Phillips, 2004).

The continuous drop in price initiated aggressive actions from United States domestic producers. They first attacked Vietnamese *pangasius* on environmental and sanitary grounds. In 2001, the Catfish Farmers of America (CFA), comprising producers and agribusinesses in six southern states, lobbied for a ban on imports of catfish from Viet Nam, alleging that Vietnamese catfish was grown in unhygienic conditions in the Mekong River. After investigating the situation in the Mekong River delta, the United States Embassy in Viet Nam, however, rejected this claim.

The second attack on Vietnamese *pangasius* was on the name “catfish”. A group of lawmakers in the United States claimed that Vietnamese *pangasius* cannot be scientifically called “catfish” and should not be sold under the label of “catfish” in the United States market. Vietnamese enterprises had to label their *pangasius* as “Basa fish” and “Tra fish” to sell to the United States market. In spite of this change, exports of Vietnamese *pangasius* to the United States market continued to increase because it was already very popular among United States consumers.

The United States producers did not stop. In 2002, when the market share of Vietnamese *pangasius* was up to 12 per cent in the United States, the CFA and eight catfish processors alleged that the Vietnamese frozen fish fillets were sold in the United States at below the cost of production. The petition was submitted to the United States International Trade Commission (USITC) and the Viet Nam Association of Seafood Exporters and Producers (VASEP), which represented 56 Vietnamese seafood processors, was called to be the defendant and submit their arguments for consideration. A USITC delegation travelled to Viet Nam to investigate the situation and finally concluded that Vietnamese *pangasius* was sold at less than a fair price in the United States market. The case led to the imposition of import tariffs of 37–64 per cent in the United States, which at that time absorbed 75 per cent of all *pangasius* exports from Viet Nam (Brambilla, Porto and Tarozzi, 2007). Shortly afterwards, Viet Nam *pangasius* exports to the United States declined by 50 per cent with an estimated loss of about US$24 million. The farm-gate price of *pangasius* was reduced by half, leading to farmer bankruptcies and great loss of employment (Tung, Thanh and Phillips 2004).

As a result, processing companies and exporters in Viet Nam had to diversify their export markets to Europe, Canada, Australia and, later, to more than 50 other countries, leading to a substantial growth in the *pangasius* industry. By late 2003 and in 2004, the price of *pangasius* had recovered to its level before the case. Farmers reinvested in new cages and ponds and new processors emerged. The *pangasius* industry in Viet Nam has emerged as a remarkably fast-growing aquaculture sector due to the diversification of its export markets following the 2003 United States anti-dumping case.

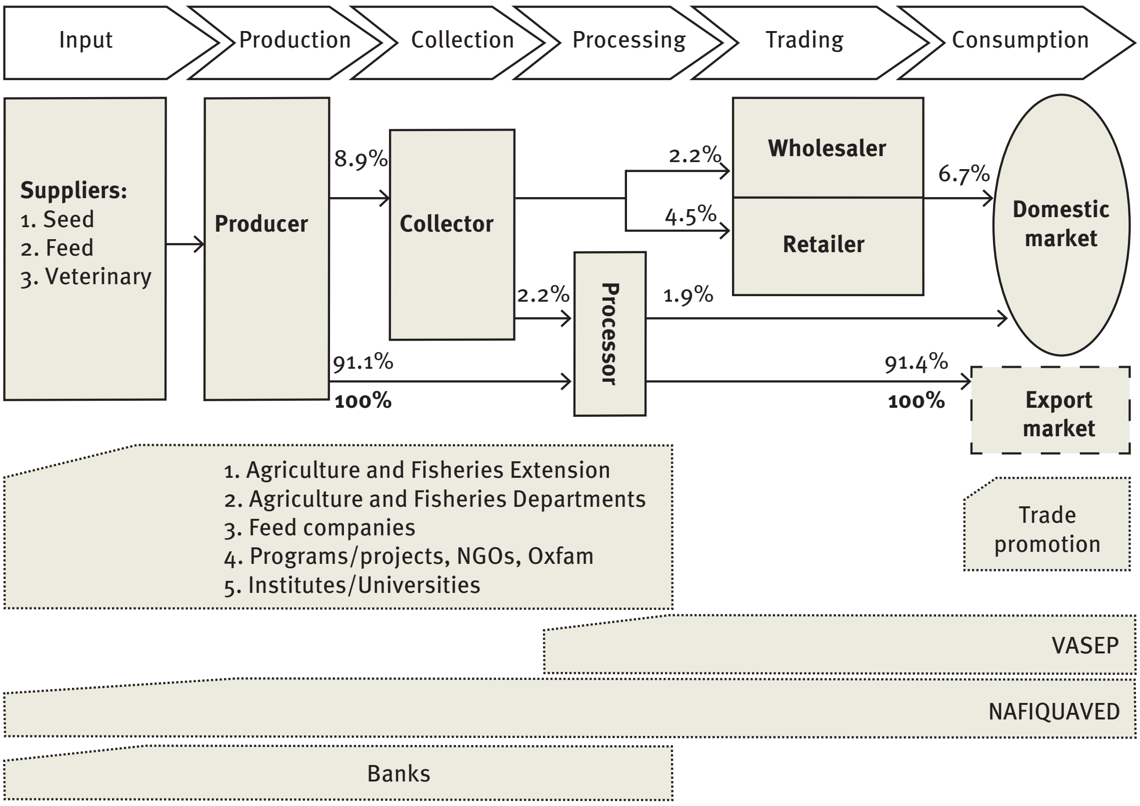
Right after this anti-dumping case against *pangasius*, Viet Nam was faced with a new anti-dumping threat in 2003 against shrimp products. In December 2003, the Ad Hoc Shrimp Trade Action Committee (ASTAC), which is an association of shrimp farmers in eight southern states of the United States, filed an anti-dumping petition against six countries – Brazil, China, Ecuador, India, Thailand and Viet Nam. The petition alleged that these six countries had dumped their shrimps in the United States market. In January 2004, the United States Department of Commerce (DOC) announced anti-dumping investigations against the six countries. Unlike the anti-dumping *pangasius* case, this time VASEP and Vietnamese producers had anticipated the case and had time to prepare by having monitored the preparations of the American shrimp producers, analyzed the United States shrimp market and trends in shrimp imports to the United States, and connected with international trade law firms. Nevertheless, Viet Nam could not succeed. In July 2004, the USITC decided that there was a reasonable indication that the United States industry was materially injured or threatened with injury due to the import of certain shrimp products from the countries concerned. The proposed tariffs were 12–93 per cent on Vietnamese shrimp products. As a result, the Vietnamese producers diversified their export markets to other countries. According to Viet Nam's General Statistics Office (GSO) (2012),[32] Japan became the largest market for Vietnamese exported shrimps. In 2009, Japan imported around 40,000 tons of frozen shrimps, valued at more than US$360 million and accounting for about 20 per cent of the Japanese frozen shrimp market. In 2010, the United States was the second largest importer of Vietnamese frozen shrimps. The United States and Japan imported 28 per cent and 27 per cent of Vietnamese exported frozen shrimps, respectively. The third and fourth largest markets are the EU and China.

Having not given up on the United States anti-dumping measures against Vietnamese frozen shrimps, in 2010 Viet Nam filed a complaint with the WTO pertaining to the anti-dumping duties that the United States had levied on frozen shrimps from Viet Nam. In 2011, a WTO panel concluded that the method used by the United States to calculate dumping margins were inconsistent with WTO rules and requested the United States to remove this calculation in the next period of review.[33]

32 GSO website: www.gso.gov.vn/default_en.aspx (accessed July 2012).

33 For more information on this issue, please see the dispute settlement page of the WTO, www.wto.org/english/tratop_e/dispu_e/cases_e/ds404_e.htm

Figure 5.7: ***Pangasius value chain in Viet Nam***



Note: NAFIQAVED refers to the National Fisheries Quality Assurance and Veterinary Directorate of Viet Nam, while VASEP is the Viet Nam Association of Seafood Exporters and Producers

Source: Khiem et al. (2010: 29)

Table 5.11: Characteristics of pangasius farming sites

	Field pond	Island pond	Net-pen enclosure	Floating cage
Stocking density (pieces)	‹20m²	20–40/ m²	30–50m²	100–250m³
Yield	50–80ton/ha	100–300 ton/ha	1000 ton/ha	100–300kg/m³
Crop cycle (months)	6–8	5–6	5–6	5–6
Meat quality (colour of meat)*	Large % of yellow/pink	75–80% white	›95%white	›95%white
Production costs in 2006 (VND per kg)	9,000	10,000	11,000	11,000
Benefit-cost ratio (2006)	1.3	1.3	1.2	1.2

Source: Nguyen (2007)

* Color of meat is an important indicator of the quality and grade of pangasius. The best quality pangasius of grade 1 has white and light pink meat. Pangasius of grade 1 is often sold to the United States or Western European markets, which require high-quality fish. The lower-quality pangasius of grade 2 has light cream yellow meat. The lowest-quality pangasius of grade 3 has yellow meat (Khoi et al., 2*008)*. Pangasius of grade 2 and 3 are often sold to markets that require lower-quality fish such as ASEAN countries or Eastern Europe.

5.3 *Pangasius* value chain and production process

5.3.1 *Pangasius* value chain

Figure 5.7 describes the *pangasius* value chain, showing the percentage value of fish sold to corresponding stakeholders. In the chain, there are suppliers of seed, feed, and veterinary drugs. Producers of seed, including larvae and fry (hatcheries), are mainly domestic, both state-owned and private, while suppliers of feed and veterinary drugs are both domestic and foreign producers and traders. The state-owned hatcheries also conduct research on the quality of broodstock and aquaculture techniques. Farmers buy these inputs at the market price directly from the suppliers or through traders.

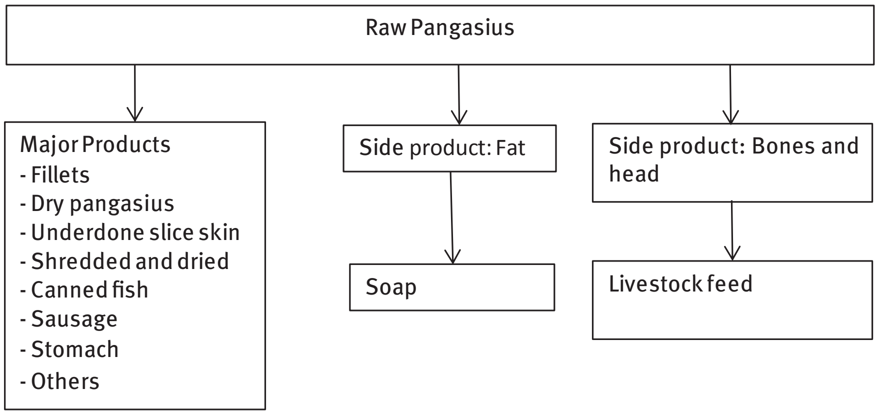
At the production stage of the chain, various farmers exist to produce fingerlings and fish. While fingerling producers are mainly independent, producers of fish (called "grow-out farmers") can be independent farmers, fishery association members, contracted farmers, or farms owned by processors (i.e., vertical integration). In the past, there were only independent grow-out farmers. However, as quality and safety standards required became more stringent, processors found it difficult to control the quality of inputs (fingerlings, feeds) and the use of antibiotics and chemicals by independent farmers, so other types of outgrowers emerged. The relationship between the processors and independent farmers is based on informal agreements rather than enforceable contracts. Instead of being independent, farmers can belong to a producer organization (fishery association), from which they receive market information, training on quality management, and technical support.

Generally, farmers belonging to producer organizations control fish quality better than independent farmers. Contracted farmers are often under close monitoring by the processors, in a kind of vertical coordination between the processors and farmers. The processors provide the farmers with support and services including guidance on how to use drugs and chemicals, and accessibility to laboratory services for fish disease diagnosis. Thus, the quality of fish supplied by contracted farmers is often better than that of fish supplied by independent farmers. Moreover, an increasing number of processors have been establishing their own farms to ensure the quality and traceability of the fish. The processors apply stringent quality and safety standards to these farms to meet the requirements of the Japanese, United States and EU markets. Recently, due to higher quality and safety standards imposed by importers, the number of contracted farmers and farms owned by processors has been increasing because the processors find it easier to control the production process of contracted farmers and their own plants to ensure fish quality and safety.

For the domestic market, there are local collectors who buy fish from various farmers to sell to wholesalers and retailers in big cities in Viet Nam. To the extent that the processors sometimes sell *pangasius* products that do not meet export quality standards to the domestic market, the domestic market is a secondary market to the export market. Fish for export are sent to processors for further treatment before being sent to the overseas markets. In the past, there were collectors between producers and processors. Due to the increase in the typical size of producers, processors have been increasingly buying fish directly from farmers. As a result, collectors of exported fish have gradually closed their businesses and switched to providing transport, hired by processors or farmers to simply transport the fish.

There are various governmental and non-governmental organizations (NGOs) that regulate and support the main stakeholders in the *pangasius* chain. The Ministry of Agriculture and Rural Development (MARD) is the main governmental body responsible for development of the fisheries sector in general and the *pangasius* industry in particular. Under MARD, there are regional departments that provide stakeholders in the *pangasius* chain with technical and financial support and extension services. The National Agro-Forestry-Fisheries Quality Assurance Department (NAFIQAD) under MARD is responsible for matters related to the quality of agricultural products, including national programmes on quality assurance and the issue of quality certificates for agricultural products. The Viet Nam Association of Seafood Exporters and Producers (VASEP) and the Viet Nam Fisheries Society (VINAFIS) are associations of processors and exporters of *pangasius* that are active in promoting the development of the

Figure 5.8: Pangasius products



Source: Authors

pangasius industry. These bodies provide producers, collectors, and processors with extension services, credit, technical advice, audit services for certification and market information, organise collective actions, and provide guidelines for their production activities.

5.3.2 *Pangasius* production process

According to various statistics, the total production area for *pangasius* in 2007 was around 5,000–9,000ha (Mantingh and Nguyen, 2008). There are three types of farming sites. In descending order of importance in *pangasius* production, they are: ponds (field ponds or island ponds); net-pen enclosures; and floating cages in the river. Field ponds are often less than 5,000m^2 and about two to three metres deep. Island ponds are on islands in large rivers or on river banks and are often 5,000–10,000m^2 and up to five metres deep. Each pond requires about two to three workers to take care of feeding the fish and changing 30–50 per cent of the water in the pond daily by pumping water from/to canals/rivers. Ponds are often located near canals/rivers. There is no water discharge treatment so it increases canal/river pollution and disease transmission and outbreaks. After harvest, accumulated waste at the bottom of the pond is removed and released into rivers or used for agriculture fertilisation. Nonetheless, the pond aquaculture system is the most productive and environment-friendly (Khoi, 2011). As a result, *pangasius* production using ponds has become popular. Various characteristics of these farming sites are presented in Table 5.11.

In the past, most *pangasius* fry were caught from the Mekong River around the border between Cambodia and Viet Nam. In the late 1990s, researchers were able to control the whole lifecycle of *pangasius* through breeding. Today, the majority of the fry are produced in hatcheries by the private sector in the Mekong River delta. First, larvae are nursed to fry until they reach 1g per piece. The nursing stage from larvae to fry takes 40 days and is the most risky stage because the fry are very sensitive to changes in water quality and temperature and have a survival rate of only 8–30 per cent (Belton and Little, 2008; Sinh and Hien, 2010).

From the hatcheries the fry are nursed for around nine weeks to grow to 10–15cm (15g); they are then called fingerlings and are ready to be sold to farmers (Khoi, 2007). The nursing stage from fry to fingerlings takes 80 days with a higher survival rate of 60 per cent. When grow-out farmers purchase fingerlings, their quality is checked by observing their mobility and agility. Healthy fingerlings are a bright colour and have no body deformations, injuries, or damaged fins. At this stage, the quality is not checked by government bodies.

