

Effects of standards on tea exports from developing countries : comparison of China and Sri Lanka

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Effects of Standards on Tea Exports from Developing Countries: Comparison of China and Sri Lanka¹

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Abstract

Food safety standards have become stricter and are currently major barriers in the international agri-food trade. These standards negatively affect developing countries exports to markets in developed countries. We use tea exports from two major tea exporting developing countries, China and Sri Lanka, as an example to discuss the effects of standards on their tea supply chains. China and Sri Lanka share some similar characteristics in tea production and exports. First, we conduct a general comparison between the two countries' tea exports based on port rejection data from UNIDO, and then we provide a detailed supply chain analysis. Finally, we summarize our work and discuss the policy implications.

Keywords: Standards, Tea, Exports, Supply Chain

JEL classification: O10, Q13, Q17

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1. Introduction

Although tariffs are being reduced, there is increasing concern in the international agri-food trade around food safety standards, especially sanitary and phytosanitary (SPS) measures (Disdier et al. 2008; Henson and Humphrey 2010). From 2002 to 2013, the number of World Trade Organization (WTO)/SPS notifications for agri-food products (HS01-HS24) increased from 410 to 655¹. The increasing number of SPS notifications for agri-food products implies that the importing countries are paying increasing attention to food safety and are implementing stricter standards for imports. This change has hindered agri-food exports, particularly from developing countries to developed countries (Otsuki and Wilson 2001, Jongwanich 2009, Neeliah and Goburdhum 2010).

Tea, which is a traditional economic crop that has been traded for centuries, is facing the same challenges. Tea is one of the most popular beverages worldwide and it has been exported from major tea producing countries, including the top four exporting countries China, India, Sri Lanka, and Kenya, since the 19th century. Although exporting tea has brought economic benefits to these developing countries through trade, the increasing food safety standards for tea have also brought challenges. Since 1996,

¹ From the SPSIMS database at <http://spsims.wto.org>

the average import tariffs on tea have decreased; however, the number of SPS notifications for tea has grown (FAO IGG/Tea 2016). For example, Figure 1 from the Food and Agriculture Organization (FAO) Intergovernmental Group on Tea (IGG/Tea) for a common SPS measure, maximal residue limits (MRLs), shows this trend clearly.

In addition to the MRLs, other common food safety standards for the herbs and spices category to which tea belongs are bacterial contamination, labeling, hygienic conditions/controls, pesticide residues, adulteration/missing documents, additives, other contamination, heavy metals, packaging, veterinary drug residues, mycotoxins, and other items. Tables 1–4 show the frequency of reasons for rejection of herbs and spices in four major developed country/region markets. The tables list the top 15 exporters that received rejections from the four markets and the reasons for the rejections. The majority of the 15 countries that have their exports most frequently rejected from these four major export markets are developing countries. China and Sri Lanka, as two of the leading tea exporters, are both in the top 15 lists.

As two major tea exporting countries in Asia, China and Sri Lanka face the challenges of food safety standards applied by all major tea-importing developed countries. To improve product quality and become more competitive in the international market, both countries have begun to set their own standards for tea. Other countries

that are pursuing this strategy include India and Kenya (FAO IGG/Tea 2016). For example, major tea producing and consuming countries have both set up MRLs based on their own criteria. These standards are equivalent to limits set by Codex Alimentarius. However, there are gaps between the MRLs of exporting countries and those of importing countries. The IGG/Tea has played a major role in setting MRLs for tea and reducing compliance costs. More details of the functions of the IGG/Tea and its interactions with various stakeholders in the international tea market are discussed later in the paper.

This paper discusses the effects of food safety standards on tea exporting developing countries by reviewing previous empirical literature and conducting face-to-face field interviews and studies. Taking two developing countries that are major tea exporters with different characteristics and some similarities, we compare the differences between the two countries in responding to standards applied to tea by importing developed countries through tea supply chain analysis in each country. Section 2 reviews the literature and background to the challenges posed by standards; Sections 3 and 4 introduce the tea supply chains of China and Sri Lanka and how the standards affect these countries, respectively; and Section 5 concludes the paper by comparing the two countries tea supply chains and responses to standards.

2. Literature Review and Background

There are a large number of studies on the impact of food safety standards on the exports of agri-food commodities from developing to developed countries. Most research found that food safety standards have larger impacts on agri-food exports than tariffs. Safety standards have negatively affected exports and particularly hindered developing countries' access to developed countries' markets (Otsuki and Wilson 2001, Disdier et al. 2008, Jongwanich 2009; Neelian and Goburdhum 2010, IDE-UNIDO 2013). For example, Hunag and Gale (2006), Shan and Jiang (2005), and You and Cui (2006) found that China's exports of vegetables, fruit, tea, aquatic products, and processed foods have not increased after accession to the WTO. Among many factors that may negatively affect China's agricultural exports, food safety standards have been identified as one of the major barriers both in academic studies (Dong and Jenson 2004, Chen et al. 2008) and in policy making (MOFCOM 2009).

Many studies have shown that various tea exports from China and Sri Lanka have been hindered by various food safety standards such as pesticide residue, MRLs, and TBT/SPS (Xu and Gao 2006, Gu et al. 2007, Sun et al. 2007, Jayaratne 2011, Wei et al. 2012, Perera 2014, Dong and Zhu 2015, FAO IGG/Tea 2016). These studies either conducted empirical analysis on tea trade data to quantify the effects of food safety

standards on trade flow reduction, or qualitatively analyzed problems and challenges in meeting standards. However, limited research has been done on the effects of standards on the tea trade supply chain, although meeting standards requires coordination among all the stakeholders along the supply chain.

