

IDE Discussion Papers are preliminary materials circulated to stimulate discussions and critical comments

**IDE DISCUSSION PAPER No.644**

**Trend in Tea Trade and the Role of Supply Chain**

**Kaoru Nabeshima\* and Etsuyo Michida\*\***

March 2017

**Abstract**

This paper first shows the trend of tea trade in major exporting countries. Although tea trade has been expanding, stricter regulation and tighter food safety requirements lead to a decline of trade and a consolidation of tea supply chains into a handful of multinationals is observed. Challenges that exporters face stemming from supply chain management as well as regulatory compliances are reviewed from the literature. Commoditization has been progressed with consumers' willingness to pay for organic or other special characteristics and it leads to consolidation of supply chains. Tea industry is shown as a good example for this global trend. Consolidation of supply chains has an important implication for economic development in developing countries that depend on agricultural export.

**Keywords:** Food Standards Compliance, Importer, Supply Chain

**JEL classification:** D22, O12

---

\* Associate Professor, Waseda University( [kknabeshima@waseda.jp](mailto:kknabeshima@waseda.jp))

\*\*Senior Overseas Research Fellow, IDE ([etsuyo\\_michida@ide.go.jp](mailto:etsuyo_michida@ide.go.jp))

The Institute of Developing Economies (IDE) is a semigovernmental, nonpartisan, nonprofit research institute, founded in 1958. The Institute merged with the Japan External Trade Organization (JETRO) on July 1, 1998. The Institute conducts basic and comprehensive studies on economic and related affairs in all developing countries and regions, including Asia, the Middle East, Africa, Latin America, Oceania, and Eastern Europe.

---

The views expressed in this publication are those of the author(s). Publication does not imply endorsement by the Institute of Developing Economies of any of the views expressed within.

---

**INSTITUTE OF DEVELOPING ECONOMIES (IDE), JETRO**  
**3-2-2, WAKABA, MIHAMA-KU, CHIBA-SHI**  
**CHIBA 261-8545, JAPAN**

©2017 by Institute of Developing Economies, JETRO

No part of this publication may be reproduced without the prior permission of the IDE-JETRO.

# Trends in Tea Trade and the Role of Supply Chain

Kaoru Nabeshima

Etsuyo Michida

## *Abstract*

This paper first shows the trend of tea trade in major exporting countries. Although tea trade has been expanding, stricter regulation and tighter food safety requirements lead to a decline of trade and a consolidation of tea supply chains into a handful of multinationals is observed. Challenges that exporters face stemming from supply chain management as well as regulatory compliances are reviewed from the previous literature. Commoditization has been progressed with consumers' willingness to pay for organic or other special characteristics and it leads to consolidation of supply chains. Tea industry is shown as a good example for this global trend.

## *I. Introduction*

Tea is a favorite drink among many people around the world throughout the history. The earliest known reference to drinking tea is written in Tong Yue published in BC59.<sup>1</sup> Tong Yue is a household slave contract and in this contract, one of the duty is to go to Wuyang region in Sichuan province to buy tea and to clean tea pots/cups (Matsuzaki 2012). Consequently, trade in tea has been expanding rapidly, although in the last few years the trade has slowed down. In part this may reflect the global slowdown. However, some portion could be attributed to the rise in the regulatory hurdle. As Lei (2017) indicates the number of SPS notification regarding tea has been on the rise (this reflects the overall increase in notification to the WTO). Tea leaves are subject to 981 non-tariff import measures (NTMs) around the world, of which 603 are related to sanitary and phytosanitary standards (SPS).<sup>2</sup> Naturally food safety

---

<sup>1</sup> According to a legend, tea was discovered as early as BC2700. However, it is not clear whether tea was used as a drink at that time (Matsuzaki 2012).

<sup>2</sup> The number was obtained from TRAINS, The global database on Non-Tariff Measures (<http://i-tip.unctad.org/>). The number is based on non-tariff measures that applies to all countries equally. There are more NTMs when including requirements against specific countries. NTMs include

regulation will fall into a type of non-tariff measures, concerning SPS. As the interest on food safety is rising around the world, it seems that the number of regulations regarding food safety seems to be on the rise.

In this kind of environment, what is the trend in tea trade globally, and what kind of implications that these regulations may have on the supply chains? These are important questions to be answered. The purpose of this paper is to have a broad overview of the general trend in tea industry as well as review of literature concerning the impact of regulations on the structure of supply chains. Next section provides the overall trend in tea trade around the world, focusing mainly on tea leaves since the trade value of tea drinks are relatively small. In section III, we review the literature on the relationship between supply chain and regulations. And the final section concludes.

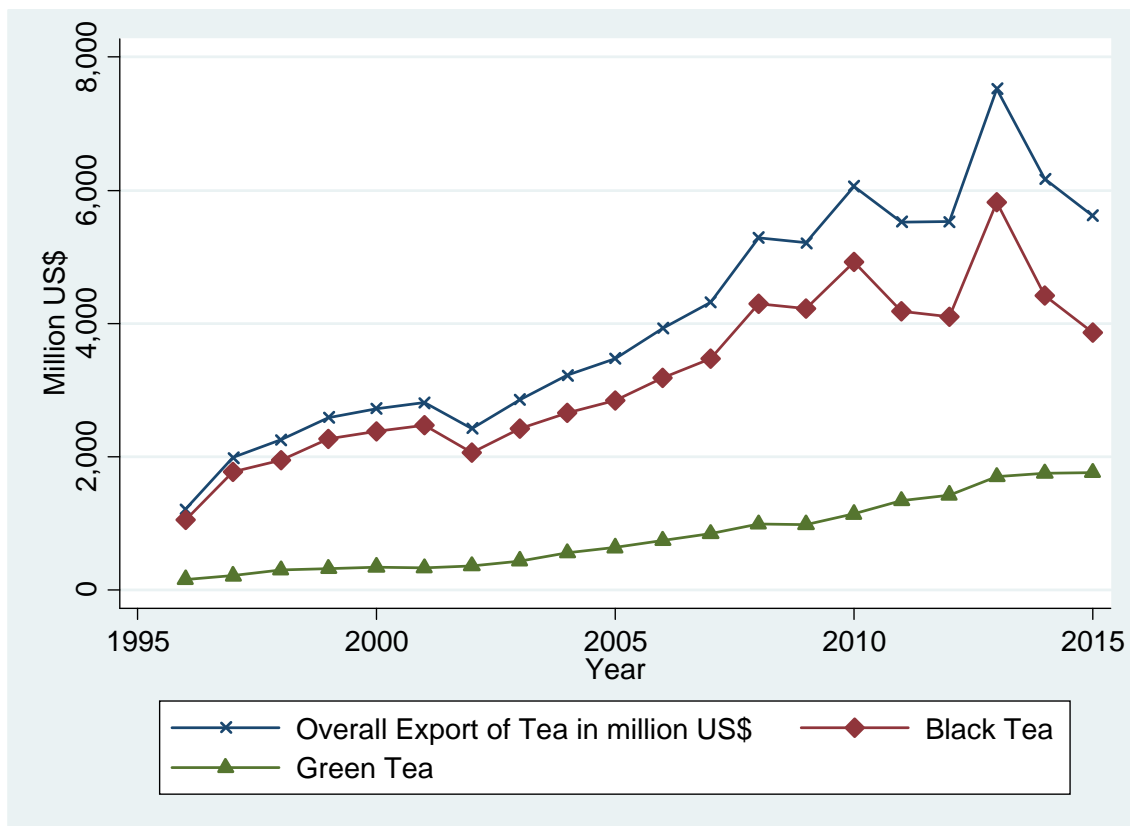
## *II. Tea Trade in Numbers*

Tea leaves trade has been expanding in the last 20 years. In 1996, the overall trade was US\$1.2 billion. This has increased to the US\$7.5 billion in 2013. Since then the overall trade in tea leaves has declined, reflecting the slowing down of world economy. Overall trend in the tea trade is defined by the performance of black tea as can be seen from Figure 1.

---

SPS, TBT, price and quantity measures, temporary trade measures, domestic taxes associated with these products, and others. The data is based on domestic regulations regardless of whether they are notified to WTO.