The most important determinant of fingerling quality is quality of broodstock, followed by water quality because it is directly connected with diseases. Nowadays, breeders are selected from grow-out farms with no previous knowledge or experience of proper breeding methods. This has led to significant inbreeding. Quality degradation from uncontrolled breeding and shortage of seeds and fingerlings has become one of the major problems currently facing the sector. Before 2003, there was only one spawning season per year, which was from April to July. Since 2003, due to the increase in demand for *pangasius*, spawning has been done throughout the year. As a result, the hatcheries have to use more chemicals and veterinary drugs and give more feed to the female *pangasius* to make more frequent artificial fertilisation possible. Grow-out farmers may suffer because they have no way to test fingerling quality. They buy fingerlings mainly based on trust in the hatcheries.

Types of feed also affect the quality of *pangasius*. There are two types of feed for *pangasius*: home-made feed and pallet feed or manufactured feed. Home-made feed is made of rice bran/broken rice, soybeans, and trash fish, and sometimes additives such as vitamin C and lysine are also used (Khoi, 2011). It is cheaper than pallet feed and its quality is not consistent. Home-made feed, therefore, can reduce fish growth and cause high fat

Figure 5.9: Pangasius farm sizes in An Giang province

Source: Khiem et al. (2010: 2)

deposition in visceral areas of the fish. As a result, farmers have shifted from home-made to pallet feed. Until 2002, 99 per cent of farmers still used home-made feed. However, in recent years, the use of pallet feed has increased, particularly on large farms (Khiem *et al.,* 2010). It takes approximately 4kg of home-made feed or 2.5–2.8kg of pallet feed to produce 1kg of *pangasius*. The fish are fed five to six times a day. In terms of operating costs for fish producers, feed is the largest cost, which is about 74 per cent if home-made feed is used and 90 per cent if manufactured feed is used (Khiem *et al.,* 2010), followed by the costs of fingerlings and labour. Therefore, the survival of fish producers depends heavily on the price of feed. In fact, many farmers decide whether to cultivate *pangasius* or other types of fish on a crop-by-crop basis (Khiem *et al.,* 2008).

In the past, *Pangasius bocourti* was known for its disease resistance. However, because the rapid expansion of its production has resulted in high stocking densities and water pollution, disease occurrence has been increasing. To deal with the problem, farmers are using antibiotics for prophylactic therapeutic treatments. Because it would be too costly for farmers if their fish failed to meet buyers' standards and couldn't be sold, farmers follow the quality management rules and regulations strictly. They are, however, rarely aware of what medicines are permitted and not permitted. The small-scale farmers simply follow the advice of friends and drug sellers on how to treat disease and use veterinary drugs (Khoi, 2011). Fish quality is first assessed by visual checking of colour and size and later by testing in the laboratory. Consumers in the United States and the EU prefer fish with white and pink meat and of identical size and are willing to pay higher prices for it. Fish that have yellow meat and/or not identical sizes can only be sold to Eastern European markets such as Russian Federation and the ASEAN countries. Some farmers rotate *pangasius* culture and shrimp culture to avoid diseases.[34] The culture of fish is all-year around. It takes about 6–8 months to raise fingerlings to a weight of around 1–1.5 kg before harvest and being sold to processors or collectors.

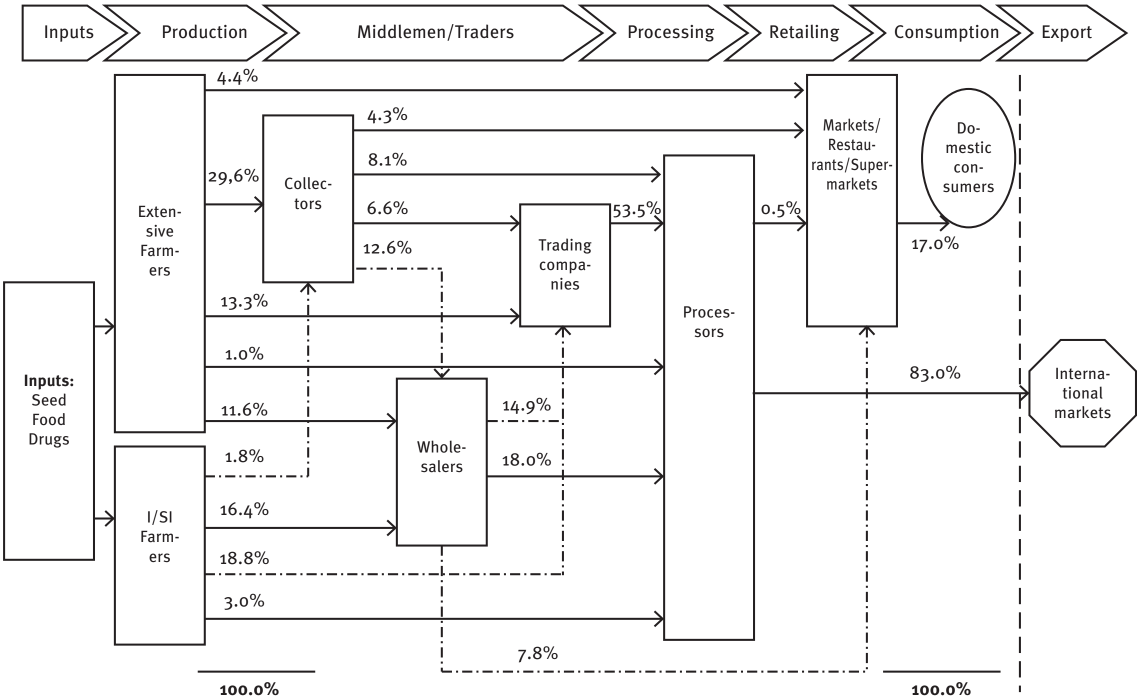
Three weeks before harvest processors or traders often come to farmers to check fish quality and take a sample of fish they might want to buy to test for antibiotics and chemical residues. If antibiotic and chemical residues exceed the required standards, the harvest will be postponed for some time so that the residues will be reduced down to the appropriate level. Before harvest, the fish are starved for two days. The fish are then harvested and transported alive to the processors by boats.

The final price for fish depends largely on its quality. To assess fish quality, the collectors/processors will check the colour of the fish and take a sample for further testing in their own labs or independent labs. The final price is not set until the day of harvest. In fact, independent farmers and even the contracted farmers have little power in negotiating prices with the collectors and/or processors, partly because they have no labs for testing fish quality. Also, there is often delayed payment from collectors/processors to farmers.

In processing factories, different fish from different farmers are separated into different batches by the processors. The fish are then checked for quality by sampling, cleaned, filleted, and frozen for exports. To obtain certification of compliance with HACCP standards, the products are randomly checked and

34 While it is easy to convert shrimp ponds to rice fields, it is difficult to convert pangasius ponds to rice fields. As a result, pangasius production maintains a high latent capacity, where farmers produce pangasius when the demand is high and stop production temporarily when there is reduction in demand.

Figure 5.10: Shrimp production value chain (Black Tiger) in Viet Nam



Source: Le (2012: 71)

analyzed by NAFIQAD. Major products from *pangasius* include fillets, dry *pangasius*, underdone sliced skin, shredded and dried fish, canned fish, sausages, stomach, and others. In addition, there are side products; for example, *pangasius* fat is sold to producers of soap, and *pangasius* bones and heads are sold to producers of livestock feed (see Figure 5.8). Most of the processors apply quality management systems such as HACCP, ISO 9001:2000, and SQF 2000. Large processors are equipped with advanced equipment and machines and frequently provide their workers with training (Khoi, 2007).

Over time, the *pangasius* industry has seen an increase in the number of large farms and a decline in the number of relatively small farms as depicted in Figure 5.9. *Pangasius* production is more capital-intensive than other aquaculture products so smaller farmers cannot compete with larger ones. Processors are shifting from smaller farmers to larger ones because the latter can provide them with fish of higher quality and that better meet standard requirements. However, farmers with less than 0.5ha still accounted for more than 80 per cent of all farmers in 2008. Because of limited land it is more difficult for small *pangasius* farmers to grow but relatively easier for them to cultivate other fish species or even downgrade from grow-out farming to nursing or hatching. Farmers without the capital to invest in nursing or hatching were forced to leave the industry.

5.4 Shrimp value chain and production process

5.4.1 Shrimp value chain

Figure 5.10 describes the value chain of shrimp production in Viet Nam. In this chain, input suppliers include three groups of stakeholders: sellers of inputs such as feed and antibiotics; fishermen who catch wild shrimp broodstocks; and shrimp hatchery and nursery farmers. The fishermen sell their broodstocks to the hatchery and nursery farmers directly or through traders. Some broodstocks are brought from central Viet Nam to the Mekong River delta. According to Le (2012), in 2009 there were 1,100 Black Tiger and five Whiteleg hatcheries in the Mekong River delta that produced more than 9 billion post-larvae Black Tiger prawns and 250 million post-larvae Whiteleg prawns, altogether accounting for 50 per cent of the total demand in the region. More than 70 per cent of the Black Tiger post-larvae are sold directly to the grow-out farmers in the same province, while about 26 per cent are sold through seed traders and the rest are kept for self-nursing. The hatcheries can have five to six cycles a year. The nursery sites can have about 50 cycles a year, each cycle being about three to five days.

Grow-out farmers, including improved extensive and intensive/semi-intensive farmers, can be independent farmers or contracted farmers, invested in by the processing companies.[35] According to Le (2012), compared with the intensive farmers the improved extensive farmers often have a larger average culture area per farm, lower average stocking density, shorter stocking

35 Extensive shrimp production is the traditional method that is often used in the coastal areas and requires minimal investment in labour and management, while intensive shrimp production requires heavy investment in capital and labour.

time, a lower percentage of post-larvae being tested for diseases, prawns mainly fed with natural feeds, lower survival rates, and importantly lower yields, which is only one-seventh of that of intensive farmers. Intensive and semi-intensive production is mainly used for growing *Penaeus vannamei*, while extensive production is used for growing Black Tiger and Whiteleg shrimps. In the Mekong River delta, about 78 per cent of the area is cultivated by the improved extensive farmers and the remainder by intensive and semi-intensive farmers. Most of these farmers are independent and small-scale (Tung, Thanh and Phillips, 2004).

Prawn trading activities often take place during the peak harvest period from April to September. The independent farmers sell their products to collectors who sell the shrimps to wholesale buyers. The collectors and wholesale buyers are sometimes owned by the same people who supply inputs. The wholesale buyers then sell the shrimps to the processing companies. The relationship between the wholesale buyers and the processing companies is often characterised by on-the-spot marketing. The contracted farmers often sell the shrimps directly to the processing companies. They may, however, sell to the collectors and/or wholesale buyers as it is not always possible to enforce the contract between the processing companies and the contracted farmers. According to Loc (2006), about 60 per cent of the shrimps are sold to the processing companies through the collectors and/or wholesale buyers.

For export, the shrimps will be processed, packed, and delivered to distributors, which are foreign import companies, some of which are located in Viet Nam, mostly in Ho Chi Minh City. These foreign import companies re-label the final products and sell them to foreign retailers, who then sell the shrimps to end users. For the domestic market, the shrimps can be sold directly by farmers or collectors and processors to local markets, supermarkets, and restaurants. In the shrimp value chain, 83 per cent of production is for export, while only 17 per cent are sold to the domestic market.

Apart from the main stakeholders already mentioned, there are minor stakeholders including service providers such as feed, medicine, and ice suppliers, people who process shrimp heads, and local transporters.

Similar to the *pangasius* value chain, various government organizations and NGOs support the major stakeholders in the shrimp value chain. The MARD and its agencies, of which NAFIQAD is important, VASEP, and national and provincial trade promotion centres manage the shrimp industry and provide the suppliers, farmers, and processors with technical advice, extension services, management training courses, quality control, financial support, and opportunities to take part in domestic and overseas trade fairs. Particularly, VASEP, as an effective processors' association, represented them in legal matters including the European anti-dumping legislation and provides its processor members with market information and various trainings.

Comparing the market structures of the two sectors, while large proportions of both *pangasius* and shrimp go to processors (93 per cent for *pangasius* and 83.6 per cent for shrimp, based on previous figures) and are exported, the value chain structure before processing is more complicated for shrimps than for *pangasius*. Because of rising standards, *pangasius* production is becoming more consolidated (as will be explained later), and the role of collectors between grow-out farmers and processors is becoming less important. On the other hand, a large proportion of shrimps are still being produced by small-scale fish farmers. We will examine the differences in these sectors by carefully analysing the production processes of these two types of aquatic products.

5.4.2 Shrimp production processes

Shrimps can be either caught from the wild or raised in farms. In Viet Nam, when exports of shrimp began in 1975, shrimps were mostly caught from the sea. As exports increased over time, cultured shrimps have become dominant. Black Tiger and *Penaeus vannamei* are the two main types of shrimp cultured in Viet Nam.

As mentioned above, for cultured shrimps there are two ways of organising shrimp production – extensive and intensive/semi-intensive. Extensive shrimp production is the traditional method that is often used in the coastal areas and requires minimal investment in labour and management, while intensive shrimp production requires heavy investment in capital and labour. Intensive shrimp production is higher-yielding than extensive production, but it is also prone to the outbreak of diseases due to its high shrimp density. Disease induces the farmers to use antibiotics and that could affect shrimp quality. Intensive shrimp production methods are known to have negative effects on the environment because of the frequent use of chemicals. Disease outbreaks have also been experienced by other shrimp-producing countries, such as Taiwan Province of China, Indonesia and Thailand.

Post-larvae are produced in hatcheries until they reach about 2–2.5cm and are sold to farmers. Post-larvae quality is often checked by sight. Shrimp diseases including fungal disease, white spot disease, and *Monodon baculovirus* (MBV) disease are common. To prevent these diseases farmers have to use a great number of antibiotics and chemical substances.

It takes about four months for the grow-out farmers to grow the shrimps. The main shrimp crop starts in January and ends in May. Shrimps are often harvested several times in one crop so that harvesting can continue for some months beyond May. Because collectors and/or wholesale buyers collect shrimps from different grow-out farmers and mix them together, it is more difficult for the processing companies to trace the shrimps and ensure their quality than if they buy shrimps directly from contracted farmers.

Wild shrimps, by contrast, are seldom infected with micro-organisms and bacteria. After being caught, the shrimps are stored on boats offshore for an average of 5–7 days (minimum three days and maximum 15 days). The shrimps will be sold to the collectors and/or wholesale buyers who will then sell them to the processing companies within a day. For various reasons such as inappropriate temperature, transportation hygiene, and time spent in offshore storage and transportation, shrimps can, however, be infected with micro-organisms and bacteria.

Table 5.12: List of relevant certifications

Certification	Main contents	Level applied	Coverage
SQF2000	Food safety assessment programme covering processors, distributors and warehousing	Factory	Global
SQF1000	Food safety assessment programme for primary producers	Farm, Hatchery	Global
HACCP	Management system for the prevention of contamination by physical, chemical, and biological hazards	Factory	Global
GlobalGAP	Initiated by the members of the Euro-Retailer Produce Association, main focus is on food safety and traceability, and concerns with social and environmental issues	Factory, Farm	Global
BRC	Food safety and quality criteria required for supplying to UK retailers and designed to standardise food criteria and monitoring procedures	Factory	United Kingdom
GMP	Developed by the US FDA for verifying the safety and purity of drug and food products	Drug and chemical suppliers	United States
ISO22000	International food safety management system involving interactive communication between chain actors, and a system management approach based on HACCP principles	Factory	Global
ISO 9001-2000	Quality management system for providing consistent products and services to meet customer expectations, focusing on quantitative measurement of performance	Feed suppliers	Global
BAP	Address environmental and social responsibility, animal welfare, food safety and traceability in a voluntary certification programme for aquaculture facilities	Farms	Global
OHSAS	British standard for occupational health and safety management system	Factory	United Kingdom
PAD	*Pangasius* Aquaculture Dialogue, initiated by WWF, is a set of standards based on multi-stakeholder consultation	Farms	Global
BMP	Targeted to improve farmers' management practices, delivering increased profitability and environmental performance by making more efficient use of resources	Farms	Global

Source: Khiem et al. (2010); Mantingh and Nguyen (2008)

5.5 Compliance with what standards is required by importing countries?

A great number of different food quality standards and certifications are relevant to this sector and importers' requirements also vary across countries. Table 5.12 provides some of the relevant certifications. These are typically requested and required by the importers. Having these certificates by no means guarantees that products procured by these processors will pass inspection at the port. However, many importers are requiring these to screen the capabilities of firms.