This paper fills the literature gap by examining the effects of food safety standards following supply chain analysis and comparing two leading developing countries that are tea exporters and discussing the general implications of the results. The key effects of food safety standards are identified in different situations for other developing countries for tea and other agri-food exports to developed countries markets. Using the port rejection data from UNIDO, we analyze the general situation for herb and spice exports from China and Sri Lanka to Australia, the European Union (EU), Japan, and the United States in this section.

We focus on China and Sri Lanka for the following reasons. Major tea production countries are located in Asia and some parts of Africa, and China, India, Sri Lanka, Indonesia, and Kenya are the major producers. These top five producers accounted for 77% of world tea production and 80% of global exports in 2012 (Majumder 2012). Over the last two decades, India has lost its leading tea export position to Sri Lanka, Kenya, and China. This paper focuses mainly on Asian tea

exports because of their similar production and market background. Therefore, we picked the top two tea exporters in Asia: China and Sri Lanka. Both countries are also major tea consuming countries (FAO IGG/Tea 2016) and have set up their own food safety standards and quality measures for tea products. In addition, China and Sri Lanka mainly produce orthodox tea, whereas other countries, such as India and Kenya, produce crush, tear, curl (CTC) tea. Understanding the gap or difference between standards of importing and exporting countries helps to clarify the effects of standards imposed by developed importing countries.

Based on the port rejection data from UNIDO, we focused on herb and spice exports, the main product of which is tea, from China and Sri Lanka to the markets of four major developed countries. Detailed data about tea are difficult to obtain, although it was possible to conduct general analysis from the general data about herbs and spices. Both China and Sri Lanka are in the 15 exporters whose products were most frequently rejected from the four markets. For the Australian market from 2003 to 2013, herb and spice products from China were rejected 170 times, and China was ranked as number 2, whereas products from Sri Lanka were rejected 46 times, and Sri Lanka was ranked as number 4 (Table 1). The Chinese and Sri Lankan products were mainly rejected because of labeling problems, although there were also problems with bacterial contamination

and adulteration/missing documents. Labeling and adulteration problems are usually considered to be management issues, whereas bacterial contamination is a food safety standard problem, although labeling may also be in some cases. Chinese and Sri Lankan products were rejected at 13 and 12 times, respectively, due to this standard. Table 5 shows more information about Australian import rejections. On average, for every 1 million US dollars of herbs and spices imported to Australia in the time period, products from China, which accounted for about 12.67% of Australia's average total herb and spice imports, were rejected 2.56 times. Sri Lanka had a smaller import share at 2.29%, although the average rejection frequency per million US dollars was higher at 4.52. The situation improved from 2003 and 2004, although further efforts to reduce rejections are still needed.

For the EU market from 2002 to 2013, herb and spice products from China were rejected 97 times, and China was ranked as number 5, whereas Sri Lankan products were rejected 20 times, and Sri Lanka was ranked as number 15 (Table 2). The Chinese products were rejected because of additives and Sri Lankan products were rejected because of mycotoxins. In addition, products were also rejected for bacterial contamination. These are food safety standard problems. Products from China had a better average performance with an 11.60% market share at a detention rate per million

US dollars of 0.06 (Table 6). Sri Lanka had 1.15% of the market share at a detention rate per million US dollars of 0.14.

For the Japanese market from 2006 to 2013, herb and spice products from China were rejected 65 times, and China was ranked number 2, whereas Sri Lankan products were rejected 18 times, and Sri Lanka was ranked number 4 (Table 3). The Chinese products were rejected mostly because of pesticide residues, additives, and mycotoxins, which are all food safety standard compliance problems. Sri Lankan products were rejected mostly due to mycotoxins, which is also a food safety standard problem. China had a better average performance than Sri Lanka, with 53.91% market share and a detention rate per million US dollars of 0.05 (Table 7). Sri Lanka had 0.16% of the market share at a detention rate per million US dollars of 4.11. Because of its big market share in Japan, China has made efforts to comply with the food safety standards applied by Japan.

For the US market from 2002 to 2013, herb and spice products from China were rejected 245 times in total, and China was ranked number 7, whereas Sri Lankan products were rejected 134 times, and Sri Lanka was ranked number 13 (Table 4). The Chinese products were rejected due to hygienic conditions, labeling, bacterial contamination, and pesticide residues, whereas Sri Lankan products were rejected due

to bacterial contamination, labeling, and hygienic conditions. These are mainly food safety standard compliance problems. China had a 13.28% of market share with a detention rate per million US dollars of 0.13, whereas Sri Lanka had 1.24% of the market share with a detention rate per million US dollars of 0.73 (Table 8).