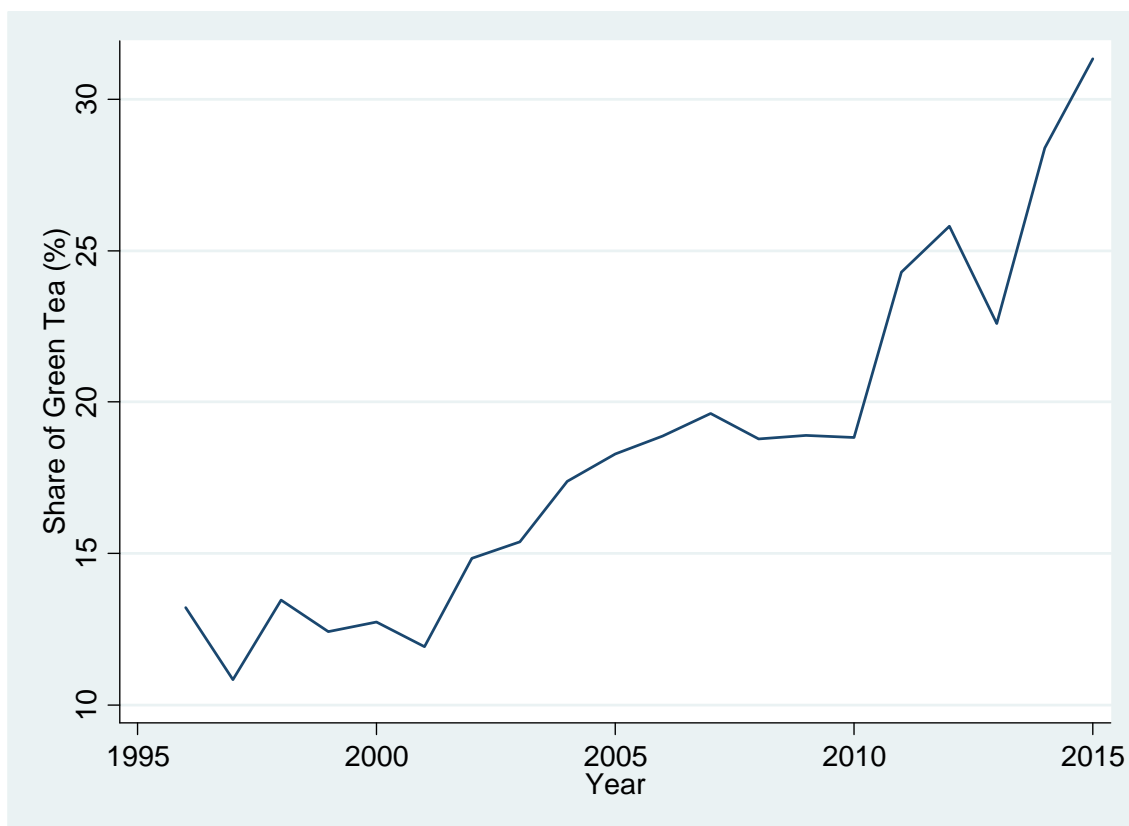
Figure 1: Overall trade in tea leaves



Source: created by authors using data from UN Comtrade

However, in recent years, the share of green teas has been increasing to reach 31% in 2015 (see Figure 2).

**Figure 2: Share of green tea leaves in overall trade**



Source: created by authors using data from UN Comtrade

Figure 3 shows the top 10 exporters of tea leaves since 2000. Sri Lanka has been the number one exporter of tea leaves, but surpassed by China by 2015. Growth of Chinese exports is quite tremendous and now China is the largest exporter of tea leaves. These two top countries are followed by India, Germany, Vietnam, Poland, the United Kingdom, Indonesia, Argentina, and the United States (see Table 1).

**Figure 3: Top 10 exporters of tea leaves**



Source: created by authors using data from UN Comtrade

Note: ARG: Argentina, CHN: China, DEU: Germany, GBR: United Kingdom, IDN: Indonesia, IND: India, KEN: Kenya, LKA: Sri Lanka, POL: Poland, USA: United States, VNM: Vietnam

**Table 1: Top 10 Exporters of Teas in 2015 (million US\$)**

Rank	Country	Trade Value
1	CHN	1,383.1
2	LKA	1,321.9
3	IND	677.9
4	DEU	217.1
5	VNM	212.4
6	POL	180.8
7	GBR	147.3
8	IDN	126.1
9	ARG	100.0
10	USA	90.8

Source: created by authors using data from UN Comtrade

In terms of black teas, Sri Lanka still is the largest exporter, followed by India, China, Poland, Germany, the United Kingdom, Argentina, Vietnam, Indonesia, and

Rwanda (see Figure 4). Sri Lanka's export is twice as large as India's (see Table 2). There are a number of European countries also appear in the ranking.

**Figure 4: Top 10 exporters of black tea**



Source: created by authors using data from UN Comtrade

**Table 2: Top 10 exporters of black tea in 2015 (million US\$)**

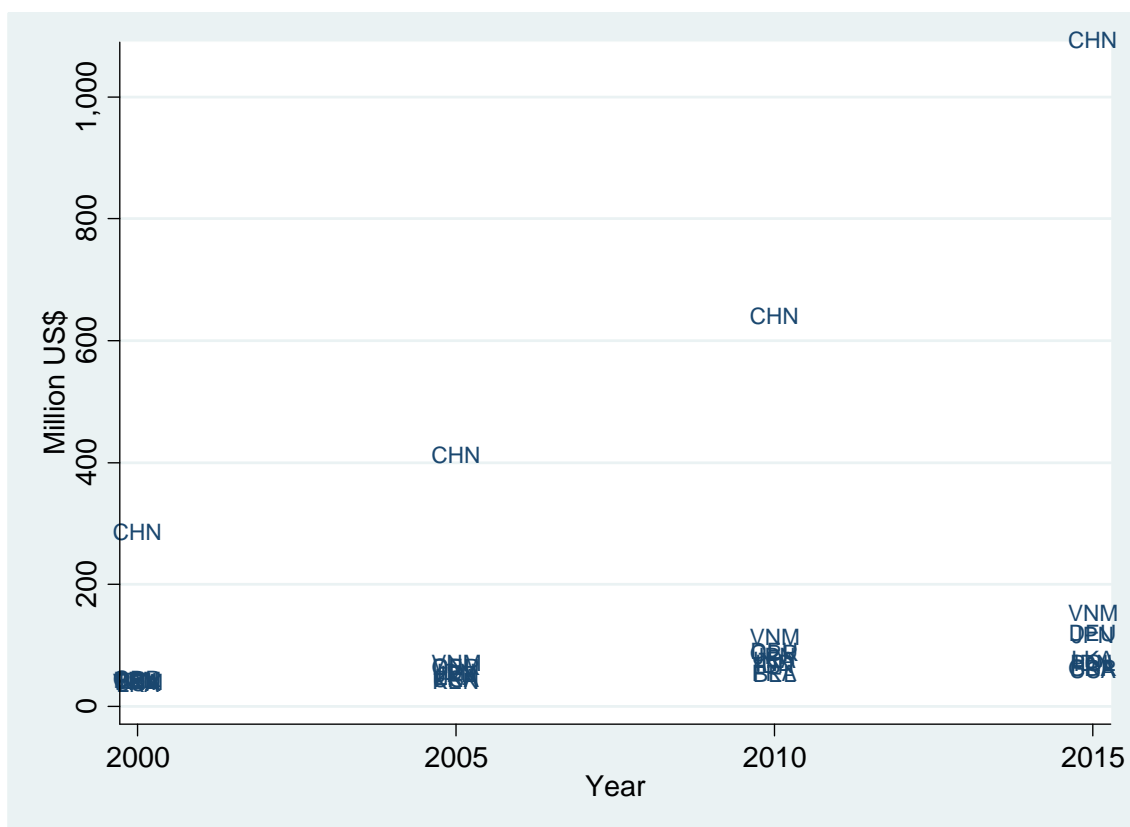
Rank	Country	Trade Value
1	LKA	1,277.0
2	IND	663.7
3	CHN	323.1
4	POL	141.8
5	DEU	129.4
6	GBR	117.8
7	ARG	95.8
8	VNM	92.3
9	IDN	88.4
10	RWA	67.4

Source: created by authors using data from UN Comtrade



In terms of green teas, China is the leading exporter, followed by Vietnam, Germany, Japan, Sri Lanka, Poland, Indonesia, France, the United Kingdom, and the United States (see Figure 5). The export volume of China is about nine times larger than the second exporter, Vietnam (see Table 3). Japan also ranks at the 4<sup>th</sup>.