Although the focus of these certificates varies, the main concerns for these certifications can be categorised as (a) hygiene, (b) social, and (c) environmental. While early certifications were concerned with what is physically included in the food products (i.e. (a)), more recent certifications tend to include other factors surrounding the production process of the food products, reflecting consumers awareness of environmental issues and sustainable livelihoods. There are both mandatory and voluntary, public and private standards (for a thorough review on the types of standards, refer to ITC, 2011).

Apart from these certifications, each country has a set of regulations to check the quality of imported goods at its borders. The requirements and testing procedures vary greatly across countries, though most include tests of maximum chemical residue levels. For the EU, while each member country has its own authority conducting border inspections, the European Food Safety Authority and the European Commission's Directorate-General for Health and Consumers (DG SANCO) are in charge of assuring food safety at Union level. The EU records and shares all the rejection data through its Rapid Alert System for Food and Feed (RASFF). For the United States, the FDA is in charge of regulating imports based on the Federal Food, Drug and Cosmetic (FD&C) Act (UNIDO, 2010). For Japan, the Imported Foods Inspection Services under the Ministry of Health, Labour and Welfare (MHLW) is in charge of imported food quality regulation based on the Food Safety Basic Act (for details, refer to Chapter 2). These border inspections relate to other sets of regulations that the exporting countries need to satisfy, as we have seen in Table 5.3.

Requirements of importers vary greatly across the importing countries, raising compliance costs for the exporters. According to interviews with Vietnamese exporters, we can observe different patterns of requirements across importing countries. For the EU, the main export products are unprocessed fish fillets and shrimps, and the buyers are more concerned about whether the exporters have the relevant certifications, such as SQF, BRC, and GlobalGAP. Thus, from the exporters' point of view, it is most important to obtain the required certifications. This is similar for the United States, except that certificates such as Best Aquaculture Practices (BAP) are more popular there. As of 2012, there is no requirement by these countries for seafood consignment sampling and testing before clearance for export (VASEP, 2012a). On the other hand, the Japanese market presents a different case. Japanese buyers' are not much concerned with whether the exporter is certified, but about the actual levels of antibiotic residues in the products. Although Japanese importers do not value certifications, they care about how production is carried out in practice and often visit processing factories with technical experts and offer technical advice for improvement. Importers conduct sampling tests voluntarily, apart from the mandatory inspection by the Vietnamese authority (NAFIQAD), because the sampling rate and testing accuracy are not enough to meet Japanese quarantine standards. Importers fear port rejections because their names will be revealed on the MHLW's website, damaging their reputation. According to exporters, port inspections in Japan are very strict relative to the EU and United States.

Furthermore, these quality standards required by importers are not stable but evolve over time, often with "very short notice" according to Vietnamese exporters interviewed for this study.[36] Exporters say, "Importers require the certificate A today and tomorrow they require the certificate B. As an exporter, there is no alternative but to obtain the B certification as well because otherwise we lose business. At the same time, we also need to pay for renewing the certificate A". According to exporters, lately Japanese ports are intensifying the inspection of Vietnamese products. These cases are detailed in Box 5.2.

36 Note that whether this refers to a sudden change in a policy or reflects the lack of policy surveillance capability by importers is not clear.

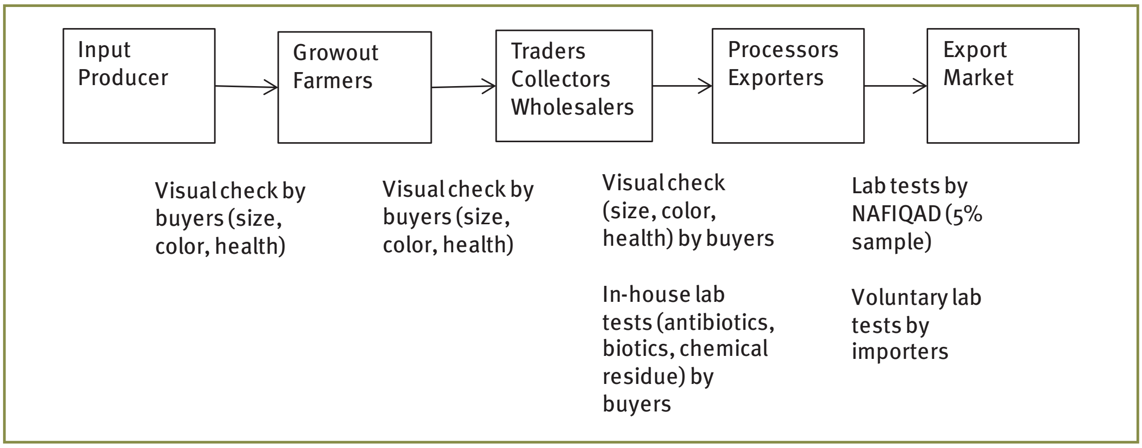
Box 5.2: Ethoxyquin in Vietnamese shrimp

On 18 May, 2012, a Vietnamese shipment to a Japanese port was found to contain ethoxyquin. Ethoxyquin for shrimp is among those chemicals for which MRLs (maximum residue levels) are not established, and because the Japanese government uses the positive list system (refer to Chapter 2), the uniform maximum residue level of 0.01ppm is applied. According to "the Imported Foods Monitoring Plan for FY 2012", if a violation is detected, the rate of monitoring inspections will be increased by 30 per cent and voluntary self-inspection is advised for the violators, whose names are revealed on the MHLW website. This rate of monitoring will in principle be normalised if no further violations are detected within one year and/or after more than 60 inspections. While this procedure is a routine process for the Japanese quarantine system, Viet Nam exporters raised concern because (a) the Japanese MRL for ethoxyquin is too low given that the MRL established by the EU and the United States is 150ppm and Japan also applies 150ppm for fishmeal (but not for shrimp), and (b) the source of ethoxyquin in Vietnamese shrimps was imported fishmeal from Latin America, which is also used by other exporting countries such as Thailand or Indonesia. Thus, the Vietnamese government and exporters' associations argue that it is not fair that only their shrimp will be the target of intensive monitoring.

NAFIQAD's director visited Japan to request adjustment of the MRLs for ethoxyquin based on the risks to human health. The Vietnamese government made a list of fishmeal containing ethoxyquin with its MRLs and instructed exporters not to use fishmeal containing this chemical (VASEP, 2012c). The exporters interviewed expressed great concern over this issue and mentioned that many of them are now refraining from exporting to Japan due to the fear of being rejected once again (another violation detection would increase the inspection rate to 50 per cent). They said that ethoxyquin is also included in the feed of pigs, chickens and fish in order to maintain quality. Shrimps can feed on soybeans but that would result in low quality as shrimps need a lot of nutrition until close to harvesting. In order to test for ethoxyquin, exporters need to import some testing kit, adding to their costs. One exporter estimated that the inspection fee increased costs as much as 20–30 cents per kg of shrimp after this incident.

In fact, there were similar incidents in the past, such as the case of enrofloxacin (2011) and trifluralin (2010) relating to shrimp exports to Japan. After the detection of violation at Japanese ports, the Vietnamese government decided to include both in a list of prohibited chemicals (Circular 03/2012/TT-BNNPTNT for enrofloxacin and Circular 20/2010/TT-BNNPTNT for trifluralin; VASEP, 2010; 2012b).

Figure 5.11: Quality inspections conducted at each level along the value chain



Source: Authors, based on interviews

Overall, because of the rise in standards, testing fees and certification fees are increasing for exporters. Exporters currently incur on average 1.5 to 2 times more expense on testing fees compared to some years back (VASEP, 2012a). Also, because inspection takes longer at Vietnamese ports before shipping abroad, it adds more storage expenses. The increasing number of different certifications and standards also adds costs for the exporters. The application costs for certifications (US$2,000 for the initial cost of GlobalGAP) need to be borne by those who will be certified – stakeholders in Viet Nam. Processors and exporters incur these costs while for smallholders, government subsidy is offered in some cases. There are also cases where the testing fees are borne by importers.

5.5.1 What measures are taken in Viet Nam?

Processors/exporters

Even with this increasing number of certificates, requirements seem mostly to be satisfied by exporters. When you visit these exporters, you quickly notice that they have many framed certificates hanging on their office walls. Although exporters express complaints, particularly because they need to bear all the costs of obtaining these certificates, they still decide to obtain them to continue trading. Most exporters also have in-house labs to check chemical residue levels (see Figure 5.11). They test the levels before purchasing from traders or smallholders and before shipping for export. Some exporters also mentioned the use of outside labs that can detect antibiotics more accurately for shipment to countries like Japan where testing is very stringent. These types of private labs are also available in the country. Processors who have a special relationship with importing firms (i.e. subsidiary firms, long-term suppliers, contractors) are in a better position to receive technical advice and information about the required standards relative to other independent firms. We observed that some processors have Japanese technical experts sent by their buyers who work in their factories, monitor the production processes, and offer advice for improvement on a daily basis.

Small-scale farmers

According to the interviews and field surveys conducted in June 2012, the greatest difficulty with compliance seems to lie at the level of small-scale producers as there are a large number of them. First of all, many farmers do not even know what the relevant standards are. According to Khiem *et al.* (2010), 36 per cent of farmers were not aware of these quality and safety standards in 2008. For popular standards, such as SQF and GlobalGAP, the MARD has put a lot of effort into increasing smallholder awareness by offering them training sessions and by offering to shoulder 50 per cent of application costs to obtain certificates. However, according to extension workers, the number of smallholders who have actually obtained these certificates is trivial because (a) the certification costs are high, (b) they have their own farming experience and do not see the necessity of being certified, and (c) they are "conservative". It is too costly for farmers to acquire such standards and they are not rewarded with higher prices for the products that satisfy these standards.

Government

Various government bodies and NGOs regulate and facilitate the development of the aquatic sector in Viet Nam. The Ministry of Agriculture and Rural Development (MARD) and provincial Departments of Agriculture and Rural Development are the central and local governmental agencies, respectively, that manage the development of the aquaculture industry. Under MARD, the National Agro-Forestry-Fisheries Quality Assurance Department (NAFIQAD) consisting of six regional centres in Viet Nam is in charge of food safety assurance and quality control in the aquaculture industry. NAFIQAD succeeded the former National Fisheries Quality Assurance and Veterinary Directorate (NAFIQAVED) in 2007 for the purpose of "assisting the Minister to carry out the state governing of quality and safety of agricultural, forestry, fishery products, and salt nation-wide".[37]

Among their activities and responsibilities, one that is important to the seafood export sector is regular monitoring inspection for harmful substances, which is conducted annually according to "the Residue Monitoring Programme for Certain Harmful Substances in Aquaculture Fish and Products". The monitoring programme is considered to follow EU requirements. According to NAFIQAD's report of activity in 2010, they inspected 154 aquatic areas in 36 provinces and cities for various species, including Black Tiger shrimp, white shrimp, giant prawn, and catfish. In total, 4,075 samples were inspected, of which 3,798 were from production farms, 143 samples were from hatcheries, and 134 samples were from middlemen. The results of inspections reveal the number of unsatisfactory samples (but not the names of the sites). Notably high violations were found in the use of prohibited antibiotics, particularly trifluralin, which was newly included on the list of prohibited substances for aquaculture in 2010. When violations are found, NAFIQAD takes measures such as (a) requesting suspension of production at these sites, (b) requesting processors not to purchase from these sites, (c) investigating the root cause for the violation, etc.

Apart from the monitoring inspection, NAFIQAD is also responsible for issuing export certification to companies based on their inspection. In addition, all the export products need to go through random sampling tests by NAFIQAD before export. According to exporters, the rate of testing at the port is about 5 per cent. NAFIQAD is also responsible for disseminating information about changing import requirements to the stakeholders in the sector.

During the last few years, complicated safety standards related to chemical and drug residues and importer certification systems have been increasingly applied to exported aquaculture products from various countries including Viet Nam. To cope with the new requirements, at the national level, MARD have requested local authorities to focus more on improving the quality of fish products even at the expense of quantity reduction. Various other new legal documents have been released to improve quality and manage hygiene and food safety in the industry. The Vietnamese government announced a Master Plan for the aquaculture and fisheries sector for the period 2005–2010 and directions for 2020. At the local levels, few provincial and mu-

37 From the NAFIQAD website, www.nafiqad.gov.vn/d-monitoring-programme (accessed August 2012).

nicipal governments have been active in training farmers and processors on how to conform to such complicated quality and safety standards or providing subsidies for application of these standards.

Industry associations/Non-government organizations

Besides these state administration agencies, the Viet Nam Association of Seafood Exporters and Producers (VASEP) and Viet Nam Fisheries Society (VINAFIS) play an effective role in promoting development of the industry. VASEP is an effective local association of leading seafood exporters and producers founded in 1998. They actively represent their members in local and international collective actions and provide their members with diverse services such as extension services, trade fairs, and information. VASEP also conveys opinions from the member exporters and producers to the government and to importing countries. Additionally, there are provincial fish associations that support suppliers, farmers, processors and exporters in the industry.

5.5.2 Observed effects of standards on stakeholders along the value chains

Processors/exporters

The direct effects of the increasing importance of standards/certificates on processors and exporters are the added costs of compliance, most of the time without any increase in the sales price. For EU and United States buyers, producers and exporters invest and obtain the required certificates. They need to incur not only the initial costs but also annual renewal fee. For detecting maximum residues, they conduct lab tests in-house and sometimes also use outside labs before exporting. At the ports, NAFIQAD conducts another random sampling test. Overall, the current trend has increased the expenditure burden on processors and exporters.

The second effect is changes to the business model of processors to rely more on fish supply from their own farms or their contract farmers rather than sourcing from traders or smallholders via on-the-spot marketing. With increasingly strict standards, the transaction costs of dealing with many smallholders are rising. In terms of assuring traceability, it is easy to centrally control all the processes from fish production to processing rather than having to trace all the smallholders' production histories. Thus, there is a trend for processors to vertically integrate production. One exporter who owns large shrimp ponds mentioned that, in their production system, each pond is labelled with an identification number. Thus, if some problems with these shrimps were detected, they could stop using all the shrimps from that pond and investigate the cause. The exporters also issue IDs for traders who bring fish/shrimps to their factories. However, because traders purchase from many small ponds and each pond is often too small to fill one container used for transportation, they tend to mix fish/shrimps from various ponds. This makes it more difficult to assure traceability for inputs from traders.

This trend of vertical integration of ponds by processors is more clearly observed for the *pangasius* sector because *pangasius* are more cash-intensive and less labour-intensive than shrimps. For shrimps, although some processors have their own shrimp ponds (a few have very large ones in the order of 500ha), it is not as common as in the *pangasius* sector. The reasons for this difference are: (i) *pangasius* is a capital-intensive product that emerged only recently so that smallholders do not have much comparative advantage, (ii) shrimps are prone to diseases and thus risky if relying on one large pond, (iii) shrimps are more labour-intensive in production than *pangasius*, (iv) shrimps need coastal land for brackish water and are land-consuming. According to one exporter, in order to satisfy its factory's processing capacity, it needs 4,000ha of shrimp farm. However, if it were *pangasius*, the company would only need 400ha. Thus, there are few shrimp processing companies that have their own ponds and, even if they do, the shrimps harvested from their own ponds account for only 2–3 per cent of total production.

