



Faculty of Economics and Business

**Determinants of Tea Trade Potential Between China and Selected
ASEAN Countries**

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**Doctor of Philosophy
2025**

Determinants of Tea Trade Potential Between China and Selected ASEAN Countries

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A thesis submitted

In fulfilment of the requirements for the degree of Doctor of Philosophy

Faculty of Economics and Business
UNIVERSITI MALAYSIA SARAWAK
2025

DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Malaysia Sarawak. Except where due acknowledgements have been made, the work is that of the author alone. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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Date: 12 September 2025

ACKNOWLEDGEMENT

I would like to take this opportunity to those who have contributed directly or indirectly to this thesis.

My sincere gratitude to the Centre for Graduate Studies, for the advice and support given during my period of study in Universiti Malaysia Sarawak.

First and foremost, I'd want to thank my supervisory committee, Prof. Dr. Mohammad Affendy bin Arip and Prof. Dr Puah Chin Hong, from selecting the research topic to the writing of this dissertation, you have always provided patient guidance and meticulous revisions. For their time and effort in mentoring me, it gave me hope that I could finally finish my thesis.

Second, I'd want to thank my sister, Wei Hanqing, for her academic guidance and my family for their unwavering support, which has been my greatest motivation. I also wish to thank all the friends and colleagues who offered care and assistance during my doctoral studies, as well as everyone who silently supported me along the way. Your encouragement and support have been vital in my pursuit of academic dreams.

Finally, I would like to thank the management of the Universiti Malaysia Sarawak for making it possible for me to complete my study here in Sarawak. Thank you all.

ABSTRACT

This study examines the trade potential and factors influencing China's tea exports to eight ASEAN countries (Cambodia, Indonesia, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam) using data from 1993 to 2022. The RCA model, an extended gravity model, and the PMG panel data analysis are used to explore trade dynamics, influencing factors, and developmental trends. Research highlights China's and Vietnam's strong comparative advantages in the tea trade, with China–Thailand trade showing increasing potential. In contrast, Malaysia, Singapore, the Philippines, and Cambodia exhibit weaker competitiveness, while Indonesia's competitiveness has declined. Key factors positively impacting trade include the GDPs, tea import volumes, and trade dependence of ASEAN countries, while geographical distance and the COVID-19 pandemic negatively affect trade. The trade potential analysis shows that the system has matured, with most ASEAN countries demonstrating indices close to or above 1, particularly Cambodia and Malaysia. Indonesia and Vietnam, however, show unrealized potential. Post-pandemic economic recovery, supported by cooperation and RCEP implementation, has strengthened trade potential. This study provides valuable insights into China's tea trade competitiveness, offering practical recommendations for optimizing regional trade policies and fostering integration.

Keywords: RCA Model, Gravity Model, Tea Trade, Trade Potential, PMG Panel Data Model

Faktor Penentu Potensi Perdagangan Teh antara China dan Negara ASEAN Terpilih

ABSTRAK

Kajian ini meneliti potensi perdagangan dan faktor-faktor yang mempengaruhi eksport teh China ke lahan negara ASEAN (Kemboja, Indonesia, Malaysia, Myanmar, Filipina, Singapura, Thailand dan Vietnam) menggunakan data dari tahun 1993 hingga 2022. Model Kelebihan Perbandingan (RCA), model graviti lanjutan, dan analisis data panel PMG digunakan untuk meneroka faktor-faktor yang mempengaruhi trend perdagangan tersebut. Hasil kajian ini mendapati kelebihan perbandingan yang kukuh antara China dan Vietnam, dengan perdagangan antara China dan Thailand menunjukkan potensi yang meningkat. Sebaliknya, Malaysia, Singapura, Filipina dan Kemboja menunjukkan daya saing yang lemah, manakala dengan Indonesia telah merosot. Faktor utama yang memberi kesan positif terhadap perdagangan termasuk KDNK negara ASEAN, jumlah import teh, dan tahap kebergantungan perdagangan. Sebaliknya, jarak geografi dan pandemik COVID-19 memberi kesan negatif terhadap perdagangan. Analisis potensi perdagangan menunjukkan bahawa sistem perdagangan telah matang, dengan kebanyakan negara ASEAN menunjukkan indeks yang hampir atau melebihi 1, terutamanya Kemboja dan Malaysia. Namun begitu, Indonesia dan Vietnam menunjukkan potensi yang masih belum kukuh. Pemulihan ekonomi pasca pandemik, yang disokong oleh kerjasama serantau dan pelaksanaan RCEP, telah mengukuhkan potensi perdagangan. Kajian ini menyediakan petunjuk daya saing perdagangan teh China, serta menawarkan cadangan praktikal untuk mengoptimumkan dasar perdagangan serantau dan memperkukuh integrasi.

Kata kunci: *Model RCA, Model Graviti, Perdagangan Teh, Potensi Perdagangan, Model Data Panel PMG*

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LIST OF ABBREVIATIONS

APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
BRI	Belt and Road Initiative
BRICS	Brazil, Russia, China, and South Africa
CAFTA	China-ASEAN Free Trade Area
CI	Competitiveness Index
EU	European Union
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GTA	Regional Trade Agreement
ITC	International Tea Committee
OLP	Overall Labor Productivity
PMG	Pooled Mean Group
RCA	Revealed Comparative Advantage
RCEP	Regional Comprehensive Economic Partnership
TI	Competitiveness Index
UNODC	United Nations Office on Drugs and Crime
VIF	Variance Inflation Factor
VR	Virtual Reality

CHAPTER 1

INTRODUCTION

1.1 Introduction

Chapter One introduces the tea industry, organized as follows. Section 1.2 provides background knowledge regarding tea production, focusing on the global tea industry. Section 1.3 presents the background of the Chinese tea industry. Section 1.4 elaborates on the paper's problem statement, while Section 1.5 presents the research objectives. The significance of this study is discussed in Section 1.6, and Section 1.7 provides an overview of the research framework.

This chapter provides a concise overview of the global tea industry. Using data from the Food and Agriculture Organization of the United Nations (FAO), the International Tea Committee, China Customs, and the China Tea Marketing Association, the chapter elucidates global and Chinese tea production, consumption, and trade circumstances. Against this backdrop, the background and status of China's tea export trade and the tea trade between China and ASEAN countries are introduced, presenting the research questions and study objectives. Finally, the significance and organizational structure of this research are outlined.

1.2 Study Background

Tea is one of the top three non-alcoholic beverages globally, cultivated in over 60 countries and consumed in more than 160 (Yang, 2019). With over two billion consumers, tea is widely regarded as a healthy beverage and is beloved worldwide (Cui & Ning, 2024). Recognizing its global significance, the UN General Assembly declared May 21st as

“International Tea Day” to highlight tea’s economic, social, and cultural importance and its role in sustainable agricultural development (Du, 2020).

Tea is also a key agricultural commodity in international trade. In 2022, global tea production was valued at over \$17 billion, with exports exceeding \$9.5 billion (Kajima et al., 2017; FAO, 2022). Smallholder farmers contribute around 60% of global output (Muench et al., 2021), making the industry vital for rural employment, poverty reduction, and food security, especially in developing countries. While traditional markets like the EU, US, and Russia show slower growth, rising demand from emerging economies in East Asia, Africa, Latin America, and the Near East is driving global tea consumption (FAO, 2022).

1.2.1 Current Global Tea Production

Tea plants flourish in warm, humid climates and are primarily cultivated in South and Central Asian regions between latitudes 20°N and 30°N (Lu, 2023). The global cultivation range now stretches from Sochi, Russia in the north to Misiones, Argentina in the south, with tea grown in over 60 countries (Chen, 2018; Xiao, 2018). As of 2023, the International Tea Committee (ITC) reports that 36 countries and regions across five continents produce tea, including 14 in Asia, 13 in Africa, three in Europe, four in South America, and two in Oceania.

Driven by rising global demand and advances in cultivation techniques, tea-growing areas have steadily expanded (Yang, 2017; Purkait et al., 2023). Over the past decade, global tea cultivation has increased by nearly 20%, with China, India, Vietnam, Myanmar, and Kenya seeing the most notable growth (Zhao et al., 2023). This expansion has brought positive outcomes, such as higher incomes for farmers, improved rural conditions, and broader agricultural development (FAO, 2022).

Despite a global economic slowdown, the tea industry-maintained stability in 2023 by sustaining production and trade. According to ITC, the global tea cultivation area reached 5.52 million hectares in 2023, a 3.76% increase from the previous year. Between 2011 and 2023, the total area under tea cultivation grew from 3.84 to 5.52 million hectares, reflecting consistent annual growth and the sector’s resilience.

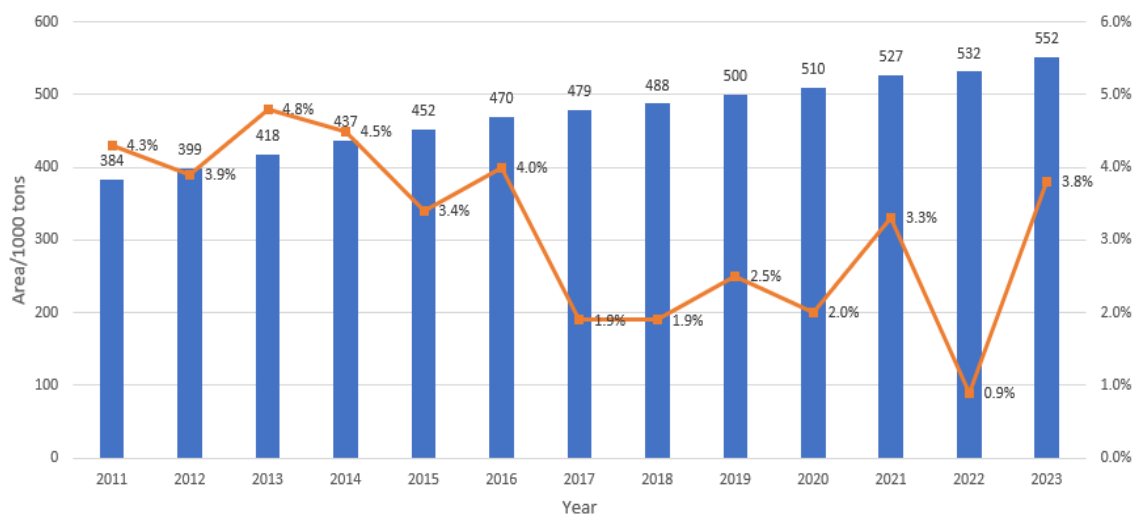


Figure 1.1: World Tea Plantation Area from 2011 to 2023

Source: International Tea Committee (2024).

As shown in Table 1.1, six countries had harvested tea cultivation areas exceeding 100,000 hectares globally in 2023. China leads with the largest harvested tea area at 2.96 million hectares, accounting for 37.97% of the global total. India follows with 619,000 hectares, representing 7.95%. Ranked 3rd to 6th are Sri Lanka (269,000 hectares), Kenya (228,000 hectares), Vietnam (112,000 hectares), and Indonesia (100,000 hectares). Other notable producers include Myanmar (93,000 hectares), Turkey (79,000 hectares), Bangladesh (57,000 hectares), and Uganda (44,000 hectares), as illustrated in Figure 1.2.

Table 1.1: Top Ten Countries in Global Harvested Tea Cultivation Area in 2023

Country name	China	India	Sri Lanka	Kenya	Vietnam	Indonesia	Myanmar	Turkey	Bangladesh	Uganda
cultivation area/10 thousand tons	295.6	61.9	26.9	22.8	11.2	10.0	9.3	7.9	5.7	4.4

Source: International Tea Committee (2024).

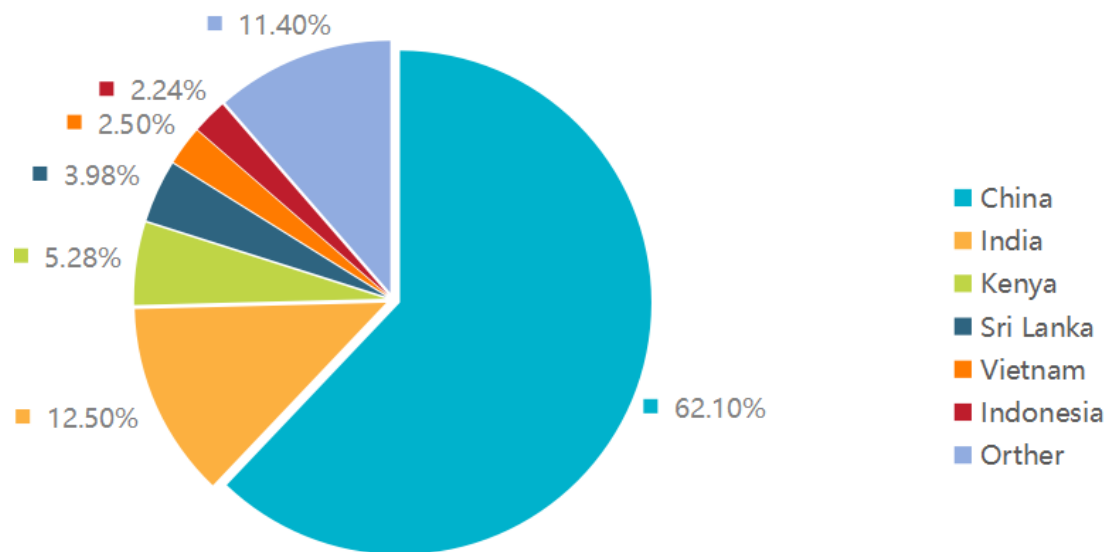


Figure 1.2: Proportion of Harvested Tea Cultivation Area in Major Tea-Producing Countries Worldwide in 2023

Source: International Tea Committee (2024).

Figure 1.3 shows that global tea production increased annually over the 12-year period, from 4.589 million tons in 2011 to 6.604 million tons in 2023. Global tea production has increased by 2.018 million tons from 2011 to 2023, a growth rate of 44.0%. In 2023, global tea production has reached 6.604 million tons, indicating a year-on-year increase of 1.9%.

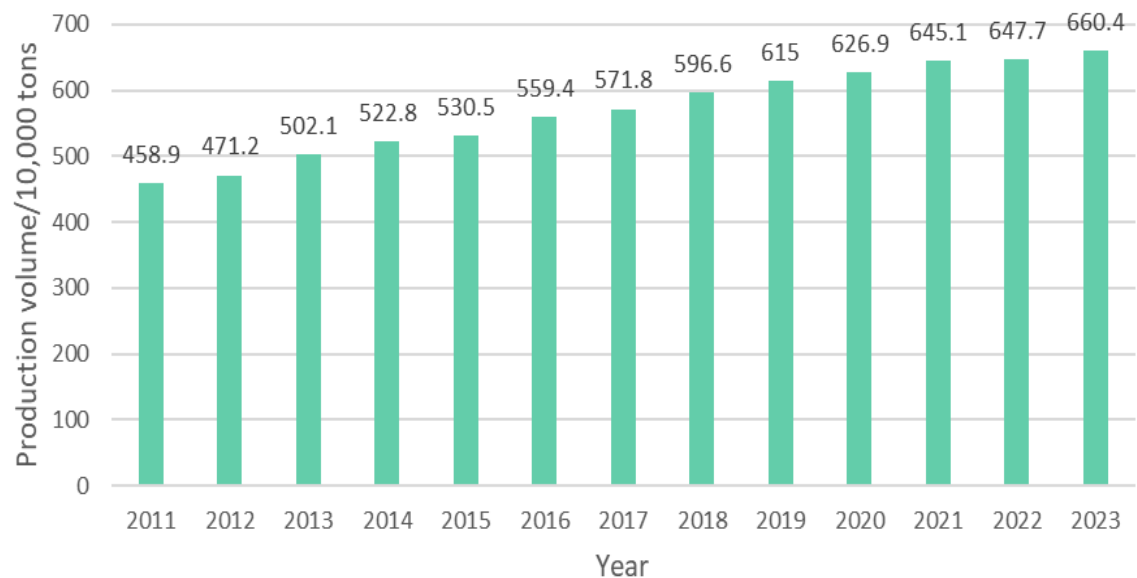


Figure 1.3: Global Tea Production from 2011 to 2023

Source: International Tea Committee (2024).

Table 1.2: Global Tea Production in 2023

Rank	Region	Production/10,000 tons	Proportion /%
1	Asia	571.00	86.46
2	Africa	79.80	12.08
3	South America	7.60	1.15
4	CIS countries	0.96	0.15
5	Oceania	0.87	0.13
Global total production		660.4	3.24

Source: International Tea Committee (2024).

In 2023, global tea production reached 6.604 million tons. Of this, tea production in Asia reached 5.71 million tons, accounting for 86.46% of the global total, an increase of 99,000 tons from 2022. Tea production in Africa was 798,000 tons, accounting for 12.08% of the global total, an increase of 26,000 tons from 2022. Tea production in South America was 76,000 tons, accounting for 1.15% of the global total, a decrease of 3,070 tons from 2022. Tea production in the CIS countries totaled 9,620 tons, accounting for 0.15%, while

Oceania produced 8,700 tons, accounting for 0.12% (Table 1.2). China's tea production reached 3.339 million tons, accounting for 50.56% of the global total, ranking first. Next is India, with a production of 1.37 million tons.

1.2.2 Global Tea Consumption

Ongoing research on the health benefits of tea by both domestic and international experts, along with increased global promotion, has contributed to a steady rise in tea consumption worldwide. Today, tea is consumed in over 160 countries and regions. Between 2002 and 2023, global tea consumption grew from 2.991 million tons to 6.212 million tons—an increase of 107.69%, with an average annual growth rate of 3.54%.

According to the International Tea Committee, global tea consumption reached 6.212 million tons in 2023, up by 3,000 tons from the previous year. On the supply side, the market structure remains stable, with China maintaining its leading position by producing 3.181 million tons (49% of global output), of which about 88% is consumed domestically. India, the second-largest producer, generated 1.365 million tons, exporting less than 17% of its total. Other major producers and exporters include Kenya (353,000 tons), Sri Lanka (251,000 tons), Vietnam (174,000 tons), Indonesia (125,000 tons), and Turkey (246,000 tons), which primarily serves its domestic market.

In terms of per capita consumption, Turkey ranks first globally as of 2023 with 3.16 kg per person annually, followed by Libya (2.63 kg) and Morocco (2.17 kg), reflecting tea's cultural significance in these countries.

As the world transitions into a post-pandemic era, global tea production and trade are stabilizing. With growing awareness of tea's health benefits, global demand is expected

to continue rising, potentially leading to a gradual increase in tea prices. However, medium-term trade stability may face threats from protectionism, financial volatility, and climate change (Dong, 2021).

To ensure sustainability, stakeholders must prioritize market transparency and the economic resilience of the supply chain, especially for the 60% of global tea producers who are smallholders (FAO, 2022). Ensuring that these farmers earn enough to cover production costs and household needs is critical. In response, many major tea-producing countries are actively working to boost domestic consumption, tap into emerging markets, and drive growth through innovation and product diversification (Cao et al., 2023).

1.2.3 Global Tea Trade Scenario

1.2.3.1 Export Trend

Affected by the sustained global economic downturn and severe disruptions in international trade and logistics, the global tea export volume has had a declining trend in 2023.

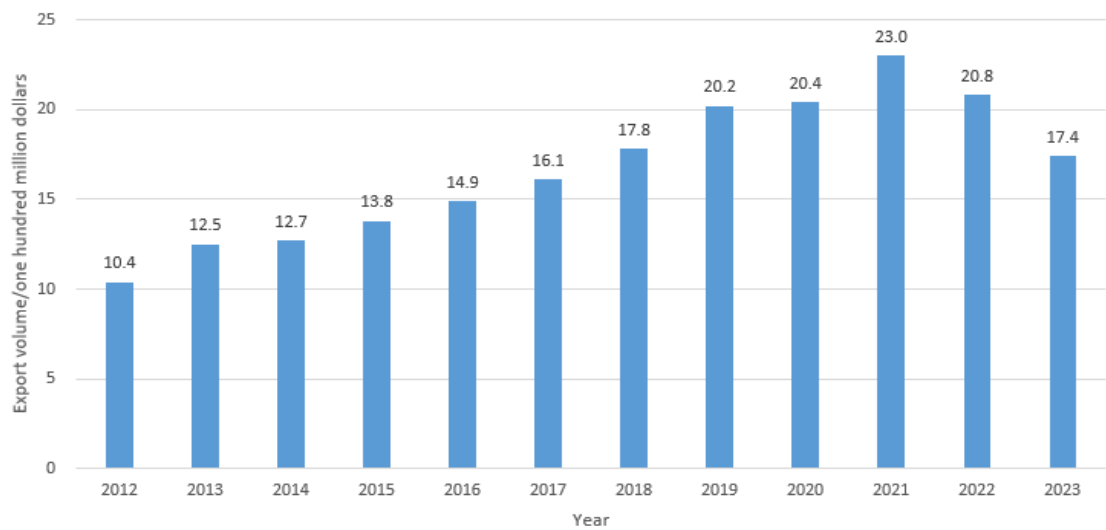


Figure 1.4: Global Tea Export Value, 2012-2023

Source: International Tea Committee (2024).

Figure 1.4 illustrates the global tea export value from 2012 to 2023. Over this period, the export value showed an overall upward trend, with fluctuations in recent years. Starting at \$1.04 billion in 2012, the value steadily increased, reaching \$2.30 billion in 2021, marking the peak. Following this, there was a decline, with the export value dropping to \$2.08 billion in 2022 while decreasing further to \$1.74 billion in 2023. While the long-term trend indicates growth, recent years highlight a downturn in global tea export performance.

Table 1.3 presents the top 10 countries/regions by tea export value in 2023. China led the global tea export market with an export value of \$17.4 billion, accounting for 23.8% of the total. Sri Lanka and Kenya followed, with export values of \$12.8 billion and \$12.0 billion, contributing 17.5% and 16.5%, respectively.

Table 1.3: Top 10 Countries or Regions by Export Value in 2023

Rank	Country	Export Value/billion US dollars	Proportion/%
1	China	17.4	23.8
2	Sri Lanka	12.8	17.5
3	Kenya	12.0	16.5
4	India	7.0	9.7
5	Poland	2.4	3.2
6	Germany	2.3	3.2
7	Japan	2.1	2.9
8	Vietnam	1.9	2.5
9	England	1.2	1.7
10	Netherlands	1.1	1.6
11	Others	12.8	17.5

Source: International Tea Committee (2024).

India ranked fourth at \$7.0 billion (9.7%). Poland and Germany, with export values of \$2.4 billion and \$2.3 billion, respectively, each accounted for 3.2%. Other notable exporters include Japan (\$2.1 billion, 2.9%) and Vietnam (\$1.9 billion, 2.5%), followed by

England (\$1.2 billion, 1.7%) and the Netherlands (\$1.1 billion, 1.6%), which held smaller shares. The “Others” category, including smaller exporting countries and regions, accounted for \$12.8 billion (17.5%), highlighting the diverse contributors to the global tea export market.

In 2023, Sri Lanka’s tea export value reached \$1.28 billion, representing a 3.6% year-on-year increase. The export price of Sri Lankan tea was \$5,372.9 per ton, a 7.7% rise compared to the previous year, continuing the growth trend of the prior year. In terms of quantity, Sri Lanka’s tea exports in 2023 totaled 238,000 tons, a 3.8% decrease year-on-year, continuing the decline from the previous year. From 2012 to 2023, Sri Lanka’s tea export quantity experienced an average annual decline of 0.4%. Initially rising, it peaked in 2014 before decreasing (Figure 1.5).

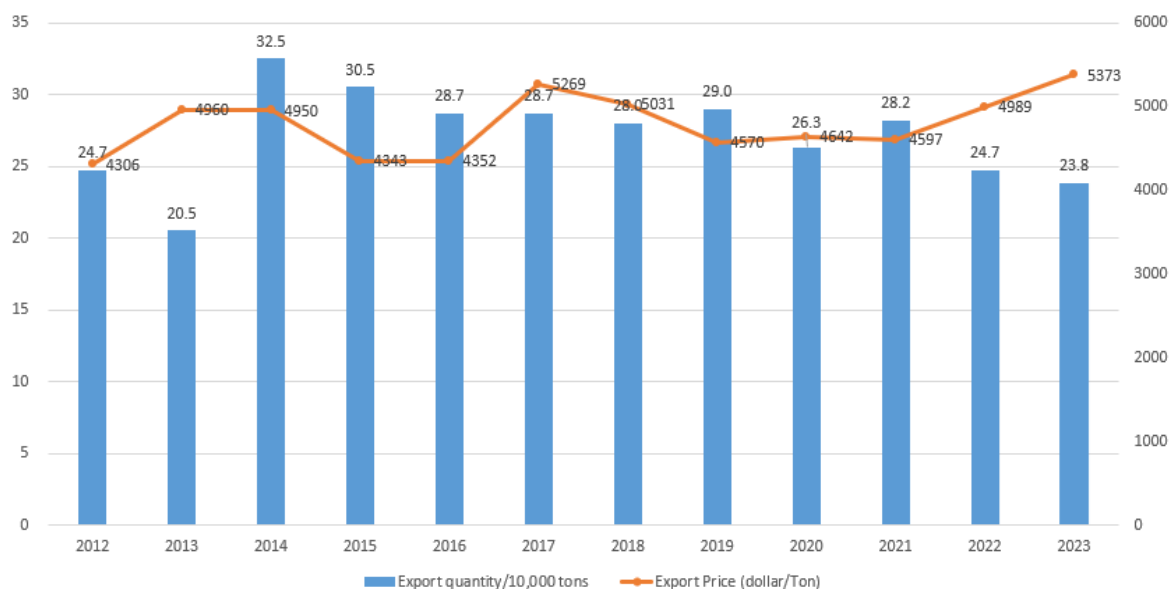


Figure 1.5: Sri Lanka’s Tea Export Prices and Quantities, 2012-2023

Source: International Tea Committee (2024).

In 2023, Kenya's tea export value reached \$1.20 billion, a 13.0% year-on-year decrease, failing to maintain the previous year's growth trend. In the same year, Kenya's tea export price was \$2,596.5 per ton, a 3.5% year-on-year increase, marking the third consecutive year of growth. From 2012 to 2023, Kenya's tea export price experienced an average annual decline of 1.8%, initially decreasing before increasing, with the lowest point in 2020. In terms of quantity, Kenya's tea exports in 2023 totaled 464,000 tons, a 16.0% year-on-year decrease, marking the third consecutive year of decline (Figure 1.6).

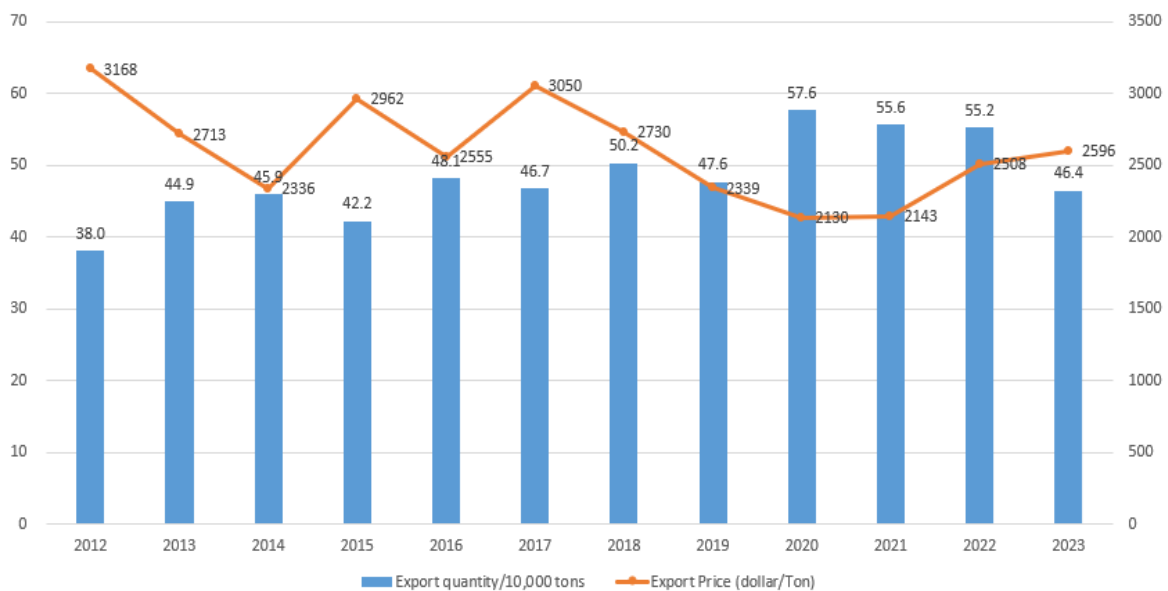


Figure 1.6: Kenya's Tea Export Prices and Quantities, 2012-2023

Source: International Tea Committee (2024).

Sri Lanka and Kenya are key players in the global tea export market, each occupying a significant position with distinct strategies and market orientations. Sri Lanka primarily targets the premium market, achieving a total tea export value of \$1.28 billion in 2023, an increase of 3.6% year-on-year. Its export price reached \$5,372.9 per ton, a 7.7% increase, reflecting strong brand competitiveness and value-added capabilities. Although

Sri Lanka's export volume decreased by 3.8% to 238,000 tons, its high-value strategy ensures a leading position in the global tea market.

In contrast, Kenya relies heavily on large-scale production to meet the demands of the mass market. In 2023, Kenya's tea export value stood at \$1.20 billion, a 13.0% year-on-year decrease. Although the export price increased by 3.5% to \$2,596.5 per ton, the export volume dropped sharply by 16.0% to 464,000 tons, resulting in a significant decline in market share and total export value. This highlights the vulnerability of Kenya's low-price, high-volume model in the face of global market fluctuations.

Overall, Sri Lanka has successfully established itself as a premium tea exporter, leveraging product quality and branding, while Kenya must address challenges related to volume decline and market positioning by optimizing its product structure and exploring value-added strategies to sustain competitiveness in the global tea market.

1.2.3.2 Import Trend

Figure 1.7 shows the global tea import value from 2012 to 2023, revealing fluctuations over this period. Beginning at \$6.90 billion in 2012, the import value steadily increased, peaking at \$7.28 billion in 2017, reflecting growing global demand for tea. However, the market experienced fluctuations after 2017, dropping to \$6.90 billion in 2020, likely influenced by global disruptions such as the COVID-19 pandemic. A brief recovery occurred in 2021, with imports rising to \$7.19 billion, but it was followed by a sharp decline to \$6.57 billion in 2023, marking the lowest value in the 12-year period.