**Figure 5: Top 10 exporters of green tea**



Source: created by authors using data from UN Comtrade

**Table 3: Top 10 exporters of green tea in 2015 (million US\$)**

Rank	Country	Trade Value
1	CHN	1,059.9
2	VNM	120.1
3	DEU	87.8
4	JPN	83.5
5	LKA	44.9
6	POL	39.0
7	IDN	37.6
8	FRA	29.5

9	GBR	29.4
10	USA	26.1

Source: created by authors using data from UN Comtrade

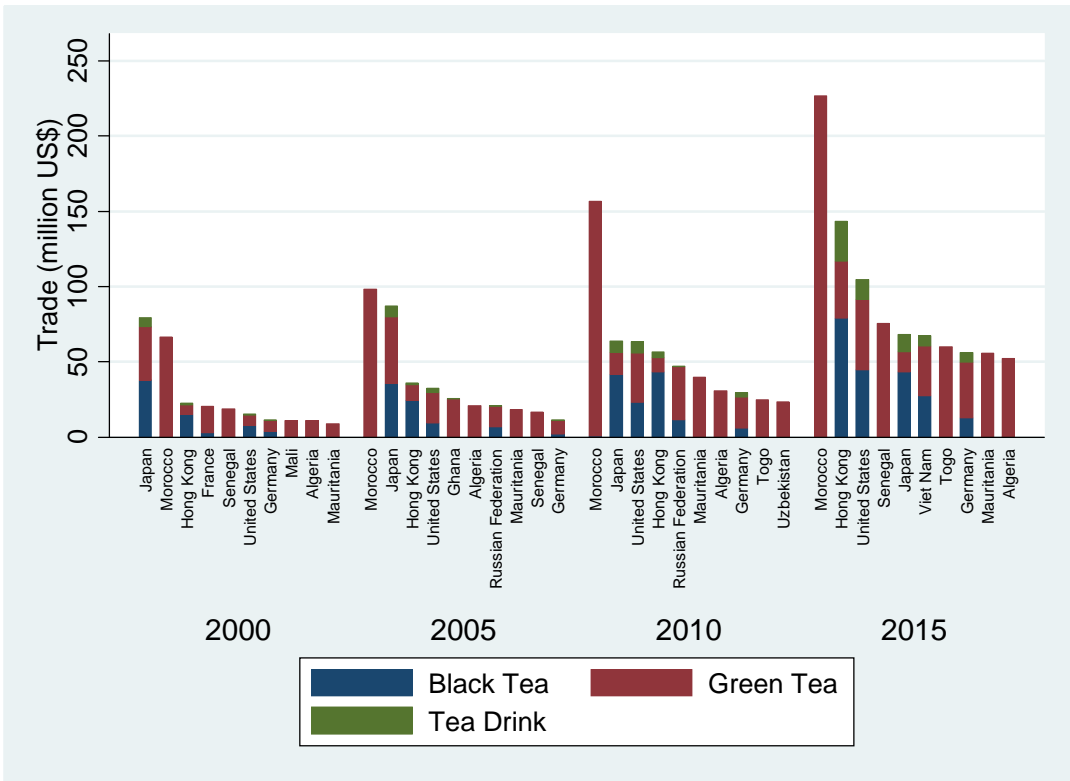
Clearly in East Asian region, China is an important exporter of teas, especially green tea. Other notable countries are Vietnam, Japan, and Indonesia. Overall Sri Lanka is the largest exporter of tea (mainly of black tea but increasing its exports of green tea in recent years).

Next, let us take a look at the major destinations of these teas exported by China, Vietnam, Japan, Indonesia, and Sri Lanka.

### **China**

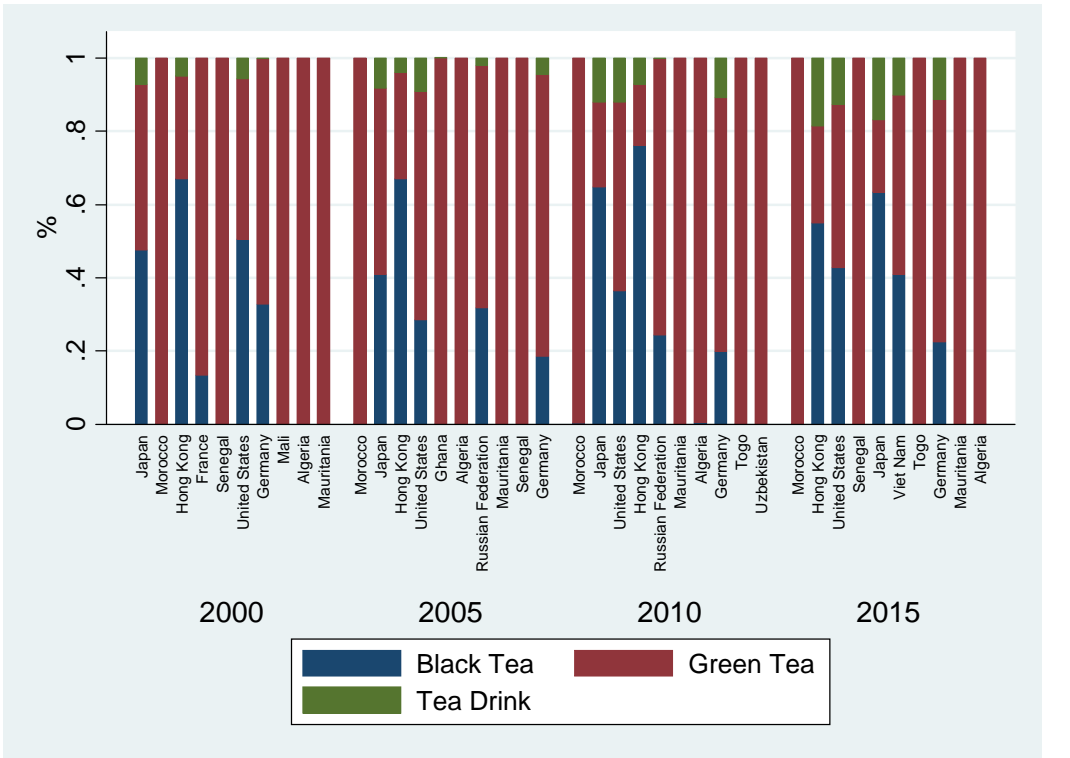
Figure 6 shows the major destination of tea products exports by China. In 2000, Japan was the top destination of tea exports, followed by Morocco and Hong Kong. However, in 2005, Morocco has become the largest export market for China and she has stayed so in 2015. The total export volume for Morocco in 2015 was US\$ 227 million. Exports to Hong Kong was about half of exports to Morocco with US\$143 million. What is interesting is that China has been expanding her exports of tea (only green tea) to countries in Africa such as Algeria, Mauritania, Senegal, and Togo in addition to Morocco. For other destination markets (East Asia, and advanced countries), exports of China consist of green teas, black teas, and tea drinks (see Figure 7).