General analysis of Chinese and Sri Lankan herb and spice exports to the markets of four major developed countries indicate that food safety standards are major problems for both countries. The analysis of the detention rate is not conclusive for the following reasons. 1) In addition to tea products, Sri Lanka also exports many spices included in the same category that cannot be separated in the available data. 2) Chinese exports have much larger absolute values than Sri Lankan exports in all markets. The smaller detention rate does not necessarily imply that China lost less than Sri Lanka in standards compliance issues. 3) China mainly exports mass produced tea leaves as intermediate products for further processing in destination markets, whereas Sri Lankan tea exports are mainly final refined tea products. This could also result in different detention rates per imported value. 4) For the Japanese market, many Japanese tea companies have been investing in China and produce tea following Japanese standards from ingredient selection to packaging. This may also explain the smaller detention rate for China compared with Sri Lanka in this market. Although the analysis using port

rejection data is not conclusive due to data limitations, it is still suggestive and reflects the challenges of food safety standards that China and Sri Lanka have been facing when exporting to markets in developed countries.

Based on the macro-background analysis in this section, in Section 2, country-specific tea supply chain analyses are conducted for both China and Sri Lanka based on field investigations and face-to-face interviews with stakeholders in key stages.

3. Tea Supply Chain in China

As the largest tea producer in the world, China is the third largest tea exporter after Sri Lanka and Kenya. It has the longest history of tea production and consumption in the world, dating back to the 2nd century BC. The area of tea plantations has increased by 60% from 2003 to 2012, and the yield has increased from 8000 to 11,000 hg/ha (Lei 2015). There are six types of tea produced in China, based on different fermentation levels, from white tea to black tea. These teas are produced mainly in southern China. The main tea producing provinces from south to north are Fujian, Guangdong, Guangxi, Yunnan, Guizhou, Sichuan, Zhejiang, Anhui, Jiangxi, and Jiangsu.

About two third of China's tea output is consumed domestically, mostly as green tea, which takes almost half of the domestic market share. Green tea is also the

main exported tea, and China is the largest green tea exporter globally. However, the export price of tea is much lower than the domestic price because in the domestic market, premium tea leaves are consumed as branded famous produce with geographical indications. However, the tea exported from China as mass-processed crude tea is supplied to larger international buyers, usually in developed countries. The Chinese tea market is polarized into domestic-oriented and export-oriented (Lei 2015) starting from the supply chain.

The domestic supply chain has several distribution channels. The main players in the supply chain are farmers, processors, refineries, and branded tea companies. The domestic supply chain is short; the distance from the farm to the consumer is short because of the demand. In China, tea is considered as a cultural high-quality drink. Although there are relatively cheap, low-quality teas in the domestic market, most tea is considered an expensive drink and is used as an expensive gift in social settings. Hence, tea is embedded in local culture, and products with geographical indications from famous production regions are usually considered as the best. Local farmers can sell their tea leaves either directly to consumers through the internet or tea fairs and exhibitions, or they can sell to local processors. In addition to this short distribution channel, tea farmers can sell their fresh tea leaves or processed crude tea to processors,

refineries, or branded tea companies.

The tea supply chain for exports is simple compared with the domestic supply chain. There are three or four players in the supply chain: farmers, processing factories, and refineries and/or exporters. Because most of the tea that China exports is mass-produced crude tea, tea farmers sell fresh tea leaves to primary processing factories to be processed into crude tea. Crude tea is sold to refineries later, after selecting, sorting, and blending with other types of tea or the same tea from different harvests according to buyer's requirements for the finished tea. Small refineries usually outsource exports of the finished products to trading companies. Large refineries that employ trade professionals and have an export license sell the finished tea directly to foreign buyers (intermediate companies or brand owners).

Recently, China's tea exports have displayed the following features according to Dong and Zhu (2015). First, although China's tea production has been growing, the growth has been mainly driven by domestic consumption rather than exports. Second, the export price of Chinese tea is lower than that of other exporting countries. As mentioned in Section 2, China's tea exports are mainly mass-produced crude tea leaves as ingredients for further processing; however, other competitors, especially Sri Lanka, are exporting branded fine tea as final products. Third, due to increasingly stringent

food safety standards, it has become more and more difficult to export tea to developed countries. China's tea export destinations have been switching from developed countries to developing countries. Lastly, SPS measures have become the biggest obstacle for tea exports to developed countries markets. These developments imply that food safety standards have affected China's tea access to developed countries market.

The tea supply chain for exports has undergone the following changes to meet the standards and win market share. The tea supply chain for exports has been separated from the domestic supply chain because of government control of the tea sector before the 1970s, and tea exporting was fully liberalized in 1999. Thus, most of the players involved in tea exports are the previously state-owned ones. To maximize profit in the higher premium domestic market, some players in the export tea supply chain are exploring the domestic market. However, most are still focused on tea exports, and they only follow the requirements of importers and importing countries. Starting from farming (contract farming or buying tea leaves), processing, and refining, players from each stage closely follow the requirements of foreign buyers. These requirements include public standards applied by importing countries and the standards of the individual buyers. For example, Lipton requires all its material suppliers to have Rainforest Alliance certification. In addition, because China mainly exports

mass-produced crude tea as an ingredient, private standards, such as GlobalGAP and GlobalGMP, are required at a business-to-business level.

The stricter food safety standards have crowded out small, less competitive players in the tea market, which is why initially only previously state owned factories or companies were involved in tea exports. However, because most Chinese tea exports are mass-produced crude tea, the export price is much lower than the domestic price. Many big companies that specialize in exports are considering engaging in domestic business. The standards to be followed and the production practices are different from those required for exports. This may share much capacity for the export business. Less effort could be devoted to creating value-added tea products for export. If producers do not add more value to exported tea products and face stricter food safety standards, the number of export businesses may decrease in the long run.