Small-scale farmers

Because of the change in the business model of processors and exporters, a large number of *pangasius* smallholders have exited the market. They either diversified into producing other fish targeted for domestic markets or downgraded their business to raising fingerlings or fish seed. On the other hand, shrimp smallholders seem to be more resistant to this change because they do have comparative advantages over the processors in producing shrimps, as mentioned in the previous paragraph (i.e. labour-intensive production, land-ownership, etc.). However, as the traceability requirement becomes even more important, it is likely that these shrimp smallholders are also to be consolidated in future. Among smallholders, those who have contracts with processors are in a better position to maintain their roles as fish or shrimp suppliers. However, these groups of smallholders are special as they own relatively larger ponds (thus reducing the transaction costs for the processors).

Collectors/traders

In the *pangasius* sector, the role of collectors and traders has declined because the processors tend to source directly from their contract smallholders and rely less on traders. Traders still operate because it requires special boats to transport the fish, but they currently function more as "transporters" than as "traders" in the traditional sense. These collectors transport *pangasius* from smallholders to processors. In the shrimp sector, the traders are still active in buying shrimps from farmers and selling to processors although they have become more tightly controlled by processors through such means as formal registration.

5.6 Major issues in import standards compliance

Given these market structures and impacts on stakeholders, what are the major bottlenecks for standards compliance in Viet Nam? Based on the fieldwork observations, we find three major issues.

5.6.1 Inadequate incentive mechanisms to comply with standards/certificates

The first and probably the most important issue is the country's weak enforcement of these certification/standards. While the stakeholders are aware of the need to comply with certification schemes/standards, under the current system there are not enough incentives for them to comply. In other words, there is neither reward for compliance nor punishment for non-compliance, particularly at the levels of small-scale grow-out and fingerling farmers. They do not have the incentive to apply for SQF1000 because in practice they can still sell their fish or shrimps without these certificates and because the costly certificates do not yield higher prices. From fingerling farmers to grow-out farmers and from grow-out farmers to collectors, few are certified and no lab tests of maximum residue levels are involved in sales decisions. Transactions occur based on visual quality checks. Although importers, especially from the EU and United States, require particular types of certifications for processors, they do not strictly investigate whether the farmers who supply the processers are also certified.

The main problem with chemical residues is that they are not readily detectable. They need to be tested for in a lab facility. It is essentially a problem of information asymmetry, where one actor in the transaction (a seller, in this case) has more information than his counterpart (a buyer). In this situation, because the buyer cannot discern the difference between a good product and a bad product, he is not willing to pay a higher price for the former. Thus, the suppliers of good products are discouraged and they decide not to supply. This is the classic "lemon's problem" in economics, which means that "lemons" (i.e. low-quality products) drive the high-quality products out of the market. If, somehow, quality becomes observable and fetches higher prices, it is expected that two separate markets would develop for each type of product. Thus, if the processors are aiming for markets with stringent standards, they have clear options available to them.

Lab tests are the only way to detect residues and thus quality. This is already done at the level of processors, but not upstream because the equipment is not widely available at the level of farmers. NAFIQAD's regular monitoring inspection is definitely one effort to enforce high quality in the market by chasing the low-quality away, but the sheer fact of high rejection rates in EU, United States and Japanese markets suggests that it is not enough. It may be that the sample size for testing is inadequate (i.e. low probability of detection), testing accuracy is not achieved, or that punishments for violations are not effective. Lab tests are not perfect because they rely on a sample. According to one of the exporters, samples of shrimps taken from the upper level of the container and the bottom level of the container may give different results.

As another example, one Japanese importer interviewed for this study mentioned that the way the test is conducted in Viet Nam is not adequate, at least not by Japanese standards. To test the residue level, it is necessary to crush many shrimp to obtain an extract from them, but he saw only a few crushed when lab tests were done at one of the Vietnamese processors. He said that if the tests are conducted in that way, even if the lab test results proved safety and the necessary documents were also well prepared by processors, the importers would still be suspicious. Thus, this importer does voluntary inspections at their own cost before entry into Japan because they know that the Japanese port inspections are very stringent. In their words, "It is ultimately up to how sincere and serious the manager is about quality standards. In Thailand, the government control is more strictly done, even from the level of fish feed". As a reference, the share of this company's average annual costs for the quality test exceeds 80 per cent of their average annual profit. They spend this much because they fear the effect on their reputation if prohibited residues are detected in their products.

A certificate is a signal of quality. In the world of asymmetric information, because the high-quality producers want to be recognised for their superiority, they invest to obtain objectively approved signals that show that quality. This works as long as the high quality receives higher reward. Between processors/exporters and importers, this is working. Because importers recognise these signals, the processors/exporters have incentives to invest in them. Thus, in fact, most processors have multiple certificates. Although the existence of various and similar certificates confuses processors/exporters and adds to their costs, as a mechanism, signalling is functioning at this level. On the other hand, at the level of farmers, because their buyers – that is, collectors or processors – do not strictly require or value this signalling, farmers have no incentive to invest in the costly certificates. This seems to be the root cause for farmers' disinterest in applying for certification even after attending training courses offered by MARD and being offered subsidies of 50 per cent of the application fee.

Currently, the Vietnamese government is trying to create VIETGAP, which is in accordance with the GlobalGAP and thus contains higher requirements than the SQF1000. Previously, they emphasised SQF1000 and extension workers have offered training to farmers. However, the result is that the farmers are now aware of these certificates, but not interested in getting certified. Observing this situation, it is not clear whether the farmers' responses to VIETGAP will be any different from their current responses. It is crucially important to consider building the incentive mechanism, that is, either reward or punishment, for the farmers to be interested in these certificates.

5.6.2 Weak control of upstream market

A second and related issue is the control of quality in the upstream market, particularly at the level of shrimp seed or fish seed. As lab tests are not perfect, even if the tests are conducted at the processor level before export, it is still important to control the production processes of the value chain as much as possible. At stages closer to export, the quality control becomes strict, but stages further back are less strictly controlled. Quality control physically becomes more difficult as it involves a large number of small-scale farmers who are also geographically spread apart, unlike the processors.

The most difficult control seems to be at the production input level, such as fish seed, feed and antibiotics. For example, shrimp seed is grown in many parts of the country and the Central province is known for producing seed. In 2011 and 2012, an epidemic of disease affecting shrimp, particularly Black Tiger shrimp, spread throughout the country, affecting 97,000ha of farms (VASEP, 2012a). This has been a serious concern for the sector and the share of Black Tiger is declining because it is prone to disease. Instead, the share of *vannamei* is increasing as it is more disease-resistant. The main reason for this disease is thought to be the low quality of shrimp seed. While government-owned hatcheries are SQF- and GlobalGAP-certified, these are few in number. Since these hatcheries do not have enough capacity to supply all the buyers, many grow-out farmers must purchase from private hatcheries, some of which operate without licence from competent authorities.

The Directorate of Fisheries in Viet Nam, Department of Animal Health, and other relevant agencies conducted seed inspections in March 2012 in Khanh Hoa province, which is one of the three largest seed-producing provinces. According to VASEP, only half of the inspected hatcheries were approved as passing the standards of veterinary hygiene and given a health certificate. Quoting the same source:

The Provincial Sub-Department of Animal Health highlighted difficulties in seed quarantine because a majority of seed was smuggled and out of control which caused an increase in diseased shrimp in localities. Until now, there have not been management measures on shrimp seed such as regulation on shrimp seed quality before releasing from the hatcheries, regulation on monitoring reproductive age of broodstock which can reproduce the best quality seed. Intensifying quarantine (building many quarantine stations, establishing inter-sectoral inspection team), strengthening inspection of seed producers and traders' operating conditions are not put into practice. Compared to shrimp production in Thailand, success rate in shrimp farming in Viet Nam reached 30 per cent, lower than that of Thailand (70 per cent) because Viet Nam's supply and quality of seed are poor. (VASEP, 2012a: 17–18)

If seeds are not controlled properly, it is easy for the shrimps to catch diseases. That would induce farmers to use antibiotics to treat the disease. However, according to interviews with extension workers, it often happens that these farmers are not very aware of what is contained in these antibiotics. Some input sellers try to approach farmers with bags of mixed antibiotics and sometimes offer free training programmes on usage as a sales campaign. Because farmers do not wish to kill their sick shrimps, they use these antibiotics. If these are not properly managed, then the chemicals remain in some shrimps. Thus, control of inputs is also critically important to ensure the quality of the final export products.

5.6.3 Still room for non-compliance

Lastly, an additional difficulty with standards compliance is the fact that there is no one common standard/certificate on the international market. The standard requirements vary greatly across various importing countries. Thus, even if a product does not satisfy the needs of one country, the processors can shift that product to another country with lower standards. In fact, in the interviews, most of the processors openly admitted that when they have had products rejected or products that do not meet the standards of the EU, United States or Japanese markets, they send those products to other markets, for instance in Asian and Middle Eastern countries. They added that because these products still satisfy the standards set by these markets, it does not mean that they are sending bad products.

These "loose ends" in the international market work both positively and negatively for the processors. The diversity of requirements is a plus for processors because they can always find somewhere to ship the "low-quality" product even when some problems occur. It also works negatively in terms of standards compliance because this leaves room for them to be less careful in quality control in the production process. If the end product is strictly inspected by a common standard, they would have no option but to follow the strict rule.

5.7 Conclusions and policy implications

In this chapter, we examined the situation of standards compliance in the particular case of the Vietnamese frozen seafood export sector. We have seen that the rapid expansion of this sector was not only due to market liberalisation policies but also due to efforts to diversify destination markets, particularly when their *pangasius* and shrimps were at risk through international trade disputes. This diversification may have made standards compliance more difficult for Viet Nam because different markets require different standards. In addition, because most of the Vietnamese processors and exporters are independent entrepreneurs and not controlled by large multinational companies, unlike in Indonesia and the Philippines, it is probably more difficult to apply one common standard to the production processes and management (Taya, 2003).

The increasingly stringent trade standards are adding costs for Vietnamese stakeholders but mostly without increasing prices. The required standards vary across importers and over time, often with short notice, and are creating confusion among stakeholders. We have heard a lot of cries from processers during the interviews conducted for this study. Still, the processors and exporters try to comply, as meeting these standards provides access to export markets. The great difficulty lies in standards compliance at the level of the small-scale farmer. In fact, because it is costly and difficult to deal with numerous smallholders and enforce standards, many processors are no longer relying on smallholders and are moving to vertically integrate production processes, particularly for the *pangasius* sector.

The chapter concludes with some policy recommendations to help improve trade standards compliance for Viet Nam. Firstly, a stricter enforcement mechanism is needed to ensure standards compliance. While a lot of famers are now aware of the existence of these standards and certifications, they are not willing to obtain certifications because there is no effective incentive mechanism. Secondly, because random sampling tests of maximum residues are never perfect, it is also important to regulate the upstream market as much as possible, particularly at the levels of fish/shrimp seeds. This strict control of seeds will reduce the risk of disease and thus the use of antibiotics. Thirdly, in addition to intensifying monitoring by local authorities, offering access to public labs for farmers may also bring positive results by educating farmers about the condition of their fish. If they can check the status of their fish themselves before sale, that will also give them more incentives to grow safer fish. Here, development agencies seem to have important roles to play.

6. Conclusion

This report analyzed trends and patterns in rejections of agri-food exports from East Asian countries to the Japanese and other key international markets. While often overshadowed by the size of manufacturing exports, agri-food exports from East Asian countries are still substantial. In 2010, East Asian countries exported US$149 billion worth of agri-food exports, which is similar to the value of exports from Latin America. However, some of these exports were rejected at the destination because of non-compliance to food safety regulations.

Among the 10 countries with the highest number of such rejections in the Japanese market, five are from East Asia, including China, Viet Nam, Thailand, Republic of Korea, and Indonesia. Among the agri-food products rejected at Japanese borders, “fish and fishery products” and “fruits and vegetables” are rejected most frequently. Reasons for such rejections vary. The most common root causes of import rejections by Japanese authorities are bacterial contamination, inadequate hygienic condition/controls, and the presence of pesticide residues, mycotoxins, and additives.

When looking at the rate of rejections per US$ billion of imports (an indicator that is termed unit rejection rate) for Asian exporting countries, food products originating from Japan, Republic of Korea and the Philippines are among the most frequently rejected in the Australian market. In the EU market, China, Thailand and Republic of Korea are among the countries with the highest number of rejections. In the United States market, Hong Kong (China), Republic of Korea, Singapore, Viet Nam and China have rather high rejection rates. So, interestingly, not only lower-income countries but also relatively higher-income countries such as Japan and Republic of Korea perform poorly in some markets.

There is also variation in the predominant reasons for rejection across the four markets analyzed here. In Australia and the United States, non-compliance with labelling requirements results in significant numbers of rejections while Japan does not reject for labelling reasons and the EU only makes relatively few rejections on this basis. In contrast, bacterial contamination is the most prominent reason for rejections in Japan. Rejections caused by inadequate hygiene conditions are significant in the United States.

These rejection reasons all point to certain kinds of problems along the supply chain and the report gave special attention to four commodities from two countries: frozen vegetables and eels from China; and *pangasius* and shrimp exports from Viet Nam. These case studies were chosen because they are significant export commodities for these countries and, at the same time, face difficulties in clearing inspections at ports.

One finding that clearly came out from looking at these four commodities and their supply chains is that export activities in these countries are increasingly vertically integrating. This is because to meet the standards set by importing countries (especially those of advanced countries), exporting firms need to put in place some kind of traceability system so that they can identify where the problem occurred and how to deal with such problems when faced with import rejections. Vertical integration facilitates such flow of information.

One implication of this trend to vertically integrate is the compartmentalization of these industries into export-oriented and domestic-oriented segments either by the necessity of the market force or by the regulations imposed by the government as in the case of China. Those that are export-oriented are typically led by large firms that can invest in their own quality control and inspection equipment. They also tend to contract with large farmers for their inputs and provide technical assistance if necessary. In contrast, domestic-oriented firms do not have such capacity to strictly control the quality of their products to the level required by importing countries. Thus, the industry is bifurcating: one mainly composed of large firms (and farms) that are producing higher quality food meant for the export market; the other composed of smaller firms (and farms) that are mainly oriented towards the domestic market with varying quality.

While a certain degree of vertical integration may be unavoidable, more focused attention should be given to smallholder farmers so that these small and medium establishments can more easily and seamlessly integrate into global supply chains. In addition, for certain commodities such as shrimps, the small size of farms is necessary as a risk mitigation measure. Furthermore, from a poverty reduction point of view, it is vital to improve the capabilities and productivity of small and medium-sized firms and farms because they provide valuable employment opportunities in rural areas.

To improve the capacities of small and medium-sized firms and farms, filling the information gap is of highest importance. The case studies in these two countries reveal that throughout the supply chain there are still knowledge gaps among different players with respect to the proper usage of agricultural chemicals and medicines and the gap seems to be largest upstream, i.e. among the original producers, especially smallholder farmers. For cultured aquatic products, in addition to proficiency in dealing with medicines, sufficient knowledge and proper understanding of feeds are also required. To improve upon this knowledge aspect, two efforts need to be undertaken. The first is to raise awareness among farmers and processors on the proper usages of agricultural chemicals, medicines, and feeds. Such effort needs to be coupled with proper technical assistance so that farmers can readily apply their knowledge in practice. In addition to the awareness raising efforts, the distribution of these chemicals, medicines, and feeds needs to be tightly controlled and recorded more stringently to enable traceability. Furthermore, this kind of efforts should not be restricted to certain sectors but should be applied to a wider variety of commodities, if applicable, to allow rotation of crops or aquatic products to be cultured and to prevent negative spillovers coming from other farming activities conducted nearby.