**Figure 6: Exports of Tea products by China**



Source: created by authors using data from UN Comtrade

Figure 7: Composition of Tea Product Exports of China

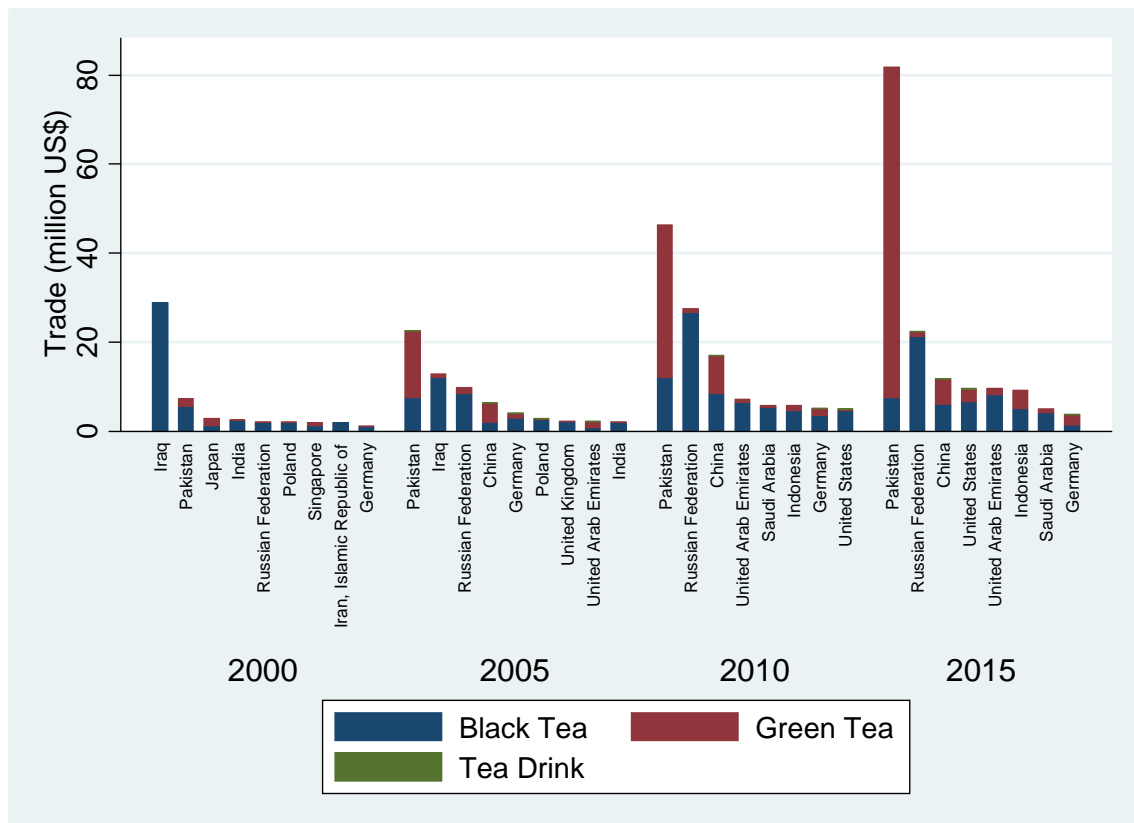


Source: created by authors using data from UN Comtrade

## Vietnam

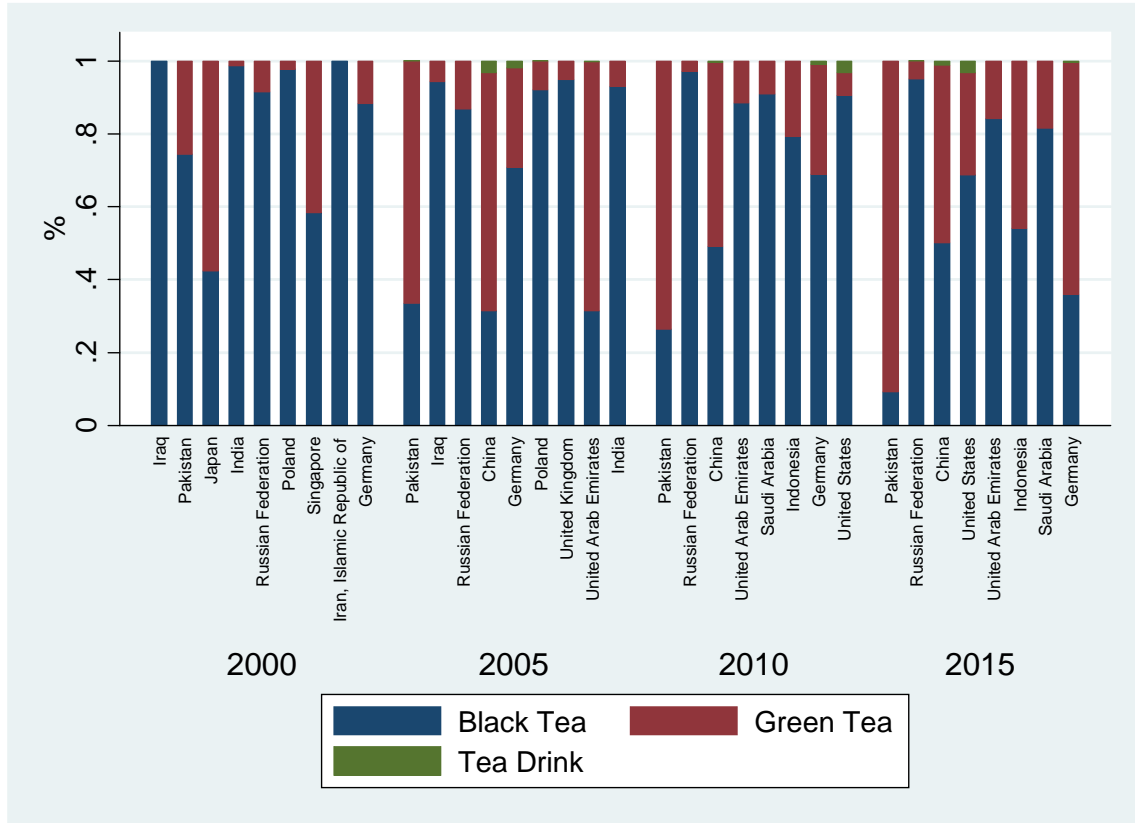
Figure 8 shows the major export markets for tea productions of Vietnam. The largest export market for Vietnam in 2000 was Iraq, consisted only of black teas (see Figure 9). In 2005, Pakistan has become the largest destination market for Vietnam. This seems to have been achieved by expansion of exports of green teas. In 2010, Russia has become the second largest market for Vietnam's black tea. In 2015, Pakistan is the by far the largest export market for Vietnam, amounting to US\$82 million. Gradually, the export of green teas is expanding and for all the markets in 2015, Vietnam exported both green and black teas, although to Russia, the share of green tea is still small.