In 2012, the eight-point code to cut bureaucracy and maintain close ties with the people was issued by the Chinese government. This eight-point code aimed to tackle corruption in bureaucracy. Once implemented, the domestic tea business suffered a major negative shock. Demand for high-quality premium tea, which is usually overpriced and used for gifting rather than consumption, dropped hugely. With this shock in the domestic tea market, the export business regained its popularity. However,

the general trend is still toward stricter food safety standards and Chinese exported tea has not added value in the international value chain. In addition, another major difficulty that the Chinese tea industry is facing in both domestic and export businesses is increasing labor costs owing to national salary increases. This challenge particularly affects tea exporters because they may lose their price advantage in the international market even for crude tea. Emerging tea exporting countries, such as Vietnam, are also gradually eroding the price advantage.

4. Sri Lankan Tea Supply Chain

Sri Lankan tea plantations date back to the British colonial period. It has the third largest area of tea cultivation (188,323 ha) after China and India. Sri Lanka produces orthodox black tea (91.8% of total production), CTC (6%), and green tea, instant, and other teas (2.2%) (Hemaratne 2016). There are seven tea regions in Sri Lanka with high, medium, and low production elevations: Kandy (medium); Nurawa-Eliya (high); Uda Pussellawa (low); Uva (high); Dimbula (high); Sabaragamuwa (low); and Ruhuna (low).

According to Hemaratne (2016), Sri Lanka is the top tea export revenue earner, the largest value-added tea exporter, and the largest orthodox tea producer and exporter. The major destinations for Sri Lankan tea exports are the Commonwealth of

Independent States, Middle East, North America, Turkey, Ukraine, Japan, and China.

About 43% of Sri Lankan tea exports are bulk, 47% are packaged, 7% are in tea bags, 1% are instant tea, and 2% are green tea. Most Sri Lankan tea is exported, and the domestic market consumes only about 2–3% of the tea production and is mainly low quality. Exported Sri Lankan tea is the highest quality Ceylon tea. Recently, the major export destinations for Sri Lanka of Russia and the Middle East have been facing economic difficulties, and Sri Lanka is trying to diversify its export markets.

Next, we examine the Sri Lankan tea industry supply chain in greater detail.

There are five players in the tea supply chain: growers, fresh leaf dealers, tea factories, brokers, and exporters. In addition, the government-run Sri Lanka Tea Board and The Tea Research Institute (TRI) also play important roles in the tea sector. Growers in the Sri Lankan tea supply chain are charge of new planting, replanting, and growing tea.

There are three types of tea growers: tea small holders (usually family farms with less than 4.4 ha), tea estate owners (over 10 ha that hire labors), corporate sector plantations (over 100 ha with a resident work force), and government sector plantations (such as TRI with a resident work force). In the growing stage, all growers, irrespective of size or ownership, follow the good agriculture practice (GAP) standard issued by TRI, which adds value at this stage.

Green leaf dealers have licenses from the Sri Lanka Tea Board. They collect fresh green leaves from farmers and supply the leaves to tea factories. The price they pay the farmers is based on the factory net sale average and the dealers keep 1% for commission and transportation costs. The green leaf dealers follow the Tea Control Act No. 51 of 1957, which regulates their mode of transport, quality of leaves, distance from farm to factory, time duration, payments, and so on. Most green leaf dealers hire experienced tea experts who can determine the quality of tea well. The value added at this stage is the prompt transport of undamaged leaves.

Next, the tea manufactures convert the fresh green tea leaves into tea. There are three types of manufacturer: private sector manufacturers (450 companies) that buy from leaf processors; corporate sector manufacturers (250 companies) that own leaf processors; and state-owned tea factories (10 companies) that own leaf processors but also buy from leaf processors. To improve performance, tea factories add value through GAP, good processing practice, and selecting the highest quality tea leaves.

The tea is auctioned by brokers that are Sri Lanka Tea Board-accredited agents of all tea manufacturers (sellers in this case) for cataloguing tea, quality assurance, warehousing, selling at auction, and remitting sales. These licensed produce brokers are auctioneers who are regulated under the Licensing of Produce Brokers Act No. 9 of

1979. There are eight selling brokers in Sri Lanka dealing with eight tea catalogues. The value added at this stage is through quality control.

The final stage in the supply chain is the buyers. The buyers sort, blend, add value, pack, and export teas. Buyers can be registered exporters of tea, registered packers of tea, and local dealers. The size of the exporters is determined by the volume of exports. The exporters follow the Tax and Control of Exports Act No. 16 of 1959. They are subject to quality control at pre-auction, pre-shipment, and pre- and post-import. Registered tea packers pack exports and a small amount for local sale. The packing business also follows Regulation 1986 and the labeling law under the Foods Act No. 26 of 1980. Buyers can also be local dealers who run 100% local wholesale and retail businesses. In the buyer stage, value is added through product diversification with quality teas.

In addition, the Sri Lanka Tea Board and TRI play major roles in the tea industry. The Sri Lanka Tea Board is a government body in charge of regulating, promoting, and assisting the development of the tea industry in Sri Lanka. They license manufacturers of tea and brokers for the auctions. All exporters are required to register with The Sri Lanka Tea Board and are regularly inspected by officers. Exporters are required to follow good processing practices. The Tea Small Holding Development

Authority under The Sri Lanka Tea Board oversees the development of small holders who are responsible for about 70% of the production in the country. For development, The Sri Lanka Tea Board provides subsidies for replanting tea plants and for fertilizers. They also provide assistance for brand building by the exporters and extension services such as seminars and workshops to teach farmers about production practices.