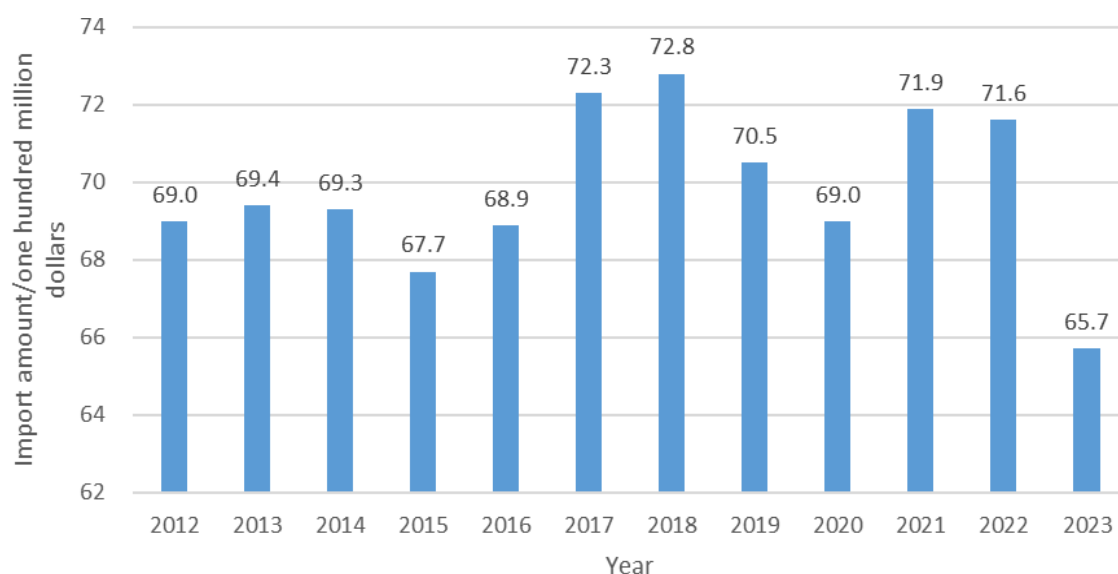


Figure 1.7: Global Tea Import Value, 2012-2023

Source: International Tea Committee (2024).

Over the long term, the data indicates an overall decline in tea import values, particularly in recent years, highlighting challenges such as weakened demand, economic slowdowns, and market competition.

Table 1.4 shows that in 2023, the top ten countries/regions for global tea import value were Pakistan, the United States, Egypt, the United Kingdom, Russia, the UAE, Germany, Morocco, Iraq, and Hong Kong (China). Pakistan ranks first in import value, reaching \$590 million, a year-on-year increase of 7.9%, accounting for 8.9% of the total share. Russia and the United Arab Emirates share the fifth position, with import values of \$2.8 billion each, accounting for 4.3%. Germany ranks seventh with \$2.3 billion (3.5%), followed by Morocco with \$2.1 billion (3.2%). Iraq is ninth with \$2.0 billion (3.0%), and Hong Kong (China) completes the top ten with \$1.8 billion, comprising 2.7% of the global total. Collectively, these top ten countries and regions account for a significant portion of the \$65.7 billion global tea import value of 2023.

Table 1.4: Top 10 Countries or Regions by Global Tea Import Value in 2023

Rank	Country	Import Value/100 million US dollars	Proportion/%
1	Pakistan	5.9	8.9
2	United States	5.2	7.9
3	Egypt	3.1	4.7
4	United Kingdom	3.1	4.7
5	Russia	2.8	4.3
6	the United Arab Emirates	2.8	4.3
7	Germany	2.3	3.5
8	Morocco	2.1	3.2
9	Iraq	2.0	3.0
10	Kong Hong (China)	1.8	2.7
Global Total Import Value		65.7	47.2

Source: International Tea Committee (2024).

In 2023, the global tea industry experienced changes in production, export, and import. Production saw a slight increase, export volumes remained relatively stable, and import volumes decreased slightly. These figures display the current state and development trends of the global tea industry.

1.2.4 Background of Tea Production in China

China, recognized as the birthplace of tea and the origin of global tea production and cultural dissemination (Qiu, 2011), holds a central position in the world tea industry. As the largest tea producer and home to the world's most extensive tea-drinking population, tea is deeply woven into daily life and national identity. It contributes significantly to increasing farmers' incomes, generating foreign exchange, and enhancing ecological sustainability (Wang, 2022). From the ancient tale of Shennong tasting herbs to modern-day "tea diplomacy" by Chinese leaders, tea has become both a cultural symbol and a diplomatic tool, showcasing China's rich heritage to the world.

China’s diverse ecological environment and multi-ethnic traditions have nurtured six major tea categories—green, black, yellow, white, oolong, and dark tea—along with a wide range of derivative products including bagged tea, instant tea, tea-based foods, additives, and daily necessities (Sheng, 2017). It is also the only country that produces all six categories, reflecting its depth in tea innovation and cultural continuity (Wang, 2011).

Tea production is widespread across more than 20 provinces and over 1,000 cities and counties, such as Zhejiang, Fujian, Yunnan, Sichuan, and Hunan, among others. According to the National Bureau of Statistics of China, the total area under tea cultivation reached 3.43 million hectares in 2023, an increase of 100,000 hectares from the previous year, marking a 3.0% annual growth rate. This represents 62.6% of the total global tea plantation area, underscoring China’s dominant role in the global tea industry (Table 1.5).

Table 1.5: Total Tea Plantation Area in China in 2023 (Unit: Hectares)

Province	2023	Ranking	2022	Change %
Jiangsu	32,840	0.96	34,000	-3.41
Zhejiang	207,800	6.05	207,000	0.39
Anhui	213,333	6.21	205,013	4.06
Fujian	245,333	7.15	234,700	4.53
Jiangxi	123,333	3.59	117,133	5.29
Shandong	35,400	1.03	27,007	31.08
Henan	143,333	4.17	116,740	22.78
Hubei	376,000	10.95	372,020	1.07
Hunan	220,000	6.41	207,213	6.17
Guangdong	99,680	2.90	99,533	0.15
Guangxi	103,467	3.01	101,153	2.29
Hainan	2,413	0.07	2,373	1.69
Chongqing	72,333	2.11	56,800	27.35
Sichuan	398,667	11.61	403,587	-1.22
Guizhou	466,667	13.59	472,227	-1.18
Yunnan	513,513	14.96	504,613	1.76
Shanxi	167,060	4.87	157,153	6.3
Gansu	12,000	0.35	12,000	0
Total	3,433,200		3,330,300	3.09

Source: China Tea Marketing Association.

China’s main tea cultivation provinces include Yunnan, Guizhou, Sichuan, Hubei, Fujian, and Hunan. Yunnan Province is the largest, reaching 513,513 hectares in 2023, accounting for approximately 15% of the total. Guizhou (466,666.67 hectares, 13.59%), Sichuan (398,666.67 hectares, 11.61%), and Yunnan show slight growth (1.76%), while Guizhou and Sichuan show slight declines of -1.18% and -1.22% , respectively. Hubei follows with 376,000 hectares (10.95%), reflecting a moderate increase of 1.07%. Significant growth is observed in Shandong (35,400 hectares, 31.08%), Henan (143,333.33 hectares, 22.78%), and Chongqing (72,333.33 hectares, 27.35%), indicating a focus on expanding tea cultivation in China’s central and northern regions. Moderate growth has occurred in provinces such as Jiangxi (5.29%) and Hunan (6.17%). In contrast, Jiangsu saw the largest decline, with a decrease of -3.41% to 32,840 hectares, while Guangdong (0.15%) and Hainan (1.69%) show minimal changes. Gansu has remained unchanged at 12,000 hectares.

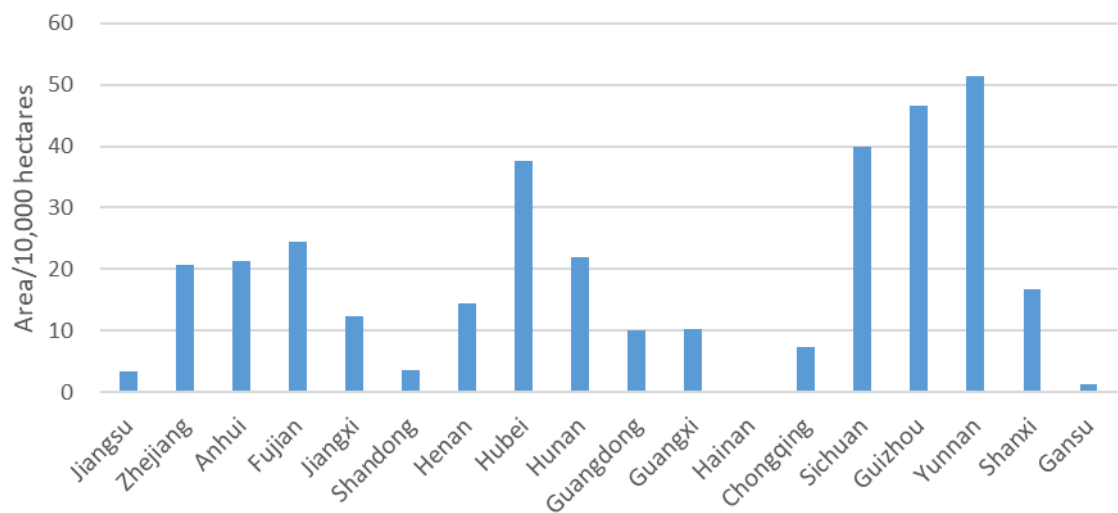


Figure 1.8: Total Tea Plantation Area in Major Tea-Producing Provinces of China in 2023

Source: National Bureau of Statistics of China (2024).

Regionally, Southwest China (Yunnan, Guizhou, Sichuan) has dominated tea cultivation, although Guizhou and Sichuan have faced slight declines. Central China (Henan, Hunan, Hubei) demonstrates notable growth, particularly in Henan. Eastern China (Zhejiang, Jiangsu) shows stability in Zhejiang but a decline in Jiangsu. The data highlights steady development in China’s tea industry, focusing on expanding cultivation in central and northern regions and maintaining strong contributions from traditional tea-growing areas in the southwest (Figures 1.8 and 1.9).

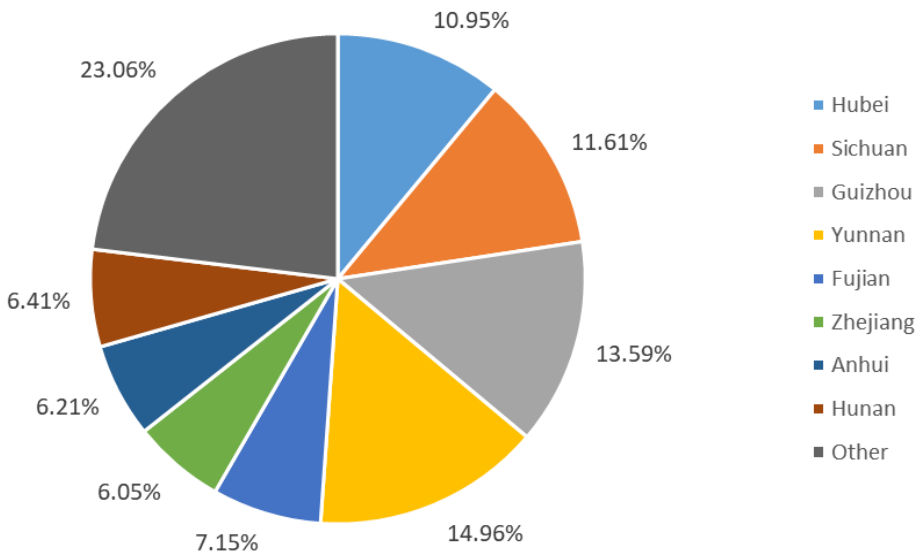


Figure 1.9: Regional Structure of Tea Plantation Area in China in 2023

Source: National Bureau of Statistics of China (2024)

Table 1.6 shows the following. In 2023, China’s total tea production reached 3,339,483 tons, an increase of 158,444 tons from 2022, reflecting a growth rate of 5.0%. Among the six major tea categories, green tea dominates with 1,934,000 tons, accounting for the largest share and achieving a growth rate of 4.3%. While black tea ranks second with 491,200 tons, its growth rate of 1.9% is the lowest among all categories. Dark tea and oolong tea show steady expansion, with production reaching 458,000 tons and 332,830

tons, growing by 7.4% and 6.9%, respectively. White tea shows 100,200 tons, with a moderate growth rate of 6.0%. Notably, yellow tea, while the smallest category at 23,253 tons, demonstrates the highest growth rate of 78.4%, indicating a resurgence in interest or production efforts. The steady growth across all categories, particularly the dominance of green tea and the rapid expansion of yellow tea, highlights the resilience and diversification of China's tea industry.

Table 1.6: Production Statistics of Six Major Tea Categories in China, 2022-2023

(Unit: Tons)				
Types of tea	2023	2022	Increase quantity	Growth rate%
Green tea	1934000	1853819	80181	4.3%
Black tea	491200	482018	9182	1.9%
Dark tea	458000	426326	31674	7.4%
Oolong tea	332830	311318	21512	6.9%
White tea	100200	94522	5678	6.0%
Yellow tea	23253	13036	10217	78.4%
Total	3339483	3181039	158444	5.0%

Source: China Tea Circulation Association (2024).

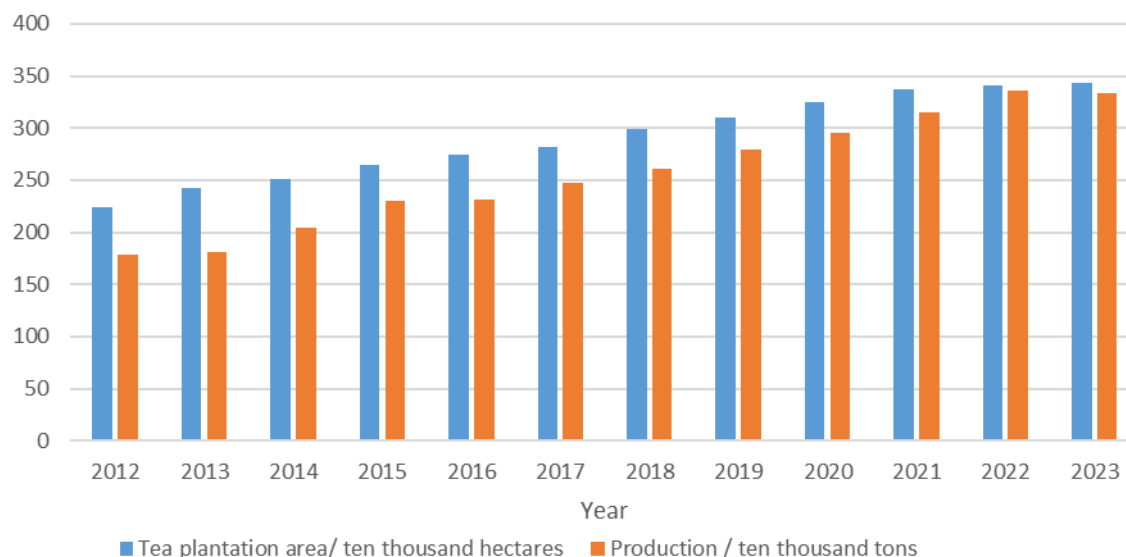


Figure 1.10: Area and Production of Chinese Tea Plantations, 2012-2023

Source: UN Comtrade database (2024).

Statistical analysis of data from the UN Comtrade database indicates that the area of tea plantations and tea production in China shows a continuous growth trend from 2012 to 2023. The tea plantation area has expanded from approximately 2.2 million hectares to over 3.43 million hectares, with significant growth, particularly from 2012 to 2020. After 2021, the growth rate has slowed, though remaining upward. Tea production has increased from 1.7 million tons in 2012 to around 3.34 million tons by 2023, more than doubling while broadly aligning with the growth in plantation areas. In 2021, tea production growth stabilized, experiencing minor fluctuations in 2022 and 2023. This may have been impacted by changes in market demand or external factors like climate conditions. This growth period highlights the steady expansion of the tea industry and ongoing advancements in production efficiency (Figure 1.10).

As the world's largest tea producer, China has consistently ranked among the top in both tea plantation areas and tea production. With the continuous development and optimization of the tea industry in recent years, the tea plantation and production areas in China have shown a steady growth trend. There has also been a heightened focus on diversification and quality enhancement, with tea quality consistently rising to meet the increasing demand for premium products from consumers worldwide.

1.2.4.1 China's Tea Imports and Exports

The tea industry is a traditional and key sector in China, offering distinct advantages (Tian, 2016). As the original home of tea trees and the world's largest tea-planting country, China has a long history of foreign trade in tea. Around the 5th century AD, Chinese tea began to be exported to neighboring countries in Southeast Asia and other regions of Asia. In the 10th century, Mongolian trade caravans came to China for business, and Chinese dark tea (brick tea) was transported to Central Asia through Siberia. Tea was

introduced to Europe by the Dutch in the 17th century, and the British introduced the tea-drinking tradition to the Americas and Australia as it spread globally (Wang, 2014). Tea production has long been a commercially significant industry and a key export product for China. Until the Opium Wars, the world's tea trade was almost solely monopolized by China. China's tea exports accounted for about 90% of the total world tea trade and approximately 60% of China's total commodity exports at that time (Sheng, 2017). Although China's dominance in the global tea market diminished significantly after 1840, the establishment of the People's Republic of China revitalized tea's economic importance, particularly through its role in generating foreign exchange via exports. Tea was classified as a strategically essential product, leading to significant development in production and steady growth in export trade. Thus, Chinese tea continued gaining worldwide influence (Qiu, 2011).

Regarding imports, during the early stages of the People's Republic of China, tea productivity was low; China's annual tea production was less than 50,000 tons. The government actively revived tea production, focusing primarily on exports to generate foreign exchange, with key markets including countries like Russia. Meanwhile, Western countries imposed a blockade on Chinese imports (Wang, 1989). China's tea imports remained minimal until the 1990s, primarily green tea (Su, 2001). After China joined the WTO, the reduction in import tariffs led to an increase in the quantity and value of agricultural imports—particularly by 2004—including tea, with even faster growth observed in recent years (Xu, 2022).

Table 1.7: Import Quantity and Value of Tea in China, 2017-2023

Year	Import quantity (ten thousand tons)	Import value (billion US dollars)	Average price (USD/kg)
2017	2.97	1.49	5.02
2018	3.55	1.78	5.01
2019	4.56	2.06	4.45
2020	4.33	1.80	4.16
2021	4.67	1.85	3.96
2022	4.14	1.47	3.55
2023	3.90	1.46	3.75

Source: China Customs (2024).

Table 1.7 and Figure 1.11 show that from 2017 to 2023, China's tea import market experienced significant fluctuations in quantity, value, and average price. Import quantity rose steadily from 2.97 million tons in 2017 to a peak of 4.67 million tons in 2021 before declining to 3.90 million tons in 2023. The import value followed a similar trend, increasing from \$1.49 billion in 2017 to a peak of \$2.06 billion in 2019 before gradually dropping to \$1.46 billion in 2023, the lowest during this period. The average import price per kg decreased from \$5.02/kg in 2017 to \$3.55/kg in 2022, reflecting a shift toward lower-cost imports.

**Figure 1.11:** Import Quantity, Value, and Average Price of Tea in China, 2017-2023

Source: China Customs (2024).

However, the average price rebounded slightly to \$3.75/kg in 2023, indicating a potential recovery in tea quality and increased global tea prices. These trends highlight a dynamic tea import market in China, with strong demand between 2019 and 2021, followed by a decline, reflecting adjustments in consumer preferences.

In 2023, Sri Lanka dominated China's tea import market, leading in volume (12,119,523 kg) and value (\$59,134,323), reflecting its strong trade relationship with China. India ranked second in volume (6,159,376 kg) and third in value (\$16,330,063), demonstrating its balanced contribution in quantity and quality. Taiwan ranked second in value (\$21,420,506); despite not being in the top 10 for volume, this highlights its focus on premium or specialty teas. Burundi ranked third in volume (3,277,549 kg) and fourth in value (\$8,525,711), showcasing its growing significance in China's tea imports. Other notable contributors included Vietnam, Kenya, and several African countries like Malawi, Uganda, and Rwanda, reflecting the diversification of China's tea supply sources. Countries such as Myanmar and Indonesia provided substantial volumes but ranked lower in value, while Taiwan and Thailand focused on quality over quantity (Table 1.8).

Table 1.8: 2023 Statistics of Tea Importing Countries or Regions in China

Tea Import Volume Ranking			Tea Import Value Ranking	
	Countries or Regions	Quantity (Kilograms)	Countries or Regions	Amount (USD)
1	Sri Lanka	12119523	Sri Lanka	59134323
2	India	6159376	Taiwan, China	21420506
3	Burundi	3277549	India	16330063
4	Myanmar	3110293	Burundi	8525711
5	Malawi	2410025	Vietnam	5157868
6	Indonesia	2407158	Kenya	4347039
7	Vietnam	2297552	Thailand	4275393
8	Kenya	1790566	Malawi	3840178
9	Uganda	1134918	Indonesia	3620658
10	Rwanda	1012821	Rwanda	2768838

Source: China Customs (2024).

Figure 1.12 shows China's tea export volume and revenue from 2012 to 2023. Between 2012 and 2021, export volume and revenue experienced steady growth, with export volume rising from 31.35 million tons to a peak of 37.53 million tons and export revenue increasing from \$10.42 billion to a peak of \$23 billion. However, both metrics declined in 2022 and 2023, with export volume falling to 36.75 million tons and revenue dropping to \$17.39 billion in 2023. While the growth period reflects China's strong performance in tea exports, particularly with revenue outpacing volume growth, the recent decline suggests external challenges such as economic conditions, global competition, or shifts in consumer demand. These trends underscore the importance of maintaining competitiveness and adapting to changes in the global tea market.

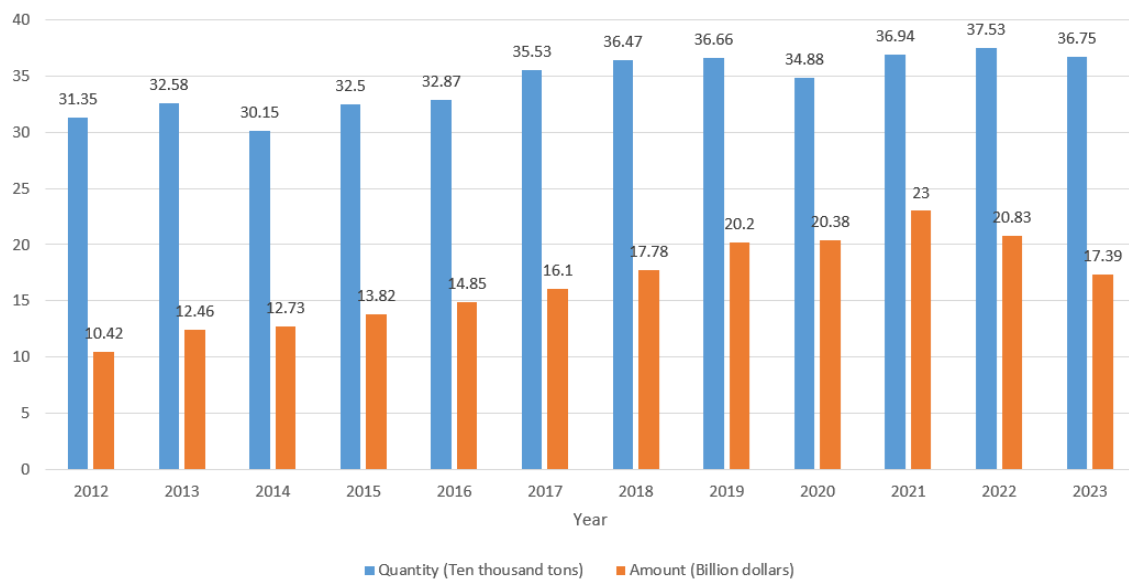


Figure 1.12: Tea Export Volume and Revenue in China, 2012-2023

Source: China Customs (2024).

Table 1.9: 2023 Statistics of Tea Exporting Countries or Regions in China

Tea Export Volume Ranking			Tea Export Value Ranking	
	Countries or Regions	Quantity (Kilograms)	Countries or Regions	Amount (USD)
1	Morocco	59831511	Hong Kong, China	220235331
2	Ghana	35289670	Malaysia	208793390
3	Uzbekistan	27228453	Morocco	190075842
4	Algeria	20265540	Ghana	141710820
5	Senegal	16677813	Algeria	70858046
6	Mauritania	15825529	Senegal	69139040
7	Russia	14759323	Mauritania	67161799
8	Mali	11956421	Vietnam	64561272
9	Japan	10317711	United States	56125566
10	Cameroon	10173366	Russia	54195576

Source: China customs (2024).

Table 1.9 shows that Morocco dominated China's tea export market, leading in volume with 59,831,511 kg and ranking third in value at \$19,007,584 in 2023, reflecting strong demand across various segments. Hong Kong (China) and Malaysia prioritized premium imports, ranking first (\$22,023,531) and second (\$20,879,339) in value despite not appearing in the top 10 for volume. Ghana and Algeria balanced volume and value, with Ghana importing 35,289,670 kg while contributing \$14,171,082 in value; Algeria imported 20,265,540 kg and accounted for \$7,085,804. African countries like Senegal, Mauritania, Mali, and Cameroon demonstrate increasing importance, contributing significantly to China's tea export volume and value. Asian countries such as Uzbekistan (27,228,453 kg) and Vietnam (\$6,456,127) played key roles. The data highlights diverse market preferences, with some regions focusing on large volumes (e.g., Morocco, Ghana) and others emphasizing quality (e.g., Hong Kong, Malaysia), underscoring the global competitiveness and appeal of Chinese tea exports. Table 1.9 highlights the diverse and dynamic nature of China's tea export market in 2023. Morocco dominates in volume, while Hong Kong and Malaysia lead in value, showcasing varying market preferences.

African countries exhibit volume and value, reflecting a growing trade relationship with China. These trends highlight the global appeal and competitiveness of Chinese tea exports.

The development of China's tea industry has been relatively fast. Tea production and processing are gradually becoming standardized. China has long held the position as the world's largest tea-growing area and top tea producer, ranking second in exports. The export unit price of China's tea has been rising, and it continues to hold a crucial position in the world tea trade.

1.2.4.2 Chinese Tea Industry and the National Economy

Tea has played a pivotal role in the economic history of China—and even the world—serving as both a cherished beverage and a powerful catalyst for economic growth and social transformation (Tao, 2001). The production, trade, and consumption of tea have significantly shaped economic landscapes over time, particularly in rural and developing regions (Li, 2012).

One of the most immediate and tangible contributions of the tea industry lies in employment creation and poverty alleviation. From cultivating tea gardens and harvesting leaves to processing, packaging, and distribution, the industry provides extensive job opportunities across the value chain. According to the China Tea Circulation Association, the tea sector supports over 70 million people, including farmers, pickers, processors, and distribution workers, contributing a comprehensive output value exceeding 700 billion yuan. Tea has been a critical tool in China's poverty eradication efforts. Between 2014 and 2020, among the 832 officially designated poverty-stricken counties, 372 engaged in tea-related production. Over 150 of these counties positioned the tea industry as their primary poverty alleviation strategy, generating output worth over 100 billion yuan and lifting more

than 2.6 million people out of poverty. In fact, poverty-stricken counties account for approximately two-thirds of China's national tea output, with plantations covering around 1.868 million hectares and producing 1.5 million tons of tea annually. These figures underscore the tea industry's strategic importance in driving rural development and economic inclusion, especially in underdeveloped areas.

In terms of population, China had a permanent resident population of approximately 1.41 billion as of 2023, providing a vast and diversified labor base for the tea industry, particularly in rural and mountainous areas where tea cultivation is concentrated. This demographic structure enables large-scale tea production and supports labor-intensive processes such as plucking, manual sorting, and traditional processing, which remain central to quality differentiation in global tea trade.

For example, Yunnan Province-one of China's key tea-producing regions-not only has abundant land resources but also a population of around 47.2 million (2020), with prefectures like Pu'er and Dali accounting for approximately 2.65 million and 3.34 million people, respectively. These tea-prefecture populations represent a significant portion of the rural workforce directly engaged in tea cultivation and processing. The large population in such regions not only ensures a stable supply of raw materials but also contributes to the competitiveness of Chinese tea in international markets, including ASEAN.

In the context of China-ASEAN tea trade, this demographic advantage enhances China's ability to meet diverse import demands from ASEAN countries, ranging from bulk green tea to premium specialty varieties. Moreover, the population-driven labor capacity allows China to maintain relatively lower production costs in traditional tea-growing provinces, reinforcing its comparative advantage in regional trade partnerships.

In terms of GDP per capita, China's national per capita GDP reached 13,020 USD in 2023. Fujian Province, another key tea-producing area, recorded a higher figure of 18,600 USD, while Yunnan stood at 9,300 USD, indicating a gap below the national average. This reflects regional income disparities among tea-producing provinces. Anhui Province, also known for its tea production (e.g., Huangshan Maofeng), had a GDP per capita of 11,200 USD in 2023, whereas Fujian again reached 18,500 USD, underscoring the income differences between inland and coastal tea regions.

These disparities are significant for tea industry development: in higher-income provinces like Fujian, rising purchasing power supports the growth of premium tea products and value-added tea derivatives; while in inland regions like Yunnan and Anhui, where income is relatively lower, the tea industry remains a vital pillar for farmer income and local employment.

In terms of employment and urbanization, the registered urban unemployment rate in Yunnan was 3.92% at the end of 2020, and the tea industry plays a key role in absorbing surplus rural labor, thereby reducing structural unemployment and promoting regional employment stability. Additionally, China's national urbanization rate reached 66.16% by the end of 2023, providing a growing market base for downstream sectors such as tea processing, logistics, catering, and retail.

Beyond its economic contributions, tea also enriches cultural and lifestyle dimensions. As living standards rise, there is growing consumer interest in health and wellness, and tea—as a natural, health-promoting beverage—has become deeply embedded in daily routines, both in China and globally (Meng, 2010). This increasing

demand supports a thriving tea market and generates opportunities for local catering, hospitality, and retail industries.

Tea is not just a commodity; it is a symbol of cultural identity and social connection (Ye & Wang, 2020). Its popularity has transformed everyday habits and plays a vital role in socializing, hospitality, and leisure (Li, 2008). The tea trade, therefore, extends beyond economic exchange to become a vehicle for cultural interaction. As tea traditions from various countries and regions blend and influence one another, new cultural phenomena emerge. This exchange promotes cross-cultural understanding and strengthens both regional and international relationships.

Moreover, the growth of the tea industry has driven technological innovation (Huang, 2019). To meet increasing demand and improve efficiency, advancements have been made in tea cultivation, processing, packaging, and transportation. Simultaneously, research on tea-related natural products—such as extraction and purification technologies—continues to expand. These innovations not only enhance the tea sector's competitiveness but also contribute positively to other industries, including biotechnology and packaging.