**Figure 8: Exports of Tea products by Vietnam**



Source: created by authors using data from UN Comtrade

**Figure 9: Composition of Tea Product Exports of Vietnam**

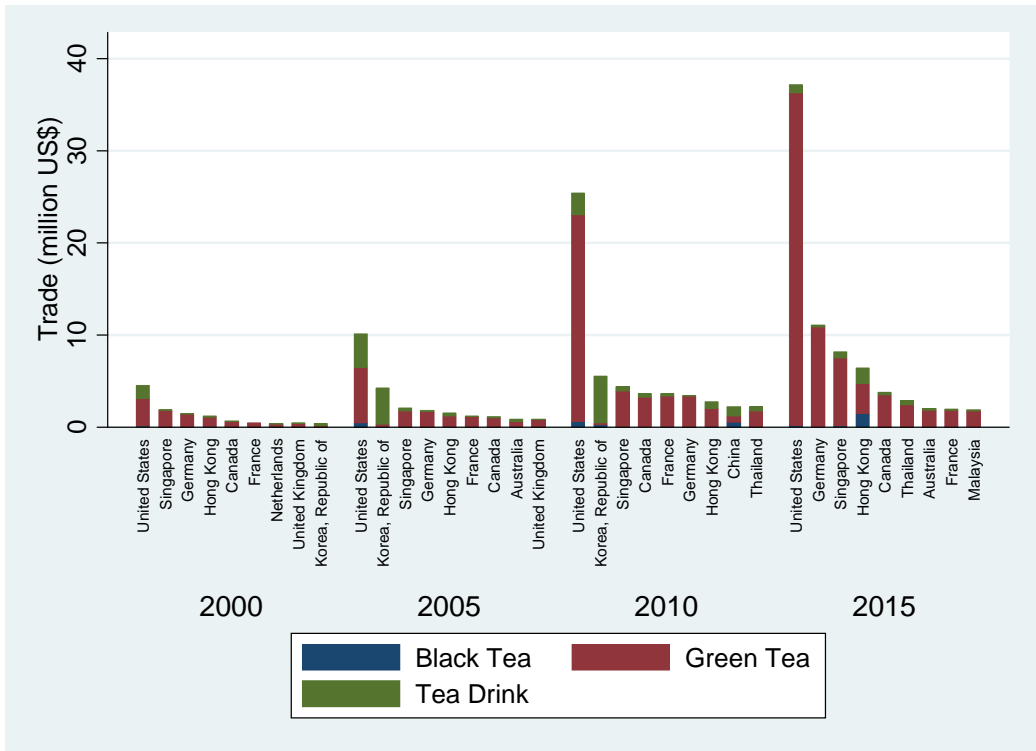


Source: created by authors using data from UN Comtrade

## Japan

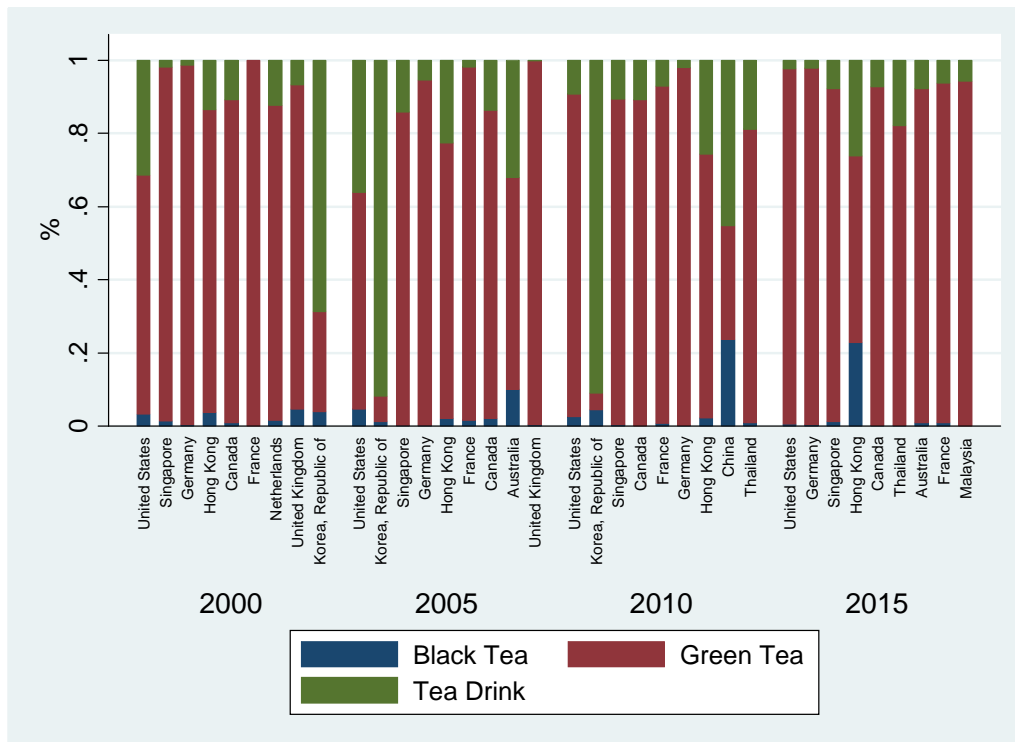
Figure 10 shows major export market of tea product exports by Japan. In 2000, the largest market for Japanese tea product export was the United States with US\$3 million. The US was still the largest market in 2015. The value of exports to the US was US\$36 million. Unlike the case of China and Vietnam, major destinations are all high income countries for Japan. In addition, Japanese exports are mainly green teas with small amount of tea drink products. This is especially so for exports to Korea in 2005 and 2010 where the bulk of exports was tea drinks rather than green teas (see Figure 11). Black tea exports are still quite small, although it accounted for 20% of exports to Hong Kong in 2015.

**Figure 10: Exports of Tea products by Japan**



Source: created by authors using data from UN Comtrade

**Figure 11: Composition of Tea Product Exports of Japan**

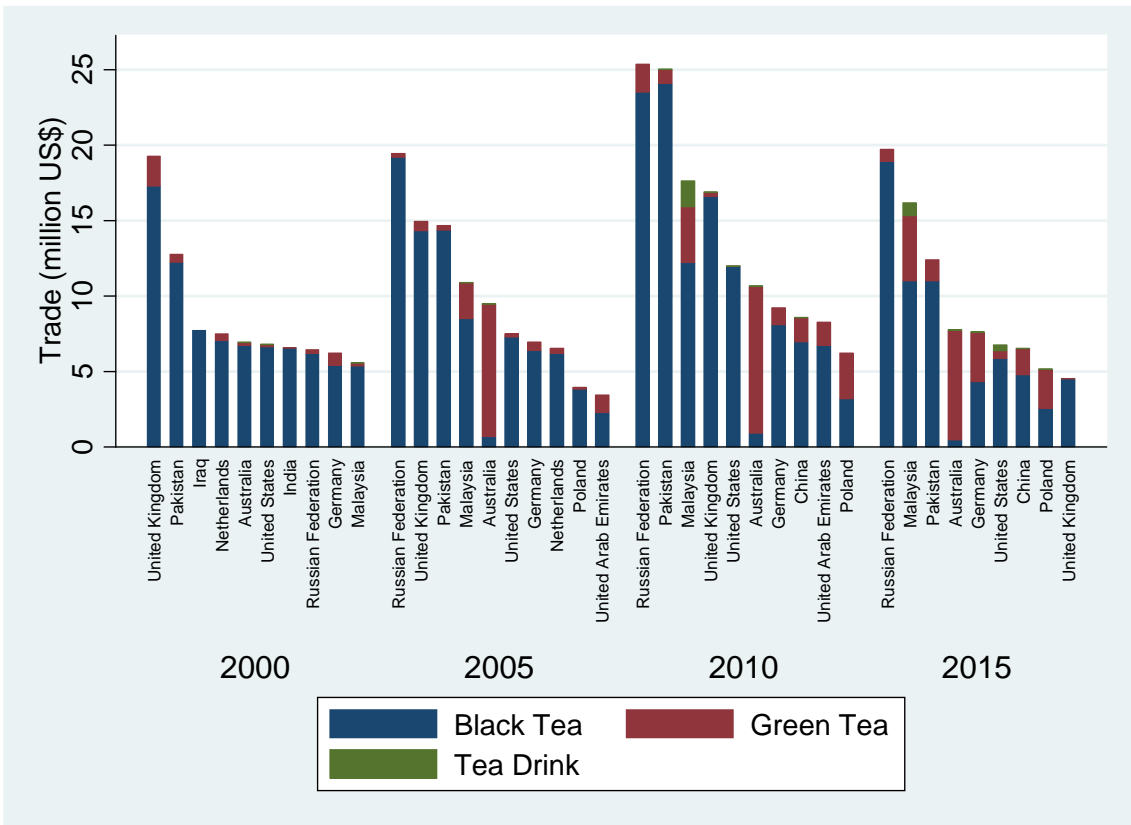


Source: created by authors using data from UN Comtrade

## Indonesia

Figure 12 shows major markets for Indonesia's tea product exports. In 2000, the UK was the largest market with US\$19 million, followed by Pakistan, Iraq, the Netherlands. Since 2005, Russia has become the largest destination market for Indonesia's tea products, mainly of black teas. Unlike other countries, exports of Indonesia's tea products are not expanding. In addition, the export markets did not see much change. However, since 2005, the exports of green teas are expanding. But the expansion seems mainly to come from replacement of black tea with green tea. What is interesting is the Australian market. In 2000, exports of tea products from Indonesia were mainly black tea. However, in 2005, this has changed dramatically. Green tea accounted for more than 90% of exports of teas from Indonesia to Australia (see Figure 13).

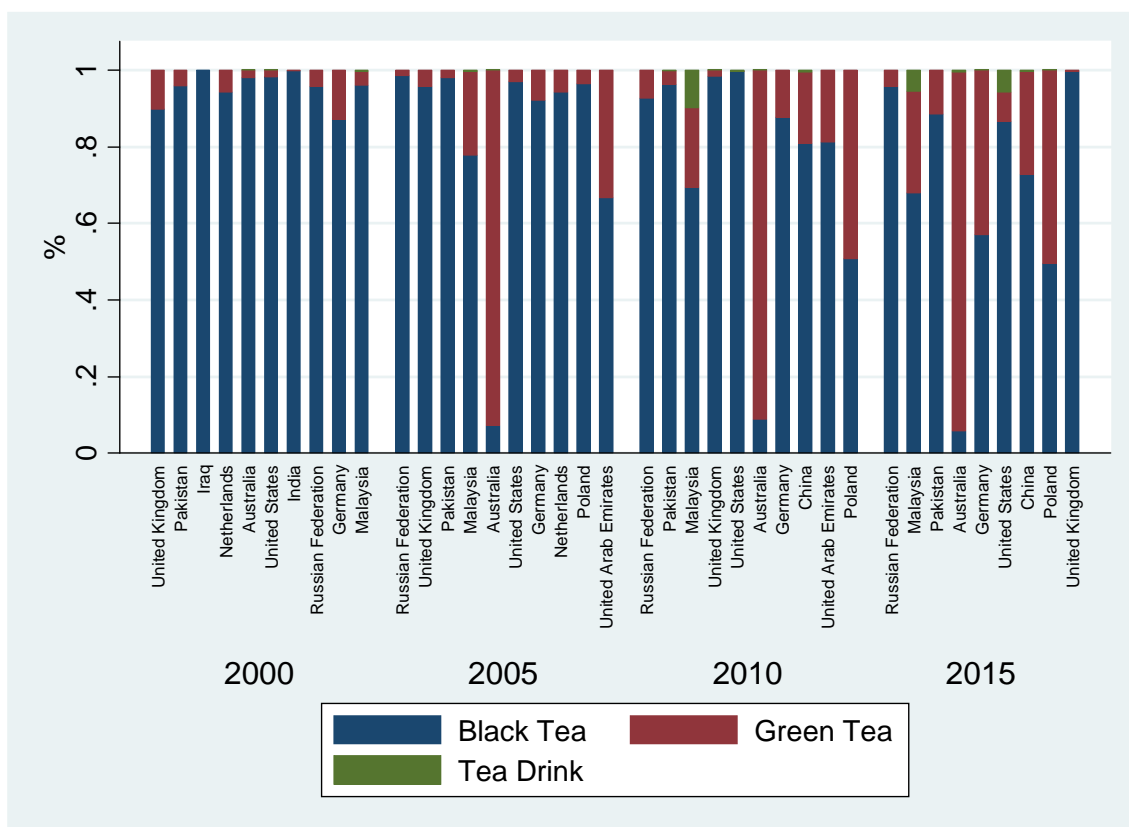
**Figure 12: Exports of Tea products by Indonesia**