Partly motivated by the requirements coming from the export sector and partly to improve the quality of food available domestically, both Chinese and Vietnamese governments are putting in place stricter domestic standards regarding agricultural and food products. This move is more visible in China where a number of food related scandals occurred lately. In general, as income rises, the demand for safer food will only increase in any country. The key is to put in place action plans and measures to improve the quality of agricultural and food products early on in the development stage, so that even smallholder farmers can adjust their production processes to meet higher standards in both domestic and international markets as the country develops. Without such efforts, small-hold farmers will be further left behind which could potentially lead to an increase in inequality between export- and domestic-oriented sectors, and also between rural and urban areas.

Some markets (notably the EU and the United States) put emphasis on obtaining internationally recognized certification (e.g. to ISO or HACCP standards) and this is becoming a necessary condition to export (although not sufficient to guarantee successes in exports). These certificates work as signaling devices at the processing stage. While difficulties in obtaining such certificates differ across Asian export countries, public assistance to firms may be necessary.

Smaller firms find it difficult to continuously scan and gather information on the required rules and standards of importing countries, especially when these rules and standards are subject to frequent changes. Industrial associations or similar organizations should have enough capacities to follow the trends in these standards. What is important is that such effort should include not only notifying concerned actors on the changes in the rules and standards ex post facto, but also to let these players know of anticipated changes in these standards so that they have enough lead time to prepare until changes take effect.

Finally, as the case of China illustrates, the presence of foreign direct investment often provides great benefit to the development of the local industry. Multinational corporations (MNCs) typically have enough experience and capacity to meet the requirements set by importing countries. In addition, they tend to provide necessary technical assistance to local producers so that their products can meet prevailing trade standards. Through these kinds of vertical technology transfer, the competitiveness of local industries can be greatly enhanced. Thus, in addition to strengthening the capabilities through domestic efforts, liberalization of foreign direct investment in this sector could be pursued simultaneously.

Future challenges

Similar to manufactured goods, agri-food trade is increasingly organized within global supply chains that involve multiple players from different countries. In order to ensure success in export markets, all players along the supply chain must comply with the required standards and regulations. Awareness of food safety is especially needed at farm level. The quality of initial inputs provided by farmers will influence the quality along the supply chain. No matter how good the supply chain is, it is only as good as its weakest link (Kremer 1993). However, looking at the data used in this report, it is quite apparent that some countries (and regions) were more successful in meeting trade standards than others. Similarly, some commodity chains seem to fare better than others. Comparative studies of supply chains of a certain commodity across different countries and regions could lead to better understanding of why some countries are successful and others not. Further studies on value chains of various commodities are needed to shed light on some of the factors that are associated with better management of the supply chain and better compliance with public regulations.

The rejection data analyzed here represent only the tip of an iceberg of potential non-compliance issues. This is because the import rejection data capture only instances of non-compliance with public regulations at the time of export. More rejections can potentially occur along the supply chain, including in business-to-business transactions. This brings up the importance of private standards in addition to the public regulations which have been given primary attention in this report.

In fact, the role of private standards in governing and shaping global supply chains has grown rapidly in recent years. Obtaining certificates to well-known practices such as HACCP and internationally recognized voluntary public standards (e.g. ISO standards) are merely necessary conditions to operate in this industry. In addition to these, more and more firms are required to obtain other certificates, often related to private standards, to get or maintain access to global supply chains. Such private standards often build upon and go beyond international standards and public regulations and can as well cover other issues including environmental sustainability or social responsibility. The emergence of private standards stems primarily from growing consumer demand for certain product characteristics or production processes, particularly in advanced countries. This is adding a further layer of complexity to enter these export markets, especially when there are numerous similar yet different private standards that are in existence and that all involve different auditing, conformity assessment and certification procedures. Those firms and farms engaging in export activities need to be aware of these standards and build up enough capacity to comply with some of these private standards to ensure their success in export markets.

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8. Annexes

Annex A

Contextualizing trade-related standards

The increasing importance of standards in international trade

The latest wave of globalization has been characterized by a remarkable process of market liberalization. With the completion of numerous rounds of multilateral, regional and bilateral trade negotiations, the world economy has seen a significant overall decline in tariff levels during the past couple of decades. However, despite the overall reduction in tariff levels, many developing countries have not been able to substantially increase their participation in global trade. Potential gains from tariff reductions have not been realized and in some cases even eroded due to an increased use of non-tariff barriers to trade. Among such non-tariff barriers one typically finds technical regulations and (public) standards. In addition, in recent years private standards have gained in importance and grown in number and are increasingly affecting and shaping international trade flows.

It has to be emphasized that technical standards for products and also for (production) processes are not new; they have been in existence for well over 100 years. Long before globalized trade took off, countries developed technical standards to guarantee consumer safety, increase transparency in markets, facilitate product compatibility, and ensure that products met consumer needs. In many cases, the compliance requirements placed on exporters are, in fact, simply the same as the requirements placed on domestic producers. However, in the recent past, standards have been applied in international trade with growing intensity. On the one hand, this trend towards standardization and application of standards is driven by legitimate motives including consumers becoming more demanding as regards the safety and quality of products, managerial and technological innovations (e.g. in production processes and product design), as well as increased awareness and concern for social, environmental and resource-sustainability issues among many governments, consumers and civil society organizations (CSOs). On the other hand, however, standards can hamper trade and, indeed, act as disguised protection measures. In a world of low tariff levels and far-reaching multilateral trade disciplines under the WTO, the ability of governments to arbitrarily impose or increase tariffs or quantitative restrictions on trade is limited so that they are sometimes tempted to resort to other means to restrict imports, including through the application of standards that have discriminatory consequences for trade partners (WTO 2005).

Trade-related standards and compliance challenges

Throughout this report, reference is made to "trade standards". Indeed, even the title of this publication makes reference to "trade standards". It is therefore pertinent to briefly explain what is meant by "trade standards".

The term "trade standards", the way it is used here, corresponds to a meta-concept that encompasses different sub-categories. Broadly speaking, in the present report the term "trade standards" refers to all technical regulations, requirements and standards (and all measures based on them) related to quality and safety aspects of products which are used and applied in cross-border commercial transactions and which, thus, affect and shape international trade flows. That is, the term "trade standards" when used in this report can refer to technical regulations, to voluntary (public) standards and, in some occasions, also to (voluntary) private standards. The first two types are also known to and defined in the WTO Agreements on Technical Barriers to Trade (TBT) and on Sanitary and Phytosanitary (SPS) Measures – with the latter agreement being of relevance here because the focus of the analyses undertaken in this report is on the agri-food sector and on food safety and human health issues.

Let us briefly recall the definitions of these different concepts and terms. According to Annex 1 of the WTO Agreement on Technical Barriers to Trade (TBT), a technical regulation is a "[d]ocument which lays down product characteristics or their related processes and production methods (...) with which compliance is mandatory. It may also include or deal exclusively with terminology, symbols, packaging, marking or labelling requirements as they apply to a product, process or production method." Technical regulations are, hence, based on standards with which compliance is compulsory and legally binding. A standard, by contrast, is defined by the WTO TBT Agreement to be a "[d]ocument approved by a recognized body that provides, for common and repeated use, rules, guidelines or characteristics for products or related processes and production methods, with which compliance is *not* mandatory" (*emphasis added*). In other words, the WTO TBT agreement covers both product standards and process standards and distinguishes between standards with which compliance is voluntary and those with which compliance is mandatory (with the latter being called "technical regulations"). To again quote directly from the TBT Agreement:

"For the purpose of this Agreement standards are defined as voluntary and technical regulations as mandatory documents."[1]

In addition, international trade flows (not least in agri-food products) have also become increasingly affected by *private* standards. Private standard schemes are voluntary standards developed and applied by non-public entities (primarily private companies and company consortia but also CSOs and NGOs). Typically, private standards are required by global brand producers and retailers when they source their products from suppliers, be they domestic or foreign firms. They are today a key mechanism for lead firms wishing to translate requirements – both product and process specifications – to other parts of the supply chain. They can also serve as mechanisms for safety and quality assurance and facilitate traceability, transparency of production processes, and standardization but also differentiation of products. Broadly speaking, the concrete function that a certain standard is to fulfill depends on whether it is part of a business-to-business (B2B) arrangement or a business-to-consumer (B2C) model. In any case, providing a concise definition of "private standards" is a complicated task given that there exists a multitude of norms, guidelines, codes and initiatives with different types of communication and verification mechanisms that are collectively considered as private standards. In fact, most private standards are not "standards" in the strictest sense of the term. Still, one can distinguish between several types of private standards and roughly divide them into *buyer codes of conduct*, *certificates*, and *product labels*. Yet, even within these various types of standard, there are wide differences with regard to the application and governance required, their substantive focus, level of stringency, and auditing processes. In recent years, their use has become more important and more widespread and they are covering a growing spectrum of issues, ranging from food safety and environmental sustainability to labor conditions and social sustainability. In many cases, such private standards include norms that go beyond national and local laws and even international (public) standards and/or contain further conditions. Often, such private standards are related to certification schemes which serve to signal compliance to consumers (see UNIDO 2010, FAO 2011). Given their private nature, compliance is not assessed by public entities and non-compliance does not entail sanctions by public authorities. Still, non-compliance can impede (or lead to disruptions of) international trade flows if global brand producers or retailers refuse to import and accept supply from producers that are unable to meet and/or get certified to the private standards they apply. This implies that although by definition private standards are voluntary, in practice they may become *de facto* mandatory wherever compliance is required for entry into certain markets.

The concept of "trade standards" used here comprises all these different types of standards described above. However, the different analyses undertaken in the various chapters of this report do not always refer to all the three types to the same extent. The first two chapters of this report, for example, analyze import rejections which are instances where non-compliance with mandatory public standards (i.e. technical regulations) gets sanctioned by public authorities in the importing country through the refusal of market entry for the shipment concerned. The other chapters of this report, on the other hand, make reference to the whole set of standards (from technical regulations and voluntary public standards to private standards) and their relevance for cross-border commercial transactions.

The multilateral trading system and trade-related standards

The recognition that standards shape, and indeed can restrict, international trade flows is reflected in the fact that there are related agreements under the WTO – that is, precisely the agreements on TBTs and SPS measures mentioned above (which, however, do not cover private standards). Over the past decades, and particularly under the leadership of the WTO since 1995, the global trading system has increasingly become codified and rule-based. Essentially, the WTO lays down legal ground rules and disciplines for international trade (in both goods and services) and for trade-related aspects of intellectual property rights. These rules are contained in multilateral trade agreements which basically constitute contracts that bind governments to operate their trade policies in accordance with what was agreed in the multilateral negotiations.

The WTO Agreements on TBTs and SPS measures have contributed to specify this rule-based global trading system. They provide an overall framework on technical regulations and standards and set disciplines on their application in a trade-related context. The TBT Agreement, for example, lays down how technical regulations, standards, and conformity assessment (e.g. sampling, inspection, testing and certification) procedures should be designed and used so that they do not constitute unnecessary obstacles to trade. It permits technical requirements that are established for legitimate purposes such as consumer or environmental protection but prohibits technical requirements created with the intention to limit international trade. With reference to the WTO's "national treatment" rule, the TBT Agreement also aims at banning discriminatory features from countries' technical regulations. Against this backdrop, WTO member states are recommended to adopt international standards (for example, those developed by ISO) as their technical requirements where they exist and whenever possible. At the same time, the TBT agreement also encourages countries to recognize the results of other countries' conformity assessment procedures (for example, tests that determine whether or not a certain product is in compliance with a given standard).[2]

Meanwhile, the WTO Agreement on Sanitary and Phytosanitary Measures (the "SPS Agreement") focuses more narrowly on the application of regulations and policies relating to food safety as well as animal and plant health (phytosanitation) with respect

1 See the full text of the TBT Agreement on www.wto.org/english/docs_e/legal_e/17-tbt_e.htm. For further information on standardization and conformity assessment, see also ISO and UNIDO (2008, 2010), for example.

2 See www.wto.org/english/docs_e/legal_e/17-tbt_e.htm.

to the spread of pests or diseases.[3] That is, the SPS Agreement covers all measures whose purpose is to protect (1) human or animal health from food-borne risks (arising, for example, from additives, contaminants, toxins, or disease-causing organisms in foodstuffs), (2) human health from animal- or plant-carried diseases, and (3) animals and plants from pests, diseases or disease-causing organisms. By their very nature, such SPS measures may result in impediments to trade. While the SPS Agreement permits governments to maintain appropriate sanitary and phytosanitary protection and accepts the fact that some trade restrictions may be necessary to ensure food safety and animal and plant health, it restricts the use of unjustified sanitary and phytosanitary measures for the purpose of trade protection. More precisely, in order to reduce possible arbitrariness of decisions, the Agreement requires any SPS measure to be based on scientific principles and assessment, to not unjustifiably discriminate among foreign sources of supply, and to be applied only to the extent necessary to protect human, animal or plant life or health and for no other purpose than that of ensuring food safety and animal and plant health. In this context, the SPS Agreement encourages governments to "harmonize" or base their national SPS measures on the international standards, guidelines and recommendations developed by other international organizations, including the joint FAO/WHO Codex Alimentarius Commission (for food safety), the World Organization for Animal Health (OIE), and the Secretariat of the International Plant Protection Convention (IPPC). In summary, the aim of the SPS Agreement is to maintain the sovereign right of any government to provide the level of health protection it deems appropriate while ensuring that these sovereign rights are not misused for protectionist purposes and do not result in unnecessary barriers to international trade.[4]

It is against the background of this increasingly rule-based global trading system that the present report analyzes the role and impact of "trade standards" in East Asian agri-food exports and value chains. While these international trade rules and disciplines, as enshrined in the WTO agreements, lay the foundation for equitable treatment for all, they require the capacity to both comply with and provide proof of compliance with the resulting trade-related standards. We have been particularly interested in the study of challenges that developing countries in East Asia face in complying with such trade standards, as well as in the analysis of root causes and consequences of non-compliance. This analysis has been based on different methodological approaches and included research on issues such as food safety, traceability and labeling.

3 That is, the TBT and SPS agreements have complementary scopes: The TBT Agreement covers all technical regulations, voluntary standards and conformity assessment procedures except those that are SPS measures and, thus, covered by the SPS Agreement.
4 See www.wto.org/english/tratop_e/sps_e/spsund_e.htm.

Annex B

Overview of Agricultural and Food Exports from East Asia

The value of agricultural and food exports has been increasing in Asia over the last decade. China is the largest exporter of both agricultural and food products in Asia. In 2010, the export of agriculture products from China reached US$32 billion and US$20 billion for food products. The second largest agriculture exporters in the region are Indonesia and Malaysia with exports totalling about US$20 billion. On the other hand, the export of food products from these two countries is around one-fourth of that of China.

For East Asian countries, the internal East Asian market (excluding Japan) is the most important exporting market, accounting for 50 per cent or more for some countries. The exceptions are Republic of Korea, the Philippines and Cambodia. Japan is the most important market for Republic of Korea in agricultural and food products, absorbing more than one third of Republic of Korea's exports in this sector. The major destinations of exports from the Philippines and Cambodia are the EU 27, the United States and EAP. Particularly interesting is the case of Cambodia. For agricultural goods, East Asia (excluding Japan) was the major destination in 2000 and little was exported to other countries and regions. By 2005, the export market was diversified and the share of EAP was reduced to about half while that of the United States increased dramatically. In 2010, the EU became the largest export market for Cambodia in agricultural goods, followed by exports to East Asia and South Asia. For food exports, again, Cambodia diversified away from almost complete reliance on East Asia to the EU, United States and East Asian markets by 2010.

For many East Asian countries, Japan is a significant market for both agricultural and food product exports, except for Cambodia, Indonesia and Malaysia. However, the significance of the Japanese market has been diminishing over the years and East Asian countries are exporting more to United States and EU markets. In addition, Cambodia, Indonesia and Malaysia export significant amounts to South Asia. Thailand is the only country in East Asia to have significant exporting activities to markets in sub-Saharan African countries.

Singapore, Republic of Korea and Thailand show stronger comparative advantage in exporting processed food than in agriculture products and therefore export more of these products than agricultural products. These countries are successful in creating value added to raw materials. For other countries, there are more agriculture product exports than food product exports.