1.2.4.3 China's Tea Trade Policy

Since the launch of reform and opening-up in the late 1970s, China's trade policy has undergone a profound transformation—from a centrally planned model to a more market-oriented and institutionally open system. Following its accession to the World Trade Organization (WTO) in 2001, China has progressively reduced tariffs, improved customs efficiency, and actively participated in multilateral and regional trade cooperation. According to data from China's Ministry of Commerce (2022), the country's average tariff

level dropped from 15.3% in 2001 to 7.4% in 2021. Meanwhile, China has signed and implemented several key trade agreements, including the China-ASEAN Free Trade Area (CAFTA) and the Regional Comprehensive Economic Partnership (RCEP), enhancing trade connectivity across the region (ASEAN Secretariat, 2022). Current national trade strategies emphasize the expansion of high-value exports, strengthened regional integration, and the development of digital trade-forming a comprehensive and diversified external trade framework. These institutional and infrastructural policies have created a favorable environment for China's agricultural exports, particularly tea.

Tea, as one of China's most culturally symbolic and economically significant agricultural products, has not yet been governed by a standalone national-level export policy framework. Nevertheless, it receives substantial indirect support from broader national strategies such as rural revitalization, export promotion, and agricultural modernization. According to the 2022 China Tea Industry Development Report by the China Tea Circulation Association (CTCA), tea has been officially listed as a "dominant characteristic industry" by the Ministry of Agriculture and Rural Affairs and is designated as a pillar industry in more than 300 counties nationwide.

Government authorities at both national and provincial levels have supported tea exporters through measures such as organizing participation in international tea expos, offering export subsidies, and facilitating certification for international standards (e.g., EU Organic, HACCP, ISO). These initiatives have been especially effective in helping tea enterprises expand into ASEAN markets and establish stable trade networks (MOFCOM, 2021). In addition, the government strongly promotes brand development and geographical indication (GI) protection, encouraging enterprises to register brands such as West Lake

Longjing, Wuyi Rock Tea, and Pu'er Tea. Public regional brands are also being developed to improve China's global tea competitiveness (CNIPA, 2020).

The rise of the digital economy has brought new momentum to tea exports. Under policy support, major tea-producing regions such as Fujian, Yunnan, and Zhejiang have been designated as Cross-Border E-commerce Pilot Zones, enabling tea companies to expand their international presence through platforms such as Alibaba, JD Global, and Lazada. The government has also provided integrated support in logistics, taxation, customs clearance, and electronic payments to reduce transaction costs for small and medium-sized enterprises (SMEs) (China Cross-border E-Commerce Bluebook, 2023). Additionally, the tea industry has been deeply integrated into China's rural poverty alleviation and revitalization efforts. Between 2014 and 2020, over 150 national-level poverty-stricken counties adopted the tea industry as a primary tool for economic recovery, benefiting more than 2.6 million people (Ministry of Agriculture and Rural Affairs, 2021). These initiatives have substantially strengthened the supply capacity and resilience of China's tea export sector.

Despite considerable progress, China's tea export industry still faces several structural challenges. First, the export system is fragmented, dominated by small-scale enterprises, and lacks unified national branding. Second, the average export unit price of Chinese tea remains significantly lower than that of competitors such as Japan and Sri Lanka, primarily due to reliance on low-value-added raw or semi-processed tea. Third, non-tariff barriers in key markets-particularly ASEAN-pose difficulties for exporters. These include food safety standards, labeling and packaging regulations, and complex import certification processes, which disproportionately affect SMEs.

To address these issues and unlock the full potential of China's tea exports, it is essential to formulate a more coordinated national tea trade policy. Key policy directions should include promoting value chain upgrading and product diversification, improving bilateral alignment on trade standards with ASEAN countries, and enhancing international logistics, branding, and e-commerce infrastructure. Strengthening the integration between trade policy and agricultural modernization will be critical to ensuring sustainable growth and competitiveness in the global tea market.

1.2.4.4 China-ASEAN Tea Trade

ASEAN countries, geographically and culturally close to China, with a significant population of ethnic Chinese, have long embraced tea-drinking habits influenced by China. They have also mastered relevant tea-making techniques. For instance, Vietnam and Myanmar established tea gardens in the 19th and early 20th centuries, respectively (Van Driem, 2019). Indonesia, located at the southernmost tip, has historical records dating back to the late 17th century of transplanting tea trees from China (Yiqing & Protection, 2021). Among the 10 ASEAN countries, Myanmar, Indonesia, Laos, Malaysia, Thailand, and Vietnam all produce tea, accounting for approximately one-tenth of the world's tea output. However, due to significant domestic consumption within their vast territories, these countries continue to import large quantities of tea, primarily from China. Chinese tea exports consistently make up over 64% of the ASEAN market.

China has remained ASEAN's largest trading partner for 14 consecutive years, with both sides being each other's largest trading partners for three straight years. In terms of export value, Malaysia surpassed Morocco in 2021 to become the top destination for China's tea exports. Bilateral trade between the two sides has increased from \$443.6

billion in 2013 to \$975.3 billion in 2022. Malaysia and Vietnam are among the 10 ASEAN countries, with Vietnam and Indonesia being major tea-producing nations. In addition to Malaysia and Thailand, other countries such as Singapore, Laos, and the Philippines also consume high amounts of tea. Due to the significant Chinese expatriate communities within the 10 ASEAN countries, whose lifestyles are relatively similar to those in China, there is a notable consumption of various types of tea. For instance, Malaysia has a tradition of drinking Liubao and Pu'er tea. Singapore, with its more developed economy, has a strong demand for tea and represents an emerging market for Chinese tea exports.

Among the countries to which China exports tea, ASEAN countries have been a highlight of growth recently (Mendoza et al., 2015). China Customs data (Table 1.10) shows that China's tea exports to ASEAN surpassed 12,600 tons in 2015 and exceeded 23,000 tons in 2019, reaching 24,000 tons in 2023. Export value increased from 1.38 billion U.S. dollars in 2015 to 4.77 billion U.S. dollars in 2020, decreasing to 3.27 billion U.S. dollars in 2023. From 2015 to 2020, the average export price steadily increased from 10.92 USD/kg in 2015 to 22.54 USD/kg in 2020. However, the export price gradually declined yearly, decreasing to 13.64 USD/kg in 2023. The decline in average prices is directly linked to the impact of the COVID-19 pandemic in China (Table 1.10). The specific trends in export volume and export value from 2015 to 2023 are presented in Figure 1.13.

Table 1.10: The Export Value, Volume, and Average Price of Tea from China to ASEAN, 2015-2023

Year	Export Value (billion USD)	Year-on-year Export Growth (%)	Export Volume (10,000 tons)	Year-on-year Export Volume Growth (%)	Average Price (USD/Kg)	Year-on-year Average Price Growth (%)
2015	1.38		1.26		10.92	
2016	2.36	71.05	1.75	38.41	13.49	23.58
2017	2.30	-2.59	1.65	-5.31	13.88	2.88
2018	2.55	11.14	1.83	10.77	13.92	0.34
2019	3.97	55.67	2.30	25.56	17.26	23.99
2020	4.77	20.15	2.12	-7.97	22.54	30.55
2021	4.49	-5.84	2.04	-3.55	22.00	-2.37
2022	4.65	3.51	2.37	16.02	19.63	-10.79
2023	3.27	-29.75	2.40	1.13	13.64	-30.54

Source: China customs (2024).

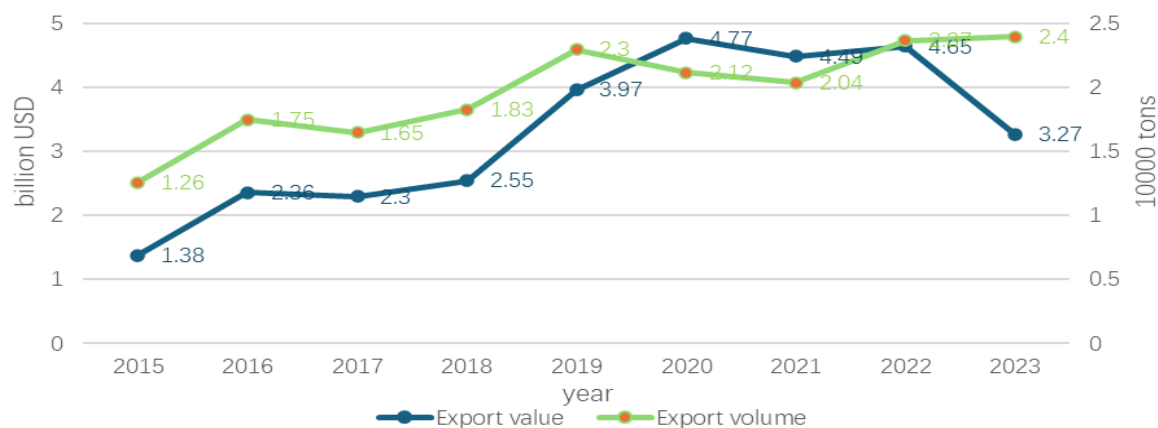


Figure 1.13: The Export Situation of Tea from China to ASEAN, 2015-2023

Source: UN Comtrade database (2024).

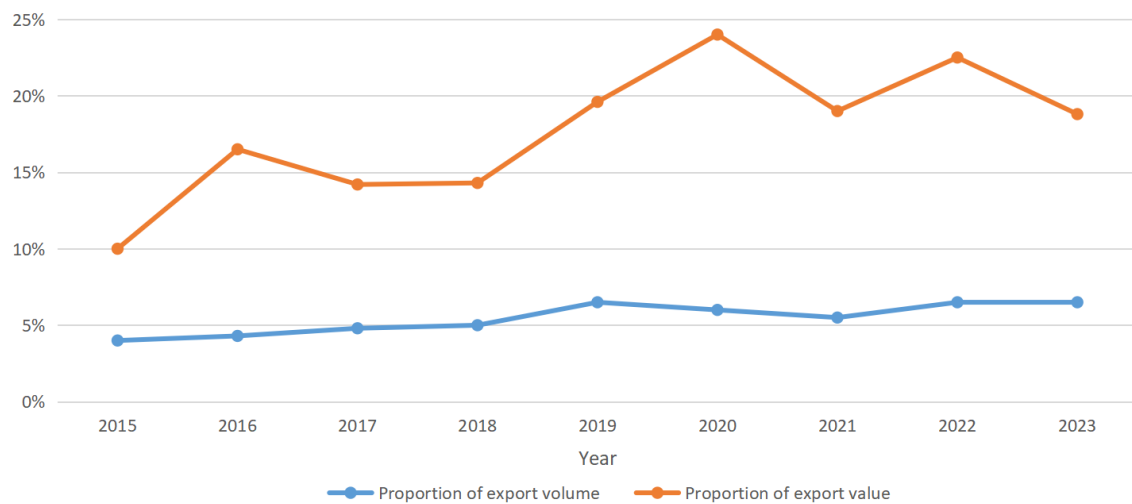


Figure 1.14: The Proportion of Export Volume and Export Value of Chinese Tea to the ASEAN Countries, 2015-2023

Source: UN Comtrade database (2024).

Figure 1.14 shows that the proportion of China's tea export volume to the 10 ASEAN countries is relatively low, around 5%, with a slow, fluctuating upward trend from 4% in 2015 to 6% in 2023. However, the proportion of export value shows a clear upward trend, from 10% in 2015 to 18% in 2023. This indicates that the ASEAN 10 market for Chinese tea is still unsaturated and holds significant growth potential. Therefore, a targeted and effective analysis of the potential and constraints of Chinese tea exports to ASEAN countries is necessary to understand the factors influencing Chinese tea exports to these countries and provide actionable recommendations.

Meanwhile, the economies of the ASEAN countries have developed rapidly in recent years, with their overall economic strength increasing and their international status rising (Chiang, 2019). Against the backdrop of the formal implementation of the Regional Comprehensive Economic Partnership (RCEP) and in conjunction with the high-quality development of the Belt and Road Initiative (BRI), deepening trade cooperation can further

unlock the potential for trade growth between the two sides and form an even closer community with a shared destiny (Hong, 2019).

1.3 Problem Statement

The preceding background highlights the significant role of the tea industry in China's economic development (Pan & Ni, 2024). Tea cultivation is widespread across the country, with thousands of tea-producing counties. Among the 832 national-level poverty-stricken counties, 337 rely on tea as a pillar industry, and nearly 100 counties depend on it as the primary source of income for local farmers. Beyond its contribution to rural income, tea exports generate foreign exchange, create employment across processing, packaging, logistics, and sales, and exert a multiplier effect on related industries. Additionally, tea plays a cultural role, promoting China's rich tea heritage and enhancing the global influence of Chinese culture (Jing, 2012).

China's position in the global tea trade is substantial. In 2022, it ranked first in export value and second in export volume. However, several challenges persist, including slow export growth, low average export prices, an evolving global trade environment, intensifying competition from other tea-exporting countries, and increasing demands for product quality and safety.

Among China's trading partners, ASEAN countries have emerged as key growth markets in recent years. Since 2021, Malaysia has become the top destination for Chinese tea exports, with Vietnam ranking third. In 2022, tea exports to ASEAN accounted for 22.31% of China's total export value, and the average export price to ASEAN was significantly higher than to other regions—surpassing any other country or economic bloc. This trend is supported by geographic proximity, shared cultural ties, a large Chinese

diaspora, and high regional tea consumption, positioning ASEAN as a promising market. Therefore, understanding the trade potential and constraints in China–ASEAN tea trade is essential to foster long-term economic cooperation and cultural exchange.

Despite the growing trade volume, existing literature lacks sufficient exploration of non-traditional factors affecting tea trade, such as the impact of COVID-19 disruptions, external trade dependency, changes in regional consumption patterns, or the role of trade agreements under frameworks like RCEP. These gaps are not merely academic—they hinder a more accurate understanding of what shapes China’s tea trade trajectory in ASEAN. For instance, a lack of clarity on how non-tariff barriers or regional regulatory differences influence export competitiveness may result in ineffective or misdirected trade policies. Moreover, very few studies focus specifically on the China–ASEAN tea trade dynamics, despite the bloc’s strategic importance. As a result, policymakers and stakeholders may be left with insufficient data to address practical challenges such as price volatility, logistics inefficiencies, or consumer preference shifts in specific ASEAN countries.

Thus, this study seeks to fill these gaps by providing a more detailed analysis of the trade potential, comparative advantage, and structural constraints within China–ASEAN tea trade. It aims to move beyond aggregate data and explore country-specific realities and challenges that may require more targeted and differentiated policy approaches.

In academic research, scholars generally agree on both the potential and limitations of China’s tea exports. There are at least two common analytical approaches dominate the literature. First, the index-based method, such as the Revealed Comparative Advantage (RCA) index, is widely used to measure international competitiveness. For example, Liu

and Li (2021) found that China's tea exports to the U.S. have declined in competitiveness. Zheng et al. (2022) compared China's tea trade along the Belt and Road and concluded that while China's presence is growing, its global competitiveness remains relatively weak. Similarly, Kong (2020) noted that although China shows strength in tea exports, it still trails behind India, suggesting room for improvement. Second, many studies apply gravity models to assess trade flows and identify constraints. Core explanatory variables include economic size, distance, population, exchange rates, and trade agreements. Zhang et al. (2019) used an extended gravity model and panel data (2001–2017) to examine factors influencing China's tea trade with Belt and Road countries and estimate potential trade volume.

Despite existing insights, significant gaps remain in the literature. Few studies have examined non-traditional influencing factors such as the international economic climate, COVID-19-related disruptions, external trade dependency. Additionally, research focusing specifically on China's tea exports to ASEAN countries is limited. These gaps point to the need for a more comprehensive understanding of the current scale and structure of China-ASEAN tea trade. There is a need to analyze how China's comparative advantage has evolved across individual ASEAN countries over time, considering both production dynamics and shifting demand patterns. Furthermore, it is important to explore the main barriers hindering the expansion of China's tea exports in this region. In addition, the potential influence of external factors-such as trade dependency-on the tea trade with ASEAN warrants systematic investigation, especially considering recent global uncertainties.

These questions have yet to be sufficiently addressed in existing literature. Therefore, this study aims to fill the gap by examining the trade potential and constraints of China's tea exports to ASEAN countries, providing both theoretical insight and policy relevance.

1.4 Research Questions

Building on the discussion of issues and gaps in research on China's tea industry, this study addresses the following research questions:

- i. How can we assess the comparative advantage of China and ASEAN countries in tea production?
- ii. What are the key factors determining the tea trade between China and ASEAN countries, including variables such as GDP and COVID-19 impacts?
- iii. How can tea trade potential between China and ASEAN partner countries be measured?

1.5 Research Objectives

The objective of this study is to evaluate the tea trade potential between China and ASEAN countries through a comprehensive analysis of competitiveness, influencing factors, and unrealized opportunities. Specifically, the study aims to:

- i. To assess the comparative advantage of China and ASEAN countries in tea production.
- ii. To examine the determinants of tea trade between China and ASEAN countries.
- iii. To measure the tea trade potential between China and ASEAN countries.

1.6 Research Significance

From a theoretical perspective, the gravity model has been a key method in econometrics since its first use in the field of economics in the 20th century. This study reviews past research on gravity models and, based on the characteristics of China's tea exports, extends and refines the model by incorporating variables such as foreign trade dependency, tea production, average prices of Chinese tea exports, pesticide residue limit standards, and whether countries have signed free trade agreements or been colonized by the UK or France. This extension provides new insights into strengthening the competitiveness of China's tea export trade, exploring trade potential, and examining export growth paths. It enriches the study of tea export trade and provides guidance for future studies related to China's tea export trade.

From a practical perspective, as a major tea producer and exporter, China has experienced fluctuations in domestic consumption and export trade, with its contribution to national income and employment gradually slowing. Due their geographical proximity and cultural affinity, while considering the context of the Belt and Road Initiative (BRI) and Regional Comprehensive Economic Partnership (RCEP), this study empirically analyzes the tea trade potential between China and ASEAN member countries. It identifies factors affecting trade potential and provides direction for strengthening trade between China and ASEAN member countries. This includes expanding trade space, improving the market competitiveness of Chinese tea in ASEAN countries, optimizing the export structure of Chinese tea to these countries, and tapping into the growth potential of Chinese tea exports. The findings serve as a valuable reference for Chinese tea production, processing, and export enterprises and theoretical support for the Chinese government's strategy to revitalize China's tea exports. This can help leverage China's strengths in tea exports,

restore its leadership position in tea exports, and support the development of the Chinese economy.

1.7 Study Structure

The rest of this study is organized as follows. Chapter Two reviews the literature on the tea export trade. Chapter Three discusses the methods used to examine the relationships between the study variables. Chapter Four introduces and discusses the empirical research findings. Finally, Chapter 5 presents policy recommendations based on the findings.

CHAPTER 2

LITERATURE REVIEW

2.1 Overview

Chapter Two presents the literature review on related models and studies, divided into four sections. Section 2.2 introduces the supporting theories and models relevant to this study. Section 2.3 reviews the literature on China-ASEAN trade policies. Section 2.4 summarizes the literature on tea trade potential. Section 2.5 summarizes the literature on the international competitiveness of tea, and Section 2.6 summarizes the chapter.

To examine the trade potential and constraints of China's tea trade with Belt and Road Initiative (BRI) countries, it is necessary to build on certain theoretical foundations and existing research. This chapter introduces the relevant theories influencing trade. Next, it elaborates on analyses regarding the tea trade, concepts, and current research on BRI and ASEAN countries. Subsequently, it analyzes the factors affecting China's tea exports and presents the study's research hypotheses.

2.2 Supporting Theories

2.2.1 Theory of Comparative Advantage

British economist David Ricardo proposed the theory of comparative advantage based on the theory of absolute advantage. He posited that the labor productivity between two countries varies and exhibits disparities, with labor efficiency determining labor costs. If the opportunity cost of producing a product domestically is lower compared to other countries, then that country has a comparative advantage in producing that product. In

contrast, if the opportunity cost is higher, the country has a comparative disadvantage. Countries should consider maximizing benefits by focusing on producing and exporting goods where they have a competitive edge while importing goods where they face comparative disadvantages. This leads to differing international divisions of labor, saving labor costs while enabling both parties to achieve maximum benefits in trade interactions.

Li (2023) suggests that the core notion of the comparative advantage theory is that a country should follow the principle of “choosing the greater benefit when weighing two advantages, and the lesser loss when weighing two disadvantages” in international trade. This means focusing its labor or capital on industries where it has the greatest advantage or least disadvantage, thereby saving resources and benefiting from increased labor productivity through specialized division of labor. Zhang (2003) argues that under the conditions of an open economy, the determinants of industrial development are closely linked to the foundations of international trade. Employing the extended theory of comparative advantage, Zhang (2003) examines the issues of industrial adjustment and development in China, exploring new approaches to industrial transformation and development while identifying the sources of comparative advantage. Zhang (2003) proposes corresponding policy recommendations to promote the formation and dynamic evolution of comparative advantages, offering valuable insights into China's economic development strategies and related policies.

Yang (2012) employed the RCA index to comprehensively analyze the comparative advantages of export goods from China and the 10 ASEAN member countries between 1995 and 2009. Employing empirical data, the study identified the export goods in which China and ASEAN countries possess comparative advantages, along with their respective

RCA index values. Chen (2014) examined the international competitiveness of China's export industries from 2002 to 2012. Using the comparative advantage index as an analytical tool, Chen compared the level of China's export industries with the overall level of global export industries. The study revealed that China holds a competitive advantage in categories 6, 7, and 8 of the Standard International Trade Classification compared to the international market, while the remaining categories (0 to 5 and 9) are at a competitive disadvantage in the global market. Saelee (2015) used the Comparative Advantage Index to calculate the comparative advantages of certain Thai fruits compared to other fruit-exporting countries. Using historical data from 2004 to 2013, the study concluded that Thailand has a comparative advantage in two categories of fruit products: HS 080450 (guavas, mangoes, mangosteens) and HS 081090 (fresh fruits such as longans, rambutans, lychees, soursops, wolf fruits, and rose apples). The findings indicate that relevant enterprises must focus on improving productivity and reducing costs through effective production management to enhance their competitiveness. Moreover, governments can support businesses by providing information on production efficiency and enterprise management. These measures can enable enterprises to reduce costs and enhance their market competitiveness.

The theory of comparative advantage has undergone significant evolution since Ricardo's original formulation. While Ricardo's model was based on labor as the sole factor of production and assumed constant returns, later economists introduced refinements to better reflect real-world conditions. The Heckscher–Ohlin model extended the theory by incorporating multiple factors such as capital and labor, proposing that comparative advantage arises from factor endowments. Further development, such as the Ricardian model with technology differences and the New Trade Theory (Krugman, 1979),

highlighted the roles of scale economies, product differentiation, and intra-industry trade, offering a more comprehensive explanation for trade flows among countries with similar endowments.

In the context of agricultural trade and especially tea trade, the concept of comparative advantage remains relevant but needs to be interpreted through a modern lens, accounting for factors like technological capacity, quality standards, non-tariff barriers, and sustainability considerations. The Revealed Comparative Advantage (RCA) index, first proposed by Balassa (1965), allows for empirical quantification of a country's trade strength in specific goods, adapting Ricardo's theory to contemporary trade data.

This study applies the extended comparative advantage framework by employing the RCA index to measure China's comparative position in tea exports, especially in relation to ASEAN markets. By doing so, it reflects the dynamic and structural nature of modern trade competitiveness, incorporating elements such as product specialization, global demand trends, and bilateral trade relations. This theoretical foundation supports the study's objectives of identifying trade potential and formulating policy recommendations to enhance China's position in the regional tea market.

2.2.2 Factor Endowment Theory

The Factor Endowment Theory, also referred to as the Heckscher-Ohlin Theory, is a doctrine proposed by Eli Heckscher and Bertil Ohlin and builds on the theory of comparative advantage. The foundation of international trade lies in the relative differences in factor endowments among countries and the intensity of using these factors in producing various goods. The direct cause of international trade is the international absolute price differences of the same product produced by different countries; varying factor prices are

determined by the differing proportions of factor supply (Lu, 2013). The differences in factor endowments determine the distribution of tea cultivation, leading to regional disparities, causing differences in tea products and the tea industry's uneven development across countries.

This theory evolved from David Ricardo's comparative advantage framework by shifting the focus from labor productivity alone to multiple production factors, such as land, labor, and capital. The Heckscher-Ohlin model introduced a more structured explanation for trade patterns based on factor intensities and national factor availability.

Later extensions of the model included technological differences (Samuelson, 1948), specific factor models (Jones, 1971), and models considering institutional or environmental factors. These enhancements made the theory more suitable for application in agriculture-related sectors like tea, where natural conditions, labor availability, and infrastructure vary significantly among countries.

Gao (2009) calculated the comparative advantage indices of various manufacturing industries in China from 1992 to 2006, analyzing the factor endowment characteristics of changes in China's manufacturing comparative advantage. The study found that labor factor advantages remain the foundation for China's manufacturing industry to participate in the international division of labor. Labor-intensive industries continue to hold comparative advantages within China's manufacturing sector, and the entry of foreign investment has enhanced the comparative advantage of various manufacturing industries. Wan (2006) proposed corresponding strategies for improving the international competitiveness of Chinese tea. At the factor endowment level, the focus should be on

addressing low factor productivity, creating new production factors while integrating them into the tea industry.

Shen (2017) suggests that tea plants require specific natural conditions for growth; a key aspect of the comparative advantage theory lies in factor endowments and natural conditions. Maslak (2020) examined China's agricultural trade based on the factor endowment theory while proposing policy recommendations for intensifying agricultural trade driven by technological advancements. The findings indicate that China's agricultural production is significantly constrained by land-factor endowment, while labor-factor endowment remains abundant. However, challenges such as rising costs and a gradual decline in the labor force emerge. In this context, technological advancements are critical for fostering and maintaining the comparative advantage of agricultural products. Thus, the government should guide technological innovation, provide technical and capital support (physical and human capital), and promote the rapid development of China's agricultural trade.

Therefore, the evolution of the factor endowment theory-from classical assumptions of land and labor to expanded views incorporating technology and policy environments-makes it especially relevant to the analysis of China-ASEAN tea trade. Tea production relies heavily on land resources, climate suitability, and labor availability. At the same time, trade outcomes are increasingly influenced by capital investment, production efficiency, and policy-induced comparative advantages. These dynamics align well with the extended interpretations of the Heckscher-Ohlin framework.

2.2.3 New Trade Theory

With the development of international trade, particularly intra-industry trade among developed countries, a new trade theory has emerged. The New Trade Theory originated in the early 1980s, proposed by a group of economists led by Paul Krugman. It encompasses perspectives on the causes of international trade, the determinants of the international division of labor, the effects of trade protectionism, and the formation of optimal trade policies.

Dai (1997) argues that the New Trade Theory provides a powerful tool for explaining new phenomena in international trade, such as intra-industry trade and the development of multinational corporations. The New Trade Theory emphasizes firm heterogeneity, economies of scale, and the influence of market structures on international trade. It has had a profound impact on international trade policy. From a New Trade Theory perspective, governments can implement trade policies to promote economies of scale and competitive advantages for domestic firms. For instance, adopting strategic trade protection policies can enable governments to support specific industries with comparative advantages, achieving an effective production scale while gaining competitive advantages in the international market. Wang (2013) notes that Intra-industry Trade Theory describes the phenomenon where a country simultaneously imports and exports similar products. The theory considers factors such as imperfect competition, product differentiation, and economies of scale, providing a theoretical basis for intra-industry trade involving homogeneous and heterogeneous products.

From the perspective of theoretical evolution, the New Trade Theory builds upon but also fundamentally extends earlier classical theories such as Ricardo's comparative

advantage and the Heckscher-Ohlin model. While those theories assume perfect competition and constant returns to scale, they fall short of explaining the rise of intra-industry trade and increasing returns in modern economies. New Trade Theory emerged to address these shortcomings by incorporating economies of scale, monopolistic competition, and product heterogeneity as key drivers of trade (Krugman, 1979; Helpman & Krugman, 1985). This evolution enabled the explanation of trade flows between similar economies where factor endowment differences are minimal-by focusing on scale economies and firm-level innovation.

From a New Trade Theory perspective, Wang (2017) studied the mechanism through which the home market effect influences export trade by modifying Schumacher's (2003) gravity model for utilizing bilateral trade data of creative products between China and the United States from 2002 to 2015. Sourced from UNCTAD statistics, Wang (2017) empirically tested the presence of the home market effect at the general and sectoral levels of China's creative product exports. The findings indicate significant home market effects in the export of overall creative products and in five categories (crafts, audiovisual, design, performing arts, and visual arts, except for new media and publishing). Thus, the home market effect has gradually replaced traditional factor endowments as a crucial source of export advantages and trade competitiveness for China's creative products. The study recommends that China should expand the influence of the home market effect on the export of creative products and enhance export competitiveness by fostering a domestic market for creative product consumption. This could create a favorable environment for creative talent, improve the production chain of creative industries, and upgrade the export structure of creative products.

China and most ASEAN member countries produce, import, and export tea products. Countries/regions with differing economic levels and living habits exhibit variations in producers. Their differences permeate all aspects of product development through production, sales, and other stages, leading to product heterogeneity. Based on the imperfect competition market, factors such as product heterogeneity, technological gaps, and similar demand preferences create the basis for intra-industry trade of both homogeneous and heterogeneous products.

Therefore, the application of New Trade Theory to the China-ASEAN tea trade is both relevant and necessary. The existence of intra-industry tea trade such as mutual import and export of different tea types (e.g., green tea, oolong, black tea) illustrates the heterogeneity of tea products. This heterogeneity, combined with increasing returns to scale in tea production and the strategic importance of brand differentiation, mirrors the key assumptions of New Trade Theory. Moreover, as China's tea industry develops towards scale, quality upgrading, and branding, the theory offers a valuable lens to understand how domestic economies of scale and consumer preferences shape export competitiveness in regional markets.

2.2.4 Theory of Competitive Advantage

Michael Porter's Theory of Competitive Advantage posits that the creation and evolution of competitive advantages extend beyond individual enterprises and industries to include four domestic determinants and two external forces. The four domestic determinants are factor conditions, demand conditions, related and supporting industries, and firm strategy, structure, and rivalry. The two external forces are chance events and government.

This theory evolved from earlier international trade theories such as the Classical Theory of Absolute Advantage by Adam Smith and the Theory of Comparative Advantage by David Ricardo, which emphasized natural endowments and production efficiency. However, these traditional theories could not fully explain why some countries with similar resource endowments perform differently in global markets. To address these limitations, Neo-Classical theories like the Heckscher-Ohlin Model introduced the role of factor proportions, yet they too failed to account for dynamic competitive behavior and innovation-driven industries. Porter's Diamond Model emerged in the 1990s as a response to these gaps, highlighting the role of innovation, firm strategy, and systemic national advantages in shaping global competitiveness.

In the context of this study, applying Porter's Competitive Advantage theory provides a more comprehensive framework to evaluate China's tea industry within an increasingly globalized and innovation-driven market.

Deng (2015) argues that competitive advantages are shaped by the collective influence of various economic factors, such as values, culture, economic structure, and historical context. Dong (2023) found significant differences in the competitive advantages of tea exports among various countries. While some countries continue to strengthen their competitive advantage, others face a decline. For China's tea industry to achieve better development, it must gradually transform its factor-based comparative advantage into an industry-wide competitive advantage through innovation, ensuring sustainable development. Peng (2015) systematically analyzed the export competitiveness of Anhui's tea industry in China using Porter's Diamond Model. The study found that Anhui tea has a certain level of export competitiveness but faces challenges in areas such as planting area,

mechanization, industrial organizational structure, and management practices. The study recommends that Anhui's tea industry expand the planting area, enhance technological innovation, cultivate leading enterprises, adjust the industrial organizational structure, improve tea quality to tackle green barriers, regulate market order, and increase financial investment.