Source: created by authors using data from UN Comtrade

**Figure 13: Composition of Tea Product Exports of Indonesia**



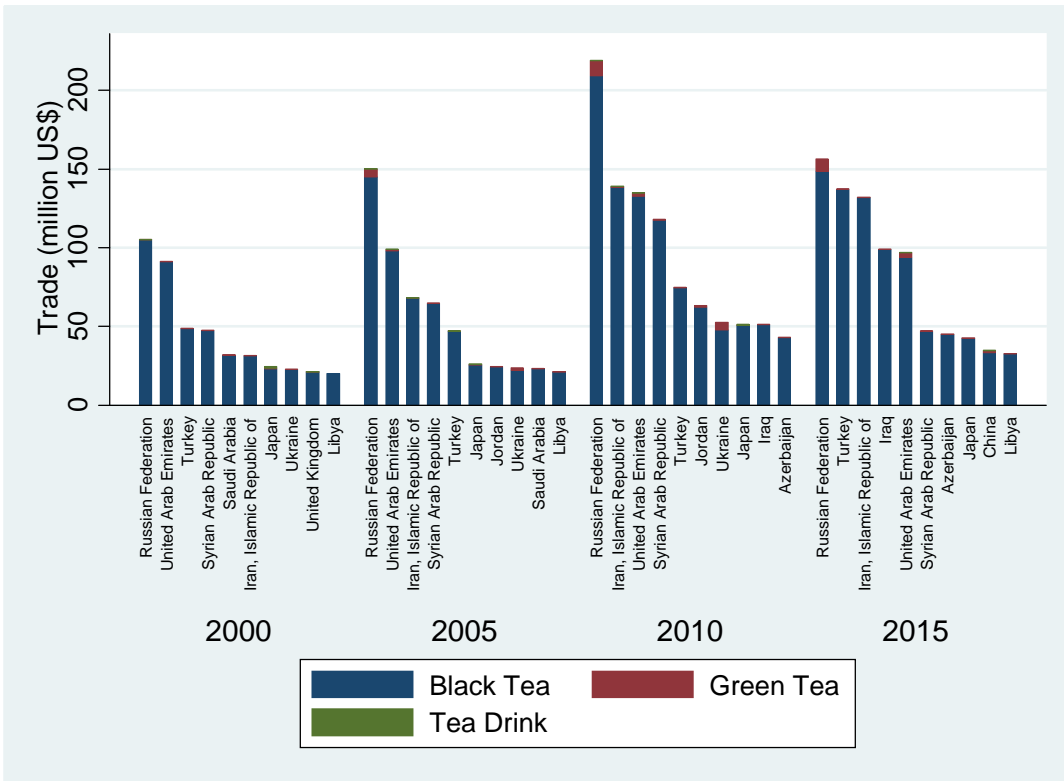


Source: created by authors using data from UN Comtrade

## Sri Lanka

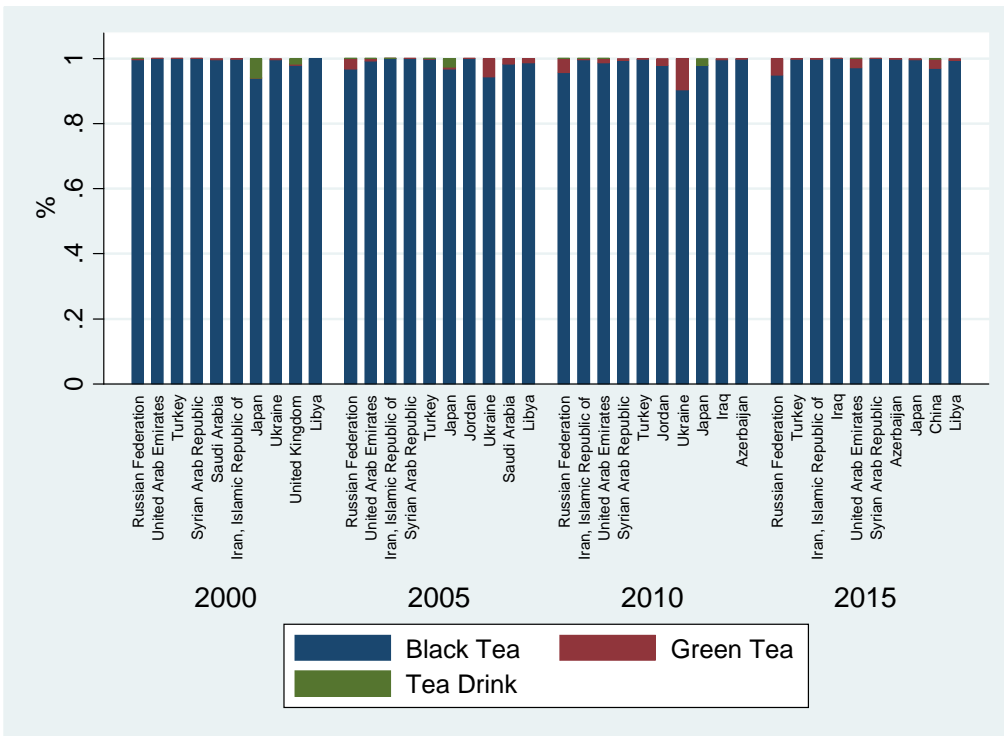
Figure 14 shows major destination market for Sri Lanka. Russia is the largest market for Sri Lanka's tea product exports. In 2000, exports to Russia were US\$105 million. This has increased to US\$156 million in 2015. Beside Russia, major markets tend to be countries in Middle East and some countries in East Asia. Notably, Japan has been a major market for Sri Lanka's tea export, although the amount is rather small. In 2000, it was US\$23 million and in 2015, US\$42 million. China is also becoming one of important market for Sri Lanka's tea export. Sri Lanka is a well-known for its black tea. However in recent years, the production and exports of green teas can be seen, although the share is still small (see Figure 15).

**Figure 14: Exports of Tea products by Sri Lanka**



Source: created by authors using data from UN Comtrade

Figure 15: Composition of Tea Product Exports of Sri Lanka



Source: created by authors using data from UN Comtrade

### ***III. Literature on Supply Chain Management, Compliance to Regulatory Measures, and Trade***

Supply chain management has played an important role in regulatory compliance, and quality control of products. A number of literatures examine supply chain management in different industries, both manufacturing and food industries including tea production. Definition and scope of supply chain management varies across literatures and some include only about supply chain, but others consider green or sustainable supply chains considering sustainability or the environment. This literature survey first attempts to overview multiple approaches to supply chain management. Then literature on supply chain management in food sector and tea production is reviewed.

The supply chains account for 50% of all trade (The Economist 2017, 11) and supply chain management and trade is closely interrelated. Successful supply chain management leads to keeping an access to regulated markets while trade help strengthen quality control of supply chains. Therefore, the second part of the literature survey focuses on the interaction between supply chain management and trade. Then implication of global supply chain for developing countries as well as small and medium enterprises (SMEs) is drawn from previous literature. For firms in developing countries, exportation to larger markets is a source of growth. Can firms upgrade products and skills through supply chains? How can be SMEs integrated into supply chains?

#### **Supply Chain Management**

Supply chain management has been recognized as a core competitive measure in globalization, and technological advances. Firms need to produce not only a quality product but also getting the products to customers in certain time, locations, delivery methods and quantities that they want. Handfield and Nichols (1998) define supply chain as,

*The supply chain encompasses all activities associated with the flow and transformation of goods from the raw materials stage (extraction), through to the end user, as well as the associated information flows. Material and information flow both up and down the supply chain.*

They also define supply chain management as,

*Supply chain management is the integration of these activities through improved supply chain relationships, to achieve a sustainable competitive advantage.*

Multiple literatures suggest that competitiveness of supply chain matters rather than that of a single firm. Croom, Romano and Giannakis (2000) discuss that companies will not seek to achieve cost reduction or profit improvement at the expense of their supply chain partners, but rather make the supply chain as a whole more competitive. Gold, Seuring and Beske (2010) also suggest that competition is more toward inter-supply chain management than inter-firm management and collaborative approach help improve supply chain management.