The exported products vary among exporting countries. While exports of aquatic products such as fish and shrimp are greater in China, Thailand, Republic of Korea and Viet Nam, palm oil and cocoa are the major exported products in Indonesia and Malaysia. Rice is another important export product especially in Thailand, Viet Nam and Cambodia.

From Annex C to Annex L, some basic information on each country in East Asia is listed. Brunei Darussalam is not included because it has very few export activities in agricultural and food commodities. Lao People's Democratic Republic is not included because of a lack of data.

Annex C

Cambodia

Annex Figure C.1: Trends in agricultural and food exports (Cambodia)

Source: UN Comtrade

Annex Table C.1: Destinations for and respective share of agricultural exports (%) from Cambodia

Rank	2000	2005	2010
1	EAP (92.0%)	EAP (49.0%)	EU27 (54.5%)
2	US (1.6%)	US (42.5%)	EAP (20.4%)
3	SSA (0.9%)	EU27 (4.5%)	SAR (11.1%)
4	AUS (0.9%)	AUS (0.5%)	US (2.4%)
5	JPN (0.8%)	SAR (0.2%)	AUS (1.9%)

Note: Data for 2010 were the most recent when the table was created. EAP includes ASEAN10 countries, China, Hong Kong (China) and Republic of Korea. EU27 includes all EU member countries. LAC includes Latin American and Caribbean countries. SSA includes sub-Saharan African countries. SAR includes South Asian countries. LAC, SSA, and SAR classifications follow those of the World Bank.

Source: UN Comtrade database

Annex Table C.2: Destinations for and respective share of food exports (%) from Cambodia

Rank	2000	2005	2010
1	EAP (91.4%)	EAP (96.9)	EU27 (49.2%)
2	US (4.3%)	EU27 (2.7%)	EAP (25.7%)
3	JPN (2.5%)	AUS (0.2%)	US (23.9%)
4	EU27 (1.6%)	US (0.2%)	SAR (0.7%)
5	AUS (0.1%)		JPN (0.4%)

Note: EAP includes ASEAN10 countries, China, Hong Kong (China) and Republic of Korea. EU27 includes all EU member countries. LAC includes Latin American and Caribbean countries. SSA includes sub-Saharan African countries. SAR includes South Asian countries. LAC, SSA, and SAR classifications follow those of the World Bank.

Source: UN Comtrade database

Annex Table C.3: Top 5 agriculture export products in 2010 (Cambodia)

HS Code	Name	Value (million US$)
1006	Rice	35
1511	Palm oil and its fractions	9
1005	Maize (corn)	3
1108	Starches and inulin	2
1201	Soya beans	1

Source: UN Comtrade

Annex Table C.4: Top 5 food export products in 2010 (Cambodia)

HS Code	Name	Value (US$ million)
2207	Ethyl alcohol, undenatured of >=80% alcohol, denatured	9
2309	Preparations of a kind used in animal feed	6
1701	Cane or beet sugar and chemically pure sucrose, solid form	5
2202	Waters, including mineral waters and aerated waters, containing added sugar or other sweetening matter or flavoured, and other non-alcoholic beverages, not including fruit or vegetable juices	4
1703	Molasses resulting from the extraction or refining of sugar	1

Source: UN Comtrade database

Annex Table C.5: Trends in Japanese rejections of food product groups imported from Cambodia, 2006–2010 (no. of rejections)

	2006	2007	2008	2009	2010
Herbs and spices	1	0	0	0	0

Source: Calculated by authors using data from the MHLW

Annex Table C.6: Trends in reasons for Japanese import rejections of Cambodian products, 2006–2010 (no. of cases)

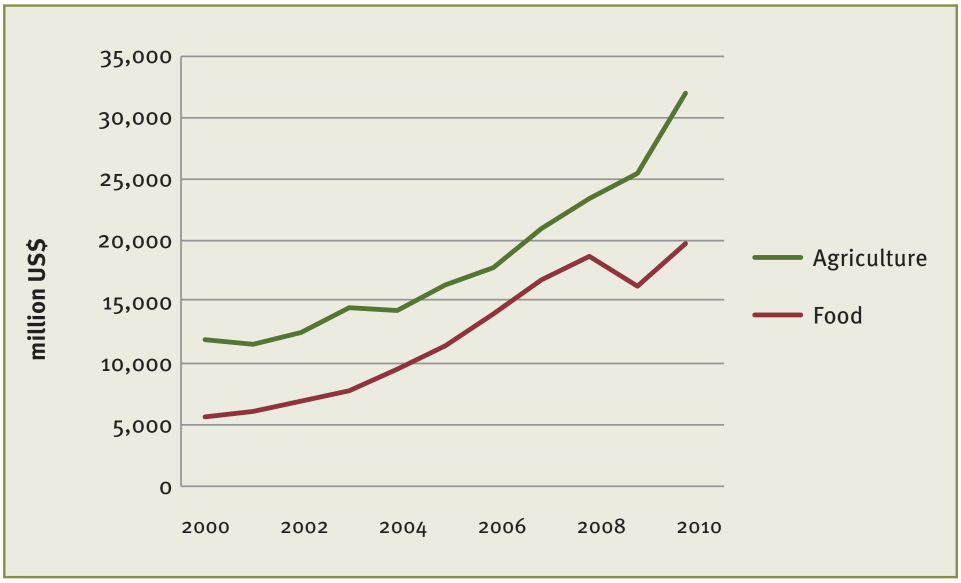
	2006	2007	2008	2009	2010
Mycotoxins	1	0	0	0	0

Source: Calculated by authors using data from the MHLW

Annex D

China (including Hong Kong)

Annex Figure D.1: Trends in agricultural and food exports (China and Hong Kong)



Source: UN Comtrade database

Annex Table D.1: Destinations for and respective share of agricultural exports from China and Hong Kong

Rank	2000	2005	2010
1	EAP (44.0%)	EAP (35.3%)	EAP (40.4%)
2	JPN (26.1%)	JPN (21.1%)	EU27 (14.0%)
3	EU27 (9.8%)	EU27 (13.1%)	JPN (12.4%)
4	US (6.7%)	US (10.1%)	US (9.7%)
5	SSA (2.2%)	LAC (1.6%)	LAC (3.0%)

Note: EAP includes ASEAN10 countries, China, Hong Kong (China) and Republic of Korea. EU27 includes all EU member countries. LAC includes Latin American and Caribbean countries. SSA includes sub-Saharan African countries. SAR includes South Asian countries. LAC, SSA, and SAR classifications follow those of the World Bank.

Source: UN Comtrade

Annex Table D.2: Destinations for and respective share of food exports (%) from China and Hong Kong

Rank	2000	2005	2010
1	JPN (39.8%)	JPN (37.7%)	EAP (27.5%)
2	EAP (30.0%)	EAP (25.1%)	JPN (25.2%)
3	US (9.6%)	US (11.1%)	US (14.2%)
4	EU27 (8.9%)	EU27 (9.8%)	EU27 (9.4%)
5	SAR (1.0%)	LAC (1.6%)	LAC (2.7%)

Note: EAP includes ASEAN10 countries, China, Hong Kong (China) and Republic of Korea. EU27 includes all EU member countries. LAC includes Latin American and Caribbean countries. SSA includes sub-Saharan African countries. SAR includes South Asian countries. LAC, SSA, and SAR classifications follow those of the World Bank.

Source: UN Comtrade database

Annex Table D.3: *Top 5 agriculture export products in 2010 (China and Hong Kong)*

HS Code	Name	Value (US$ million)
0304	Fish fillets and other fish, fresh, chilled or frozen	3,701
0703	Onions, shallots, garlic, leeks, etc., fresh or chilled	2,613
0712	Vegetables, dried, whole, cut etc., no added preparation	1,896
0307	Molluscs and aquatic invertebrates not elsewhere specified or included, live etc	1,658
0303	Fish, frozen (no fish fillets or other fish meat)	1,479

Source: UN Comtrade

Annex Table D.4: *Top 5 food export products in 2010 (China and Hong Kong)*

HS Code	Name	Value (US$ million)
1605	Crustaceans, molluscs and other aquatic invertebrates, prepared or preserved	2,393
1604	Prepared or preserved fish; caviar and caviar substitutes	2,055
2008	Fruit, nuts and other edible parts of plants, otherwise prepared or preserved, whether or not containing added sugar or other sweetening matter or spirit, not elsewhere specified or included	1,921
1602	Prepared or preserved meat, meat offal and blood not elsewhere specified or included	1,423
2309	Preparations of a kind used in animal feeding	1,248

Source: UN Comtrade

Annex Table D.5: *Trends in Japanese rejections of food product groups imported from China, 2006–2010 (no. of rejections)*

	2006	2007	2008	2009	2010
Beverages	20	19	6	8	7
Cereals and bakery products	24	44	12	7	7
Confectionery and sugar	9	0	1	0	0
Dairy products	9	9	3	1	3
Fish and fishery products	170	145	76	73	96
Food additives	4	2	0	1	7
Fruits and vegetables and products	137	131	55	104	63
Herbs and spices	19	15	7	3	7
Meat and meat products	30	20	36	39	33
Non-food products	26	18	34	111	99
Nuts, nuts products and seeds	44	38	23	21	20
Other processed foods	8	7	5	13	4
Other products of animal origin	0	0	1	0	0

Source: Calculated by authors using MHLW data

Annex Table D.6: *Trends in reasons for Japanese rejections of Chinese products, 2006–2010 (no. of cases)*

	2006	2007	2008	2009	2010
Food additives	117	50	17	32	32
Adulteration/missing document	1	24	4	1	4
Bacterial contamination	122	100	57	66	92
Heavy metal	0	0	0	2	1
Hygienic condition/ controls	3	14	23	7	1
Mycotoxins	45	25	18	14	15
Other contaminants	6	3	17	6	4
Others	35	49	49	122	105
Others microbiological	0	0	0	1	0
Packaging	0	0	2	0	0
Pesticide residues	119	125	24	71	47
Veterinary drugs residues	52	58	48	59	45

Source: Calculated by authors using MHLW data

Annex Table D.7: *Trends in Japanese rejections of food product groups imported from Hong Kong, 2006–2010 (no. of rejections)*

	2006	2007	2008	2009	2010
Beverages	0	2	0	0	0
Confectionery and sugar	0	0	0	0	1
Fish and fishery products	0	1	1	1	2
Fruits and vegetables	1	2	0	1	0
Herbs and spices	0	1	1	0	0
Nuts, nuts products and seeds	1	0	0	0	0

Source: Calculated by authors using MHLW data

Annex Table D.8: *Trends in reasons for Japanese import rejections of products from Hong Kong, 2006–2010 (no. of cases)*

	2006	2007	2008	2009	2010
Food additives	2	4	1	0	0
Bacterial contamination	0	0	0	1	0
Other contaminants	0	0	1	0	3
Others	0	0	0	1	0
Pesticide residues	0	2	0	0	0

Source: Calculated by authors using MHLW data

Annex E

Indonesia

Annex Figure E.1: *Trends in agricultural and food exports (Indonesia)*

Source: UN Comtrade database

Annex Table E.1: *Destinations for and respective share of agricultural exports from Indonesia*

Rank	2000	2005	2010
1	EAP (22.7%)	EAP (25.6%)	EAP (32.8%)
2	EU27 (21.0%)	SAR (21.9%)	SAR (26.2%)
3	JPN (19.1%)	EU27 (19.6%)	EU27 (16.2%)
4	SAR (14.1%)	US (9.4%)	US (5.2%)
5	US (12.0%)	JPN (8.0%)	JPN (3.6%)

Note: EAP includes ASEAN10 countries, China, Hong Kong (China) and Republic of Korea. EU27 includes all EU member countries. LAC includes Latin American and Caribbean countries. SSA includes sub-Saharan African countries. SAR includes South Asian countries. LAC, SSA, and SAR classifications follow those of the World Bank.

Source: UN Comtrade database

Annex Table E.2: *Destinations for and respective share of food exports (%) from Indonesia*

Rank	2000	2005	2010
1	EAP (31.2%)	EAP (35.1%)	EAP (43.9%)
2	US (27.1%)	US (25.9%)	US (18.9%)
3	EU27 (17.9%)	EU27 (17.6%)	EU27 (12.0%)
4	JPN (8.0%)	JPN (5.4%)	JPN (4.7%)
5	LAC (3.0%)	LAC (2.8%)	LAC (3.3%)

Note: EAP includes ASEAN10 countries, China, Hong Kong (China) and Republic of Korea. EU27 includes all EU member countries. LAC includes Latin American and Caribbean countries. SSA includes sub-Saharan African countries. SAR includes South Asian countries. LAC, SSA, and SAR classifications follow those of the World Bank.

Source: UN Comtrade database

Annex Table E.3: Top 5 agriculture export products in 2010 (Indonesia)

HS Code	Name	Value (US$ million)
1511	Palm oil and its fractions, not chemically modified	13,500
1513	Coconut (copra), palm kernel or *babassu* oil etc., not chemically modified	2,294
0306	Crustaceans, fresh, chilled or frozen	940
1519	Industrial monocarboxylic fatty acids, acid oil	904
0901	Coffee; coffee husks and skins; coffee	814

Source: UN Comtrade

Annex Table E.4: Top 5 food export products in 2010 (Indonesia)

HS Code	Name	Value (US$ million)
1801	Cocoa beans, whole or broken, raw or roasted	1,191
1605	Crustaceans, and other aquatic invertebrates, prepared or preserved	330
2306	Oil-cake and other solid residues of vegetable	245
1804	Cocoa butter, fat and oil	237
1604	Prepared or preserved fish; caviar and caviar substitutes	214

Source: UN Comtrade

Annex Table E.5: Trends in Japanese rejections of food product groups imported from Indonesia, 2006–2010 (no. of rejections)

	2006	2007	2008	2009	2010
Beverages	1	1	1	15	20
Cereals and bakery products	0	0	1	0	0
Dairy products	1	0	0	0	0
Fish and fishery products	18	47	20	8	17
Food additives	0	0	0	0	1
Fruits and vegetables and products	2	10	1	11	3
Herbs and spices	1	0	0	0	0
Non-food products	1	1	0	1	1
Nuts, nuts products and seeds	0	1	3	1	3
Other processed foods	1	0	0	0	0

Source: Calculated by authors using MHLW data

Annex Table E.6: Trends in reasons for Japanese import rejections of products from Indonesia, 2006–2010 (no. of cases)

	2006	2007	2008	2009	2010
Food additives	1	3	0	3	0
Bacterial contamination	5	12	9	7	16
Hygienic condition/ controls	0	1	0	13	16
Mycotoxins	1	1	3	1	3
Other contaminants	3	4	1	0	1
Others	1	2	0	1	3
Pesticide residues	0	2	1	9	6
Veterinary drugs residues	14	35	12	2	0

Source: Calculated by authors using MHLW data

Annex F

Malaysia

Annex Figure F.1: Trends in agricultural and food exports (Malaysia)

Source: UN Comtrade database

Annex Table F.1: Destinations for and respective share of agricultural exports from Malaysia

Rank	2000	2005	2010
1	EAP (32.2%)	EAP (34.0%)	EAP (31.5%)
2	SAR (21.7%)	EU27 (1530%)	SAR (16.3%)
3	EU27 (12.7%)	SAR (11.8%)	EU27 (10.6%)
4	JPN (6.5%)	US (8.2%)	US (7.4%)
5	US (6.4%)	JPN (4.9%)	SSA (5.4%)

Note: EAP includes ASEAN10 countries, China, Hong Kong (China) and Republic of Korea. EU27 includes all EU member countries. LAC includes Latin American and Caribbean countries. SSA includes sub-Saharan African countries. SAR includes South Asian countries. LAC, SSA, and SAR classifications follow those of the World Bank.