Zheng (2022) analyzed the factors influencing the international competitiveness of tea exports from China and significant tea-exporting countries along the Belt and Road using Porter's Diamond Model. The study found that China's tea has relatively weak international competitiveness. It proposed several strategies to promote China's tea export trade, including improving tea quality, enhancing brand awareness, advancing the transformation of the tea industry, and developing cross-border e-commerce. Using the Double Diamond Model as a theoretical foundation, Huang (2022) explored the key factors influencing the international competitiveness of China's tea industry. While China's tea industry is continuously expanding its international market and currently exhibits strong international competitiveness, it remains relatively weaker compared to other major exporting countries. The international competitiveness of China's tea industry primarily stems from its abundant natural resources and significant domestic demand. However, it is constrained by factors such as increased labor costs, weak technological innovation in tea production, low quality of export tea, and inadequate pesticide-related standards. Thus, the study proposes measures to enhance international competitiveness, including strengthening technological innovation in tea production, promoting green and high-quality development in the tea industry, and building a stronger international talent pool.

In summary, the evolution from traditional comparative advantage theories to Porter's Diamond Model reflects a shift in analytical focus—from passive resource endowments to dynamic, innovation-driven capabilities. This theoretical development supports the application of Porter's framework in this study to assess the structural and strategic dimensions of China's tea trade competitiveness in the ASEAN context.

2.2.5 Theory of Regional Economic Integration

Regional economic integration refers to the process in which two or more countries and regions come together economically by mutually assisting in forming economic policies and measures and signing economic treaties or agreements, establishing a regional economic union. This theory can be used to enhance the economic strength and competitiveness of member countries by eliminating trade barriers, promoting the free flow of goods and services, optimizing resource allocation, and improving production efficiency.

The concept of regional economic integration has evolved alongside changes in global trade patterns and institutional economics. Early trade theories, such as the Theory of Comparative Advantage by Ricardo, focused on the benefits of trade between countries based on relative efficiency. However, these theories did not account for institutional cooperation or the role of economic blocs. With the rise of globalization in the 20th century, economists such as Viner (1950) introduced the concepts of trade creation and trade diversion in customs unions, which laid the theoretical foundation for understanding the economic impact of regional integration. Subsequent developments in new trade theory and endogenous growth theory further emphasized the importance of economies of scale, innovation, and knowledge spillovers within integrated regions. These advancements

support the idea that integration not only enhances trade flows but also fosters long-term competitiveness and structural transformation of participating economies.

In applying this theory to the current study, the context of China-ASEAN tea trade illustrates how regional economic integration frameworks like CAFTA and RCEP influence export potential, trade patterns, and industrial upgrading.

Liang (2007) argues that international regional economic integration is a significant characteristic of contemporary global economic development and that China's participation in international regional economic integration is accelerating. To create a favorable external environment for economic development, regional economic integration is the current political and economic development trend. The connections between countries deepen gradually through integration. Within such regions, trade barriers are weakened or eliminated, production factors flow more freely, and markets are shared. Dong (2023) states that establishing regional integration organizations can reduce tariffs between countries, elevate the development levels of countries within a region, enhance mutual connectivity and joint development, and protect the trade interests of all countries involved. This leads to mutual benefits within a region, promoting trade complementarity between countries, optimizing resource allocation, generating agglomeration effects, and improving resource utilization efficiency. For instance, the China–ASEAN Free Trade Area Agreement (CAFTA) and the Regional Comprehensive Economic Partnership (RCEP), which came into effect in 2022, significantly promote the economic development of member countries.

Jiang (2021) argues that the global spread of the COVID-19 pandemic and the prevalence of trade protectionism have heightened trade globalization uncertainty. In this

context, establishing free trade zones is essential for countries to reduce trade policy uncertainties. Taking the China–ASEAN Free Trade Area (CAFTA) as an example, Jiang (2021) analyzed the impact of free trade zone establishment on Chinese firms’ export market choices. The findings indicate that CAFTA significantly encourages Chinese firms to select member countries of the free trade zone as export destinations. The effect is particularly pronounced for private enterprises, small- and medium-sized enterprises, and low-productivity firms. Furthermore, member countries with lower levels of economic development, lower trade openness, and higher economic risks are more attractive to Chinese firms. These insights contribute to a better understanding of the microeconomic effects of free trade zones, guiding firms in selecting export markets.

In conclusion, the theoretical evolution from classical comparative advantage to modern regional integration theory reflects a growing recognition of the strategic role of institutions, agreements, and regional frameworks in shaping trade and economic outcomes. This development justifies the use of regional economic integration theory in this study, particularly in analyzing how China-ASEAN cooperation mechanisms influence the structure and potential of the tea trade.

2.2.6 Gravity Model of Trade

2.2.6.1 Gravity Model of Trade Background

The gravity model originates from Newton’s law of universal gravitation in physics (Kimura & Lee, 2006). Tinbergen (1962) and Poyhonen (1963) were among the first to apply the gravity model to estimate trade potential. While applying the gravity model to the field of trade, they assumed that the trade volume between two countries is explained by certain core factors. Their principles indicate that trade flows between two countries

should positively correlate with their respective economic sizes and negatively correlate with the distance between them. From a market supply and demand perspective, a trade market's supply force is influenced by the economic size of the exporting country. In contrast, the demand force is influenced by the economic size of the importing country. Transaction costs (trade/transportation costs) between two countries can be represented by the geographical distance between them.

Tinbergen (1962) introduced Preferential Trade Agreements (PTAs) as virtual variables in the gravity model, suggesting that reaching a particular form of PTA could promote trade. Baldwin (1994) employed the traditional gravity model to calculate trade potential, using theoretical trade volume as trade potential values for Western European countries; Baldwin (1994) contrasted the theoretical with the actual trade volume of Central and Eastern European countries to assess the level of European integration. Scholars have subsequently expanded on this foundation, gradually incorporating several variables into the study of gravity models of trade that have resulted in a more detailed and precise definition of trade potential.

Nilsson (2000) applied the traditional gravity model to Asia-Pacific Economic Cooperation (APEC) member countries, measuring trade efficiency by comparing actual trade volume to trade potential, referring to the fitted trade value to reflect trade potential. Jiang (2003) suggests that ASEAN and APEC both promote trade. Li (2005) combined regional trade arrangements with export potential, using the gravity model to assess to what extent RTAs promote export potential.

Huang et al. (2015) examined the factors influencing China's export of electromechanical products to Germany based on an improved gravity model. The results

indicate that Germany's Gross Domestic Product (GDP) significantly and positively affects China's export of electromechanical products. Fu (2014) studied the factors influencing agricultural trade flows between China and 15 RCEP countries, including India, using an improved gravity model. The study found that total economic size positively affects bilateral trade, while per capita GDP and geographical distance have negative effects. Feng and Gao (2015) employed the gravity model to examine the factors influencing China's commodity trade. The findings indicate that economic development, differences in per capita income levels between two countries, transport distance, and the signing of free trade agreements are the main influencing factors. Lohani (2024) examined the trade patterns between India and other BRICS nations (Brazil, Russia, China, and South Africa). To enhance the gravity model, they included time-invariant factors such as per capita GDP, distance, and language. The study focused on BRICS countries and India's leading merchandise export partners from 2001 to 2016, confirming that the traditional gravity model principles hold true for India. However, as distance increases, trade is negatively impacted by higher costs. Furthermore, a common official language and shared borders positively affect trade. The study found evidence of marginal trade creation, with a 21% increase over the expected level.

Research on trade potential emerged relatively late in China. Wu et al. (2003) estimated export potential values using the gravity model. Lu and Zhao (2010) note that factors affecting China's exports can be classified into natural and manufactured determinants. When analyzing the trade potential between China's northwest region and five Central Asian countries, Ma (2014) categorized trade potential into limited, exploratory, and enormous potential. By calculating the average trade efficiency between China and ASEAN countries, Tu and Li (2016) found that factors promoting bilateral trade

include GDP, Free Trade Agreements, and shared borders, while hindrances primarily involve distance and tariffs. By assessing the trade facilitation level among RCEP member countries, Fan (2018) suggests that RCEP's overall trade potential is significant. Chen (2019) used fixed effects, mixed effects, and random effects models to evaluate the impact of maritime channels on China–ASEAN trade potential. The findings suggest that CAFTA's role in promoting export trade is gradually strengthening (Chen, 2019). By calculating the trade potential of China's electromechanical products exported to ASEAN, Zhe and Wang (2020) suggest that significant positive factors include the economic size of importing and exporting countries, shared languages, and shared borders. Li and Liu (2020) note that significant factors affecting agricultural trade between China and ASEAN include distance, the importing country's population size, per capita arable land area, and whether it has joined CAFTA. He and Lan (2021) indicate that the property tax burden index, currency freedom, protection index, and financial freedom significantly enhance trade efficiency between China and ASEAN.

Research on trade potential often employs the gravity model, where scholars derive equations that fit the data and input explanatory variables to predict trade flows. Trade potential is typically calculated as the ratio of actual trade volume to the predicted value. While perspectives differ in classifying these results, they generally fall into two categories.

In calculating China's export potential to significant trading partners, Sheng and Liao (2004) suggest that if the actual value is less than the theoretical value, it is considered "insufficient trade," highlighting the potential for further exploration and value between the two countries. If the actual value equals the theoretical value, there is an ideal trade situation between the two countries, although such scenarios are rare. If the actual

value exceeds the theoretical value, it is considered “sufficient trade” or “excessive trade.” Meanwhile, in their study of China’s bilateral trade arrangements in 2000, Liu and Jiang (2002) divided the results into three categories using the values “1.2” and “0.8” as thresholds, a method adopted in this study.

To further strengthen the theoretical grounding of the gravity model, it is worth discussing how the model has evolved over time. While Tinbergen (1962) and Pöyhönen (1963) laid the foundation by using GDP and distance to explain bilateral trade flows, later economists refined the model to improve its empirical accuracy and theoretical consistency. For example, Bergstrand (1985, 1989) introduced price indices and factor endowments into the model, while Anderson and van Wincoop (2003) addressed the problem of “multilateral resistance terms,” offering a theoretically grounded model that better controls for relative trade frictions between countries. Their augmented model became the modern standard in estimating trade potential.

Head and Mayer (2014) further contributed to the empirical applications of the gravity model by systematically comparing estimation techniques, while Eichengreen and Irwin (1998) emphasized historical trade barriers and institutional effects in long-run gravity models. These developments have made the gravity model not only a descriptive tool but also a reliable framework for policy evaluation and trade potential assessment.

Moreover, the gravity model has proven to be particularly effective in analyzing agricultural and specialty product trade. Agricultural goods, including tea, are often influenced not only by economic size and distance, but also by factors such as regulatory barriers, consumer preferences, and climate compatibility. These extensions show the flexibility of the gravity model in capturing sector-specific trade characteristics.

Given the unique structure of China-ASEAN tea trade, the gravity model is well-suited to this study. First, China and ASEAN countries vary significantly in GDP, market openness, and consumer preferences for tea products. Second, shared borders, geographic proximity, and cultural similarities (e.g., Chinese diaspora, traditional tea consumption) are crucial in shaping bilateral tea trade, making gravity-based models highly appropriate for capturing such spatial and cultural frictions. Third, ASEAN as a region includes both high-income (e.g., Singapore, Brunei) and developing countries (e.g., Myanmar, Cambodia), allowing a rich variation in trade determinants to be modeled effectively.

2.2.6.2 Chinese Tea Export Influencing Factors

The gravity model serves as one of the most widely used theoretical frameworks for analyzing bilateral trade flows. It posits that the trade volume between two countries is positively related to their economic sizes and negatively related to the distance between them. Over time, the gravity model has been extended to include various explanatory variables beyond GDP and distance, such as trade openness, common language, tariffs, exchange rates, and external shocks like pandemics. These extensions allow researchers to better capture both traditional and non-traditional trade determinants. The selection of variables in this study is thus grounded in the classical and extended versions of the gravity model, supported by a wide body of literature.

Extensive research exists on factors influencing tea exports, focusing on export structure, competitiveness, market concentration, and trade potential. Yang et al. (2018) examined the characteristics and trends of tea trade between China and ASEAN from 2001 to 2017. They found that China's tea exports to ASEAN countries are primarily concentrated in Thailand, Malaysia, Myanmar, Vietnam, and Singapore, with export

volumes consistently accounting for over 64% of the ASEAN market. Using the CMS model, Chen (2015) analyzed the growth factors of China's tea exports to ASEAN, discovering that the liberalization process of bilateral trade, the import demand of ASEAN tea markets, and the overall competitiveness of Chinese tea in ASEAN markets significantly influence China's tea export growth. Zhang et al. (2019) used an extended gravity model and panel data from 2001 to 2017 to analyze the factors affecting China's tea exports and trade potential to BRI countries. Based on panel data from China and 40 major tea-importing countries and regions, Wang (2021) employed a progressive difference-in-differences model to evaluate the policy impact of the BRI on the growth of China's tea exports.

Based on the gravity model framework and previous empirical literature, the following variables have been selected and justified as key determinants of China's tea export trade:

i. Economic Size of Destination Countries

Huo and Lin (2010) examined Chinese tea exports from 1992 to 2007 while using a gravity model for empirical analysis. The findings indicate that the development of the domestic tea industry and the GDP of import countries have a positive promoting effect on Chinese tea exports. In contrast, the exchange rate of import countries, distance, and pesticide residue standards have negative effects. Liu (2013) used the gravity model to study the influencing factors of Chinese tea exports; the GDP of tea-importing countries and tea production volume have a promoting effect, while pesticide residue standards and distance have inhibitory effects on Chinese tea exports. Li and Jia (2017) used the gravity model to examine the influencing factors of Chinese tea exports within the scope of the

Belt and Road. They found that freight costs, the GDP of import countries, and price trade conditions significantly affect Chinese tea export trade while making corresponding policy recommendations.

Therefore, GDP is selected as a core variable representing market size and purchasing power of destination countries.

ii. Foreign Trade Dependency

Based on the results of a random effects gravity model analysis, Niu (2024) found that trade dependence, population size, and GDP have a promoting effect on China's tea exports to the EU, with trade dependence having the greatest promoting effect. In contrast, geographic distance and non-technical trade barrier policies and regulations have a restraining effect on tea exports.

Foreign trade dependency reflects the degree of openness and a country's reliance on international markets, which is crucial for understanding the absorptive capacity of importing countries, especially in the ASEAN context.

iii. Import Volume of Tea in Destination Countries

Zhang (2021) used panel data from 37 representative countries and regions from 2001 to 2017 to empirically analyze the factors influencing China's tea exports and trade efficiency. The analysis shows that increases in domestic supply, expansion of import market capacity, and reductions in trade costs all promote the efficiency of the tea trade.

According to the FAO (2022), tea imports by ASEAN countries have grown steadily, particularly in Malaysia and Singapore, offering long-term export opportunities for China.

Therefore, import volume is a practical demand-side variable that captures real-time market capacity and trend potential.

iv. Geographical Distance

Li (2017) adopted the BRI as a starting point to analyze its impact on China's tea export trade. Using databases such as UN Comtrade and World Bank data while employing EViews software, Li constructed a traditional logarithmic gravity model to empirically analyze the factors influencing China's tea export trade under the BRI. The results indicate that freight costs have the most significant impact on export trade volume. The GDP of various countries and their price trade conditions also significantly affect China's tea export trade volume. Dong (2024) conducted an empirical analysis to find that the geographical distance between the capital cities of two countries negatively affects China's tea exports.

Anderson and van Wincoop (2003), in their foundational gravity model revision, emphasized the "border effect" where distance encompasses not only physical separation but also cultural, linguistic, and institutional barriers. Head and Mayer (2014) reaffirmed that distance remains a robust negative determinant of trade, even in the era of digitalization and faster transport, especially for sensitive goods like food and agriculture.

Therefore, distance is retained as a critical explanatory variable that proxies for all forms of trade resistance, especially relevant for perishable and regulated products like tea.

v. COVID-19 Pandemic

Research on the impact of the 2019 novel coronavirus pandemic as a variable in trade studies, particularly in tea export trade, is limited. However, the pandemic has had a significant global impact, especially on foreign trade. The severe COVID-19 outbreak

drastically reduced economic interactions between countries and imposed strict limitations on foreign economic activities. During the initial stages, strict measures were implemented to prevent further spread, leading to labor shortages and rising costs in the production and distribution of tea. Concurrently, China's transportation and logistics nearly came to a halt, causing delays in delivery schedules for numerous enterprises. Furthermore, heightened global pandemic-related regulations increased the complexity of import and export procedures, reducing the efficiency of tea exports (Kan, 2023).

Peng (2023) argues that the COVID-19 pandemic significantly impacted global service trade; however, the development and application of digital technologies provided opportunities for the international service trade market. Peng (2023) constructed indices such as significant comparative advantages, international market shares, and trade competitive advantage indices to evaluate comprehensive service trade competitiveness based on the TOPSIS model, integrating factors including pandemic impacts into the diamond model to explore influencing factors. The study found that factors such as pandemic outbreaks significantly impact the service trade competitiveness of countries along the BRI.

Wu (2023) selected the top 28 countries in 2019 for the export value of Chinese artificial boards as samples, with Chinese exports to destination countries of artificial boards as dependent variables. Factors such as GDP of destination countries, per capita forest area difference between the two countries, RMB exchange rates against destination countries, foreign trade dependence of destination countries, and the COVID-19 pandemic were selected as independent variables (Wu, 2023). An extended gravity model was established using panel data from 2010 to 2020 on China's exports of artificial boards to

sample countries for quantitative empirical analysis. The analysis shows a significant negative correlation between the COVID-19 pandemic and China's exports of artificial boards.

Therefore, this study includes a dummy variable for the pandemic period to capture the external shock dimension and its impact on bilateral tea trade flows.

In summary, the inclusion of these variables is rooted in the classical and extended gravity model literature, and each variable is supported by multiple empirical studies. The selection reflects both theoretical validity and empirical relevance in the context of China–ASEAN tea trade. This comprehensive variable framework ensures robustness and contextual sensitivity of the empirical model.

2.2.7 RCA Model

To assess Türkiye's comparative advantage in the service sector between 2013 and 2021, Özdemir (2024) employed the TBI index, building on the RCA methodology while validating its results. Survey data indicate that Türkiye has demonstrated a comparative advantage in maintenance and repair, transportation, travel, insurance, pension, and government goods and services during this period.

Naing et al. (2021) examined watermelon trade data from 2014 to 2019, sourced from the United Nations Commodity Trade Statistics database. The study utilized Revealed Comparative Advantage (RCA) and Revealed Symmetric Comparative Advantage (RSCA) indices to assess the level of comparative advantage in the watermelon trade. The findings indicate that the Lao People's Democratic Republic, Myanmar, and Vietnam possess a comparative advantage in the global watermelon market. The study recommends that

ASEAN-5 member countries should strive to preserve their comparative advantage in watermelon exports internationally.

İzgi and Kavacık (2024) utilized various analytical tools, including Balassa's RCA, to evaluate competitiveness. Their study focuses on the Turkish air conditioning industry and its sub-product categories from 2001 to 2021. Notably, this research is the first to use Product Mapping to examine the industry's competitiveness. The findings indicate that the Turkish air conditioning sector is primarily competitive. Specifically, Türkiye is competitive in 11 sub-products, nearly competitive in three, and lacks competitiveness in 10.

In the context of China, the Revealed Comparative Advantage (RCA) model serves as a valuable analytical tool for evaluating the international competitiveness of Chinese tea in global markets. Specifically, the RCA index allows researchers to quantify whether a country is relatively more efficient in producing and exporting a certain good compared to the world average. For China, a major tea-producing and exporting country, an RCA value greater than 1 in tea exports suggests that tea is a relatively specialized and competitive export product.

Several studies have applied the RCA model to analyze China's trade performance, indicating that China has consistently maintained a strong comparative advantage in tea exports over time. This is largely due to its abundant natural resources, long-standing cultivation traditions, and economies of scale. Furthermore, the RCA index enables the identification of trends across years and across different trading partners, which is crucial for assessing the sustainability of China's comparative advantage in the face of changing global demand, production costs, and non-tariff trade barriers.

In the context of this study, the RCA model not only helps confirm China's comparative advantage in tea exports overall but also aids in identifying specific ASEAN markets where China's competitiveness is either strengthening or weakening. This can provide critical insights for trade policy adjustments and targeted promotion strategies.

2.3 China's Trade Policy

Established in November 2002, the China–ASEAN Free Trade Area (CAFTA) is the largest free trade area globally in terms of population, while comprising primarily developing countries. It officially commenced operations on January 1, 2010 (Yang, 2011) and has been in operation for 12 years. ASEAN countries are a crucial aspect of the Maritime Silk Road, located at the intersection of the BRI, benefiting from convenient logistics and transportation (Zhao, 2008). The Regional Comprehensive Economic Partnership (RCEP), which took effect on January 1, 2022, is based on ASEAN's five "10+1" free trade agreements. As the world's largest free trade area, RCEP, led by ASEAN, is a regional free trade agreement characterized by high standards and quality (Zhao, 2008). With the ongoing optimization and development of trade conditions between China and ASEAN, domestic and international research on this topic has gradually increased.

Constructing relevant indicators of trade facilitation, Kong and Dong (2015) calculated the level of trade facilitation among countries/regions related to the BRI. The study found that improving trade facilitation expands trade potential. Wang and Xu (2016) suggest that when examining the interactive relationship between bilateral trade and economic growth, the interaction and feedback effects among countries must be considered. The authors constructed multiple-country GVAR models to investigate the relationship

between bilateral trade among countries/regions along the Belt and Road and China's economic growth. Xie and Yang (2015) used export data from the Chelem database to analyze the market share of China and the United States in the European Union. They found that the export complementarity between China and the United States is greater than the export competitiveness.

Finger and Kreinin (1979) proposed the export similarity index, often used to measure the structural similarity of goods exported to the same market from different regions. Using the UN Comtrade database, Han et al. (2015) calculated the bilateral trade relationship between China and West Asian countries based on indices such as the RCA, trade complementarity index, export similarity index, intra-industry trade index, and marginal intra-industry trade index. The results indicate that the trade relationship between China and West Asian countries exhibits trade complementarity. Flynt et al. (2015) note that the Belt and Road strategy is conducive to promoting economic development in western China while narrowing the economic gap between its eastern and western regions. Tiezzi (2015) suggests that the BRI is internally consistent with China's domestic economic development goals. This initiative is essential in promoting China's economic development and enhancing its position in the global value chain.

Rolland (2015) suggests that infrastructure diplomacy reflects China's emphasis on neighboring relations. The Belt and Road strategy unifies China and relevant countries along the route into a network comprising "trade, transportation, and multilateral institutions," enhancing China's trade level with countries/regions while expanding its influence. In studying the trade relationship between China and ASEAN, Wang and Song (2021) suggest that Yunnan is an essential gateway in constructing the Belt and Road

Center, radiating toward South and Southeast Asia. He and Lan (2021) argue that there is considerable untapped potential between China and ASEAN countries. Overall, trade efficiency between China and ASEAN is improving, though disparities remain. Tao (2019) suggests that the BRI will inject new momentum into their trade relations.

Zhao and Yu (2017) and Liao and Ning (2015) have studied the trade facilitation between China and ASEAN. The former suggests that trade between China and Singapore, Indonesia, Malaysia, Thailand, and Vietnam is relatively balanced. The latter empirically investigated the trade facilitation between China and ASEAN using the gravity model, finding significant complementary advantages between China and ASEAN. Zhang and Sun (2017) observe that while the trade volume between China and ASEAN continues to expand, issues such as similar trade structures, intense competition, and low levels of facilitation remain. Huang (2019) argues that the level of maritime logistics significantly positively correlates with trade between China and ASEAN. Tan and Xu (2019) suggest that CAFTA can mitigate the negative impact of RMB exchange rate fluctuations on trade between Yunnan Province and ASEAN countries. Utilizing a structural gravity model with the introduction of exchange rates, Liu and Guo (2015) find that the establishment of CAFTA significantly promotes bilateral trade. Guo and Xiao (2014) analyzed and forecasted the trade prospects between China and ASEAN using an extended gravity model. They suggest that leveraging bilateral trade complementarity, government leadership, forming a free trade zone, and a positive external environment are essential for closer cooperation between open markets.

Regarding the study of China and ASEAN's trade structure, Li and Zhao (2002) suggest that complementarity and cooperation are the mainstream trends in economic and

trade development between China and four ASEAN countries. Shi (2004) conducted a comparative analysis of the export similarity between China and ASEAN countries, suggesting that CAFTA will expand market capacity, increase trade complementarity, and significantly promote trade development. Zhang and Jiang (2004) argue that the degree of trade between China and ASEAN is steadily increasing, indicating an improvement in their specialization and division of labor. Zhang and Shen (2017) found that China and ASEAN have a strong complementarity in trade, but competition is also significant. Zhu (2019) analyzed the trade structure of agricultural products between China and ASEAN. The findings suggest that although the total trade volume has expanded, China primarily exports low-value-added products. This leads to a relatively single structure and weak competitiveness, and measures should be taken to improve the trade structure.

Regarding the study of tea trade between China and ASEAN member countries, Yang (2019) indicates that China's tea exports to ASEAN countries are primarily Thailand, Malaysia, Myanmar, Vietnam, and Singapore, accounting for over 64% of the ASEAN market. The export volume to Thailand, Vietnam, and Malaysia has grown rapidly. The export value has shown a clear upward trend, with the fastest growth in export value to Vietnam. Recently, green tea exports have grown relatively faster compared to black tea. The main tea products exported are large-packaged tea, while the growth rate of small-packaged green tea has been significant in recent years. The average price of small-packaged tea fluctuates significantly, while the average price of large-packaged tea remains relatively stable.

Li (2023) suggests that there is significant potential for the export of tea from Yunnan Province to ASEAN member countries. A favorable trade environment is essential in opening the ASEAN market for Yunnan tea.

Dong (2023) suggests that China's export scale of tea to RCEP member countries continues to expand, with an increasing proportion of green tea exports within the region nearly equaling black tea exports. The 10 ASEAN countries have gradually become the core market for China's tea exports within the RCEP region. While the international competitiveness of Chinese tea has strengthened overall, there is still a gap compared to other major tea-exporting countries. The empirical analysis indicates that the per capita GDP of the importing country, the degree of foreign trade openness, exchange rates, average price of Chinese tea exports to various countries, tea production, number of pesticide residue limit standards, free trade agreements, historical colonization by Britain or France, and having a common border or maritime area all positively impact Chinese tea exports. However, the geographical distance between the two countries' capital cities negatively affects Chinese tea exports.

2.4 Tea Trade Potential

The study of “potential” initially focused more on production aspects (Zheng, 2021) and later developed into trade aspects. Production potential refers to the maximum capacity that can be achieved under given conditions, while trade potential refers to the maximum sustainable trade value that can be achieved between countries/regions under ideal conditions without trade friction. It assumes unchanged transportation and trade systems, i.e., the ideal trade value. The term generally used to measure the potential level of trade between countries or regions is trade potential.

Scholars typically draw on two methods when studying trade potential. First is the index method, which calculates various indicators such as the Trade Competitiveness Index (TCI) to measure the trade potential between countries or regions. If there are significant differences in the RCA patterns between two countries, a high index of complementarity, or a low index of product similarity, further potential for trade between the two countries is considered. Otherwise, the trade potential is limited. The theoretical basis for this method is the traditional theory of comparative advantage. It holds that in international trade, a country exports products in which it has a comparative advantage while importing products in which it does not. Thus, a country's export structure essentially reflects its comparative advantage structure, while its import structure reflects its comparative disadvantage structure. If the comparative advantage structure of the export country matches the comparative disadvantage structure of the import country, the former has strong growth potential or capacity in that market. Therefore, the RCA index and the TCI can be used to measure the comparative advantage patterns of parties, and their correlation, to determine their trade potential.

Li and Mei (2005) compared the RCI index and product similarity index of various agricultural products between China and the European Union (EU). Their findings indicate that the trade relationship in agricultural products between China and EU countries is mainly complementary, with competitiveness as secondary. This trade structure implies that there is significant development potential for both parties in the field of agricultural trade. Yang (2007) calculated the RCA index, complementarity index, and trade intensity index of agricultural products between China and the EU from 2000 to 2005. The results show differences in the comparative advantage patterns of agricultural products between the two countries, with a complementarity index greater than 1 and a trade intensity index

less than 1. This indicates that the level of complementarity in agricultural products between China and the EU is higher than the average complementarity level between China and other markets; however, China's actual exports of agricultural products to the EU are less than its potential export capacity. Therefore, the authors note that "the degree of development of China's access to the EU's agricultural product market is insufficient, and there is still great potential to be tapped in agricultural trade between China and the EU."

By calculating the RCA index of agricultural products between China and Australia, Yin and Xiao (2007) found that China and Australia's comparative advantages in agricultural products are complementary; Australia has a comparative advantage in land-intensive agricultural products, and China has a comparative advantage in labor-intensive agricultural products. By calculating the trade intensity index, the authors also found that the trade intensity between China and Australia in many complementary agricultural products is less than 1. This indicates that the connection between the two countries in these product trades is not tight, and further potential for agricultural trade development exists.

Second, gravity models of trade were initially used to study trade potential, primarily focusing on European countries. Over time, they were widely adopted in trade studies across various countries and regions, becoming a valuable tool for analyzing trade potential.

For calculating trade potential, scholars generally use the method proposed by Liu (2002). This involves expressing the trade potential value as the ratio of the actual trade amount between countries to the theoretical amount calculated using the gravity model of

trade. This approach has been widely adopted as a standard for evaluating trade potential between countries and is extensively used in trade potential estimation studies. Trade potential calculated through the gravity model of trade can be used to measure the trade development potential between two countries. The gap between estimated values and actual trade volumes can be assessed to better understand the trade development potential between countries (Guan, Jiang, 2024). For instance, Ji (2020) examined China's export of sports goods to countries along the Belt and Road. Estimating the trade potential, the findings indicate that China's exports of sports goods to these countries are demand-driven, with most countries having significant potential. Chen (2023) calculated that the export potential of China's cultural products to RCEP member countries is on the rise, with significant room for development. Based on panel data from 2008 to 2021 on China's cultural product exports to RCEP partner countries, Cai and Wei (2023) constructed a gravity model. They analyzed the trade potential of China's cultural product exports to these countries and found that the current cultural product trade between RCEP partner countries and China is in the potential exploration stage, with substantial trade space and potential for trade volume expansion.