Although agreeing on the important role of supply chains, different academic field approach supply chain management in diversified ways and focuses of investigation vary. Literature survey by Croom, Romano and Giannakis (2000) shows diversity among definitions of supply chain management as well as areas of literature dealing with the issue. Their paper shows that the supply chain management literature covers strategic management, logistics, marketing, relationships/partnerships (of actors), best practices, and organizational behavior.

Case studies in multiple industries are presented in the past literature to examine supply chain structures. Choi and Hartley (1996) examine the auto supply chains for supplier selection and show quality and delivery is the most important factors for

selecting suppliers than price. Naylor, Naim and Berry (1999) present classification of supply chain structures depending on the characteristics of products. It uses an example of PC supply chain which is characterized as a highly variable product demand and show which part of the supply chains is stock holding point and how Just-In-Time system is applied so that supply chains can react to demand.

Supply chain management has been applied to both manufactured goods as well as food. However, some important characteristics are observed for agriculture and food products that are distinct from manufactured goods. For food supply chains, factors such as food quality and safety, and weather related variability play an important role (Salin 1998). Ahumada and Villalobos (2009) refer to limited shelf life of agro-food products, demand and price variability as characteristics affecting food supply chain. Lowe and Preckel (2004) suggest that agro-food supply chains have very long lead time and large supply and demand fluctuation. These characteristics makes the underlying supply chains from farm to fork more complex and harder to manage compared to other supply chains. Moreover, agro-food supply chains face more stringent regulation and requirement for food safety reasons. It is not easy to apply practices that have been applied to other products to food area.

Some literatures define production stages for food supply chains. Ahumada and Villalobos (2009) classify agro-food products into perishable such as fresh produce and non-perishable as grains, nuts, potatoes, and tea. Also four stages in supply chains of production, harvest, storage, and distribution are identified as decision making stages. Roth and others (2008) suggest while traditional food supply chains comprised of small scale and localized players with fragmented chains, modern supply chains have long reach from farm suppliers, farmers, consolidators/storage, processors, wholesaler/distributors, and retailers. Processors/manufacturers have extended reach to retailers.

With regard to geographical coverage, ITC (2011) reviews papers that deal with private standards and food supply chains and shows many literature deal with coffee, flowers, fresh fruits, and vegetables in Latin America and Africa with qualitative case studies.

## **Supply Chain Management and the Environment and Social Issues**

Supply chain management that deals with social and environmental issues is often called green supply chain management or sustainable supply chain management. There are multiple definitions offered but Bowen and others (2001) distinguish greening supply process which represents suppliers' taking into environmental consideration in production and product-based green supply which involves changes in product.

Interaction between supply chain management and sustainability issues is discussed in greening supply process literature. Carter and Easton (2011) investigate literature examining interaction between supply chain management and sustainability which is related to the area of social and environment through a cooperate social responsibility perspective. Seuring and Müller (2008) also conduct a literature review on supply chain management in the perspective of environmental and social issues and streamline 191 papers and categorizes into papers with environmental issues, with social issues and with both issues. Supply chain management for sustainable products aims at gaining competitive advantage in markets. Srivastava (2007) conducts literature review focusing on manufactured products and deal with green design, recycling and waste management. Hassini, Surti and Searcy (2012) also conduct literature survey and 29 journals from areas of economics, operations research, engineering, and business deal with the issue.

Solér, Bergström and Shanahan 2010 show Swedish food supply chains focusing on transmission of environmental information in supply chains. They suggest that suppliers at different stages of supply chains perceive transmitted environmental information in various ways. This creates barriers for whole supply chains to install consistent management.

Among the literature on greening supply process in which suppliers give environmental consideration, Penker (2006) examines food chains and ecological impact by focusing on Austrian bread production. Morris and Kirwan (2011) discuss the concept of ecological embeddedness and the relationship between producing food that satisfy food safety standards and protecting the environment. Linton, Klassen and Jayaraman (2007) examine literature on sustainable supply chains.

## **Global supply chains and trade**

Supply chains have been extended globally with trade. Roth and others (2008) state that pressure of cost reduction led to globalization of supply chains to import less costly supply globally, and to export by multinationals that have huge variety of products produced efficiently at low cost.

Interaction of supply chain and trade, especially literature take up case studies on upgrading supplier firms that are linked with headquarters through trade.

Gereffi (1999) discuss that organizational learning takes place to improve the position of firms in global supply chain and upgrading occurs to products that are organizationally related through the lead firms in global commodity chains. The paper identifies produce-driven supply chains and buyer-driven supply chains. Producer-driven supply chains are organized by manufacturers such automobile or aircraft and buyer-driven supply chains are coordinated by branded retailers or marketers. It provides a case study in dynamic changes of apparel supply chains that is considered as buyer-driven chains. It describes how Asian economies move from OEM to higher-value-added products, offshore sourcing, reorganizing supply chains.

For meeting demand for agricultural and food products in climate and seasonal cycle, food supply chains extend to multiple regions with different climate patterns. An expectation of fresh produce year-around availability lead to expansion of trade with Mexico, Chile and other South American countries in North America and an increase in trade with Spain, Turkey, North African countries for Northern European countries. The changes in demand and distribution patterns are expected to continue or even accelerate in the near future (Ahumada and Villalobos 2009). These moves involve an increase in trade of agro-food products.

Roth and others (2008) take up a food scare incident occurred in US. The recall of pet food produced in China reveals risks of global sourcing. The paper discusses that multilayered supply chains without traceability has caused the food scare and suggests measures to improve. To produce safe food and keep access to regulated markets, managing supply chains is inevitable. As trade connects countries with different culture

and norms for food production and consumption, they discuss the gap between producers and consumers in China who find lower price more important than safety and consumers in US who are willing to pay for quality.

### **Developing countries and SMEs**

Swinnen and Maertens (2007) discuss food supply chains in developing countries focusing on state-controlled supply chain management. For example, Kenyan Tea Development Cooperation (KTDA) controlled tea export in Kenya. Privatization and food safety demand by consumers shift the industry to form vertical coordination system through supply chains.

Gorton, Dumitrashko and White (2006) present a case study of a dairy firm in Moldova, a transition economy, to reorganize supply chain with small-scale producers to regain competitiveness. The case study firm faced information asymmetry at a procurement stage and it has procured from rural household and wasted milk as a larger portion was unusable due to cheating. The firm changed the procurement source from small-scale farmers to larger companies. Farmers still played important roles so that their contracts were revised annually with more flexibility so that market fluctuation can be reflected in quantity of procurement. Substandard milk was returned to producers. The firm installed test equipment at collecting stations, which contributed to reduction of counterfeit milk.

Hassini, Surti and Searcy (2012) find that rate of return on early adoption to sustainable supply chain management by SMEs is not encouraging although sustainable management is important in the long run. Ahumada and Villalobos (2009) claim that agro-food supply chains with larger firms are easier to adopt supply chain management observed in other products. Supply chains with small-scale and independent farmers have been transformed into supply chains with larger-scale firms. Lee (2008) suggests that buyer environmental requirements and support were positively linked to their SME suppliers' participation in green supply chain initiatives using South Korea firm survey.

Roth and others (2008) discuss that consolidation of supply chains by multinationals has led to commoditization which is characterized by undifferentiated products sourced globally, purchase with high volume and at low prices with



standardization. Commoditization has been promoted further with consumers who are willing to pay for various private standards for organic, non-GMO (genetically modified organisms), and others such as Fair Trade.

### **Tea Supply Chain and Market**

Black tea, oolong tea, green tea, and white tea is among the major kinds of tea. Tea supply chains for black tea are characterized by a very strong vertical integration of just a few multinationals (Unilever, Tata Tea, Mcleod Russel, James Finlay, John Keeles as major producers/processors, Unilever, Tata Tea, Van Rees, James Finlay as traders, and Unilever, Tata Tea, Twinings as packaging) . Multinational have more consolidated supply chains either moving up or down the chains to achieve economy of scale. Consequently markets tend to fall in hands of few multinationals (Roth and others 2008). And tea supply chain is one of these examples.

Tea market is described in The State of Sustainability Initiatives Review 2014 (Potts and others 2014). Top global tea producing countries are China, India, Sri Lanka, Kenya and Turkey. Supply chain face issues of pesticides for both food safety as well as the environment, agrochemicals for occupational health, habitat conversion due to establishment of plantation, as well as wages and poverty. There are private standard schemes such as Fair Trade and Rainforest Alliances. Commitment of sustainable production has been led by major manufacturers such as Tata, Unilever, and Twinings in tea production. Organic tea has gained an increasing market share. They examine different private standard schemes that tea producers choose and variations.