For quality control, The Sri Lanka Tea Board has tea testers who test the teas prior to auctions to remove teas that do not meet their standards. Typically, about 0.1–0.2% of teas are rejected at this point, mainly due to storage problems and contamination. Teas that are meant for the export market are required to comply with ISO 3720². The Sri Lanka Tea Board follows the strictest values for MRLs (which are usually from the EU) and they issue the domestic registered trade mark for Ceylon tea, the Lion logo. They also have an ozone logo which indicates the ozone-friendliness of Ceylon tea according to the Montreal Protocol. The Sri Lanka Tea Board also registers geographical indications for the seven growing regions and requires tea factories to have ISO22000.

Because of the economic difficulties facing the traditional big buyers of Sri Lankan tea, the Sri Lanka Tea Board is under pressure to explore new markets.

² ISO 3720 was first introduced in 1986. The current version is 2011 one. There is another ISO standard for green tea, which is ISO 11287:2011.

Currently about 40% of Ceylon teas are for brands, including about 100 local brands and big buyers such as Hama from Turkey and Unilever (Lipton).

The TRI, which performs research and development, is another key player in the Sri Lankan tea industry. The TRI aims to apply the strictest standards, establish testing methods for MRL, and makes suggestions to the Tea Board when they regularly conduct tests for issuing quality certification or accrediting. According to the TRI, about 90% of the concerns that tea importers have are with agricultural chemical residues. As a tea producing country, Sri Lanka relies on imports of pesticides and fertilizers to produce tea. Imports of these chemicals are controlled by the registration of pesticides in the Ministry of Agriculture. To ensure that these chemicals meet the strictest MRLs, the TRI tests them, and once they meet all the export standards based on the importers requirements, the TRI approves the chemicals and recommends that the government can import them. If there are different standards set by different importers, the TRI follows the strictest standard. Hence, all the chemicals that are used in Sri Lankan tea production should satisfy the importers' concerns about residues. Once a chemical is approved, the TRI teaches farmers how and when to use the pesticides or agricultural chemicals.

When importers' standards or requirements for tea are not feasible, the TRI

negotiates with the regulatory agencies in other countries to educate them about tea production in Sri Lanka so that the importing countries can set reasonable values for MRLs and other regulations. The TRI is closely involved with the FAO IGG/Tea through the Sri Lanka Tea Board and also sets the Sri Lankan version of GAP, which includes good agricultural practices, good processing practices, and markets three perspectives that corresponding players in the supply chain follow.

Currently, the Sri Lankan tea industry is facing the following difficulties. 1) Standards compliance. Developed countries usually have the strictest standards that can be difficult to meet for both small and large players in the supply chain. Capacity limits are the barrier for the small players. For large players, it takes time and money to be compliant. For example, a tea estate with a resident work force obtained Rainforest Alliance certification in 2011 as requested by Unilever at a cost of 8 million Sri Lankan rupees. The certification required physical infrastructure investments, such as toilets and cleaning stations for chemical sprayers, and educating workers. There are 800 workers in the tea estate with their families, making 3200 residents in total. To obtain and keep the certification, the tea estate needs to ensure all 3200 people follow certain practices in their daily life. Education and changing mindsets and attitudes are difficult and expensive. In addition, Rainforest Alliance certification was not created for tea. There

are many control points that are not applicable to tea cultivation. Lastly, meeting these standards does not result in a price premium, although it is a requirement to stay in business. 2) Labor shortages and labor welfare problems. There is labor shortage in the tea sector. The current young generation does not want to work in the tea sector and are more attracted to other jobs in big cities. In addition, Sri Lankan trade unions are strong. They ask for wage rises every two years and frequently strike, which is particularly damaging to the tea sector because of the crop characteristics. 3) Exploration of new markets. As mentioned before, Sri Lanka is seeking market diversification.

5. Comparison and Conclusion

Based on the analysis of port rejection data for Chinese and Sri Lankan tea exports and their tea supply chains, we identified similarities and differences between these two leading tea exporting countries. Both countries have government involvement in the tea sector. However, the Chinese tea market has become more liberalized recently. The current government influence in the Chinese tea industry is mainly on the domestic market. The Sri Lankan tea sector is well controlled by the government. Every stage of the supply chain is regulated by the government. In particular, the government regulates quality control to ensure the competitiveness of Sri Lankan tea in export markets. The Chinese government may learn from this

example to regulate the standard compliance of the tea sector more closely. The tea sectors in both countries are also facing labor shortages. This may be true for the entire agriculture sector globally. Labor shortages include the inadequate labor supply and rising wages. Both problems must be tackled by the industry, other sectors, and the government.

The differences between the tea sectors of the two countries are as follows. First, China exports mainly mass-produced crude tea, whereas Sri Lanka exports mainly branded fine tea. The importing countries and the sub-markets in each country are not the same; however, they both face strict food safety standards imposed by the importing countries. The standards include both public and private standards. Although there is no price premium, exporters in China and Sri Lanka must meet these standards to stay in business. Careful practices and efficient communication in every stage of the supply chain are needed for both countries. In addition, to explore more export opportunities and to gain more profit, Chinese tea exporters should learn from Sri Lanka to create more added value for their export products. The Chinese government should also take a greater lead in the inter-government negotiations for Chinese tea producers as producing countries discuss more efficient, better international industry standards with tea consuming

countries.