Source: UN Comtrade database

Annex Table F.2: Destinations for and respective share of food exports (%) from Malaysia

Rank	2000	2005	2010
1	EAP (56.4%)	EAP (51.9%)	EAP (51.6%)
2	EU27 (14.8%)	EU27 (15.2%)	US (9.0%)
3	US (7.0%)	US (8.5%)	EU27 (6.6%)
4	AUS (3.9%)	JPN (4.8%)	JPN (5.4%)
5	JPN (3.3%)	AUS (4.0%)	SSA (3.9%)

Note: EAP includes ASEAN10 countries, China, Hong Kong (China) and Republic of Korea. EU27 includes all EU member countries. LAC includes Latin American and Caribbean countries. SSA includes sub-Saharan African countries. SAR includes South Asian countries. LAC, SSA, and SAR classifications follow those of the World Bank.

Source: UN Comtrade database

Annex Table F.3: *Top 5 agriculture export products in 2010 (Malaysia)*

HS Code	Name	Value (US$ million)
1511	Palm oil and its fractions, not chemically modified	12,400
1516	Animal or vegetable fats and oils and hydrogen etc., not further prepared	2,193
1519	Industrial monocarboxylic fatty acids, acid oil, refined, industrial fat alcohol	1,613
1513	Coconut (copra), palm kernel or *babassu* oil etc., not chemically modified	974
0306	Crustaceans, fresh, chilled or frozen	427

Source: UN Comtrade

Annex Table F.4: *Top 5 food export products in 2010 (Malaysia)*

HS Code	Name	Value (US$ million)
1804	Cocoa butter, fat and oil	615
1901	Malt extract; food preparations of flour, etc.	388
1905	Bread, pastry, cakes, biscuits and other bakers' wares, whether or not containing cocoa; communion wafers, empty sachets of a kind suitable for pharmaceutical use, sealing wafers, rice paper and similar products	350
1805	Cocoa powder, not sweetened	340
2106	Food preparations, not elsewhere specified or included	246

Source: UN Comtrade

Annex Table F.5: *Trends in Japanese import rejections of food product groups imported from Malaysia, 2006–2010 (no. of rejections)*

	2006	2007	2008	2009	2010
Cereals and bakery products	2	0	0	1	2
Confectionery and sugar	1	1	1	1	3
Fish and fishery products	1	1	0	2	0
Fruits and vegetables and products	0	2	0	0	0
Non-food products	0	0	3	2	0
Other processed foods	1	0	1	0	0

Source: Calculated by authors using MHLW data

Annex Table F.6: *Trends in reasons for Japanese import rejections of Malaysian products, 2006–2010 (no. of cases)*

	2006	2007	2008	2009	2010
Food additives	2	0	2	1	4
Bacterial contamination	3	1	0	2	1
Mycotoxins	0	1	0	0	0
Other contaminants	0	2	0	0	0
Veterinary drugs residues	0	0	0	1	0

Source: Calculated by authors using MHLW data

Annex G

Myanmar

Annex Table G.1: *Destinations for and respective share of agricultural exports from Myanmar*

Rank	Agriculture in 2010	Food in 2010
1	SAR (43.0%)	SAR (71.6%)
2	EAP (36.1%)	EAP (19.7%)
3	SSA (6.8%)	JPN (8.6%)
4	JPN (3.5%)	
5	EU27 (1.4%)	

Note: EAP includes ASEAN10 countries, China, Hong Kong (China) and Republic of Korea. EU27 includes all EU member countries. LAC includes Latin American and Caribbean countries. SSA includes sub-Saharan African countries. SAR includes South Asian countries. LAC, SSA, and SAR classifications follow those of the World Bank.

Source: UN Comtrade

Annex Table G.2: *Top 5 agriculture export products in 2010 (Myanmar)*

HS Code	Name	Value (US$ million)
0713	Dried leguminous vegetables, shelled	890
0302	Fish, fresh or chilled (excl. those of fillets or other meat)	204
1006	Rice	156
0306	Crustaceans, fresh, chilled or frozen and cooked etc.	80
1207	Other oil seeds and oleaginous fruits	69

Source: UN Comtrade database

Annex Table G.3: *Top 5 food export products in 2010 (Myanmar)*

HS Code	Name	Value (US$ million)
1701	Cane or beet sugar and chemically pure sucrose, solid form	9
2106	Food preparations not elsewhere specified or included	1
2203	Beer made from malt	0.7
1905	Bread, pastry, cakes, biscuits and other bakers' wares, whether or not containing cocoa; communion wafers, empty sachets of a kind suitable for pharmaceutical use, sealing wafers, rice paper and similar products	0.2
2202	Waters, including mineral waters and aerated waters, containing added sugar or other sweetening matter or flavoured, and other non-alcoholic beverages, not including fruit or vegetable juices	0.005

Source: UN Comtrade database

Annex Table G.5: Trends in Japanese import rejections of food product groups imported from Myanmar, 2006–2010 (no. of rejections)

	2006	2007	2008	2009	2010
Beverages	0	0	1	0	0
Fish and fishery products	1	0	0	0	0
Fruits and vegetables and products	0	1	2	0	0
Herbs and spices	0	0	1	3	0
Nuts, nuts products and seeds	0	0	0	3	5

Source: Calculated by authors using MHLW data

Annex Table G.6: Trends in reasons for Japanese import rejections of Myanmar products, 2006–2010 (no. of cases)

	2006	2007	2008	2009	2010
Mycotoxins	0	1	1	3	0
Other contaminants	1	0	1	0	0
Pesticide residues	0	0	2	3	5

Source: Calculated by authors using MHLW data

Annex H

Philippines

Annex Figure H.1: Trends in agricultural and food exports (Philippines)

Source: UN Comtrade database

Annex Table H.1: Destinations for and respective share of agricultural exports from the Philippines

Rank	2000	2005	2010
1	JPN (29.5%)	EU27 (24.7%)	EU27 (30.5%)
2	US (24.5%)	JPN (21.5%)	US (22.9%)
3	EAP (20.6%)	EAP (21.3%)	EAP (19.9%)
4	EU27 (16.3%)	US (19.5%)	JPN (15.4%)
5	AUS (0.6%)	AUS (0.8%)	SAR (1.4%)

Note: Data for 2009 were the most recent when the table was created. EAP includes ASEAN10 countries, China, Hong Kong (China) and Republic of Korea. EU27 includes all EU member countries. LAC includes Latin American and Caribbean countries. SSA includes sub-Saharan African countries. SAR includes South Asian countries. LAC, SSA, and SAR classifications follow those of the World Bank.

Source: UN Comtrade database

Annex Table H.2: Destinations for and respective share of food exports (%)from the Philippines

Rank	2000	2005	2010
1	US (40.0%)	US (36.3%)	US (33.3%)
2	EAP (23.4%)	EAP (27.4%)	EAP (26.1%)
3	EU27 (11.4%)	EU27 (12.0%)	EU27 (16.7%)
4	JPN (8.3%)	JPN (6.5%)	JPN (3.9%)
5	AUS (1.3%)	AUS (2.2%)	AUS (1.6%)

Note: EAP includes ASEAN10 countries, China, Hong Kong (China) and Republic of Korea. EU27 includes all EU member countries. LAC includes Latin American and Caribbean countries. SSA includes sub-Saharan African countries. SAR includes South Asian countries. LAC, SSA, and SAR classifications follow those of the World Bank.

Source: UN Comtrade database

***Annex Table H.3:** Top 5 agriculture export products in 2010 (Philippines)*

HS Code	Name	Value (US$ million)
1513	Coconut, palm kernel or *babassu* oil etc., not chemically modified	1,266
0803	Bananas, including plantains, fresh or dried	319
0801	Coconuts, brazil nuts and cashew nuts, fresh or dried	154
0402	Milk and cream, concentrated or sweetened	131
1302	Vegetable saps and extracts; pectic substances, pectinates and pectates; agar-agar and other mucilages and thickeners, whether or not modified, derived from vegetable products	116

Source: UN Comtrade

***Annex Table H.4:** Top 5 food export products in 2010 (Philippines)*

HS Code	Name	Value (US$ million)
1604	Prepared or preserved fish; caviar and caviar substitutes	254
2008	Fruit, nuts and other edible parts of plants, otherwise prepared or preserved, whether or not containing added sugar or other sweetening matter or spirit, not elsewhere specified or included	222
2009	Fruit juices (incl. grape must) and vegetable juice, no spirits	90
2306	Oil cake and other solid residues, of vegetables	78
1704	Sugar confectionery (incl. white chocolate), no cocoa	53

Source: UN Comtrade database

***Annex Table H.5:** Trends in Japanese import rejections of food product groups imported from the Philippines 2006–2010 (no. of rejections)*

	2006	2007	2008	2009	2010
Beverages	0	0	0	1	0
Cereals and bakery products	1	0	1	1	0
Confectionery and sugar	0	0	0	0	2
Fats and vegetable and products	0	0	0	1	0
Fish and fishery products	10	9	24	11	4
Food additives	1	0	0	1	1
Fruits and vegetables and products	10	12	27	2	9
Meat and meat products	1	0	0	0	3
Non-food products	0	0	0	1	1
Other processed foods	0	0	0	1	0

Source: Calculated by authors using MHLW data

Annex Table H.6: Trends in reasons for Japanese import rejections of Filipino products, 2006–2010 (no. of cases)

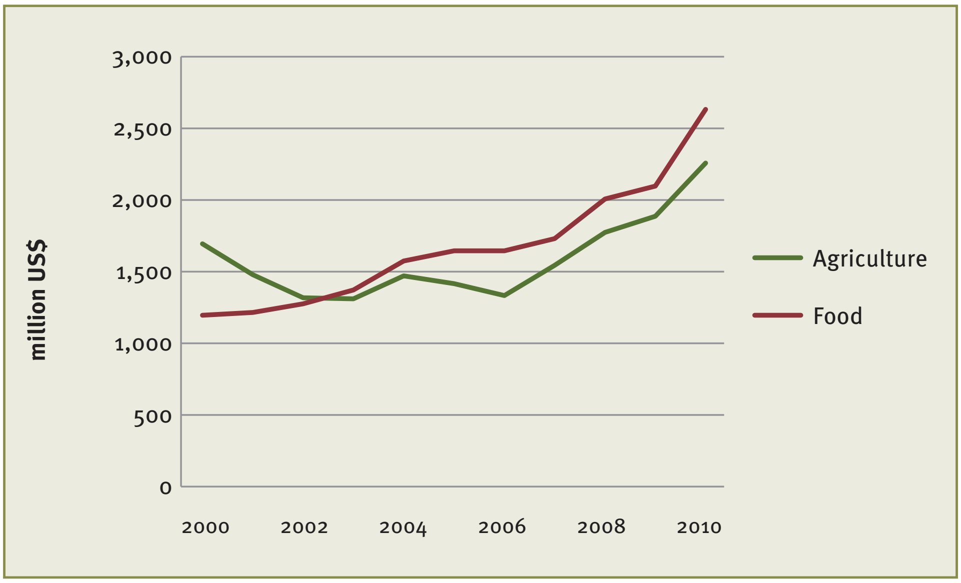
	2006	2007	2008	2009	2010
Food additives	6	3	4	4	3
Bacterial contamination	11	12	26	11	10
Heavy metal	0	1	0	0	1
Hygienic condition/ controls	0	0	7	0	0
Mycotoxins	0	0	0	0	2
Other contaminants	2	0	0	2	1
Others	3	0	0	1	1
Others microbiological	0	0	0	1	0
Pesticide residues	1	5	15	0	2

Source: Calculated by authors using MHLW data

Annex I

Republic of Korea

Annex Figure I.1: Trends in agricultural and food exports (Republic of Korea)



Source: UN Comtrade database

Annex Table I.1: Destinations for and respective share of agricultural exports from Republic of Korea

Rank	2000	2005	2010
1	JPN (73.8%)	JPN (55.9%)	JPN (41.0%)
2	EAP (14.5%)	EAP (20.5%)	EAP (30.5%)
3	US (3.8%)	US (6.6%)	US (7.3%)
4	SAR (0.3%)	EU27 (3.3%)	EU27 (5.9%)
5	LAC (0.3%)	SSA (0.4%)	LAC (1.7%)

Note: Data for 2009 were the most recent when the table was created. EAP includes ASEAN10 countries, China, Hong Kong (China) and Republic of Korea. EU27 includes all EU member countries. LAC includes Latin American and Caribbean countries. SSA includes sub-Saharan African countries. SAR includes South Asian countries. LAC, SSA, and SAR classifications follow those of the World Bank.

Source: UN Comtrade database

Annex Table I.2: Destinations for and respective share of food exports (%) from Republic of Korea

Rank	2000	2005	2010
1	JPN (47.7%)	JPN (38.5%)	JPN (32.7%)
2	EAP (16.9%)	EAP (21.7%)	EAP (33.6%)
3	US (12.0%)	US (13.8%)	US (10.8%)
4	EU27 (5.7%)	EU27 (2.7%)	AUS (2.4%)
5	LAC (1.0%)	AUS (2.4%)	EU27 (2.2%)

Note: EAP includes ASEAN10 countries, China, Hong Kong (China) and Republic of Korea. EU27 includes all EU member countries. LAC includes Latin American and Caribbean countries. SSA includes sub-Saharan African countries. SAR includes South Asian countries. LAC, SSA, and SAR classifications follow those of the World Bank.

Source: UN Comtrade database

Annex Table I.3: *Top 5 agriculture export products in 2010 (Republic of Korea)*

HS Code	Name	Value (US$ million)
0303	Fish, frozen, (no fish fillets or other fish meat)	682
0307	Molluscs and aquatic invertebrates, not elsewhere specified or included	304
0304	Fish fillets and other fish meat, fresh, chilled	225
0709	Other vegetables, fresh or chilled	108
1212	Seaweeds, algae, sugar beet and cane; vegetables	97

Source: UN Comtrade

Annex Table I.4: *Top 5 food export products in 2010 (Republic of Korea)*

HS Code	Name	Value (US$ million)
2106	Food preparations not elsewhere specified or included	378
1701	Cane or beet sugar and chemically pure sucrose, solid form	242
1902	Pasta, prepared or not, couscous, prepared or not	240
2202	Waters, including mineral waters and aerated waters, containing added sugar or other sweetening matter or flavoured, and other non-alcoholic beverages, not including fruit or vegetable juices	156
1905	Bread, pastry, cakes, biscuits and other bakers' wares, whether or not containing cocoa; communion wafers, empty sachets of a kind suitable for pharmaceutical use, sealing wafers, rice paper and similar products	145

Source: UN Comtrade

Annex Table I.5: *Trends in Japanese import rejections of food product groups imported from Republic of Korea, 2006–2010 (no. of rejections)*

	2006	2007	2008	2009	2010
Beverages	1	2	1	2	3
Cereals and bakery products	1	2	1	2	0
Dairy products	0	1	0	0	0
Fish and fishery products	9	23	27	13	25
Fruits and vegetables and products	8	7	18	8	10
Herbs and spices	2	0	1	3	0
Meat and meat products	0	2	1	0	0
Non-food products	0	0	0	4	7
Nuts, nuts products and seeds	0	1	0	0	0
Other processed foods	3	0	1	0	2

Source: Calculated by authors using MHLW data

Annex Table I.6: *Trends in reasons for Japanese import rejections of products from Republic of Korea, 2006–2010 (no. of cases)*