2.5 International Competitiveness of Tea

Research on industrial competitiveness is a complex, systematic undertaking. The classical approach of using the quantity of resources to measure and compare industrial competitiveness is insufficient to provide convincing explanations. The introduction of Porter's National Competitive Advantage Trilogy marked a pioneering approach to systematically evaluating industrial competitiveness. As the theory of industrial competitiveness has undergone several evolutions and revisions, the measurement methods continue to advance. From various perspectives and using the theory of competitive

economics, domestic and international scholars have proposed various models and methods for measuring indicators such as international trade, productivity, costs, prices, and technological innovation grounded in practical experience.

With the rapid development of China's tea industry, scholarly attention to the tea industry is increasing. Sachitra (2016) analyzed the factors influencing Sri Lanka's tea export competitiveness using Porter's Diamond Model. The study found that factors such as production, infrastructure, production technology, related industry confirmation, and raw materials significantly affect Sri Lanka's tea exports. Nadia (2017) researched the advantages and disadvantages affecting the tea export competitiveness of ASEAN countries from 2011 to 2014 based on tea export data. Pamia (2010) found that the value of the tea production chain is closely related to the tea value chain. Tea brand development can increase the added value of tea while enhancing its market competitiveness. Pritchard (2006) found that the preference for tea in Western countries and the increased competitiveness of tea exports from other countries have significantly affected Indian tea exports, posing challenges.

Xu and Chen (2007) suggest that the weak competitiveness of Chinese tea exports is due to underdeveloped industries, domestic demand, low production technology, and small production scale. Jiang (2009) compared the tea industry competitiveness of Yunnan Province with that of other tea-producing provinces in China using the scale advantage index, efficiency advantage index, and comprehensive advantage index. The findings rank Yunnan Province's tea industry as the third in the country, only behind Zhejiang and Fujian provinces. Sabry (2017) proposed improving the tea market and sales networks to promote the development of the Hawaiian tea industry, increase brand awareness, and

expand tea sales. Xu (2005) focused on the tea processing industry, analyzing the factors influencing the international competitiveness of China's tea processing industry.

Udeshna (2017) examined the international competitiveness of Indian tea using the RCA index, concluding that Indian tea prices are relatively high compared to world market tea prices. Jin (2019) investigated the competitiveness of Chinese tea exports to countries along the Belt and Road using the RCA index and international market share. The findings suggest that although there is a certain competitive advantage, the main exports are raw tea, which still lags Kenya and Sri Lanka in terms of quality and differentiation. Kong (2020) used the RCA index to calculate the export competitiveness of Chinese tea and compared it with India, the world's second-largest tea exporter. The findings indicate that while China's tea competitiveness is strong, it is low compared to India, indicating significant room for improvement. Corresponding policy recommendations were proposed accordingly.

Cai (2021) compared the export competitiveness of Chinese tea with other major tea-exporting countries using the RCA index, TC index, and Michaely index. The findings show significant fluctuations across all three indices, with an overall lag in the African region. In selecting proxy indicators for the international competitiveness of China's tea processing industry, the study mainly used the RCA index and Overall Labor Productivity (OLP). The data analysis shows that the competitiveness of China's tea processing industry is not significantly affected by the intensity of personnel development or research funding; however, research funding positively affects the tea processing industry. The study also indicates that China's tea processing enterprises have lower levels of high-quality personnel and development funding compared to the global average (Cai, 2021).

Guan (2010) focuses on a comparative advantage analysis of Chinese tea exports, outlining the status of Chinese tea exports while examining various aspects such as export proportion, volume, and prices. Wang and Pan (2004) employed the RCA index, TCI, and the export price elasticity of Chinese tea exports from 1986 to 2000. They found a significant decline in the competitiveness of Chinese tea exports. Xu (2006) examined the competitiveness of Chinese tea exports based on the RCA index, TCI, and international market share, concluding that the competitiveness of Chinese tea exports has gradually declined.

Most research on tea industry competitiveness consists of descriptive analyses of the current state of tea industry development, lacking quantitative methods and evaluation models. Some studies have adopted quantitative methods for empirical analysis. However, this is primarily from the perspective of the tea trade and lacks a competitiveness evaluation model. A few scholars have analyzed the tea industry from multiple perspectives but have not used quantitative methods to examine the factors of competitiveness, leading to a relatively unstructured indicator system.

2.6 Research Gap

Existing literature indicates that the tea trade has become increasingly important in both cultural and economic contexts. Tea is not only a cornerstone of China's rich cultural heritage but also plays a central role in economic development. Tea exports have made significant contributions to the income of local farmers, generated foreign exchange earnings, and supported employment in industries such as processing, packaging, and logistics. As of 2023, China ranks first globally in tea export value and second in export volume. Moreover, tea exports promote the global dissemination of Chinese tea culture,

enhancing China's international cultural influence. Among China's tea trade partners, ASEAN countries have emerged as a key market. Since 2021, Malaysia has consistently been the top destination for Chinese tea exports for three consecutive years; Vietnam ranked third from 2020 to 2022. Over the past five years, exports to ASEAN have accounted for approximately 20% of China's total tea export value, with average prices significantly higher than other markets. This underscores the importance of this region to China's tea trade.

While existing studies provide valuable insights into the international competitiveness of China's tea exports, few have focused on the tea trade between China and ASEAN countries. The limited research on this topic often focuses on a small subset of ASEAN countries, leaving many questions unanswered about the overall trade scale and structure, as well as the evolution of China's RCA across all ASEAN nations. Furthermore, most studies rely on traditional trade factors such as economic scale, population, and geographical distance without considering broader influences such as external trade dependency, the COVID-19 pandemic, or international trade agreements. In the event of future global crises like the COVID-19 pandemic, policymakers and tea enterprises may face challenges in responding effectively. These gaps highlight the need for a more comprehensive analysis of the trade potential and determinants of China's tea exports to ASEAN countries.

The present study addresses these gaps by conducting a comprehensive analysis of the tea trade between China and ASEAN countries. First, the Revealed Comparative Advantage (RCA) index is employed to evaluate the international competitiveness of tea exports from China and eight ASEAN countries, analyzing structural changes over time.

Second, a gravity model of trade is constructed to assess the trade potential of China's tea exports to ASEAN countries. By incorporating factors such as external trade dependency and the impact of the COVID-19 pandemic, this research provides deeper insights into the determinants of trade flows. Finally, based on the empirical findings, the study offers targeted recommendations for policymakers and businesses, aiming to optimize trade relations, promote the sustainable development of China's tea exports to ASEAN countries, and foster international trade and cultural exchange.

CHAPTER 3

METHODOLOGY

3.1 Overview

Chapter Three presents the study's methodology, divided into five sections, thoroughly exploring the theory and methods of international trade. Section 3.2 details the Revealed Comparative Advantage (RCA) model and gravity model of trade, focusing on the latter. The gravity model of trade provides a robust theoretical framework for explaining the phenomenon of international trade. Section 3.3 details selecting the sample data. To ensure the integrity and reliability of the research data, we have implemented rigorous data processing steps. Section 3.4 describes the model construction and each explanatory variable, laying a solid foundation for subsequent empirical analysis. Section 3.5 introduces the methods and purposes of the preliminary analyses, including descriptive statistics, correlation analysis, multicollinearity testing, panel unit root tests, and a panel cointegration test. This ensures that the constructed model is statistically and economically reasonable and effective. Based on the mixed results from the panel unit root tests, we applied Pooled Mean Group (PMG). To quantify and predict the potential trade volume between countries, Section 3.6 introduces the trade potential estimation.

3.2 Trade Theory Models

3.2.1 RCA Model

The RCA model concept was first introduced by economist Bela Balassa in 1965 (Adigwe, 2021). Balassa aimed to reveal each country's relative advantages in international trade through empirical data, addressing the shortcomings of traditional

comparative advantage theory in empirical analysis (Tapsin & Alitoska, 2018). The RCA model provides a quantifiable method for studying a country's competitiveness regarding specific products or services, making it an essential tool in international economics and trade research (Adigwe, 2022). The formula for the RCA model is as follows:

$$RCA_{ij}^k = \frac{(X_{ij}^k / X_i^k)}{(X_{wj}^k / X_w^k)} \quad \text{Equation 3.1}$$

where X_{ij}^k represents the export value of product j by country i in year k . X_i^k represents the total export value of country i in year k . X_{wj}^k indicates the export value of the product j in year k worldwide. X_w^k depicts the total export value worldwide in year k .

The RCA value reflects a country's relative advantage or disadvantage in a specific product or service (Cvetković & Petrović-Ranđelović, 2017). When the RCA value is greater than 1, the country's export proportion in that product or service is higher than the global average, signaling a higher RCA. This suggests that the country has a dominant position in this area with strong production and export capabilities, typically holding a larger market share and competitiveness. This may be due to advantages in resources, technology, labor, or specialized expertise regarding that product or service. An RCA value equal to 1 indicates that a country's export proportion for that product or service is equivalent to the global average. This implies that the country's competitiveness and market share in that area are comparable to the global average, neither advantageous nor disadvantaged. When the RCA value is less than 1, the country's export proportion in that product or service is lower than the global average, indicating a lack of revealed comparative advantage. This implies weaker production and export capabilities, lower

market share, and reduced competitiveness for that product or service. This could stem from disadvantages in resources, technology, labor, or lower specialization in that product or service (Ceglowski, 2017).

3.2.2 Gravity Model

In the late 19th century, Ravenstein was the first to apply the gravity model to the study of migration patterns, proposing the gravity theory of migration to explain why migrants choose certain destinations over others. In his classic work “The Wealth of Nations,” British economist Adam Smith (1776) first introduced the gravity trade theory. He argued that the trade volume between two parties depends on their relative advantages and market sizes, laying the foundation for subsequent trade theories. Tinbergen (1962) was the first to apply the gravity model to the study of international trade. To this day, trade theory models are critical tools economists employ to explain and gain a deeper understanding of international trade. These models not only provide a theoretical framework to explore the reasons for trade, influencing factors, and potential effects. They also offer insights for policymakers formulating trade policies. Major trade theory models include Comparative Advantage Theory (Jiang, 2005), Absolute Advantage Theory (Zhang and Fan, 2023), New Trade Theory (Li, 2019), among others. These theories provide explanatory frameworks for understanding trade. They are often interconnected and can be applied in a comprehensive manner based on real-world situations. Notably, the gravity model of trade is commonly used to explain and understand the phenomenon of international trade. It is a more empirical model used to explain and predict the actual flow of international trade, i.e., providing a trade potential estimation (Jiang & Zhang, 2003; Cui, 2024; Zhang, 2024). The term “gravity model” was inspired by Newton’s law of gravity. It posits that the trade flow between two countries is analogous to a gravitational force and

related to their economic sizes and geographical distances. The general form of the gravity model can be expressed as follows:

$$T = \frac{A \cdot M_1 \cdot M_2}{D} \quad \text{Equation 3.2}$$

Where T represents the trade flow or trade volume between two regions. A is a constant representing the combined impact of other influencing factors. M_1 and M_2 represent the economic sizes of the two regions, represented by GDP or total exports (Ashley & Sun, 2017). D represents the geographical distance between them. The trade flow between two regions is directly proportional to their economic sizes and inversely proportional to their geographical distance. This is analogous to Newton's law of gravity, where gravity is directly proportional to the mass of objects and inversely proportional to the distance between them (Cohen, 1981). The gravity model provides a simple, effective way to explain why trade is more active between certain regions while more limited between others. It is suitable for the preliminary analysis and prediction of trade flows. Considering the typically non-linear trend in the relationship between economic size and distance, which may exhibit decreasing or increasing patterns, logarithmic transformation is suitable. Logarithmic transformation is conducive to capturing such non-linear relationships while considering extreme values that could significantly impact the results, such as extremely large economic sizes or minimal distances. By taking the logarithm, we effectively mitigate the impact of extreme values, making the model more robust. Therefore, in economics and trade research, logarithmic transformation has become widely adopted. This method contributes to simplifying models, enhancing interpretability, and aligning with the characteristics of empirical data. By taking the logarithm, the gravity model of trade can be expressed as follows:

$$\ln(T) = \alpha + \beta_1 \cdot \ln(M_1) + \beta_2 \cdot \ln(M_2) + \beta_3 \cdot \ln(D) + \varepsilon \quad \text{Equation 3.3}$$

Where $\ln(T)$ represents the logarithm of trade flow. α is the intercept term. β_1 and β_2 represent the combined impact of other influencing factors. β_3 is the parameter associated with economic size. $\ln(M_1)$ and $\ln(M_2)$ represent the logarithm of the economic sizes of two regions, respectively. $\ln(D)$ represents the logarithm of geographical distance. ε is the error term, representing the impact of other factors not considered by the trade flow model.

However, in practical scenarios, factors influencing trade extend beyond economic size and geographical distance, encompassing elements such as cultural factors, political considerations, institutional differences, and more. To better adapt to the complexities of present-day trade environments, scholars have expanded the model as follows:

$$T = F(M_1, M_2, D, X_4, X_5, \dots) \quad \text{Equation 3.4}$$

Thus, the general expression of the extended gravity model for trade is as follows:

$$\ln(T) = \alpha + \beta_1 \cdot \ln(M_1) + \beta_2 \cdot \ln(M_2) + \beta_3 \cdot \ln(D) + \beta_4 \cdot \ln(X_4) + \beta_5 \cdot \ln(X_5) + \dots + \varepsilon \quad \text{Equation 3.5}$$

where X_4 and X_5 represent additional potential factors that may influence trade, such as cultural similarity, political systems, and technological levels. β_4 and β_5 denote their respective parameters. This extended expression can introduce various influencing factors based on specific research objectives. For instance, if a study focuses on environmental sustainability, variables related to environmental factors can be added. If the research considers the influence of financial markets, variables related to financial factors

can be introduced. Such extensions make the model more flexible, enabling a more comprehensive understanding of the diverse influencing factors behind trade flows.

3.3 Sample Data Selection

As one of the world's largest tea producers, China boasts a rich history and tradition in tea cultivation (Benn, 2015). With a diverse range of tea types (green, black, oolong, white, yellow, dark, etc.), each variety has unique flavors and characteristics (Kumar et al., 2018). Chinese tea not only holds a significant position in the domestic market but also exerts notable influence in the international market. The export volume of Chinese tea accounts for a considerable share of the global tea trade (Majumder et al., 2010). Major export markets include Asia, Europe, North America, and others. On November 4, 2002, China and ASEAN initiated negotiations for CAFTA (Zhang, 2012), marking a significant step in economic cooperation between China and ASEAN while enhancing the competitiveness of Chinese tea in ASEAN countries.

3.3.1 Data Selection of the RCA Model

By constructing and analyzing the RCA model, we can delineate the comparative advantages of China and eight ASEAN countries in the tea trade. The RCA model is critical in quantifying how much each country excels in the production and export of tea relative to other nations. To perform this analysis, we gathered a comprehensive dataset crucial for accurately assessing comparative advantages. The data is detailed below.

- i. **Tea Export Values:** The total export value of tea from each country under consideration. This metric reflects the economic value of tea exports to understand the significance of tea in each country's trade portfolio.

- ii. **Total Export Values:** The overall export value for each country, encompassing all products and commodities. This broader measure contextualizes tea exports within the total export landscape of each country.
- iii. **Global Tea Export Value:** The aggregate value of tea exports globally. This data is essential for benchmarking and comparison purposes, providing a standard against which individual country data can be assessed.
- iv. **Global Total Export Value:** The total value of all global exports. This data offers a comprehensive view of the global trade environment, serving as a reference for evaluating the proportion of tea exports in the global trade context.

The data used in this analysis were meticulously sourced from reputable international trade databases and official statistical reports. These sources are renowned for their accuracy and reliability, ensuring that the data used in the RCA model analysis is precise and trustworthy. By leveraging robust data sources, we deliver a reliable assessment of the comparative advantages in the tea trade. The findings provide valuable insights into the trade dynamics between China and ASEAN countries.

3.3.2 Gravity Model Data Selection

This section describes the systematic collection of tea export data from China to ASEAN countries from 1993 to 2022 using authoritative platforms such as the General Administration of Customs of the People's Republic of China, the National Bureau of Statistics, the World Bank, the International Tea Committee, the Food and Agriculture Organization of the United Nations, and other reliable sources. With tea export trade value as the dependent variable, this section explores the impact of twelve factors on China's tea export trade to ASEAN countries. These factors include the annual tea import volume from

China for eight ASEAN countries (IMP), the capita Gross Domestic Product (GDP) of the eight ASEAN countries, the Gross Domestic Product (GDP) of China, the historical trade dependence (DEP) of the eight ASEAN countries, the comprehensive distance between the capitals of the eight ASEAN countries and China (DIS), and whether the COVID-19 pandemic has occurred (PAN). Since early trade between Laos and Brunei with China was infrequent and trade volume had been relatively small, these two countries are excluded from the analysis. This research explores China's tea export situation across eight ASEAN countries: the Philippines, Cambodia, Singapore, Indonesia, Malaysia, Thailand, Myanmar, and Vietnam. The dependent variable is the tea export amount (trade value), and the independent variables include the eleven factors mentioned above. Through the research framework, we gain a more comprehensive and accurate understanding of the dynamics of tea trade between China and these eight ASEAN countries, providing a reliable foundation for an in-depth analysis of the influencing factors.

During the data collection process, there were instances of missing data: the import volume and import value of tea from China to Cambodia in 1993 and 2007; the import volume and import value of tea from China to the Philippines in 2001; the import volume and import value of tea from China to Vietnam in 2008. Mean substitution was employed to address these missing data points.

For the missing data points regarding the import volume and value of tea from China to Cambodia in 2007, from China to the Philippines in 2001, and from China to Vietnam in 2008 (six data points did not appear at the beginning of the dataset), we employed a mean substitution. For instance, if the import volume and value of tea from China to Cambodia in 2006 were 3942 kg and \$30,556, and 4259 kg and \$35,350 in 2008,

then the mean values can be used to estimate the missing data for Cambodia in 2007. This results in an import volume of approximately 4235.5 kg and an import value of around \$32,953 for 2007.

The advantages of using mean substitution to handle missing data include simplicity, feasibility, avoidance of introducing additional errors, retention of overall sample characteristics, and widespread applicability (Little & Rubin, 2019). This method is easy to understand and implement, requiring no complex calculations or parameter settings, making it suitable for addressing situations with missing data. Since it involves directly using the mean of the available data to fill in the missing values, it does not introduce additional errors during the imputation process. This helps maintain the consistency and stability of the data. In cases where the dataset is large, mean substitution can preserve the overall sample characteristics to some extent, as the imputed data reflects the trends and distribution.

3.4 Empirical Model

This section discusses the study's two empirical models, namely, the RCA Model and the Gravity Model of Trade.

3.4.1 RCA Model

By constructing the RCA model for tea trade between China and eight ASEAN countries, we can analyze each country's comparative advantage in tea exports, providing a scientific basis for related trade decisions and policymaking. Identifying each country's RCA in the tea trade illustrates which countries are more competitive in the international tea market. This is significant for enhancing the status of these countries in the global tea market (Kamburawala & Abeyrathne, 2024). Understanding each country's comparative

advantage provides data support for governments and relevant agencies to formulate and adjust tea export policies. It also helps tea production and export enterprises identify potential international markets. This enables them to develop effective market entry strategies and resource allocation (Qiao et al., 2016). Comparative advantage analysis can identify strengths and weaknesses in tea production and export among countries, driving industry optimization and upgrades while increasing the added value of products (Keter, 2012).

In Equation 3.5, j represents the tea product; the formula of the RCA model in this section can be described as follows:

$$RCA_i^k = \frac{(X_i^k / X_t^k)}{(X_w^k / X_{tw}^k)} \quad \text{Equation 3.6}$$

Where X_i^k represents the tea export value of country i in year k . X_t^k represents the total export value of country i in year k . X_w^k represents the tea export value of in year k worldwide. X_{tw}^k represents the total export value worldwide in year k .

Applying the RCA value in tea trade can reveal a country's relative advantages or disadvantages in tea exports. If a country's RCA value is greater than 1, its proportion of tea exports is higher than the global average, signifying that the country has a comparative advantage in tea production and export. This may be due to advantages in resources, technology, labor, or specialized expertise in tea production, allowing the country to occupy a larger market share while maintaining greater competitiveness (Muflihah et al., 2023). When the RCA value equals 1, the country's proportion of tea exports is consistent with the global average. This indicates that the country's competitiveness and market share in tea are aligned with the global market, with neither significant advantage nor

disadvantage. If the RCA value is less than 1, the country's proportion of tea exports is lower than the global average, indicating a lack of revealed comparative advantage in tea production and export. The country may face disadvantages in resources, technology, and labor or have lower specialization in tea production, resulting in weaker market share and competitiveness.

3.4.2 Gravity Model

This section discusses the extended gravity model of trade, employing seven factors as explanatory variables. The annual amount of tea imports from China to eight ASEAN countries (TRA) is the dependent variable. The meanings of each variable are described in Table 3.1.

Table 3.1: Variables Definition

Variables	Definition of Variables	Data Source
TRA_i^k	The trade amount between China and ASEAN member country i in year k (in U.S. dollars)	United Nations Commodity Trade Statistics Database
IMP_i^k	The amount of tea imported from China by ASEAN member country i in the year k (in kilograms)	United Nations Commodity Trade Statistics Database
$PGDP_i^k$	The per capita Gross Domestic Product (GDP) of ASEAN member country i in the year k (in U.S. dollars)	World Bank
$PGDP^k$	The per capita Gross Domestic Product (GDP) of China in the year k (in U.S. dollars)	World Bank
DEP_i^k	The external trade dependency of ASEAN member country i in the year k	United Nations Commodity Trade Statistics Database
DIS_i^k	The comprehensive distance from the capital of ASEAN member country i to Beijing in the year k	CEPII Database
PAN^k	Whether the COVID-19 pandemic broke out in year k	Compilation of Publicly Available Data
EX_i^k	The exchange rate of US dollar to ASEAN member country i in the year k	Compilation of Publicly Available Data

The gravity model of trade is as follows:

$$LN(TRA_i^k) = \alpha + \beta_1 LN(IMP_i^k) + \beta_2 LN(ASGDP_i^k) + \beta_3 LN(CGDP_i^k) + \beta_4 LN(DEP_i^k) + \beta_5 LN(DIS_i^k) + \beta_6 EX_i^k + \beta_7 PAN_i^k + \varepsilon_i^k \quad \text{Equation 3.7}$$

where the amount of tea imported from China by ASEAN member country i in year k is IMP_i^k . This variable serves as a direct trade indicator, reflecting the level of interaction and cooperation between both parties in the tea sector. The quantity of tea imported by ASEAN member countries from China indirectly reflects the overall demand trend for Chinese tea in the ASEAN market. An increase in import volume may indicate growing interest in Chinese tea among ASEAN countries and the competitiveness of Chinese tea in the ASEAN market. By observing the quantity of tea imported by ASEAN member countries from China, we gain insights into the trade cooperative relationships among these nations. Therefore, this variable becomes a crucial reference indicator for assessing regional trade cooperation. Consequently, the quantity of tea imported by ASEAN member countries from China is expected to positively impact trade values.

The per capita GDP of ASEAN member country i in year k is $PGDP_i^k$. GDP per capita refers to the total GDP of a country or region divided by its total population. This indicator measures the value of the average GDP created by each resident over a certain period. The calculation formula is as follows:

$$PGDP_i^k = \frac{GDP_i^k}{POP_i^k} \quad \text{Equation 3.8}$$

Where GDP_i^k represents the GDP of the country in year k . POP_i^k represents the total population of the country in year k . Choosing per capita GDP as an explanatory variable is based on the following considerations. First, GDP is a key indicator for

measuring the economic level of a country or region. Introducing it into the model can provide information about the overall economic strength of ASEAN member countries. A higher per capita GDP may imply stronger economic power and higher purchasing power, potentially influencing these countries' demand for Chinese tea. Second, per capita GDP can also reflect the standard of living of residents in different countries. For countries with higher per capita GDP, consumers are more likely to have higher purchasing power and a broader range of choices, which may positively impact their consumption of Chinese tea. Additionally, per capita GDP can reflect the degree of market openness in a country to some extent. Higher per capita GDP is often associated with a more open market economy, implying that it might be easier to import goods, including Chinese tea. Therefore, the per capita GDP of ASEAN member countries is expected to positively impact trade values.

The per capita GDP of China in year k is $PGDP^k$. This variable represents the level of economic development in China and the improvement in consumer purchasing power, which has a multifaceted impact on tea trade between China and ASEAN countries. First, as per capita GDP increases, Chinese consumers' purchasing power grows, leading to a higher demand for premium and diverse tea products, stimulating tea exports from ASEAN countries to China. Second, the rise in per capita GDP is often accompanied by industrial upgrading and supply chain optimization, making China more competitive in tea production and export, increasing its market share globally. Changes in per capita GDP can reflect shifts in consumer preferences. For instance, as living standards improve, Chinese consumers will likely pay more attention to health and wellness, driving demand for organic and specialty teas, boosting tea trade between China and ASEAN. Moreover, the growth in per capita GDP enhances China's role in regional economic cooperation, creating more opportunities for bilateral tea trade through trade agreements and policy

incentives. Therefore, the increase in China's per capita GDP is expected to positively impact the tea trade volume between China and ASEAN.

The external trade dependency of ASEAN member country i in year k is DEP_i^k . Trade dependency is a crucial economic indicator in international trade research. It measures the degree of external trade dependence within the economic system of a country or region, reflecting the proportion of its total economic scale occupied by the combined value of exports and imports. It also indicates the extent of the economic system's connection with the global market. The calculation formula for trade dependency is as follows:

$$DEP_i^k = \frac{TEI_i^k}{GDP_i^k} * 100\% \quad \text{Equation 3.9}$$

Where TEI_i^k represents the total trade imports and exports of the country in year k . GDP_i^k is the country's GDP in year k . The percentage obtained by dividing TEI_i^k by GDP_i^k and multiplying the result by 100% indicates the relative importance of international trade within the economic system. Notably, when calculated using the expenditure method, GDP includes consumption, investment, government purchases, and net exports. Net exports equal exports minus imports. If the sum of a country's exports and imports is very large, it may result in total external trade exceeding the GDP, leading to a situation where the trade dependency is greater than 1. A high trade dependency may indicate a country's greater reliance on the international market, making its economy more open. However, this may also mean that it is more sensitive to global market fluctuations. In contrast, a low trade dependency may suggest a relatively self-sufficient country, but it could result in fewer opportunities to use the global market.

Choosing trade dependency as an explanatory variable is based on the following reasons. First, trade dependency reflects the openness of a country's economic system. Higher trade dependency generally indicates a greater reliance on the international market and a more open market. In terms of the gravity model of trade, this implies that ASEAN member countries with higher trade dependency are more likely to engage in trade with other countries, including China, making their demand for Chinese tea more responsive. Second, countries highly dependent on external markets are more susceptible to global economic fluctuations. In the gravity model of trade, introducing this variable helps analyze the overall economic dynamics of these countries and their relative position in trade activities. Trade dependency may also be related to the market demand of these countries. Countries with higher dependency may prioritize diversifying import sources to reduce economic risks, which could impact their import decisions for Chinese tea. Therefore, the trade dependency of ASEAN member countries is expected to positively impact trade values.

The comprehensive distance from the capital of ASEAN member country i to Beijing in year k is DIS_i^k . To effectively address the issue of constant geographical distance, we adopt a common method to measure the distance between ASEAN countries and China more accurately. Specifically, we introduce a distance variable calculated by multiplying the absolute distance between the capital cities of two countries by the annual average price of international crude oil. This approach is based on the following considerations. While geographical distance is an essential factor, the impact of oil prices on transportation costs cannot be overlooked when considering international trade. Through this calculation method, we obtain a more comprehensive measure of distance that reflects actual trade costs more effectively. The distance variable not only considers

the physical distance in geographical space but also incorporates economic factors, leading to a more comprehensive understanding and analysis of the trade relationship between ASEAN countries and China. The following formula presents the calculation method for the distance variable:

$$DIS_i = ADIS_i * PWIT^k \quad \text{Equation 3.10}$$

Where DIS_i represents the comprehensive distance between ASEAN countries and Beijing. $ADIS_i$ is the absolute distance between the capital cities of the two countries. $PWIT^k$ represents the annual average price of international crude oil. The international crude oil selected here is WTI (West Texas Intermediate). Introducing this distance variable enriches our understanding of the factors influencing trade relationships, making the study more comprehensive and in-depth. Regarding the potential impact of distance factors on trade volume, geographical distance is a crucial factor in trade costs. Shorter distances are often associated with lower transportation costs, potentially prompting more frequent and larger-scale trade activities. Second, geographical distance also reflects differences in aspects such as culture, language, and business connections. Closer countries may have more interactions in terms of culture and business, which could influence the convenience and closeness of trade between them. Therefore, the distance between the capital cities of ASEAN member countries and Beijing is expected to negatively impact trade volume.

The exchange rate of the U.S. dollar to the currency of ASEAN member country i in year k is EX_i^k . This variable is an essential financial indicator reflecting economic interactions that significantly influences the import and export prices of tea and trade flows. Fluctuations in the exchange rate between the U.S. dollar and the local currency of

ASEAN member countries directly affect their import costs and purchasing power, impacting the demand for Chinese tea in the ASEAN market. Specifically, if the U.S. dollar appreciates against the local currency, the cost of importing Chinese tea to ASEAN countries will rise, potentially leading to a decrease in import volume. In contrast, if the exchange rate depreciates, import costs will decrease, and demand for Chinese tea may increase.

Exchange rate fluctuations also indirectly reflect the economic environment within the region and the volatility of international markets. For instance, the strength or weakness of the U.S. dollar may be influenced by global economic conditions and financial policies, similarly affecting the tea consumption and trade structure in ASEAN countries. By observing the fluctuations in the exchange rate between the U.S. dollar and the currencies of ASEAN member countries, we gain deeper insights into the procurement behavior, trade balance, and cross-border economic cooperation trends of these countries in the tea trade.

Whether the COVID-19 pandemic broke out in year k is represented by PAN^k . The outbreak of the COVID-19 pandemic is a dummy variable, taking the value of 0 if the COVID-19 pandemic broke out in year k , and 1 otherwise. The COVID-19 pandemic outbreak may have multiple impacts on tea trade volume. First, lockdowns and quarantine measures caused by the pandemic may significantly reduce tea production and transportation, leading to supply chain disruptions that affect the supply of tea. Additionally, the pandemic may lead to labor shortages and increased production costs, further impacting tea production and trade. Second, the global economic recession and decreased consumer demand caused by the pandemic may reduce market demand for tea,

negatively affecting trade volume. On the other hand, health and safety concerns during the pandemic may increase consumer demand for organic and healthy teas, partially offsetting the decline in demand. Therefore, the COVID-19 pandemic outbreak is expected to significantly negatively impact tea trade volume. However, the extent of the impact must be verified through data analysis.