Raynolds and Ngcwangu (2010) examine how Fair Trade connect South African tea producers with American consumers and engages in empowerment, land reform, and sustainable development.

### **Food Rejection**

Roth and others (2008) deals with contamination of pet food that was produced in China and imported to the United States and shows some FDA's inspection records for plant imported from China. They found that many recalled food for contamination imported from Mainland China did not go through a single inspection. And FDI only

inspects 1% of imported food and does not inspect for nonorganic contaminants such as heavy metals and chemicals and pollution. Bovay (2016) examines the US food rejection using the data of the Food and Drug Administration Data from 2005 to 2013. It explains that FDI prioritizes and targets certain exporting countries and products that they inspect due to limited resources for inspection and uses risk-based criteria to choose shipment they inspect. And the top three categories in violation are seafood/seafood products, vegetable/vegetable products, and fruits/fruits products. The top three countries of violation is Mexico, India, and China. The report concludes that due to nonrandom nature of sampling, inferences cannot be applied for the dataset. Still it is clear that violation cases seem to recur among targeted products as well as countries.

#### ***IV. Concluding remarks***

This paper provided an overview of some of the issues facing tea industry around the world. Trade in tea leaves has been expanding although in the last few years, the trade value has shrunk by a considerable amount. The fluctuation of global tea trade seems to be influenced more by the trade of black teas. However, increasingly the trade in green teas has been seen in the data. Some countries such as Sri Lanka is now also started to export green teas alongside black teas. The regulations concerning food safety (and SPS in general) seems to be on the rise, especially since 2012. Whether this has an impact on the tea trade is an empirical question to be asked. In addition to the notification to WTO, another data set gathered by UNCTAD based on the domestic regulation also points to the fact that there is a proliferation of regulations concerning tea products around the world that applies equally to all countries. If we include these measures that applies only to certain countries, then the number will be even larger.<sup>3</sup> As the literature review points out, trade is largely organized by a supply chain. How the supply chain will adapt to the changing regulatory environment will depend on the nature of the supply chain. For instance, if they are tightly knit supply chain such as automotive supply chain, one can

---

<sup>3</sup> For any SPS that applies equally to all countries, there are also measures that apply only to certain countries reflecting the concerns on, for instance, specific infectious disease, etc.

imagine that the adaptation will be done as a collective action with all the firms within the supply chain. However, for other supply chain which are more loosely structured, it may be the case that only the able may be able to survive in the chain. If this is the case, then it will be a concern for firms in developing countries, especially to SMEs. Based on the work conducted in this paper, the next step will be to more systematically analyze the impact of the regulations on tea trade including rejections at the border as presented in Lei (2017) and link regulations to the structure of supply chains.

## Reference

- Ahumada, Omar and J. Rene Villalobos. 2009. "Application of Planning Models in the Agri-Food Supply Chain: A Review." *European Journal of Operational Research* 196(1):1-20.
- Bovay, John. 2016. "Fda Refusals of Imported Food Products by Country and Category, 2005–2013." Economic Information Bulletin EIB-151, Economic Research Center, United States Department of Agriculture, Washington, DC.
- Bowen, Frances E., Paul D. Cousins, Richard C. Lamming and Adam C. Farukt. 2001. "The Role of Supply Management Capabilities in Green Supply." *Production and Operations Management* 10(2):174-189.
- Carter, Craig R. and P. Liane Easton. 2011. "Sustainable Supply Chain Management: Evolution and Future Directions." *International Journal of Physical Distribution & Logistics Management* 41(1):46-62.
- Choi, Thomas Y. and Janet L. Hartley. 1996. "An Exploration of Supplier Selection Practices across the Supply Chain." *Journal of Operations Management* 14(4):333-343.
- Croom, Simon, Pietro Romano and Mihalis Giannakis. 2000. "Supply Chain Management: An Analytical Framework for Critical Literature Review." *European Journal of Purchasing & Supply Management* 6(1):67-83.
- Gereffi, Gary. 1999. "International Trade and Industrial Upgrading in the Apparel Commodity Chain." *Journal of International Economics* 48(1):37-70.
- Gold, Stefan, Stefan Seuring and Philip Beske. 2010. "Sustainable Supply Chain Management and Inter-Organizational Resources: A Literature Review." *Corporate Social Responsibility and Environmental Management* 17(4):230-245.
- Gorton, Matthew, Mikhail Dumitrashko and John White. 2006. "Overcoming Supply Chain Failure in the Agri-Food Sector: A Case Study from Moldova." *Food Policy* 31(1):90-103.
- Handfield, Robert B. and Ernest L. Nichols, Jr. 1998. *Introduction to Supply Chain Management*. Upper Saddle River, NJ: Prentice Hall.
- Hassini, Elkafi, Chirag Surti and Cory Searcy. 2012. "A Literature Review and a Case Study of Sustainable Supply Chains with a Focus on Metrics." *International Journal of Production Economics* 140(1):69-82.
- ITC. 2011. "The Impacts of Private Standards on Global Value Chains: Literature Review Series on the Impacts of Private Standards - Part I." International Trade Centre, Geneva.
- Lee, Su - Yol. 2008. "Drivers for the Participation of Small and Medium - Sized Suppliers in Green Supply Chain Initiatives." *Supply Chain Management: An International Journal* 13(3):185-198.
- Lei, Lei. 2017. "Effects of Standards on Tea Exports from Developing Countries: Comparison of China and Sri Lanka." mimeo, Institute of Developing Economies, Japan External Trade Organization, Chiba.

- Linton, Jonathan D., Robert Klassen and Vaidyanathan Jayaraman. 2007. "Sustainable Supply Chains: An Introduction." *Journal of Operations Management* 25(6):1075-1082.
- Lowe, Timothy J. and Paul V. Preckel. 2004. "Decision Technologies for Agribusiness Problems: A Brief Review of Selected Literature and a Call for Research." *Manufacturing & Service Operations Management* 6(3):201-208.
- Matsuzaki, Yoshiro. 2012. *World History of Tea (Nenpyou Cha No Sekaishi)*. Tokyo: Yasaka Shobo.
- Morris, Carol and James Kirwan. 2011. "Exploring the Ecological Dimensions of Producer Strategies in Alternative Food Networks in the Uk." *Sociologia Ruralis* 51(4):349-369.
- Naylor, J. Ben, Mohamed M. Naim and Danny Berry. 1999. "Leagility: Integrating the Lean and Agile Manufacturing Paradigms in the Total Supply Chain." *International Journal of Production Economics* 62(1-2):107-118.
- Penker, Marianne. 2006. "Mapping and Measuring the Ecological Embeddedness of Food Supply Chains." *Geoforum* 37(3):368-379.
- Potts, Jason, Matthew Lynch, Ann wilkings, Gabriel Huppé, Maxine Cunningham and Vivek Voora. 2014. *The State of Sustainability Initiatives Review 2014: Standards and the Green Economy*. Manitoba and London: International Institute for Sustainable Development (IISD) and the International Institute for Environment and Development (IIED).
- Raynolds, Laura T. and Siphelo Unathi Ngcwangu. 2010. "Fair Trade Rooibos Tea: Connecting South African Producers and American Consumer Markets." *Geoforum* 41(1):74-83.
- Roth, Aleda V., Andy A. Tsay, Madeleine E. Pullman and John V. Gray. 2008. "Unraveling the Food Supply Chain: Strategic Insights from China and the 2007 Recalls." *Journal of Supply Chain Management* 44(1):22-39.
- Salin, Victoria. 1998. "Information Technology in Agri-Food Supply Chains." *The International Food and Agribusiness Management Review* 1(3):329-334.
- Seuring, Stefan and Martin Müller. 2008. "From a Literature Review to a Conceptual Framework for Sustainable Supply Chain Management." *Journal of Cleaner Production* 16(15):1699-1710.
- Solér, Cecilia, Kerstin Bergström and Helena Shanahan. 2010. "Green Supply Chains and the Missing Link between Environmental Information and Practice." *Business Strategy and the Environment* 19(1):14-25.
- Srivastava, Samir K. 2007. "Green Supply-Chain Management: A State-of-the-Art Literature Review." *International Journal of Management Reviews* 9(1):53-80.
- Swinnen, Johan F. M. and Miet Maertens. 2007. "Globalization, Privatization, and Vertical Coordination in Food Value Chains in Developing and Transition Countries." *Agricultural Economics* 37:89-102.
- The Economist. 2017. "The Retreat of the Global Company". *The Economist*, 2017/01/28.