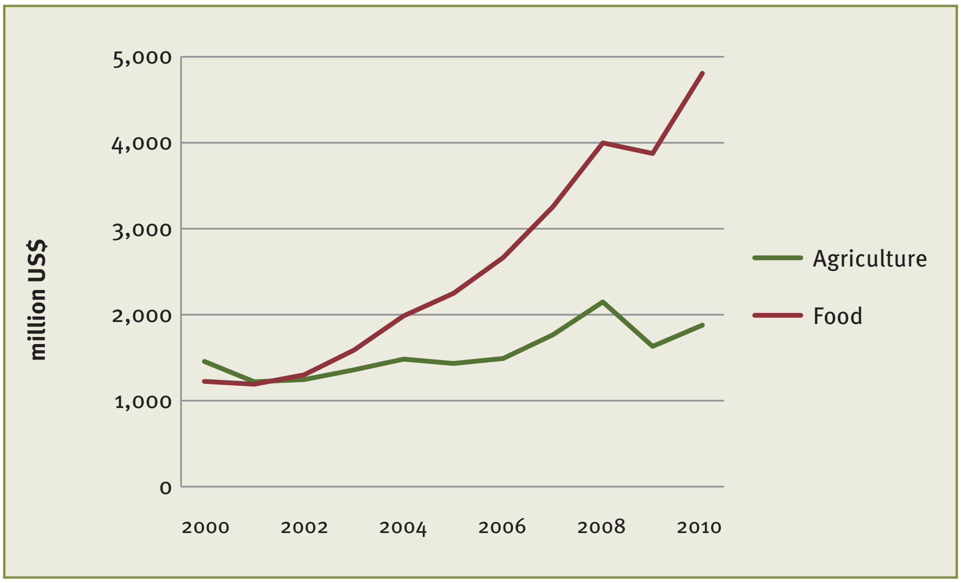
	2006	2007	2008	2009	2010
Food additives	7	4	2	1	9
Adulteration/missing document	0	0	1	1	0
Bacterial contamination	11	15	21	10	20
Hygienic condition/ controls	0	0	9	1	0
Mycotoxins	0	1	0	0	0
Others	0	2	2	4	8
Pesticide residues	6	16	14	15	9
Veterinary drugs residues	0	0	1	0	1

Source: Calculated by authors using MHLW data

Annex J

Singapore

Annex Figure J.1: Trends in agricultural and food exports (Singapore)



Source: UN Comtrade database

Annex Table J.1: Destinations for and respective share of agricultural exports from Singapore

Rank	2000	2005	2010
1	EAP (33.2%)	EAP (41.7%)	EAP (43.9%)
2	EU27 (12.2%)	JPN (11.4%)	JPN (9.3%)
3	JPN (11.6%)	EU27 (7.7%)	EU27 (7.6%)
4	US (10.1%)	US (5.1%)	SSA (7.0%)
5	SAR (5.9%)	SAR (5.1%)	SAR (6.6%)

Note: Data for 2009 were the most recent when the table was created. EAP includes ASEAN10 countries, China, Hong Kong (China) and Republic of Korea. EU27 includes all EU member countries. LAC includes Latin American and Caribbean countries. SSA includes sub-Saharan African countries. SAR includes South Asian countries. LAC, SSA, and SAR classifications follow those of the World Bank.

Source: UN Comtrade database

Annex Table J.2: Destinations for and respective share of food exports (%) from Singapore

Rank	2000	2005	2010
1	EAP (44.5%)	EAP (54.0%)	EAP (61.5%)
2	JPN (28.3%)	JPN (17.1%)	JPN (10.9%)
3	EU27 (5.5%)	AUS (6.4%)	AUS (6.0%)
4	AUS (4.8%)	EU27 (6.0%)	SAR (5.2%)
5	US (3.7%)	US (3.2%)	US (2.7%)

Note: EAP includes ASEAN10 countries, China, Hong Kong (China) and Republic of Korea. EU27 includes all EU member countries. LAC includes Latin American and Caribbean countries. SSA includes sub-Saharan African countries. SAR includes South Asian countries. LAC, SSA, and SAR classifications follow those of the World Bank.

Source: UN Comtrade database

Annex Table J.3: Top 5 agriculture export products in 2010 (Singapore)

HS Code	Name	Value (US$ million)
0402	Milk and cream, concentrated or sweetened	218
1511	Palm oil and its fractions	202
0303	Fish, frozen, (no fish fillets or other fish meat)	121
1516	Animal or vegetable fats and oils and fractions	98
0410	Edible products of animal origin, not elsewhere specified or included	80

Source: UN Comtrade database

Annex Table J.4: Top 5 food export products in 2010 (Singapore)

HS Code	Name	Value (US$ million)
2208	Undenatured ethyl alcohol of an alcoholic, spirit beverage etc.	1,334
1901	Malt extract; food preparations of flour, etc.	898
1806	Chocolate and other food preparations containing cocoa	330
2106	Food preparations, not elsewhere specified or included	327
2204	Wine of fresh grapes, (incl. fortified wines)	271

Source: UN Comtrade database

Annex Table J.5: Trends in Japanese rejections of food product groups imported from Singapore, 2006–2010 (no. of rejections)

	2006	2007	2008	2009	2010
Beverages	1	0	0	0	1
Cereals and bakery products	0	0	0	1	1
Confectionery and sugar	0	0	0	0	1
Fruits and vegetables and products	0	0	0	0	1
Nuts, nuts products and seeds	2	0	0	0	0
Other processed foods	0	0	0	1	0

Source: Calculated by authors using MHLW data

Annex Table J.6: Trends in reasons for Japanese import rejections of products from Singapore, 2006–2010 (no. of cases)

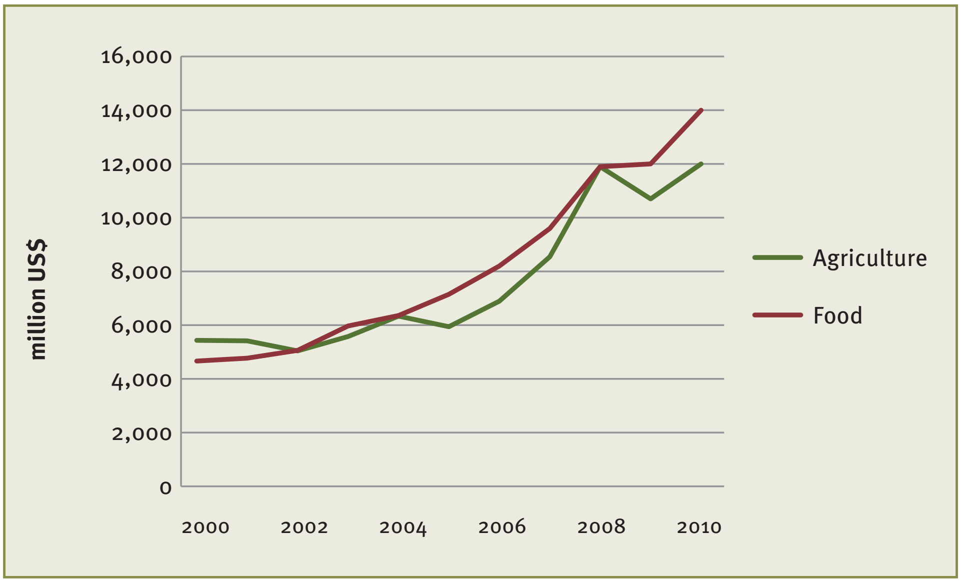
	2006	2007	2008	2009	2010
Food additives	3	0	0	1	1
Adulteration/missing document	0	0	0	1	0
Bacterial contamination	0	0	0	0	2
Mycotoxins	0	0	0	0	1

Source: Calculated by authors using MHLW data

Annex K

Thailand

Annex Figure K.1: *Trends in agricultural and food exports (Thailand)*



Source: UN Comtrade database

Annex Table K.1: *Destinations for and respective share of agricultural exports from Thailand*

Rank	2000	2005	2010
1	EAP (26.1%)	EAP (33.1%)	EAP(35.7%)
2	JPN (20.5%)	JPN (14.3%)	SSA (16.2%)
3	US (17.8%)	US (13.7%)	US (11.9%)
4	EU27 (11.5%)	SSA (12.3%)	JPN (10.5%)
5	SSA (7.7%)	EU27 (7.7%)	EU27 (7.5%)

Note: EAP includes ASEAN10 countries, China, Hong Kong (China) and Republic of Korea. EU27 includes all EU member countries. LAC includes Latin American and Caribbean countries. SSA includes sub-Saharan African countries. SAR includes South Asian countries. LAC, SSA, and SAR classifications follow those of the World Bank.

Source: UN Comtrade database

Annex Table K.2: *Destinations for and respective share of food exports (%) from Thailand*

Rank	2000	2005	2010
1	US (24.8%)	EAP (21.9%)	EAP (27.4%)
2	JPN(23.7%)	JPN (21.9%)	JPN (17.5%)
3	EAP (20.0%)	US (20.4%)	US (16.6%)
4	EU27 (13.1%)	EU27 (16.7%)	EU27 (16.3%)
5	AUS (3.2%)	AUS (3.6%)	AUS (3.5%)

Note: EAP includes ASEAN10 countries, China, Hong Kong (China) and Republic of Korea. EU27 includes all EU member countries. LAC includes Latin American and Caribbean countries. SSA includes sub-Saharan African countries. SAR includes South Asian countries. LAC, SSA, and SAR classifications follow those of the World Bank.

Source: UN Comtrade database

Annex Table K.3: Top 5 agriculture export products in 2010 (Thailand)

HS Code	Name	Value (US$ million)
1006	Rice	5,341
0306	Crustaceans, fresh, chilled or frozen etc.	1,725
714	Roots and tubers with high starch	817
1108	Starches and inulin	772
0307	Molluscs and aquatic invertebrates, not elsewhere specified or included	420

Source: UN Comtrade database

Annex Table K.4: Top 5 food export products in 2010 (Thailand)

HS Code	Name	Value (US$ million)
1604	Prepared or preserved fish; caviar and caviar substitutes	2,411
1701	Cane or beet sugar and chemically pure sucrose	2,152
1602	Other prepared or preserved meat, meat offal or blood not elsewhere specified or included	1,832
1605	Crustaceans, molluscs and other aquatic invertebrates, prepared or preserved	1,709
2008	Fruit, nuts and other edible parts of plants, otherwise prepared or preserved, whether or not containing added sugar or other sweetening matter or spirit, not elsewhere specified or included	892

Source: UN Comtrade database

Annex Table K.5: Trends in Japanese rejections of food product groups imported from Thailand 2006–2010 (no. of rejections)

	2006	2007	2008	2009	2010
Beverages	0	0	0	0	1
Cereals and bakery products	19	21	24	29	34
Confectionery and sugar	1	0	1	1	0
Dairy products	1	0	1	0	0
Fish and fishery products	49	39	38	47	38
Fruits and vegetables and products	31	27	19	26	17
Herbs and spices	5	5	3	4	5
Meat and meat products	6	8	15	9	15
Non-food products	2	2	2	1	11
Nuts, nuts products and seeds	1	1	0	0	1
Other processed foods	5	0	0	1	0

Source: Calculated by authors using MHLW data

Annex Table K.6: Trends in reasons for Japanese import rejections of products from Thailand, 2006–2010 (no. of cases)

	2006	2007	2008	2009	2010
Food additives	11	2	8	7	9
Bacterial contamination	64	55	57	67	52
Hygienic condition/ controls	13	13	13	21	32
Mycotoxins	10	11	10	5	4
Other contaminants	2	3	2	1	0
Others	0	2	3	1	11
Pesticide residues	17	13	6	13	13
Veterinary drugs residues	3	4	4	3	1

Source: Calculated by authors using MHLW data

Annex L

Viet Nam

Annex Figure L.1: Trends in agricultural and food exports (Viet Nam)

Source: UN Comtrade database

Annex Table L.1: Destinations for and respective share of agricultural exports from Viet Nam

Rank	2000	2005	2009
1	EAP (35.0%)	EAP (26.4%)	EAP (31.8%)
2	JPN (15.0%)	EU27 (1531%)	EU27 (21.1%)
3	US (12.5%)	US (14.5%)	US (10.3%)
4	EU27 (11.7%)	JPN (14.0%)	JPN (7.0%)
5	SSA (2.0%)	SSA (6.5%)	SSA (5.9%)

Note: Data for 2009 were the most recent when the table was created. EAP includes ASEAN10 countries, China, Hong Kong (China) and Republic of Korea. EU27 includes all EU member countries. LAC includes Latin American and Caribbean countries. SSA includes sub-Saharan African countries. SAR includes South Asian countries. LAC, SSA, and SAR classifications follow those of the World Bank.

Source: UN Comtrade database

Annex Table L.2: Destinations for and respective share of food exports (%) from Viet Nam

Rank	2000	2005	2009
1	EAP (33.9%)	JPN (26.6%)	EAP (30.0%)
2	JPN (16.3%)	EAP (20.3%)	US (17.5%)
3	EU27 (13.8%)	US (17.1%)	JPN (17.0%)
4	US (5.9%)	EU27 (16.8%)	EU27 (14.7%)
5	SAR (0.8%)	AUS (1.4%)	SSA (0.9%)

Note: EAP includes ASEAN10 countries, China, Hong Kong (China) and Republic of Korea. EU27 includes all EU member countries. LAC includes Latin American and Caribbean countries. SSA includes sub-Saharan African countries. SAR includes South Asian countries. LAC, SSA, and SAR classifications follow those of the World Bank.

Source: UN Comtrade database

Annex Table L.3: *Top 5 agriculture export products in 2009 (Viet Nam)*

HS Code	Name	Value (US$ million)
1006	Rice	2,666
0901	Coffee; coffee husks and skins; coffee substitutes with coffee	1,731
0304	Fish fillets and other fish meat, fresh, chilled or frozen	1,622
0306	Crustaceans, fresh, chilled or frozen	1,397
0801	Coconuts, brazil nuts and cashew nuts, fresh or dried	884

Source: UN Comtrade database

Annex Table L.4: *Top 5 food export products in 2009 (Viet Nam)*

HS Code	Name	Value (US$ million)
1605	Crustaceans, molluscs and other aquatic invertebrates, prepared or preserved	457
1604	Prepared or preserved fish; caviar and caviar substitutes	177
1905	Bread, pastry, cakes, biscuits and other bakers' wares, whether or not containing cocoa; communion wafers, empty sachets of a kind suitable for pharmaceutical use, sealing wafers, rice paper and similar products	103
1902	Pasta, prepared or not, couscous, prepared or not	96
1704	Sugar confectionery (incl. white chocolate), no cocoa	71

Source: UN Comtrade database

Annex Table L.5: *Trends in Japanese rejections of food product groups imported from Viet Nam, 2006–2010 (no. of rejections)*

	2006	2007	2008	2009	2010
Beverages	0	0	2	9	14
Cereals and bakery products	2	8	5	1	2
Confectionery and sugar	0	2	2	1	2
Dairy products	0	1	0	0	0
Fats and vegetable and products	0	0	0	0	2
Fish and fishery products	117	147	60	57	83
Fruits and vegetables and products	5	5	5	8	11
Herbs and spices	2	1	0	0	2
Meat and meat products	0	0	0	1	1
Non-food products	1	0	0	2	1
Nuts, nuts products and seeds	2	1	0	0	0
Other processed foods	2	0	0	0	0

Source: Calculated by authors using MHLW data

Annex Table L.6: *Trends in reasons for Japanese import rejections of products from Viet Nam, 2006–2010 (no. of cases)*

	2006	2007	2008	2009	2010
Food additives	7	5	3	8	9
Bacterial contamination	43	30	20	27	25
Hygienic condition/ controls	0	0	2	7	14
Mycotoxins	3	2	2	1	0
Other contaminants	0	1	0	0	0
Others	0	6	0	2	1
Packaging	0	0	2	0	0
Pesticide residues	5	4	1	2	38
Veterinary drugs residues	73	117	44	32	31

Source: Calculated by authors using MHLW data

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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Telephone: (+43-1) 26026-0, Fax: (+43-1) 26926-69
E-mail: unido@unido.org, Internet: http://www.unido.org

INSTITUTE OF DEVELOPING ECONOMIES, JAPAN EXTERNAL TRADE ORGANIZATION
Wakaba 3-2-2, Mihamaku, Chiba, Chiba Prefecture, 261-8545, Japan
Telephone: (+81) 43-299-9535, Fax: (+81) 43-299-9736
E-mail: eastasia_tscr@ide.go.jp, Internet: www.ide.go.jp/English/