3.5 Data Analysis and Econometric Estimation

3.5.1 Descriptive Statistics

Descriptive statistics is a preliminary data analysis method used to summarize and interpret the key characteristics of a dataset through statistical measures (Rasoolpur, 2015; Niu, 2023). Key statistical measures include the mean, median, and standard deviation. These quantitative indicators reveal the central tendency, variability, breadth, and dispersion of data distribution. The mean indicates the central tendency of the data. The median represents the middle value, while the standard deviation quantifies the spread of data. These statistics help to understand the overall nature of the data while identifying patterns or anomalies that may exist. Through descriptive statistics, we can systematically analyze and summarize data, providing a solid foundation for subsequent data exploration and analysis (George & Mallery, 2018).

3.5.2 Correlation Analysis

Correlation analysis is a critical statistical method used to understand relationships between variables. By calculating correlation coefficients, we can quantify and assess the degree of linear association between variables (Yano, 2010; Li, 2023). Commonly used correlation coefficients include Pearson's correlation coefficient and Spearman's rank correlation coefficient (Schober et al., 2018). Pearson's correlation coefficient measures

the strength and direction of the linear relationship between two variables. The formula is as follows:

$$r = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum (x_i - \bar{x})^2 \sum (y_i - \bar{y})^2}} \quad \text{Equation 3.11}$$

Where x_i and y_i are the observed values of variables X and Y , $\bar{x}$ and $\bar{y}$ are the respective means of variables X and Y . Spearman's rank correlation coefficient measures the monotonic relationship between two variables. The formula is as follows:

$$\rho = 1 - \frac{6 \sum d_i^2}{n(n^2 - 1)} \quad \text{Equation 3.12}$$

Where d_i represents the difference in ranks between corresponding observations of the two variables. n is the number of observations. Coefficients range from -1 to $+1$. Negative values indicate a negative correlation, while positive values indicate a positive correlation; values close to zero suggest no linear relationship between the variables. In addition to numerical coefficients, correlation analysis can visually demonstrate relationship patterns and trends between variables using scatter plots and trend lines. This analysis uncovers potential patterns and associations between variables while revealing underlying causal relationships or complex interactions, providing crucial insights for further data interpretation and decision-making. In data-driven decision-making and predictive analysis, a thorough understanding and analysis of correlations are critical to ensure model accuracy and predictive validity (Hauke & Kossowski, 2011).

3.5.3 Multicollinearity Tests

Multicollinearity testing is a significant statistical analysis tool used to assess whether there is a high correlation among multiple independent variables (Dong, 2023;

Roberto et al., 2023). In multiple regression analysis, a strong linear correlation among independent variables can increase the standard errors of estimated regression coefficients, reducing a model's accuracy and reliability. Multicollinearity tests typically assess the degree of collinearity by calculating Variance Inflation Factors (VIF) for each independent variable; VIF values greater than 10 generally indicate strong collinearity. Methods to address multicollinearity include removing highly correlated variables, combining variables, and using orthogonalization techniques. Effective multicollinearity testing and management can enhance a model's robustness and explanatory power. This ensures that the established model accurately captures the impact of independent variables on the dependent variable while mitigating biased or misleading results (Daoud, 2017).

3.5.4 Panel Unit Root Test

Unit root tests can determine whether time series data exhibit a unit root (i.e., non-stationarity) (Dogru et al., 2019; Nguyen, 2021). In time series analysis, stationarity is a fundamental assumption. This means that the statistical properties of a series such as mean and variance are constant over time without any noticeable trend or cyclical changes. The main purpose of the unit root test is to verify whether this assumption holds. Common unit root test methods include the Augmented Dickey–Fuller (ADF) test and Phillips–Perron (PP) test. In unit root tests for long panel data, it is common to consider the data's panel characteristics, including variations across individuals and over time. Therefore, the ADF and IPS tests (Im-Pesaran-Shin Test) are also essential choices.

The study sample includes a cross-section of $n=8$ and a time series of $t=30$. Therefore, this study utilizes long panel data and employs the ADF and IPS to conduct unit root tests on the variables.

3.5.4.1 ADF Panel Unit Root Test

The ADF unit root test is a crucial method in time series analysis to determine whether a series has a unit root, indicating non-stationarity. It is widely applied in economics and finance for stability analysis. The presence of a unit root suggests that the time series is non-stationary. This means its mean, variance, and autocorrelation characteristics change over time, which can lead to unreliable model predictions. The ADF test extends the classical Dickey–Fuller test by incorporating lagged terms to address autocorrelation issues. The regression model for the ADF test typically includes a constant term, a time trend term, and multiple lagged terms, expressed as follows:

$$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \sum_{i=1}^p \delta_i \Delta y_{t-i} + \varepsilon_t \quad \text{Equation 3.13}$$

Where y_t represent the time series being tested. α denotes the constant term and β is the time trend coefficient. γ is the unit root test coefficient, which is critical in the ADF test. If $\gamma = 0$, it indicates the presence of a unit root, suggesting that the series is non-stationary. Δy_t represents the different terms of y_t as $\Delta y_t = y_t - y_{t-1}$. The lagged values $\sum_{i=1}^p \delta_i \Delta y_{t-i}$ address autocorrelation, ensuring that the error term ε_t behaves as white noise.

The steps for performing the ADF test begin with establishing the hypotheses. First, the null hypothesis H_0 assumes that the series has a unit root (non-stationary). Second, the alternative hypothesis H_1 assumes that the series does not contain a unit root (stationary). Next, an appropriate model type is selected (including a constant term only, including a time trend term, or excluding both). The ADF statistic is calculated and compared against the critical value. If the ADF statistic is smaller than the critical value,

the null hypothesis is rejected, indicating that the series is stationary. If the ADF statistic exceeds the critical value, the null hypothesis cannot be rejected, suggesting that the series has a unit root and requires further treatment to achieve stationarity.

The ADF test's strength lies in its ability to account for lagged terms that address autocorrelation. This can ensure accurate test results, especially for series with trends or drifts. However, the test has limitations, such as the need for careful selection of the lag length—too many or too few lags can affect the outcome. Additionally, the ADF test may be less effective at identifying stationarity in complex time series compared to more advanced methods. In practice, the ADF test is widely used to assess the stationarity of time series like stock prices, GDP, and exchange rates. If a series is found to be non-stationary, differencing or other transformations are typically applied to ensure that subsequent regression analyses and forecasting models are robust and reliable.

3.5.4.2 IPS Panel Unit Root Test

The IPS unit root test was proposed by Im, Pesaran, and Shin in 2003. It allows for different autoregressive coefficients across individual cross-sections, providing a more flexible examination of unit root issues in panel data. Its hypothesis allows for different autoregressive coefficients for each cross-sectional unit root process, meaning that time series in different cross-sections can exhibit varying dynamic properties. Unlike the ADF test, the IPS test permits heterogeneity, making it more flexible and suited for practical applications. The null hypothesis of the IPS unit root test is H_0 , where each cross-sectional unit in the panel data has a unit root. The alternative hypothesis is H_1 , where at least one cross-sectional unit does not have a unit root, meaning at least one cross-sectional time series is stationary. The IPS unit root test is based on the following regression model:

$$\Delta y_{it} = \alpha_i + \rho_i y_{it-1} + \sum_{k=1}^p \beta_{ik} \Delta y_{it-k} + \varepsilon_{it} \quad \text{Equation 3.14}$$

Where ρ_i is the autoregressive coefficient for the i th cross-sectional unit. Other symbols have the same definitions as defined above. The $W_N T$ statistic for the IPS test is the standardized average t-statistic, calculated as follows:

$$W_N T = \frac{1}{\sqrt{N}} \sum_{i=1}^N t_i \quad \text{Equation 3.15}$$

The standardized IPS statistic $\bar{t}$ is calculated as follows:

$$\bar{t} = \frac{1}{N} \sum_{i=1}^N t_i \quad \text{Equation 3.16}$$

In large samples, the standardized average t-statistic for IPS tests follows a standard normal distribution. By comparing $W_N T$ with the critical values from the standard normal distribution, we can determine whether to reject the null hypothesis.

Both test methods are based on regression models to test time series for the presence of unit roots. If the test statistic significantly exceeds the critical value, we can reject the unit root hypothesis, indicating the series is stationary. If the test statistic is not significant, this suggests that the series may possess a unit root, indicating non-stationarity. Non-stationary time series may exhibit trends, seasonal fluctuations, or cyclical movements, which can affect the statistical properties and predictive ability of the series. Therefore, unit root tests have wide application in time series analysis in economics, finance, and other fields. They can ensure the reliability and effectiveness of analysis while providing a solid foundation for future modeling and forecasting (Ajewole et al., 2020).

3.5.5 Panel Cointegration Test

Cointegration tests are typically used for non-stationary variables. Cointegration occurs when a linear combination of two or more non-stationary time series results in a stationary series (Azam et al., 2021; Nguyen, 2021; Niu, 2023). If the time series variables involved are non-stationary, cointegration tests can help determine whether there is a long-term stable relationship. Non-stationary time series may exhibit trends or drifts over time, while cointegration indicates a long-term equilibrium relationship among these series when their linear combination is stationary. Suppose there are two time series y_t and x_t . If they are non-stationary (they exhibit unit roots) but some linear combination $z_t = y_t - \beta x_t$ is stationary, there is cointegration between y_t and x_t , with $(1, -\beta)$ being the cointegration vector. Among the commonly used cointegration testing methods, this study employs the Westerlund and Pedroni cointegration tests to examine cointegration among variables with unit roots.

3.5.5.1 Kao Cointegration Test

The Kao test is a cointegration test method based on panel data used to determine whether there is a long-term cointegration relationship between multiple time series. The basic premise of the Kao test is to examine whether the error terms in the panel data regression model have a unit root, thus determining whether a cointegration relationship exists between the time series. The regression model of the Kao test is typically expressed as follows:

$$y_{it} = \alpha_i + \beta x_{it} + \varepsilon_{it} \quad \text{Equation 3.17}$$

Where y_{it} and x_{it} are the dependent and independent variables, respectively, for the i th individual at time t . α_i represents the individual effects, and ε_{it} is the error term. The goal of the cointegration test is to determine whether the error term (ε_{it}) has a unit root, i.e., whether it is non-stationary. The null hypothesis of the Kao test states that no cointegration relationship exists for any individual, while the alternative hypothesis is that at least one individual exhibits a cointegration relationship. Specifically, the Kao test performs a unit root test on the error term ε_{it} ; the test statistic is typically expressed in the following form:

$$t_{Kao} = \frac{\hat{\beta}}{SE(\hat{\beta})} \quad \text{Equation 3.18}$$

Where $\hat{\beta}$ is the estimated coefficient in the regression model, and $SE(\hat{\beta})$ is its standard error. In the Kao test, the computed statistic is compared with the critical value. If the statistic is significantly smaller than the critical value, the null hypothesis is rejected, indicating the presence of a cointegration relationship. If the statistic is greater than the critical value, the null hypothesis cannot be rejected, suggesting no cointegration relationship. The advantage of the Kao test lies in its ability to handle heterogeneity in panel data, making it particularly suitable for cross-sectional data analysis. It can identify long-term equilibrium relationships between different time series. However, it has certain limitations, such as assuming that all individuals share the same cointegration vector, which may not be appropriate for individuals with different cointegration vectors. Additionally, the Kao test requires a sufficiently large sample size and time length to ensure reliability. In practical applications, the Kao test is widely used in fields such as economics and finance. When working with panel data, it effectively identifies

cointegration relationships between different time series, providing a basis for further economic analysis and policy research.

3.5.5.2 Pedroni Cointegration Test

The Pedroni Cointegration Test, proposed by Peter Pedroni (1999; 2004), introduces several statistics to assess cointegration relationships in panel data, allowing for individual heterogeneity. The Pedroni cointegration test is based on the following linear regression model:

$$y_{it} = \alpha_i + \delta_i t + \beta_i x_{it} + \varepsilon_{it} \quad \text{Equation 3.19}$$

Where y_{it} is the dependent variable for the i th cross-sectional unit at time period t . x_{it} is the explanatory variable for the i th cross-sectional unit at time period t . α_i represents individual fixed effects. $\delta_i t$ is the time trend term. β_i is the regression coefficient. ε_{it} is the error term. The null hypothesis (H_0) of the Pedroni cointegration test is that there is no cointegration relationship across any cross-sectional unit. The alternative hypothesis (H_1) is at least one cross-sectional unit exhibits a cointegration relationship, or all cross-sectional units exhibit cointegration relationships. The Pedroni cointegration test provides seven statistics, including four panel statistics and three group statistics as follows:

$$\text{The } \nu\text{-statistic: } \hat{\nu} = \sum_{i=1}^N \sum_{t=1}^T \varepsilon_{it}^2 / (T-1),$$

$$\rho\text{-statistic: } \hat{\rho} = \sum_{i=1}^N \sum_{t=1}^T \varepsilon_{it} \varepsilon_{it-1} / (T-1),$$

$$PP\text{-statistic: } \hat{PP} = \sum_{i=1}^N \sum_{t=1}^T \varepsilon_{it} \varepsilon_{it-1} / (T-1),$$

$$ADF \text{ -statistic: } \hat{ADF} = \sum_{i=1}^N \sum_{t=1}^T \varepsilon_{it} / \sigma_{\varepsilon_i} .$$

Regarding the Group ρ -statistic, Group PP -statistic, and Group ADF -statistic, group statistics are similar to panel statistics but calculated slightly differently to reflect the influence of heterogeneity across individuals. If the computed test statistic is significant when compared to its critical value, we reject the null hypothesis and conclude that a cointegration relationship exists.

3.5.6 Pooled Mean Group (PMG) Estimator

Persaran et al. (1999) introduced a novel method known as the PMG estimator, designed to estimate non-stationary dynamic heterogeneous panels. This technique involves pooling and averaging coefficients across groups (Frank, 2007). The PMG estimation method combines features of mean group estimation and dynamic fixed effects estimation, which handles long-term and short-term dynamic relationships in heterogeneous panel data. The advantages are as follows.

i. Allows for short-term heterogeneity: The PMG estimation method permits different cross-sectional units to exhibit heterogeneity in short-term dynamic adjustments, meaning that short-term coefficients and adjustment speeds may vary across cross-sectional units.

ii. Assumes long-term homogeneity: The PMG estimation method assumes that all cross-sectional units have the same coefficients in long-term equilibrium relationships, meaning that long-term coefficients are identical.

The PMG estimation method is based on the following error correction model:

$$\Delta y_{it} = \alpha_i + \lambda_i (y_{it-1} - \beta' x_{it-1}) + \sum_{k=1}^p \gamma_{ik} \Delta y_{it-k} + \sum_{k=1}^q \phi_{ik} \Delta x_{it-k} + \varepsilon_{it} \quad \text{Equation 3.20}$$

Where y_{it} and x_{it} represent the dependent variable and the explanatory variable for the i th cross-sectional unit at time period t , respectively. Δy_{it} represents the change in the dependent variable for the i th cross-sectional unit at time period t . α_i represents individual fixed effects. λ_i is the coefficient of the error correction term, reflecting the speed at which the system returns to its equilibrium state. β is the long-term equilibrium coefficient, assuming it is the same across all cross-sectional units. γ_{ik} and ϕ_{ik} are coefficients in the short-term dynamic adjustment process, allowing for heterogeneity across cross-sectional units. ε_{it} is the error term. Assuming the long-term equilibrium relationship is:

$$y_{it} = \alpha_i + \beta' x_{it} + \mu_{it} \quad \text{Equation 3.21}$$

Where β is the vector of long-term equilibrium coefficients shared by all cross-sectional units. μ_{it} is the long-term equilibrium error term. Thus, the error correction term of the error correction model is: $\lambda_i (y_{it-1} - \beta' x_{it-1})$, where $y_{it-1} - \beta' x_{it-1}$ is the lagged error correction term representing the deviation from the long-term equilibrium. The differenced terms in the short-term dynamic adjustment process are:

$$\sum_{k=1}^p \gamma_{ik} \Delta y_{it-k} + \sum_{k=1}^q \phi_{ik} \Delta x_{it-k}, \text{ where } \gamma_{ik} \text{ is the coefficient of the lagged dependent variable.}$$

ϕ_{ik} is the coefficient of the lagged explanatory variable. p and q represent the lag order of the dependent variable and the explanatory variable, respectively (Frank, 2007).

Based on the above, the PMG estimation method is a panel data estimation approach that combines the advantages of mean group estimation and dynamic fixed effects estimation. By allowing for short-term heterogeneity and assuming long-term homogeneity, PMG provides more flexible and accurate estimates when using heterogeneous panel data. Its mathematical foundation includes constructing error correction models, estimating long-term equilibrium relationships, and estimating error correction coefficients. Thus, PMG applies to a wide range of practical scenarios (Iqbal et al., 2023).

3.6 Trade Potential Calculation

Trade potential calculation provides valuable insights for formulating trade policies and market strategies by quantitatively analyzing the potential trade volume between two countries or regions (Egger, 2002). After introducing the basic concepts and formulas of the gravity model of trade in the previous sections, we detail how to apply this model to calculate trade.

- i. Substitute the economic scale data of the countries/regions involved in the trade into the model.
- ii. Calculate the theoretical trade volume.
- iii. The tea trade potential index is typically defined as the ratio of actual trade volume to the theoretically estimated trade volume, which is calculated using the gravity model.

This index measures the gap or the degree of potential utilization between actual trade and the theoretically possible maximum trade. The trade potential index can be calculated as follows:

$$Index = \frac{TRA_A}{TRA_p} \quad \text{Equation 3.22}$$

Where TRA_A represents the actual international trade volume or trade value. TRA_p indicates the theoretically possible trade volume or trade value estimated by the gravity model of trade. By calculating the trade potential index, we can assess a country or region's performance in utilizing its trade potential. A high index indicates that the actual trade is close to its potential level. A low index may suggest the presence of trade barriers, market obstacles, or other factors affecting trade (Egger, 2002).

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Overview

Chapter Four is organized as follows. Section 4.2 provides a detailed calculation of the RCA index for tea exports between China and eight ASEAN countries while offering an in-depth analysis of the results. This section delineates the competitiveness and trend changes in tea exports between China and the eight ASEAN countries. Section 4.3 presents the descriptive statistical and correlation analyses to explore the relationship between variables. Multicollinearity tests are performed to ensure the model's reliability and accuracy. Section 4.4 focuses on unit root and cointegration tests to confirm the data's stationarity and the long-term equilibrium relationships among variables. These tests are crucial for the subsequent dynamic panel data analysis. Section 4.5 estimates the dynamic linear panel model and details the estimation results. Section 4.6 presents the measurement of trade potential and the analysis of the trade potential values obtained. The chapter comprehensively and systematically reveals the comparative advantages, influencing factors, and trade potential of China's tea exports to the eight ASEAN countries.

4.2 Background of Tea Trade Between China and ASEAN Countries and the RCA Index

Tea trade between China and ASEAN countries has shown steady growth in recent years, driven by increasing market demand, economic cooperation, and the Regional Comprehensive Economic Partnership (RCEP). The BRI has further strengthened regional trade connections. As the world's largest tea producer and exporter, China meets the diverse needs of the ASEAN market with high-quality and diversified products. At the

same time, ASEAN countries such as Vietnam and Indonesia serve as major regional tea suppliers and significant consumers of Chinese tea. Through bilateral trade, China and ASEAN countries have established close ties within the tea supply chain, fostering mutual prosperity in the agriculture and food and beverage sectors. Based on RCA index analysis, China and ASEAN countries exhibit strong complementarity and cooperation potential in the tea sector. In the context of global economic recovery and the gradual easing of the COVID-19 pandemic's impact, bilateral trade encounters new opportunities and challenges for further development.

First, data were collected from the UN Comtrade database including tea export data, total commodity export data from China and the selected ASEAN countries, and global tea and global total commodity export data. The selected ASEAN countries include Malaysia, Vietnam, Thailand, Indonesia, Singapore, Cambodia, Myanmar, and the Philippines. The data comprises annual export values from 2014 to 2023 to ensure the timeliness and accuracy of the results. In the context of tea exports, an RCA value greater than 1 indicates that a country's export share of tea exceeds the global average, reflecting a revealed comparative advantage. This suggests strong production and export capabilities, competitive market share, and potential advantages in resources, technology, labor, or expertise. An RCA value equal to 1 signifies that the country's export share aligns with the global average, indicating neither an advantage nor a disadvantage in competitiveness. An RCA value below 1 highlights a lack of revealed comparative advantage. This suggests weaker production and export capabilities, lower competitiveness, and limited market share, possibly due to disadvantages in resources, technology, labor, or specialization (Ceglowski, 2017).

The RCA model formula is used to calculate the comparative advantage of each country in terms of tea exports. Table 4.1 presents the RCA indices of China and the eight ASEAN countries in tea exports.

Table 4.1 shows that the RCA indices of the nine countries mentioned above exhibited significant differences from 2014 to 2023. China and Vietnam maintained consistently high RCA indices, demonstrating strong comparative trade advantages. China peaked in 2018, while Vietnam, though generally high, showed a declining trend. Myanmar's competitiveness gradually strengthened, with its RCA index increasing from 0.310 in 2014 to 0.615 in 2023. Thailand's performance remained stable, with a slight improvement in competitiveness. However, Indonesia's competitiveness gradually weakened, with its RCA index dropping from 2.302 in 2014 to 0.757 in 2023. Malaysia experienced a peak in 2018, followed by a downward trend. Singapore's index fluctuated between 0.1 and 0.2, indicating stability but low competitiveness. Cambodia and the Philippines consistently had low RCA indices, with Cambodia staying below 0.005 for a long time, reflecting extremely weak trade competitiveness.

Table 4.1: The RCA Index of Tea Exports for China and Eight ASEAN Countries

Y e a r	Philippines	Cambodia	Malaysia	Myanmar	Thailand	Singapore	Indonesia	Vietnam	C h i n a
2014	0.004		0.088	0.311	0.112	0.149	2.302	4.565	1.636
2015	0.002	0.000	0.067	0.184	0.081	0.134	1.941	3.035	1.407
2016	0.001	0.000	0.112	0.221	0.087	0.176	1.736	2.831	1.570
2017	0.004	0.004	0.103	0.362	0.118	0.156	1.459	2.275	1.535
2018	0.002	0.002	0.261	0.498	0.164	0.188	1.678	2.396	1.994
2019	0.001	0.001	0.311	0.304	0.183	0.159	1.244	1.970	1.825
2020	0.006	0.001	0.265	0.284	0.219	0.174	1.253	1.500	1.671
2021	0.004	0.000	0.304	0.434	0.230	0.130	0.976	1.540	1.756
2022	0.006	0.001	0.067	0.629	0.200	0.147	0.854	1.667	1.606
2023	0.003	0.004	0.108	0.615	0.186	0.198	0.757		1.461

Source: Calculated by the author (data from the UN Comtrade Database).

Generally, China, Vietnam, and Myanmar demonstrate strong competitiveness, while Indonesia and Malaysia must address the downward trend in their competitiveness. Cambodia and the Philippines still require significant improvement in trade advantages.

The dynamic changes in the comparative advantages of each country in tea exports can be observed by analyzing the RCA indices across the years. The following sections analyze the tea trade background and RCA indices for China and each of the eight ASEAN countries in detail.

4.2.1 Tea Trade Between China and Philippines and the RCA Index of Philippines

The trade relationship between China and the Philippines dates to the Ming and Qing dynasties, during which maritime trade between China and the Spanish-controlled Philippines was highly active. The Manila Galleon Trade was a key form of trade during this period. Yu (2000) suggests that it facilitated economic and cultural exchanges between the two countries. On February 21, 2023, the Philippines ratified the RCEP, formally joining the agreement. As the world's largest free trade agreement, RCEP significantly promotes economic and trade cooperation among member countries.

The Chinese Ministry of Foreign Affairs indicates bilateral trade between China and the Philippines reached \$71.9 billion in 2023, with China exporting \$52.41 billion to the Philippines and importing \$19.49 billion. Despite the Philippines experiencing an 8% decline in total foreign trade in 2023, bilateral trade between China and the Philippines grew by 2% with the support of RCEP. However, since 2024, bilateral trade has shown a downward trend due to the impact of the South China Sea issue. Ma and Zhao (2024) note that China has long been the Philippines' largest trading partner, the largest source of

imports, and the second-largest export market, holding a crucial position in the Philippines' foreign trade.

The tea trade between China and the Philippines dates back centuries. From the 16th to 18th centuries, Chinese merchants transported tea and other goods to Southeast Asia, including the Philippines, via the Maritime Silk Road. During this period, Chinese navigators traveling between China and Southeast Asia frequently stopped at ports in the Philippines, which helped foster the growth of the tea trade.

Table 4.2 shows the rankings of the Philippines' tea import sources from 2014 to 2023 and the share of tea imports from each country. The changes in the sources of the Philippines' tea imports show that Vietnam and China have been the dominant suppliers for several years. Vietnam ranked first multiple times, but its share gradually decreased from 33.5% in 2016 to 15.9% in 2023. Meanwhile, China's position steadily improved, reaching second in 2020 with a 20.6% share and remaining second in 2023 with a 15.5% share.

Countries such as Indonesia, Sri Lanka, Poland, and Japan performed significantly across various years, reflecting the diversification of the Philippines' tea import sources. Indonesia ranked third in 2022 and 2023, with shares of 13.9% and 12.9%, respectively. Notably, "Other Asia, nes" (representing Asian countries not specified elsewhere) contributed a stable proportion to the Philippines' tea imports, highlighting the active tea trade within the region.

The concentration of the Philippines' tea imports market remains high overall, with the top few countries accounting for over 90% of imports. However, a trend toward

diversification is emerging, with more countries likely to participate in its tea supply chain in the future, thereby enhancing market competitiveness and stability.

Table 4.2: Rankings and Shares of the Philippine’s Tea Import Sources, 2014-2023

Year	Rank-1		Rank-2		Rank-3		Rank-4		Rank-5	
2014	Singapore	28.70%	India	13.80%	USA	13.70%	Indonesia	8.00%	Korea	7.20%
2015	Vietnam	23.30%	Singapore	20.30%	USA	16.40%	Other Asia	7.30%	China	6.10%
2016	Vietnam	33.50%	Singapore	20.70%	USA	10.30%	Other Asia	9.70%	China	6.00%
2017	Singapore	27.30%	Vietnam	21.10%	Other Asia	9.60%	USA	7.80%	China	7.30%
2018	Vietnam	21.80%	Singapore	19.70%	Other Asia	10.60%	USA	8.70%	China	7.80%
2019	Vietnam	23.60%	USA	18.20%	China	16.70%	Other Asia	14.70%	Indonesia	8.60%
2020	China	20.60%	Indonesia	13.30%	India	11.60%	Vietnam	11.00%	Sri Lanka	10.20%
2021	Vietnam	22.30%	China	16.40%	Indonesia	12.70%	India	12.60%	Sri Lanka	9.40%
2022	Vietnam	20.90%	Indonesia	13.90%	China	11.40%	India	10.20%	Sri Lanka	9.90%
2023	Vietnam	15.90%	China	15.50%	Indonesia	12.90%	Japan	12.50%	Poland	12.40%
Cont.	Rank-6		Rank-7		Rank-8		Rank-9		Total	
2014	Germany	5.00%	Sri Lanka	4.80%	Other Asia	4.70%	China	4.40%		90.30%
2015	India	4.80%	Malaysia	4.60%	Korea	3.70%	Germany	3.10%		89.60%
2016	Sri Lanka	3.40%	Germany	2.90%	Indian	2.60%	Korea	2.5		91.70%
2017	Indonesia	5.80%	Malaysia	5.00%	Sri Lanka	4.70%	Poland	3.30%		90.70%
2018	Sri Lanka	6.30%	India	4.70%	Indonesia	4.70%	Japan	3.10%		91.00%
2019	Sri Lanka	3.30%	Singapore	3.30%	Poland	2.80%				91.30%
2020	USA	10.20%	Other Asia	6.40%	Serbia	5.50%	Japan	2.80%		91.50%
2021	Poland	7.50%	Other Asia	4.60%	UK	2.80%	Serbia	2.50%		91.00%
2022	Poland	9.50%	Other Asia	6.00%	Japan	5.40%	UAE	3.80%		91.00%
2023	Other Asia	6.40%	India	6.00%	Sri Lanka	5.60%	UAE	4.80%		91.90%

Note: “Other Asia, nes” means other Asian countries not elsewhere specified.

Source: UN Comtrade database.

Figure 4.1 shows that the volume of tea imported by the Philippines from China had a fluctuating upward trend from 2014 to 2023. Between 2014 and 2017, the import volume gradually increased from approximately 94 tons to nearly 199 tons, benefiting from the enhanced competitiveness of Chinese tea in terms of price, quality, and regional trade facilitation. From 2018 to 2019, the import volume rose sharply, reaching a peak of 722 tons in 2019, likely driven by the rapid growth in market demand in the Philippines

and strengthened trade cooperation between the two countries. This sudden surge, occurring just before the outbreak of the COVID-19 pandemic, may be attributed to several factors. First, early concerns over potential supply chain disruptions may have prompted importers to pre-emptively stockpile Chinese tea. Second, the Philippine market was experiencing a rapid expansion of tea-based beverage consumption, such as bubble tea, which fueled increased demand. Third, favorable trade conditions and relatively low shipping costs at that time may have facilitated larger import volumes. However, from 2020 to 2021, the import volume significantly declined due to the impact of the COVID-19 pandemic, although China remained a major supplier of tea. Trade restrictions, logistical disruptions, and demand uncertainty contributed to this decline. The import volume gradually recovered in 2022 and 2023, reflecting the post-pandemic market rebound and renewed demand for Chinese tea. This trend highlights the Philippines' reliance on Chinese tea imports and the dynamics of its international market performance.

Overall, this trend highlights not only the Philippines' reliance on Chinese tea imports but also how external shocks, such as the pandemic, and domestic market dynamics jointly shape international trade performance.

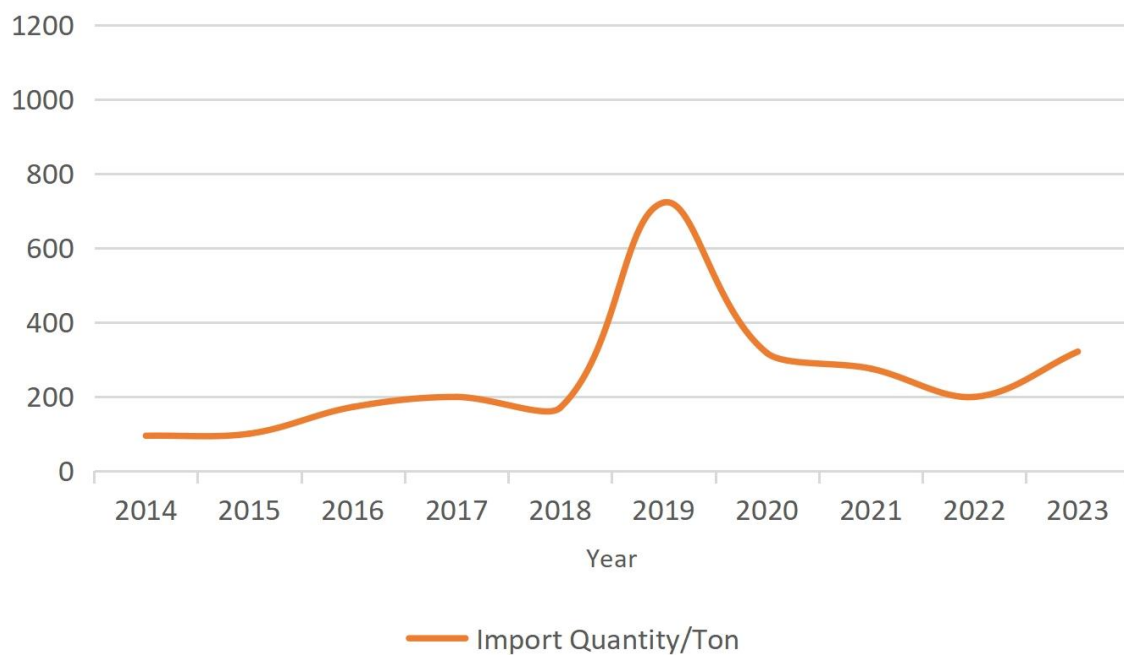


Figure 4.1: Tea Import Volume of the Philippines from China, 2014-2023

In recent years, the Philippines' tea imports from China have grown significantly, though with periodic fluctuations. Despite China's important role in the Philippine market, its share has declined, likely due to the diversification of demand in this market, intensified competition from other countries, and shifts in the global economic environment. As the world's largest tea producer and exporter, China continues to meet Philippine market demands with high-quality, diverse products, maintaining a strong competitive edge.