The analysis of the effects of the food safety standards for Chinese and Sri Lankan tea exports provides a general picture of the current tea export business in developing countries. As the two major tea exporting countries at different positions in the international tea supply chain, China and Sri Lanka provide some general implications for other tea exporting developing countries to learn from. For example, how the governments can help in regulation (quality control), promotion, and inter-governmental negotiations to improve responses to stricter standards. Comparing China and Sri Lanka will also help other developing countries to identify their own problems and to search for solutions.

Finally, to meet stricter food safety standards and to access more markets in developed countries, better quality control in each stage of the supply chain and better communication with importers and importing countries are necessary. Moreover, governments of developing countries should negotiate with importing countries, especially for products that the importing countries do not produce or produce different varieties of with different agricultural conditions, to make sure appropriate sustainable standards are jointly set. These suggestions also apply to general agri-food exports from developing countries to developed countries with

increasingly strict food safety standards.

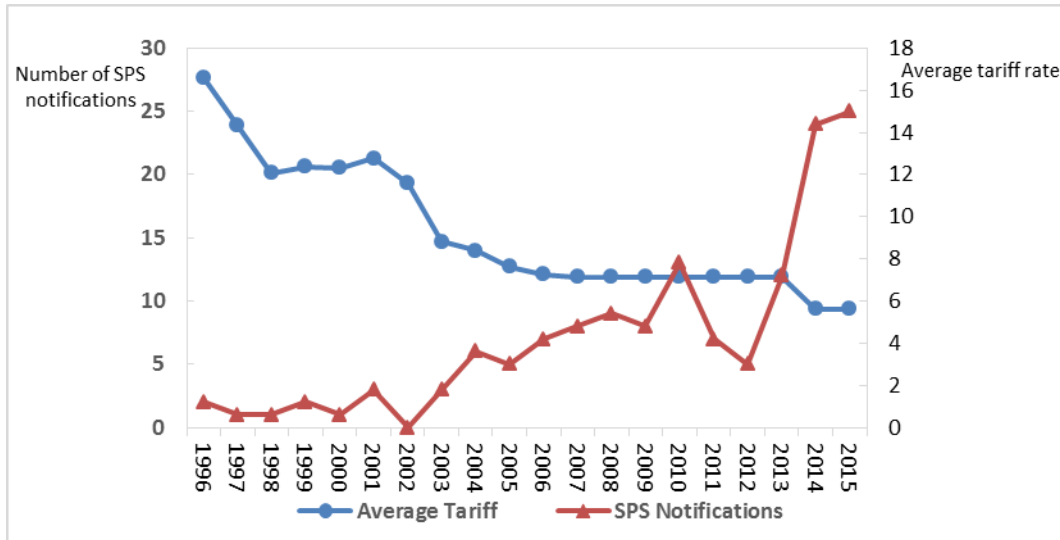
Reference

- Basu Majumder, A., Bera, B., & Rajan, A. (2010). Tea statistics: global scenario. *Inc. J. Tea Sci*, 8(1), 121-124.
- Disdier, A., Fontagné, L. And Mimouni, M. (2008). The impact of regulations on agricultural trade: Evidence from the SPS and TBT agreements. *American Journal of Agricultural Economics* 90: 336-350.
- Dong, F., & Jensen, H. H. (2004). The challenge of conforming to sanitary and phytosanitary measures for China's agricultural exports.
- Dong, Y., & Zhu, Y. (2015). Impact of SPS Measures Imposed by Developed Countries on China's Tea Export-A Perspective of Differences in Standards. *Applied Economics and Finance*, 2(4), 160-169.
- FAO IGG/Tea. (2016). The effects of maximum residue levels in tea on international tea trade. Twenty-second Session. Naivasha, Kenya, 25-27 May 2016
- GU, G. and Niu, X. (2007). Empirical study on the impacts of technical barrier to trade on international trade – Taking tea trade between China and Japan as an example. *Journal of International Trade* 6:74-80.
- Henson, S., & Humphrey, J. (2010). Understanding the complexities of private standards in global agri-food chains as they impact developing countries. *The journal of development studies*, 46(9), 1628-1646.
- Herath, D., & Weersink, A. (2007). Peasants and plantations in the Sri Lankan tea sector: causes of the change in their relative viability. *Australian Journal of Agricultural and Resource Economics*, 51(1), 73-89.
- Huang, S. W., & Gale, F. (2006). *China's rising fruit and vegetable exports challenge US industries*. USDA, Economic Research Service.
- IDE-UNIDO. (2013). Meeting Standards, Winning Markets Regional Trade Standards Compliance Report.
- Jayarathne, P. (2011). Sustainable Supply and Supply Chain Mapping-Sri Lankan Tea Supply Chain.
- Jongwanich, J. (2009). The impact of food safety standards on processed food exports from developing countries. *Food Policy*, 34(5), 447-457.
- MOFCOM (2009). *Reports of Chinese agricultural export*. Beijing: Ministry of Commerce of People's Republic of China.
- Neeliah, S. A., & Goburdhun, D. (2010). Complying with the clauses of the SPS Agreement: Case of a developing country. *Food control*, 21(6), 902-911.