The trend in the Philippines' tea imports from China reflects China's comparative advantage in the global tea trade. The RCA index for the Philippines' tea exports measures its competitiveness in tea production and trade. Furthermore, fluctuations in the RCA index may reflect changes in the Philippine tea market's demand and import sources. Through subsequent analysis of the RCA index, the comparative advantage of Chinese tea in the Philippine market can be further quantified, revealing the relationship between its market

share and global trade share. This provides data support and strategic reference for enhancing the competitiveness of Chinese tea in the Philippine market.

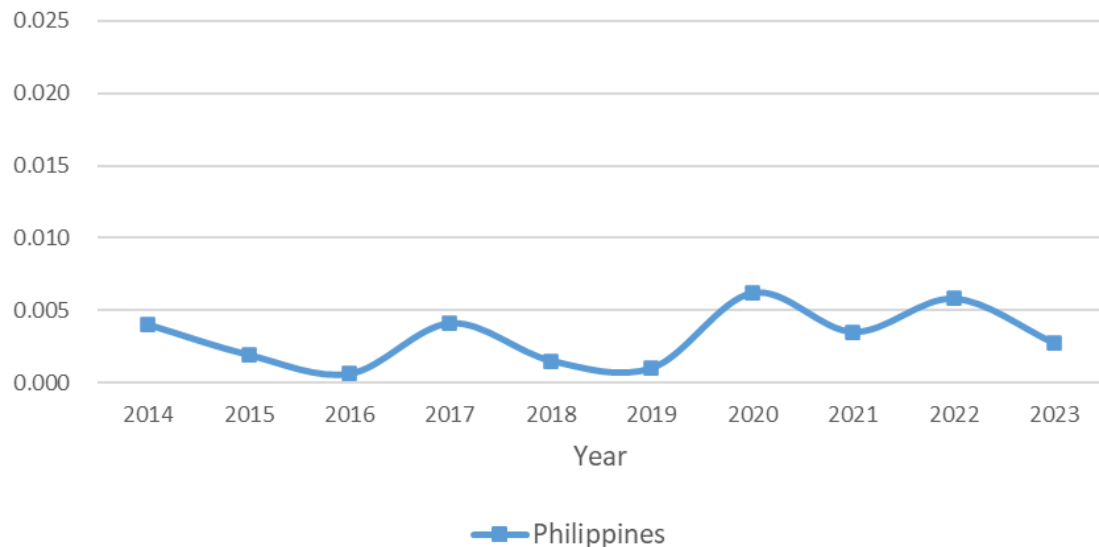


Figure 4.2: RCA Index of the Philippines' Tea Exports, 2014 – 2023

The RCA index of the Philippines remained below 0.01 from 2014 to 2023, with consistently low values and periodic fluctuations, indicating an extremely weak comparative advantage in the global tea trade. This is likely due to limitations in domestic productivity, highlighting the country's significant constraints in tea production and export capabilities, with market demand primarily dependent on imports. In peak years like 2017, 2020, and 2022, the RCA index neared 0.006, indicating a slight boost in competitiveness. In other years, it fell to around 0.001, reflecting weaker advantages (Figure 4.2).

As a consumer market, the Philippines' tea supply is largely sourced from international markets, with an increasingly evident trend of diversification in import origins. While Vietnam and China remain the primary suppliers, the share of imports from other countries such as Indonesia, Poland, and Sri Lanka have been gradually increasing.

This import structure has somewhat facilitated tea consumption in the Philippines but also highlights its weak position in the global tea trade. To boost competitiveness, the Philippines may need to strengthen local production through policy support and technology while optimizing imports to meet diverse, sustainable demand.

The Philippines' tea imports and consumption in recent years have shown a growth trend, with most of its tea supply sourced from international markets. As domestic tea consumption grows and the market expands, the Philippines' tea import volume is expected to keep rising, leading to a more diverse and competitive market.

4.2.2 Tea Trade Between China and Cambodia and the RCA Index of Cambodia

In recent years, China and Cambodia's trade relations have deepened, showing steady growth. China has remained Cambodia's largest trading partner for several consecutive years. The latest report from Cambodia's General Department of Customs and Excise indicates bilateral trade between Cambodia and China reached \$12.37 billion in the first 10 months of 2024, an increase of 23% year-on-year, further solidifying China's status as Cambodia's largest trading partner. On January 1, 2022, the China–Cambodia Free Trade Agreement officially occurred, marking Cambodia's first bilateral free trade arrangement. The implementation of this agreement has provided new impetus for trade between the two countries, boosting bilateral trade growth. China's General Administration of Customs illustrates bilateral trade between China and Cambodia totaled \$14.82 billion in 2023, with China exporting \$12.75 billion to Cambodia and importing \$2.07 billion from Cambodia.

Sun and Yan (2023) note that, with the advancement of the BRI, cooperation between China and Cambodia in infrastructure development has achieved significant

results. For instance, China has been instrumental in Cambodia's road and bridge construction, boosting economic development and regional connectivity. Driven by the bilateral free trade agreement and the Regional Comprehensive Economic Partnership, China–Cambodia trade relations have continued to strengthen. Bilateral trade volume and investment scale have steadily increased, benefitting the economic development of both countries significantly.

Historical records show that as early as the 5th century, China began exporting tea to Southeast Asia and beyond. The trade relied on both overland and maritime Silk Roads, with Cambodia, a key hub in Southeast Asia, naturally influenced by Chinese tea culture. However, historical factors prevented Cambodia from developing its own distinctive techniques for tea cultivation and processing, relying instead on imported tea. Small-scale commercial tea plantations did not emerge in Cambodia until the early 20th century, primarily producing black and green tea for the domestic market. Currently, Cambodia's tea cultivation area remains relatively small; however, with increasing market demand and technological advancements, the country's tea production has been steadily rising. According to statistics, Cambodia now has a total tea plantation area of several thousand hectares, with an annual tea production of several hundred tons.

Table 4.3 shows significant changes in Cambodia's tea import market from 2014 to 2023. China consistently held a dominant position, ranking first from 2019 to 2022, with its share increasing from 50.5% to 58.0%. However, in 2023, China's share dropped to 39.6%, placing it in second position. Meanwhile, Thailand's importance gradually increased; in 2023, it became the top supplier with a 39.6% share, reflecting its advantages in price competitiveness and regional trade facilitation. Vietnam, which held the leading

position in 2014 and 2015, saw its market share gradually decline, reaching 5.5% in 2023, ranking fourth. “Other Asia, nes” held a significant share in several years, accounting for 10.2% in 2023. This indicates growing demand for tea imports from other countries in the region. Cambodia’s tea import sources remain highly concentrated, with the top five suppliers consistently accounting for over 90% of imports. However, diversification has become a growing trend in recent years. Changes in the ranking and share of import countries reflect the dynamic nature of Cambodia’s tea market, including the decline in China’s share, the rise of Thailand, and intensified regional competition.

Table 4.3: Rankings and Shares of Cambodia’s Tea Import Sources, 2014-2023

Year	Rank-1		Rank-2		Rank-3		Rank-4		Rank-5	
2014	Vietnam	32.10%	China	15.50%	Other Asia,	15.30%	Singapore	14.10%	France	6.40%
2015	Vietnam	33.60%	Other Asia,	14.30%	Thailand	13.50%	Singapore	11.20%	France	9.40%
2016	Vietnam	25.90%	China	18.00%	Thailand	14.40%	Other Asia,	9.90%	Singapore	9.00%
2017	Thailand	42.40%	China	21.90%	Vietnam	6.70%	Singapore	5.60%	Other Asia,	5.00%
2018	Thailand	49.20%	China	17.70%	Other Asia,	8.70%	Singapore	4.70%	USA	4.40%
2019	China	50..5%	Thailand	19.00%	Indonesia	5.50%	Vietnam	4.90%	Other Asia,	4.60%
2020	China	57.50%	Thailand	16.50%	Other Asia,	5.60%	France	5.20%	Vietnam	4.30%
2021	China	58.00%	Japan	14.60%	Thailand	9.30%	Other Asia,	5.20%	Indonesia	3.40%
2022	China	39.50%	Thailand	18.70%	Vietnam	12.50%	Other Asia,	11.00%	Japan	8.30%
2023	Thailand	39.60%	China	37.20%	Other Asia,	10.20%	Vietnam	5.50%		
Cont.	Rank-6		Rank-7		Rank-8					Total
2014	Thailand	5.20%	Korea	2.30%	Australia	0.023				90.80%
2015	China	7.10%	Australia	4.40%						93.60%
2016	Lao	7.60%	France	5.90%						90.70%
2017	France	4.70%	USA	4.50%						90.70%
2018	Indonesia	3.80%	France	3.40%						92.00%
2019	Singapore	4.60%	Japan	2.60%						91.80%
2020	Indonesia	2.80%								91.80%
2021										90.50%
2022	Indonesia	3.90%								93.70%
2023										92.50%

Source: UN Comtrade database.

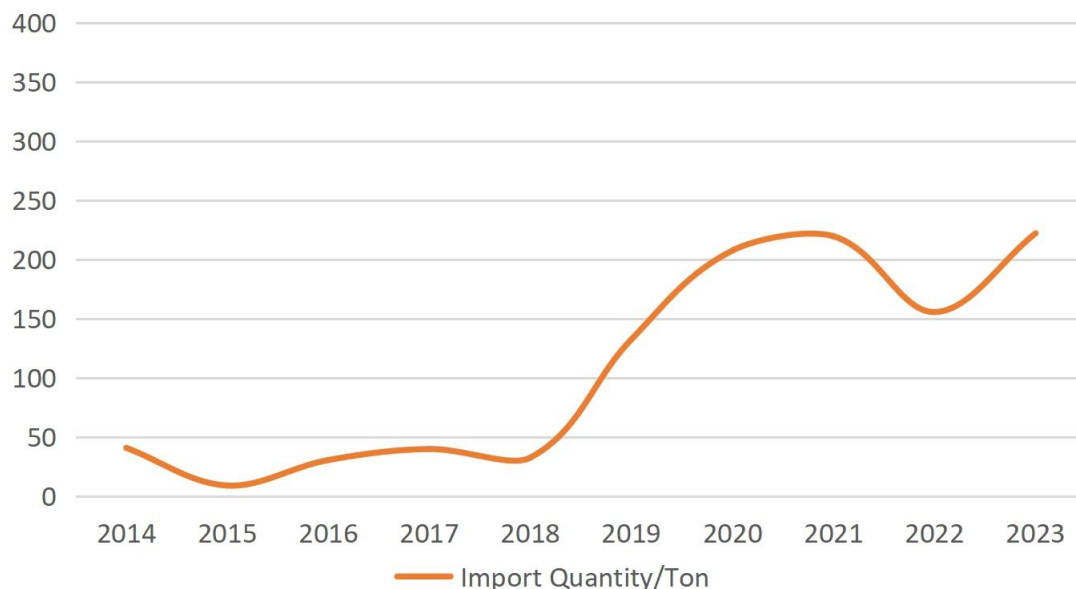


Figure 4.3: Cambodia's Tea Import Volume from China, 2014-2023

Figure 4.3 illustrates that Cambodia's tea import volume from China shows an overall upward trend from 2014 to 2023, though with fluctuations. The import volume remained relatively low, with minor variations between 2014 and 2018. In 2019, the volume increased significantly, peaking at around 220 tons in 2021. This was followed by a notable decline in 2022 before rebounding to its historical high in 2023. This trend reflects the overall growth in Cambodia's demand for Chinese tea, which is also shaped by external factors at certain times.

While collecting data on Cambodia, data for 2014 was missing, so the analysis focused on the RCA index trend from 2015 to 2023.

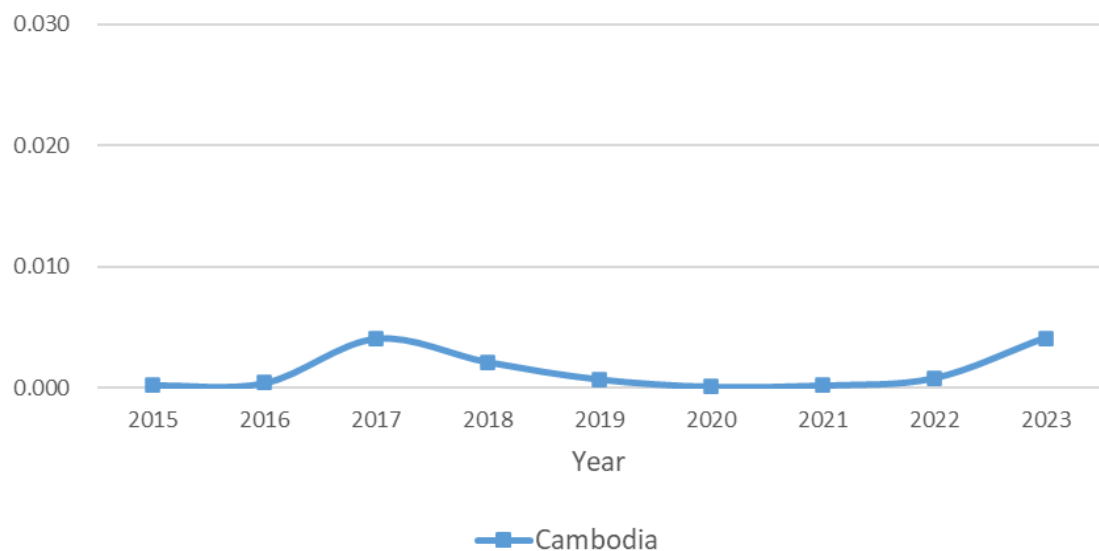


Figure 4.4: RCA Index of the Cambodia's Tea Exports, 2014-2023

Figure 4.4 shows that Cambodia's RCA values remained consistently far below 1 during this period, indicating an extremely weak comparative advantage in tea exports. In most years, RCA values were near zero, indicating minimal international competitiveness in tea exports and a heavy reliance on imports. In 2017, the RCA index peaked at nearly 0.006, possibly due to increased exports or a short-term rise in regional demand. From 2018 to 2020, the RCA index rapidly declined to near zero, reflecting the effects of intensified international competition and reduced domestic production efficiency. From 2021 to 2023, the RCA index recovered slightly, indicating some improvement in production and exports; however, overall competitiveness remained extremely weak.

Cambodia's tea imports and consumption have shown a growth trend in recent years. With the development of Cambodia's economy and improving living standards, tea, as a traditional beverage, will continue to hold an essential position in the Cambodian consumer market. Cambodia's tea market is continuously expanding, providing ample opportunities for the further development of the tea trade.

4.2.3 Tea Trade Between China and Malaysia and the RCA Index of Malaysia

China and Malaysia have a long-standing trade relationship that has deepened significantly in recent years. Since 1995, foreign trade has played an essential role in Malaysia's national economy, with a trade dependency ratio exceeding 150% and a consistent trade surplus over the years. Furthermore, Malaysia has actively participated in China's BRI, engaging in extensive cooperation in areas such as infrastructure development and technological innovation. The overall economic and trade relationship between China and Malaysia is characterized by a mix of competition and complementarity. China is Malaysia's largest source of imports and the second-largest export market. Reports from China's Belt and Road Portal show that China has been Malaysia's largest trading partner for several consecutive years. As of 2020, Malaysia was China's ninth-largest trading partner, with bilateral trade exceeding \$57.6 billion and comprising 16% of Malaysia's total trade.

Due to Malaysia's multi-ethnic and multicultural social structure, tea consumption habits vary among residents of different ethnic and cultural backgrounds. The Malaysian tea market is dominated by Chinese teas, with varieties such as Fujian's Tieguanyin and Pu'er tea being particularly popular among local consumers. Lin (2020) suggests that Malaysian Chinese tea merchants have significantly promoted Chinese tea culture. Amid rapid urbanization, convenient tea products like ready-to-drink tea and tea bags have grown increasingly popular among consumers. Malaysia was China's second-largest tea export destination in 2023. The volume of tea exported to Malaysia in 2023 reached 9,000 tons, marking a year-on-year increase of 16.14%. Since 2017, tea exports from mainland China to Malaysia have shown steady growth, highlighting the vitality and potential of Malaysia's tea consumption market.

Table 4.4 shows that the rankings and shares of Malaysia's tea import sources underwent significant changes from 2014 to 2023. Indonesia consistently ranked first, but its market shares gradually declined from 43% to 27.1%, weakening its dominant position. China climbed from fourth to second place, with its market share rising from 5.9% to 25.9%, reflecting a rapid upward trend. Vietnam remained third, with its share fluctuating between 13% and 16%, indicating relative stability. India and Kenya alternated between fourth and fifth positions, but their overall shares showed a downward trend. Argentina's market share gradually declined after 2016 but regained seventh place in 2023. Meanwhile, the share of "Other Asian Regions" remained stable at around 2% to 3%. Overall, while Indonesia's market share declined, the shares of China and Vietnam increased, indicating that Malaysia's tea import market is becoming increasingly diversified.

Table 4.4: Rankings and Shares of Malaysia's Tea Import Sources, 2014-2023

Year	Rank-1		Rank-2		Rank-3		Rank-4		Rank-5	
2014	Indonesia	43.00%	China	19.40%	Viet Nam	13.60%	India	5.90%	Kenya	5.90%
2015	Indonesia	36.60%	Viet Nam	13.60%	India	13.20%	China	11.70%	Kenya	9.60%
2016	Indonesia	33.40%	Viet Nam	16.30%	India	15.00%	China	11.00%	Kenya	7.40%
2017	Indonesia	37.30%	Viet Nam	14.50%	India	13.50%	China	12.00%	Kenya	6.20%
2018	Indonesia	34.90%	Viet Nam	15.70%	India	13.80%	China	12.50%	Argentina	4.80%
2019	Indonesia	29.80%	China	17.80%	Viet Nam	13.60%	India	10.50%	Kenya	6.20%
2020	Indonesia	26.80%	China	25.00%	Viet Nam	13.90%	Kenya	9.10%	India	6.80%
2021	Indonesia	28.80%	China	28.10%	Viet Nam	13.40%	Kenya	8.40%	India	5.20%
2022	Indonesia	27.30%	China	24.10%	Viet Nam	16.00%	Kenya	8.80%	India	7.70%
2023	Indonesia	27.10%	China	25.90%	Viet Nam	13.70%	India	7.00%	Kenya	6.10%
Cont.	Rank-6		Rank-7		Rank-8		Rank-9		Total	
2014	Sri Lanka	2.80%								90.50%
2015	Sri Lanka	3.80%	Singapore	1.60%						90.20%
2016	Argentina	2.60%	Sri Lanka	2.40%	Australia	1.50%	Papua New	1.40%		90.90%
2017	Argentina	2.40%	Sri Lanka	2.00%	Mozambique	1.80%	Australia	1.50%		91.10%
2018	Singapore	2.90%	Kenya	2.70%	Sri Lanka	1.50%	Other Asia,	1.40%		90.10%
2019	Argentina	6.20%	Other Asia,	2.40%	Sri Lanka	2.00%	Singapore	1.90%		90.40%
2020	Argentina	5.60%	Other Asia,	1.80%	Sri Lanka	1.50%				90.40%
2021	Argentina	3.10%	Other Asia,	2.10%	Japan	1.60%				90.50%
2022	Argentina	2.40%	Other Asia,	2.20%	Singapore	1.70%				90.10%
2023	Singapore	4.50%	Argentina	2.40%	Malawi	2.10%	Sri Lanka	1.70%		90.50%

Source: UN Comtrade database.

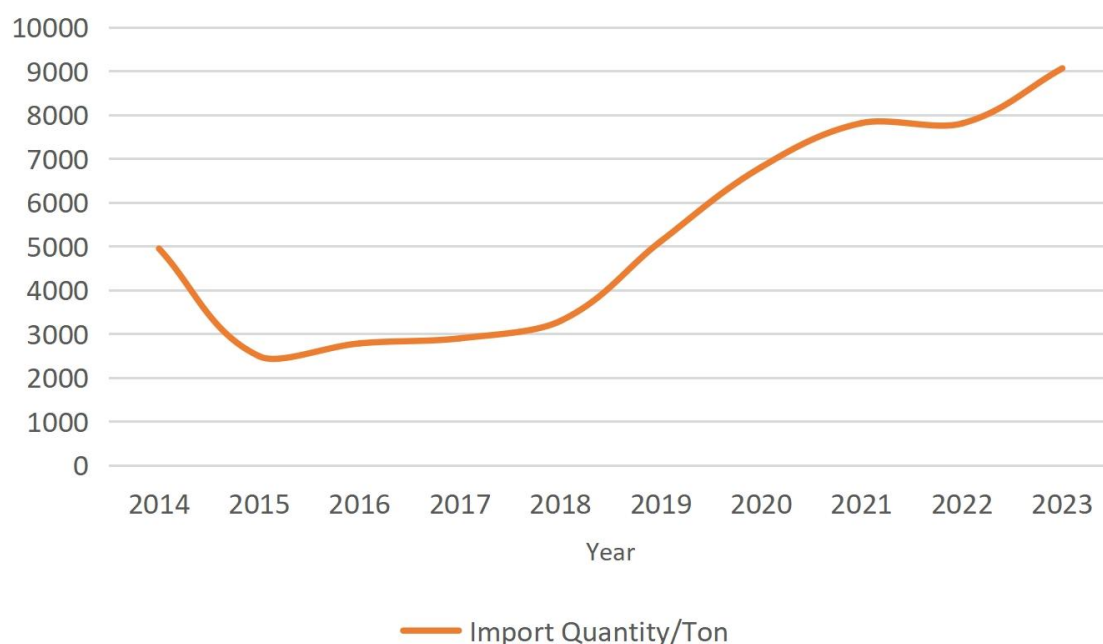


Figure 4.5: Malaysia’s Tea Import Volume from China, 2014-2023

Figure 4.5 shows that Malaysia’s tea imports from China experienced an initial decline followed by a steady increase from 2014 to 2023. In 2014, the import volume was approximately 4,947 tons, gradually decreasing to its lowest point of about 2,784 tons in 2016. In 2017, the import volume started increasing steadily, peaking at approximately 9,065 tons in 2023. Malaysia’s demand for Chinese tea has grown rapidly in recent years, reflecting a strong upward trend in the market.

Interestingly, unlike other ASEAN countries examined in this study, Malaysia’s tea imports did not experience a significant drop during the COVID-19 period.

This indicates that COVID-19 had a relatively limited impact on Malaysia’s tea trade with China. Several possible reasons can be considered. First, Malaysia has a well-established tea distribution infrastructure and a high baseline demand for tea, especially for Chinese-origin tea varieties. Second, the country’s reliance on Chinese tea may have

encouraged consistent imports even during global disruptions. Third, strong bilateral trade agreements and effective pandemic response measures may have helped stabilize trade flows between the two countries. This trend contrasts with countries such as the Philippines and Indonesia, which experienced sharp fluctuations during the same period, underscoring Malaysia's resilient import dynamics.

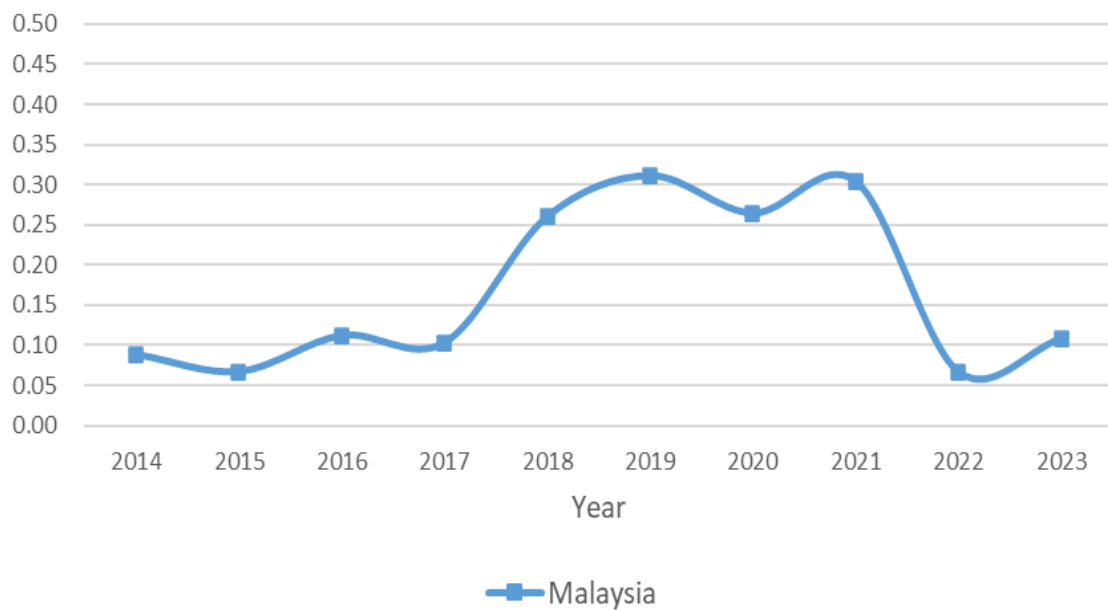


Figure 4.6: The RCA Index of Malaysia's Tea Exports

Figure 4.6 shows that from 2014 to 2023, Malaysia's RCA index for tea exports fluctuated but remained generally low, indicating limited competitiveness in the international tea market. From 2014 to 2016, the index fluctuated slightly between 0.05 and 0.1, reflecting weak competitiveness. Between 2017 and 2020, the index rose sharply, peaking at 0.31 in 2019, suggesting greater export competitiveness, possibly driven by increased market demand or policy support. However, from 2021 to 2022, the index rapidly declined to a low point near 0.05. This indicates a sharp reduction in competitiveness, potentially caused by intensified international competition or domestic

production issues. In 2023, the index slightly rebounded to around 0.1, but overall competitiveness remained low, highlighting Malaysia's reliance on imports for tea consumption.

Malaysia's tea import volume in recent years has shown fluctuating growth, with China as a major supplier holding a significant market share. Regarding consumption, Malaysia's tea consumption has steadily increased, with green tea, black tea, and oolong tea being the primary varieties consumed. Driven by the modern tea beverage market and the promotion of tea culture, Malaysia's tea market is expected to continue growing steadily.

4.2.4 Tea Trade Between China and Myanmar and the RCA Index of Myanmar

During the Qing Dynasty, trade between China and Myanmar was primarily conducted overland through Yunnan. Researchers Yu and Wang conducted in-depth studies on China–Myanmar trade during this period, highlighting the significant role of overland trade between Yunnan and Myanmar at the time. Recently, China has become Myanmar's largest trading partner, top export market, and primary source of imports. The “Myanmar Trade Guide (2023)” published by the Trade Development Bureau of the Ministry of Commerce indicates Myanmar's per capita GDP in 2022 was approximately \$1,095.8, with China dominating Myanmar's foreign trade.

Located at the crossroads of South and Southeast Asia, Myanmar serves as a key overland route for China to access the Indian Ocean. Under the BRI, Myanmar is regarded as an essential node in both the 21st Century Maritime Silk Road and the Silk Road Economic Belt. The trade relationship between China and Myanmar reflects a strong foundation for cooperation in historical and modern contexts (Du & Ma, 2015). With the

advancement of the BRI and deeper regional economic cooperation, economic and trade ties between the two countries have strengthened further.

Historically, tea was one of the most important commodities in China–Myanmar trade. According to historical records, trade between Yunnan and countries such as India and Myanmar was frequent during the Tang Dynasty, with tea being one of the primary goods that facilitated economic exchanges between the two countries. Tea is both a major economic crop in Myanmar and a key crop promoted in anti-drug initiatives by the United Nations Office on Drugs and Crime (UNODC) and China. Moreover, tea serves as a focal point in the agricultural economic cooperation between China’s Yunnan Province and Myanmar (Guo et al., 2024). In modern times, tea production in Myanmar has been primarily concentrated in the Shan and Kachin States. These regions primarily produce green tea, gradually demonstrating a competitive advantage in the international market. Research indicates that Myanmar’s green tea trade competitiveness index has improved, shifting from weak to strong.

Table 4.5: Rankings and Shares of Myanmar's Tea Import Sources, 2014-2023

Year	Rank-1		Rank-2		Rank-3		Rank-4		Rank-5	
2014	China	23.80%	Singapore	22.20%	Korea	14.50%	Malaysia	11.10%	Kenya	9.30%
2015	China	25.70%	Singapore	24.10%	Malaysia	22.90%	Kenya	10.30%	Korea	10.00%
2016	China	28.00%	Malaysia	23.40%	Kenya	20.50%	Korea	12.60%	Thailand	4.70%
2017	China	41.10%	Kenya	31.20%	Viet Nam	23.00%				
2018	Kenya	65.50%	Viet Nam	22.30%	China	8.20%				
2019	Kenya	86.00%	Viet Nam	3.50%	China	3.30%				
2020	Kenya	74.80%	India	15.20%						
2021	India	64.40%	Kenya	31.00%	China	2.20%				
2022	India	60.20%	Kenya	35.20%	China	2.00%				
2023	India	64.50%	Kenya	21.70%	China	13.00%				
Cont.	Rank-6		Rank-7							Total
2014	India	7.30%	Viet Nam	4.70%						92.90%
2015										92.90%
2016	Singapore	4.50%								93.70%
2017										95.30%
2018										96.10%
2019										92.70%
2020										90.00%
2021										97.50%
2022										97.40%
2023										99.20%

Source: UN Comtrade database.