- Otsuki, T., Wilson, J. S., & Sewadeh, M. (2001). Saving two in a billion:: quantifying the trade effect of European food safety standards on African exports. *Food policy*, 26(5), 495-514.
- Perera, P. (2014). Tea Smallholders in Sri Lanka: Issues and Challenges in Remote Areas. *International Journal of Business and Social Science*, 5(12).
- Sun, D., Sun, W. and Zhou, J. (2007). The impact of EU's MRL standards on China's tea exports. *Journal of Agricultural Technical Economics* 1:63-71.
- Chen, C., Yang, J., & Findlay, C. (2008). Measuring the effect of food safety standards on China's agricultural exports. *Review of World Economics*, 144(1), 83-106.
- Shan, S., & Jiang, A. (2005). Analysis on the Comparative Advantage and Export Competity of China's Aquatic Products [J]. *International Trade Journal*, 5, 005.
- Wei, G, Huang, J., & Yang, J. (2012). The impacts of food safety standards on China's tea exports. *China Economic Review*, 23(2), 253-264.
- Xu, Y., & Gao, Q. (2006). Positive Analysis of the Effect of Technique Barriers on China's Tea Export [J]. *Journal of International Trade*, 5, 015.
- You, J.M. & Cui, Y. (2006). Considerations on the important and export trade of Chinese fruit. *Guoji Maoyi Wenti (Journal of International Trade)*. 6. 26-31

Figures and Tables

Figure 1 Average applied tariff rate for selected countries and notifications (MRLs) for tea.



Notes:

1. Countries are Canada, China, Egypt, EU, Japan, Morocco, Pakistan, Russian Federation, United States, Saudi Arabia, and South Africa.
2. Figure is from FAO 2016.

Table 1 Reasons for rejections of herb and spice imports to the Australian market by country, 2003–2013.

Country	Reason for Rejection												Total
	Labeling	BC	PR	AM	HC	Additives	VR	OM	Mycotoxins	HM	OC	Other	
India	199	59	75	19	0							4	356
China	129	13	9	10	0							9	170
South Africa	48	5	0	12	0							1	66
Sri Lanka	34	12	0	0	0							0	46
United States	20	3	18	2	0							0	43
Vietnam	28	4	1	0	0							3	36
Malaysia	28	3	0	0	0							1	32
Pakistan	27	1	1	1	0							0	30
Bangladesh	20	8	0	1	0							0	29
Papua New Guinea	13	0	0	0	0							15	28
Spain	20	5	3	0	0							0	28
Korea, South	23	1	0	3	0							0	27
Thailand	12	4	4	2	1							1	24
Indonesia	19	2	1	0	0							1	23
Japan	11	1	3	0	0							0	15

Notes:

Abbreviations are applied due to limited table size:

AM- Adulteration/missing documents; BC- Bacterial contamination; HC- Hygienic conditions/controls; HM- Heavy metals; OC- Other contaminants; OM- Other microbiological contaminants; PR- Pesticide residues; VR- Veterinary drug residues;

Table 2 Reasons for rejections of herb and spice imports to the EU Market, 2002–2013.

Country	Reason for Rejection												Total	
	Additives	Mycotoxins	PR	BC	OM	OC	HC	AM	HM	Labeling	Packaging	VR		Other
India	134	299	305	48	7	8	6	5	0	0	1		4	817
Thailand	13	7	78	196	6	0	0	1	0	0	0		3	304
Turkey	114	16	4	38	6	0	1	0	1	0	0		2	182
Vietnam	16	2	2	74	12	3	5	0	0	1	0		0	115
China	34	15	0	12	6	5	1	3	3	1	0		17	97
Pakistan	58	21	0	2	1	0	1	0	0	1	0		0	84
Egypt	22	1	15	22	10	4	0	0	0	0	0		1	75
Morocco	0	1	51	3	6	1	3	0	0	0	0		0	65
Russia	53	0	0	1	0	0	0	0	0	0	0		0	54
Indonesia	0	34	0	3	3	2	2	0	1	0	0		0	45
Country of origin not mentioned	32	6	0	2	0	1	0	0	0	0	0		0	41
Peru	3	33	0	0	1	0	1	0	0	0	0		0	38
Ghana	6	20	0	0	0	0	0	4	0	0	0		0	30
Brazil	0	5	3	9	1	1	0	1	0	0	0		2	22
Sri Lanka	4	9	1	5	1	0	0	0	0	0	0		0	20

Notes:

Abbreviations are applied due to limited table size:

AM- Adulteration/missing documents; BC- Bacterial contamination; HC- Hygienic conditions/controls; HM- Heavy metals; OC- Other contaminants; OM- Other microbiological contaminants; PR- Pesticide residues; VR- Veterinary drug residues;

Table 3 Reasons for rejections of herb and spice imports to the Japanese market by country, 2006–2013.

Country	Reason for Rejection													Total
	PR	Additives	Mycotoxins	HC	BC	OC	VR	AM	Labeling	Packaging	OM	HM	Other	
India	37	17	12	0	1	0	0	0					0	67
China	25	20	6	5	6	0	0	1					2	65
Thailand	18	4	4	8	0	2	0	0					4	40
Korea, South	7	4	0	3	1	1	2	0					0	18
Sri Lanka	0	1	17	0	0	0	0	0					0	18
United States	5	4	1	1	1	0	0	0					2	14
Brazil	1	6	0	0	0	4	0	0					0	11
Italy	1	5	1	2	0	0	0	0					0	9
Vietnam	3	4	0	0	1	0	0	0					1	9
Pakistan	2	0	3	1	0	1	0	0					0	7
Peru	0	3	0	0	2	0	0	0					0	5
China (Hong Kong)	0	3	0	0	0	1	0	0					0	4
Taiwan	0	3	0	1	0	0	0	0					0	4
Tunisia	0	1	3	0	0	0	0	0					0	4
Laos	3	0	0	0	0	0	0	0					0	3

Notes:

Abbreviations are applied due to limited table size:

AM- Adulteration/missing documents; BC- Bacterial contamination; HC- Hygienic conditions/controls; HM- Heavy metals; OC- Other contaminants; OM- Other microbiological contaminants; PR- Pesticide residues; VR- Veterinary drug residues;

Table 4 Reasons for rejections of herb and spice imports to the US market by country, 2002–2013.

Country	Reason for Rejection												Total
	BC	Labeling	HC	PR	AM	Additives	OC	HM	Packaging	VR	Mycotoxins	HM	
India	2358	729	683	656	85	273	6	1	1			2	4794
Mexico	486	158	94	56	21	47	9	0	0			2	873
Pakistan	314	81	43	0	35	13	0	0	0			0	486
Canada	175	80	21	3	7	28	0	0	0			0	314
Indonesia	48	41	10	0	185	6	0	0	0			0	290
United Kingdom	6	196	3	0	20	34	0	0	0			0	259
China	38	58	97	27	18	3	3	0	0			1	245
Vietnam	116	51	28	12	4	6	0	0	0			3	220
Thailand	63	31	44	21	17	7	0	0	0			0	183
Italy	3	112	2	0	44	1	0	0	0			0	162
Peru	8	28	35	83	3	4	0	0	0			0	161
Bangladesh	73	65	5	0	0	10	0	0	0			0	153
Sri Lanka	58	30	29	0	17	0	0	0	0			0	134
Brazil	42	74	4	0	12	0	0	0	0			0	132
Turkey	84	32	7	0	4	0	0	0	0			0	127

Notes:

Abbreviations are applied due to limited table size:

AM- Adulteration/missing documents; BC- Bacterial contamination; HC- Hygienic conditions/controls; HM- Heavy metals; OC- Other contaminants; OM- Other microbiological contaminants; PR- Pesticide residues; VR- Veterinary drug residues;

Table 5 Australian imports of herbs and spices.

Country	Year											Average
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	
China (detention frequency/million USD imports)	2.27	2.56	6.03	6.78	2.95	0.50	2.05	1.35	1.01	0.92	0.31	2.56
Sri Lanka (detention frequency/million USD imports)	10.94	4.52	5.99	2.80	6.85	0.00	0.00	1.82	3.15	2.85	1.78	4.52
China (% of import value)	12.12	12.67	11.21	11.63	11.84	11.53	11.95	14.83	14.01	15.49	14.60	12.67
Sri Lanka (% of import value)	1.01	2.29	1.35	1.82	2.55	2.47	2.31	3.38	2.04	2.69	4.47	2.29

Table 6 EU imports of herbs and spices.

Country	Year												Average
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	
China (detention frequency/million USD imports)	0.05	0.02	0.12	0.10	0.08	0.06	0.02	0.04	0.04	0.06	0.05	0.02	0.06
Sri Lanka (detention frequency/million USD imports)	0.00	0.00	0.46	0.40	0.11	0.15	0.14	0.10	0.08	0.00	0.11	0.16	0.14
China (% of import value)	5.94	6.53	8.31	9.58	9.15	10.60	12.02	11.66	13.68	14.30	12.40	14.97	11.60
Sri Lanka (% of import value)	1.22	0.93	0.84	1.00	1.15	1.33	1.19	0.91	1.02	1.21	1.21	1.47	1.15

Table 7 Japanese imports of herbs and spices.

Country	Year								Average
	2006	2007	2008	2009	2010	2011	2012	2013	
China (detention frequency/million USD imports)	0.14	0.09	0.04	0.02	0.03	0.02	0.02	0.00	0.05
Sri Lanka (detention frequency/million USD imports)	8.75	4.18	2.66	8.53	5.58	1.13	1.13	0.91	4.11
China (% of import value)	51.41	49.84	51.03	52.82	54.88	56.02	56.53	58.75	53.91
Sri Lanka (% of import value)	0.17	0.15	0.10	0.17	0.13	0.16	0.17	0.21	0.16

Table 8 US imports of herbs and spices.

Country	Year												Average
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	
China (detention frequency/million USD imports)	0.19	0.32	0.10	0.13	0.08	0.17	0.11	0.10	0.12	0.05	0.09	0.06	0.13
Sri Lanka (detention frequency/million USD imports)	1.35	0.58	0.16	1.10	0.93	2.33	0.63	1.09	0.30	0.00	0.05	0.21	0.73
China (% of import value)	10.41	10.09	12.84	15.44	13.71	13.24	13.93	14.69	15.61	13.83	12.60	12.97	13.28
Sri Lanka (% of import value)	1.22	0.84	0.84	1.10	1.50	1.32	1.25	0.99	1.54	1.25	1.50	1.49	1.24