Table 4.5 presents the rankings and shares of Myanmar's tea import sources from 2014 to 2023, highlighting significant changes in the country's main tea suppliers over the years. From 2014 to 2018, China held a dominant position, but its share plunged to 8.2% in 2018 and gradually declined from its leading role thereafter. Kenya's market share surged in 2017, peaking at 86% in 2019. It remained the top supplier from 2020 to 2023, though its share fell to 64.5% by 2023. India emerged as a key supplier in 2020, maintaining a high share from 2021 to 2023, with its peak at 64.4% in 2021. Vietnam performed strongly from 2018 to 2019, but its market share declined in the following years. Overall, in recent years, Kenya and India have dominated Myanmar's tea import market, while China's

market share has decreased significantly, reflecting changes in the structure of Myanmar's tea export market.

Figure 4.7 illustrates the trend in Myanmar's tea imports from China from 2014 to 2023. There was an initial decline, followed by fluctuations, and then a gradual recovery. Between 2014 and 2016, import volume declined annually, falling from around 305 tons to 234 tons. In 2017, imports increased, reaching a peak of nearly 356 tons. However, from 2018 onward, the import volume declined sharply and remained at relatively low levels between 2018 and 2022. By 2023, imports had slightly rebounded but still had not returned to the 2014 level. This shift may be related to Myanmar's diversification strategy for its import market, with increased imports from other countries such as Kenya and India. It may have been influenced by shifts in China–Myanmar trade relations, price competition, and changes in market demand.

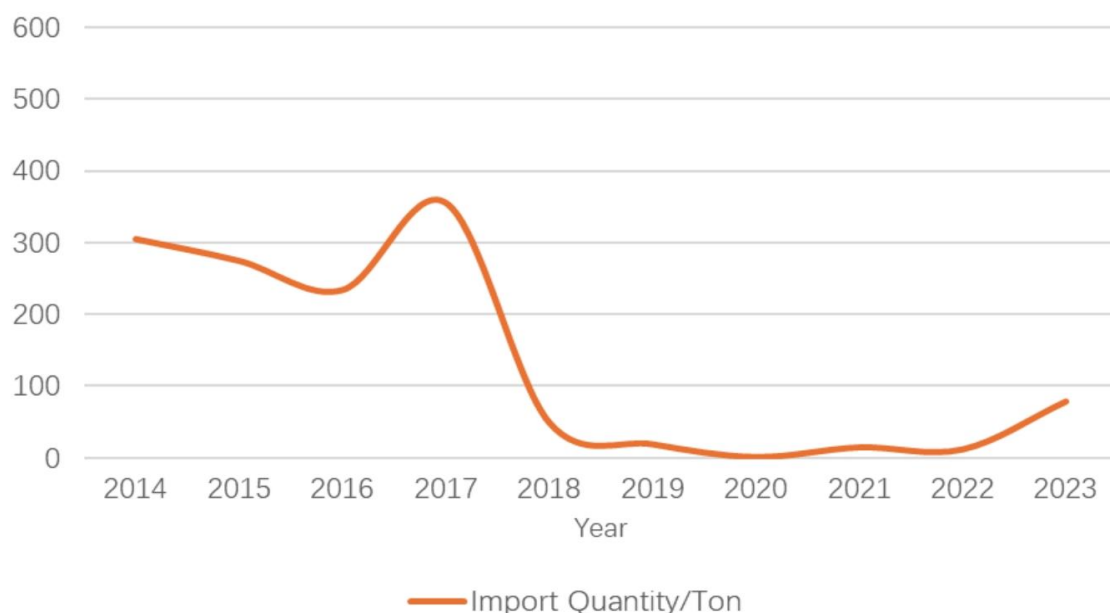


Figure 4.7: Myanmar's Tea Import Volume from China, 2014–2023

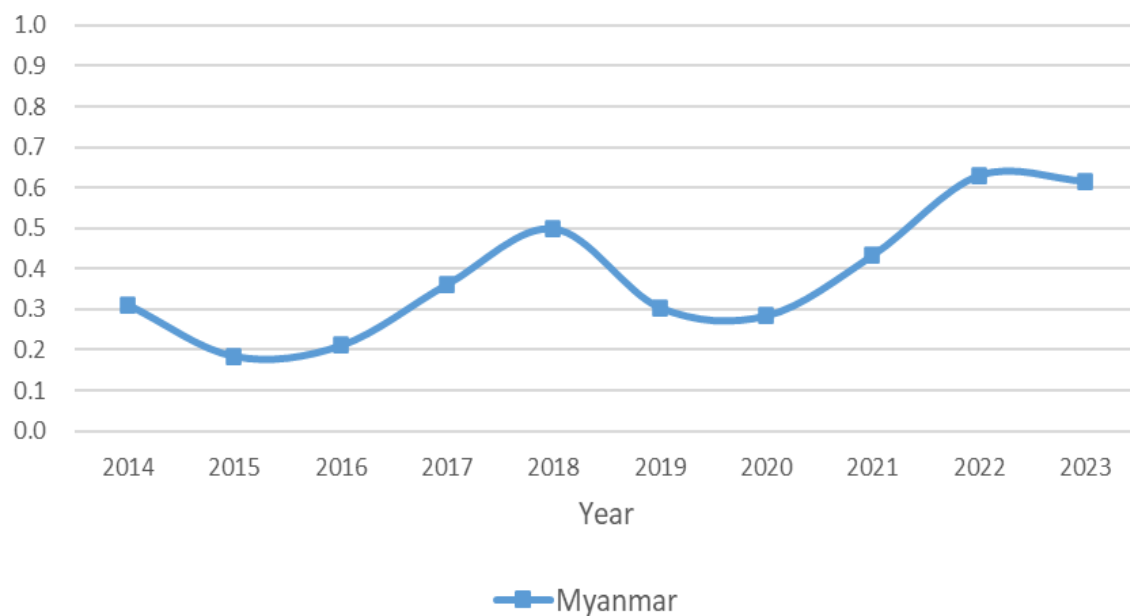


Figure 4.8: The RCA Index of Myanmar's Tea Exports

From 2014 to 2023, Myanmar's RCA index for tea exports fluctuated but showed gradual growth overall, indicating improved export competitiveness (Figure 4.8). Between 2014 and 2015, the index fluctuated slightly between 0.2 and 0.3, reflecting weak competitiveness. From 2016 to 2018, the index gradually increased, reaching a peak of approximately 0.5 in 2018. This suggests enhanced export advantages during this period, possibly due to growing export demand or supportive policies. However, from 2019 to 2020, the index declined to around 0.3, indicating a temporary weakening of competitiveness. Between 2021 and 2023, the index rose sharply, peaking at around 0.7 in 2022. This highlights a significant improvement in Myanmar's tea export competitiveness. This growth can be attributed to expanded production, market diversification, improved product quality, or proactive policy interventions. Overall, Myanmar's RCA index for tea exports shows an upward trend while remaining highly volatile. This suggests that while

Myanmar's tea competitiveness in the international market has improved, it remains relatively weak and subject to considerable uncertainty.

Overall, from 2014 to 2023, Myanmar's tea import volume showed a fluctuating downward trend. Although there were instances of recovery in certain years, such as 2017, the overall import volume has been gradually decreasing. At the same time, Myanmar's RCA index for tea exports exhibits a fluctuating upward trend. This indicates that while Myanmar's tea competitiveness in the international market remains weak, it is gradually improving. Consequently, its tea trade is likely to face certain challenges.

In the long term, advancements in Myanmar's tea production technology and quality, along with expanding international markets, may further reduce tea import volume. Meanwhile, evolving domestic consumer preferences are expected to make Myanmar's tea market more diverse and personalized.

4.2.5 Tea Trade Between China and Thailand and the RCA Index of Thailand

China and Thailand have a long trade history, dating back to ancient times when they conducted commercial exchanges via the Maritime Silk Road. Since the establishment of diplomatic relations between China and Thailand in 1975, their economic and trade cooperation has deepened. As an important country along the BRI, Thailand has collaborated extensively with China in areas such as infrastructure construction, investment, and trade. The signing and implementation of the RCEP have further facilitated trade liberalization within the region, providing new opportunities for China–Thailand trade. China has become Thailand's largest trading partner in recent years. In 2023, China maintained its position as Thailand's largest trading partner for the 11th consecutive year, continuing to serve as Thailand's largest source of imports, second-

largest export market, and largest agricultural product export market. Thailand is a tea-producing country with plantations covering approximately 326,830 hectares, including around 6,670 hectares of privately cultivated land. Its mild climate and abundant rainfall are highly suitable for tea tree growth, especially for varieties like green tea and Myanmar tea, which thrive well in these conditions. Thailand's warm climate influenced how tea was adopted when it was introduced to the country. Thai people adapted tea to their dietary preferences, leading to the creation of iced tea. However, unlike in China, tea drinking is not a deeply ingrained cultural practice in Thailand. Thai people focus more on taste and refreshment rather than the sophistication of tea-drinking traditions (Li et al., 2020).

Table 4.6: Rankings and Shares of Thailand's Tea Import Sources, 2014-2023

Year	Rank-1		Rank-2		Rank-3		Rank-4		Rank-5		Total
2014	Viet Nam	36.30%	China	24.50%	Myanmar	14.70%	Indonesia	13.70%	Japan	3.50%	92.70%
2015	China	42.80%	Viet Nam	20.60%	Myanmar	20.30%	Indonesia	9.90%			93.70%
2016	China	48.70%	Viet Nam	17.80%	Myanmar	17.00%	Indonesia	11.30%			94.90%
2017	China	45.30%	Viet Nam	21.50%	Myanmar	15.10%	Indonesia	11.40%			93.30%
2018	China	49.20%	Viet Nam	25.00%	Myanmar	11.20%	Indonesia	7.70%			93.10%
2019	China	46.00%	Viet Nam	28.40%	Myanmar	10.40%	Indonesia	9.00%			93.70%
2020	China	44.00%	Viet Nam	30.10%	Myanmar	9.30%	Indonesia	9.20%			92.50%
2021	China	52.00%	Viet Nam	27.60%	Indonesia	9.50%	Myanmar	4.20%			93.30%
2022	China	49.10%	Viet Nam	25.30%	Indonesia	11.40%	Myanmar	7.60%			93.40%
2023	China	49.60%	Viet Nam	22.40%	Indonesia	12.10%	Myanmar	7.90%			91.90%

Source: UN Comtrade database.

Table 4.6 shows that from 2014 to 2023, Thailand's tea import market was highly concentrated, with China consistently being the largest supplier. China's share steadily increased from 24.5% in 2014 to 49.6% in 2023, highlighting its competitive advantages in quality, supply capacity, and pricing. Vietnam has long held the second position, but its market share fell from 36.3% in 2014 to 22.4% in 2023, indicating a decline in competitiveness. Indonesia and Myanmar alternated in the third and fourth positions, with Indonesia gradually rising since 2019, reaching a 12.1% share in 2023, surpassing

Myanmar. The market share of the main import countries consistently remained above 92%, indicating the stability and concentration of Thailand's tea import market.

From 2014 to 2023, the volume of tea imported by Thailand from China showed a steady growth trend, increasing from approximately 1,000 tons in 2014 to 7,500 tons in 2023, reflecting strong demand growth. Between 2014 and 2018, import volume grew rapidly, then slightly declined in 2019 and 2020, possibly due to global trade fluctuations. From 2021 to 2023, the import volume increased significantly, reaching a peak in 2023 (Figure 4.9). This trend highlights the strong competitiveness of Chinese tea in the Thai market, driven by advantages in quality, price competitiveness, and friendly trade relations between China and Thailand.

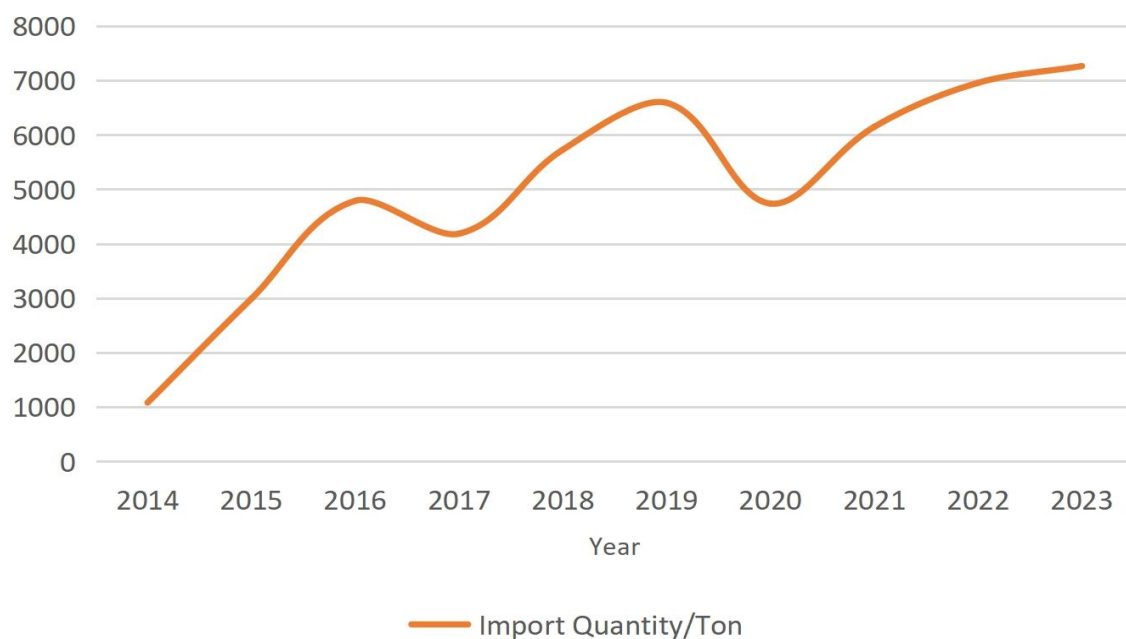


Figure 4.9: Thailand's Tea Import Volume from China, 2014-2023

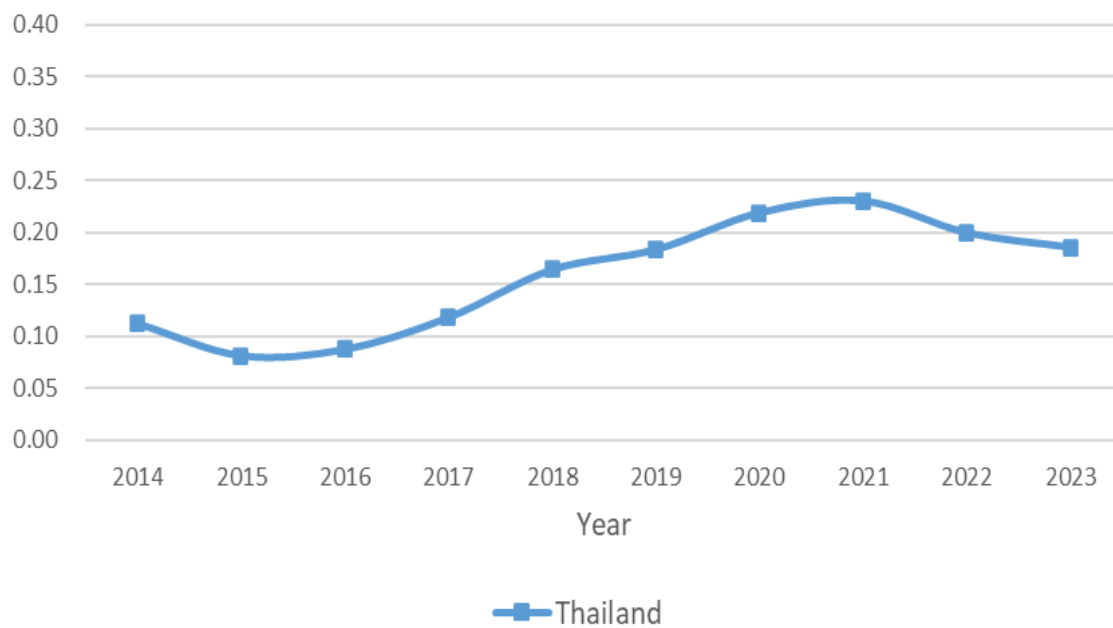


Figure 4.10: The RCA Index of Thailand's Tea Exports

From 2014 to 2023, Thailand's RCA index exhibited an initial increase followed by a decline, reflecting fluctuations in its tea export competitiveness (Figure 4.10). From 2014 to 2016, the index remained around 0.1, indicating weak competitiveness. Between 2017 and 2020, the index gradually increased, reaching a peak of approximately 0.23 in 2020, suggesting enhanced export competitiveness during this period, likely due to product quality improvements and market expansion. However, from 2021 to 2023, the index gradually declined to about 0.16, indicating weakened competitiveness, possibly attributed to intensified international competition or domestic production issues. Overall, Thailand's tea export competitiveness remains low, and efforts to enhance product quality, expand markets, and optimize policy support will be essential to strengthening its international competitiveness.

Thailand's tea import trade in recent years has shown a fluctuating upward trend, with its competitiveness in the international market gradually improving. As a major tea-producing country, China has strong growth potential in the Thai market but faces challenges, including competition from Thailand's rapidly developing domestic tea industry.

4.2.6 Tea Trade Between China and Singapore and the RCA Index of Singapore

The Chinese Ministry of Foreign Affairs indicates bilateral trade relations between China and Singapore have developed rapidly since establishing diplomatic ties in 1990. Singapore is China's fifth-largest trading partner among ASEAN countries. Since 2013, China has been Singapore's largest trading partner for 11 consecutive years. In 2023, bilateral trade between China and Singapore amounted to \$108.39 billion, a year-on-year decrease of 2.6%.

Data on tea trade between China and Singapore is relatively limited in publicly available sources. This may be due to Singapore's relatively small share in China's tea export market or the lack of separate statistical reporting for Singapore in relevant datasets. Notably, the Protocol for Further Upgrading the China–Singapore Free Trade Agreement, taking effect on December 31, 2024, further opens the services trade and investment markets between these two countries. This agreement may create new opportunities for agricultural product trade, including tea, deepening bilateral cooperation in this sector.

Table 4.7: Rankings and Shares of Singapore's Tea Import Sources, 2014-2023

Year	Rank-1		Rank-2		Rank-3		Rank-4		Rank-5	
2014	Indonesia	22.60%	China	16.30%	Sri Lanka	13.20%	India	9.20%	Malaysia	6.30%
2015	Indonesia	19.70%	China	13.70%	Sri Lanka	11.50%	Malaysia	9.60%	India	9.20%
2016	Indonesia	20.30%	China	17.00%	India	12.20%	Sri Lanka	12.00%	Japan	7.40%
2017	Indonesia	21.80%	China	18.70%	Sri Lanka	13.50%	Japan	8.00%	India	8.00%
2018	Indonesia	20.40%	China	15.90%	Viet Nam	14.20%	India	10.10%	Sri Lanka	8.00%
2019	Indonesia	22.90%	China	15.00%	India	12.00%	Viet Nam	9.20%	Sri Lanka	8.90%
2020	China	19.30%	Indonesia	19.20%	India	12.10%	Viet Nam	10.10%	Sri Lanka	7.70%
2021	Indonesia	20.40%	China	19.80%	India	11.00%	Sri Lanka	7.90%	Japan	7.80%
2022	China	21.50%	Indonesia	21.00%	India	12.20%	Japan	8.30%	Sri Lanka	7.80%
2023	China	16.50%	Indonesia	13.90%	India	13.40%	Malaysia	9.00%	Sri Lanka	7.50%
Cont.	Rank-6		Rank-7		Rank-8		Rank-9		Rank-10	
2014	Japan	6.10%	Viet Nam	4.20%	Other Asia	3.90%	Thailand	2.50%	Kenya	2.00%
2015	Viet Nam	7.70%	Japan	6.50%	Other Asia	4.00%	Kenya	3.90%	Germany	2.50%
2016	Viet Nam	5.60%	Malaysia	4.60%	Other Asia	3.50%	Kenya	3.00%	UAE	2.30%
2017	Viet Nam	5.60%	Other Asia	3.60%	Kenya	2.70%	Malaysia	2.60%	Germany	2.30%
2018	Japan	6.40%	Other Asia	4.00%	Kenya	2.70%	Malaysia	2.30%	Germany	2.10%
2019	Japan	7.10%	Other Asia	4.90%	Malaysia	3.10%	Thailand	2.50%	Morocco	2.20%
2020	Malaysia	5.50%	Other Asia	5.40%	Japan	5.30%	Thailand	3.50%	Kenya	2.80%
2021	Malaysia	6.70%	Other Asia	6.10%	Thailand	5.10%	Myanmar	3.00%	Kenya	2.20%
2022	Malaysia	6.20%	Other Asia	5.60%	Thailand	3.10%	Kenya	2.70%	Morocco	2.50%
2023	Viet Nam	6.00%	Japan	5.80%	Other Asia	5.00%	Morocco	4.70%	Kenya	3.80%
Cont.	Rank-11		Rank-12		Rank-13					
2014	Germany	1.90%	USA	1.80%						90.00%
2015	USA	2.30%								90.40%
2016	USA	2.20%	Germany	1.90%						91.80%
2017	South Korea	2.30%	United Arab	1.60%						90.70%
2018	USA	1.90%	United Arab	1.90%	South Korea	1.70%				91.50%
2019	Kenya	2.20%								90.10%
2020										91.10%
2021	Viet Nam	1.50%								91.40%
2022										90.80%
2023	United Arab Em	3.30%	Germany	2.50%						91.50%

Source: UN Comtrade database.

Table 4.7 shows that from 2014 to 2023, the top five suppliers consistently accounted for over 70% of Singapore's tea imports, indicating a highly concentrated market dominated by Indonesia, China, and India. Indonesia maintained the leading position for a long time, but its market share decreased from 22.6% in 2014 to 13.9% in 2023. Meanwhile, China's share gradually increased, reaching 16.5% in 2023, challenging

Indonesia's dominance. India's market share grew steadily, rising from 9.2% in 2014 to 13.4% in 2023. Vietnam demonstrated strong growth momentum, accounting for 9.0% in 2023, while Sri Lanka's share gradually declined to 7.5%. Singapore's tea import structure remains stable but shows a trend of decreasing market share for Indonesia, coupled with increasing competitiveness from China and India.

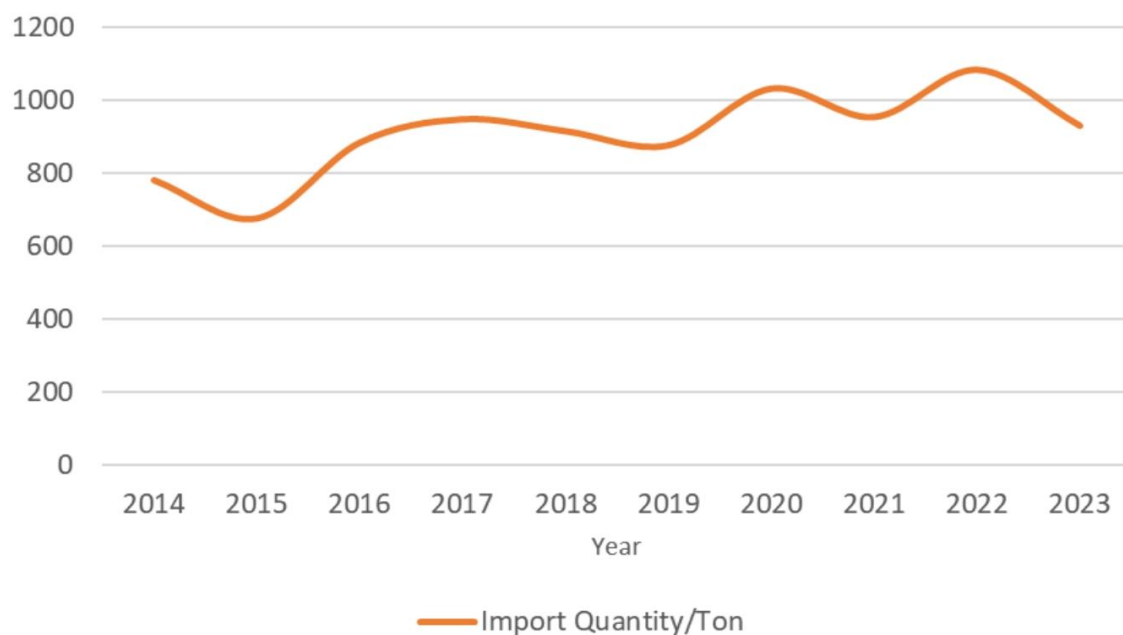


Figure 4.11: Singapore's Tea Import Volume from China, 2014-2023

Figure 4.11 shows a general upward trend with fluctuations in Singapore's tea imports from China between 2014 and 2023, rising from approximately 677 tons in 2014 to a peak of around 1,085 tons in 2022 before slightly decreasing in 2023. Imports grew slowly from 2014 to 2017, remained stable at high levels from 2018 to 2021, and peaked in 2022 before a slight decline. The decline in 2023 may be attributed to global economic fluctuations, changes in supply chains, or shifts in consumer preferences. While Singapore's demand for Chinese tea has shown significant growth, the decline in 2023 requires further observation to determine if it is a short-term phenomenon.

Singapore's RCA values remained below 1 throughout the decade, indicating a weak comparative advantage in tea exports and relatively low competitiveness in the international market. The RCA values fluctuated significantly, rising from 0.0830 in 2013 to 0.1879 in 2018, followed by a decline in 2021, possibly due to the global economic situation and international trade environment. The values rebounded in 2022 and 2023, reflecting changes in the market competitiveness of Singapore's tea exports.

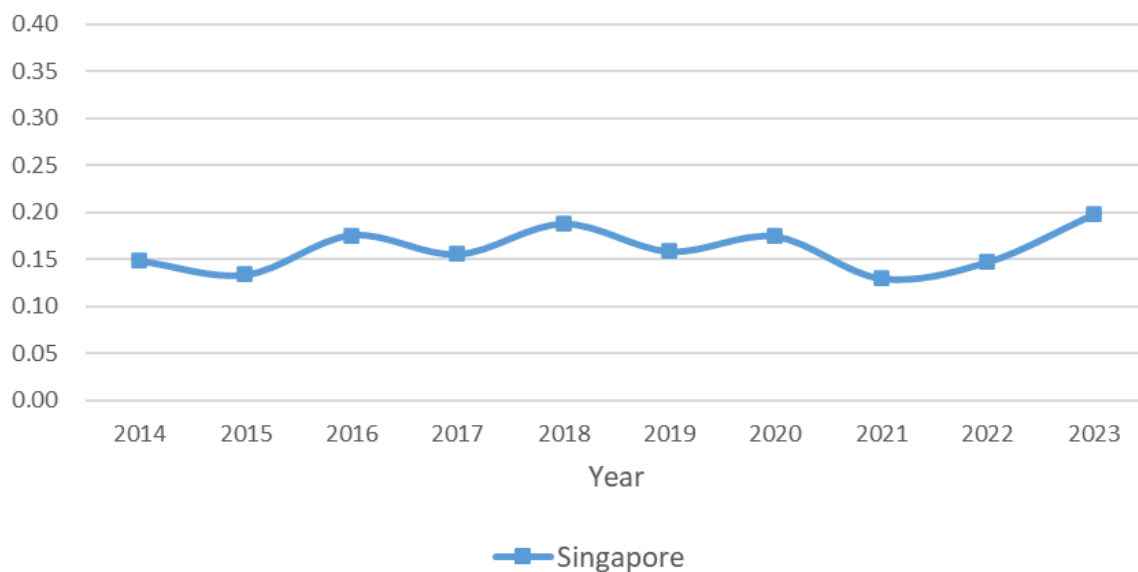


Figure 4.12: The RCA Index of Singapore's Tea Exports

From 2014 to 2023, Singapore's tea import volume and RCA index exhibit a fluctuating growth trend. This trend highlights the sustained and stable domestic demand for tea in Singapore, as well as the vibrancy and diversity of its tea market (Figure 4.12).

4.2.7 Tea Trade Between China and Indonesia and the RCA Index of Indonesia

Indonesia is one of the world's major tea-producing countries, with a tea production of approximately 129,000 tons in 2020, accounting for 2.1% of the global total. Regarding exports, Indonesia exported about 45,000 tons of tea in the same year, making

up 2.5% of global tea exports and ranking eighth globally. In tea trade between China and ASEAN, Indonesia and Vietnam are the primary tea-importing countries, with their trade volumes representing a significant proportion of China's total tea imports from ASEAN countries. This reflects the close trade ties between China and these countries and indicates the high concentration of China's tea import market in the ASEAN region. In recent years, the advancement of the BRI has further strengthened tea trade cooperation between China and Indonesia. The types of tea China imports from Indonesia primarily include black tea and green tea, catering to the domestic market's demand for diverse tea products. China also exports specialty teas to Indonesia, promoting cultural exchange and integration of tea traditions between the two countries. Before 2021, China's tea exports to Indonesia accounted for a relatively low proportion of Indonesia's total tea imports, about 1% to 2%. However, in 2022, this share began increasing significantly. In 2022, China became the third-largest tea supplier to Indonesia, with a 5.2% share. By 2023, China ranked second, accounting for 9.4% of Indonesia's tea imports (Table 4.8).

Table 4.8 illustrates that from 2014 to 2023, Indonesia's tea import market was predominantly led by Vietnam, with its share increasing from 39.6% to 72.5%, demonstrating stable competitiveness. Kenya ranked second/third during this period, but its share fluctuated significantly and was surpassed by China in 2023. India's market shares gradually declined, while Thailand and Malaysia maintained relatively stable contributions. "Other Asia, nes" has shown gradual growth since 2021, with its share reaching 3% to 4%. Overall, Indonesia's tea import sources remain concentrated but have gradually diversified in recent years. In the future, this trend may continue toward balancing cooperation with key source countries while further diversifying import sources.

Table 4.8: Rankings and Shares of Indonesia's Tea Import Sources, 2014-2023

Year	Rank-1		Rank-2		Rank-3		Rank-4		Rank-5		Rank-6		Total
2014	Viet Nam	39.60%	Iran	20.70%	Kenya	15.20%	India	10.50%	Argentina	3.90%	Sri Lanka	3.10%	93.00%
2015	Viet Nam	60.70%	Kenya	12.70%	India	8.60%	Iran	6.60%	Argentina	3.40%			92.00%
2016	Viet Nam	74.20%	Kenya	9.80%	India	7.40%							91.40%
2017	Viet Nam	66.10%	Kenya	16.20%	India	7.40%	Thailand	2.30%					92.00%
2018	Viet Nam	62.40%	Kenya	15.20%	India	6.10%	Thailand	4.80%	Germany	2.60%			91.10%
2019	Viet Nam	60.10%	Kenya	16.50%	Thailand	7.60%	Malaysia	3.70%	Other Asia	3.60%			91.50%
2020	Viet Nam	65.50%	Kenya	17.90%	India	4.00%	Malaysia	3.00%					90.40%
2021	Viet Nam	59.00%	Kenya	22.40%	Malaysia	4.30%	Other Asia	3.30%	Thailand	3.20%			92.20%
2022	Viet Nam	53.60%	Kenya	25.80%	China	5.20%	Thailand	4.40%	Other Asia	4.10%			93.10%
2023	Viet Nam	72.50%	China	9.40%	Kenya	5.40%	Other Asia	4.00%					91.30%

Source: United Nations Comtrade database.

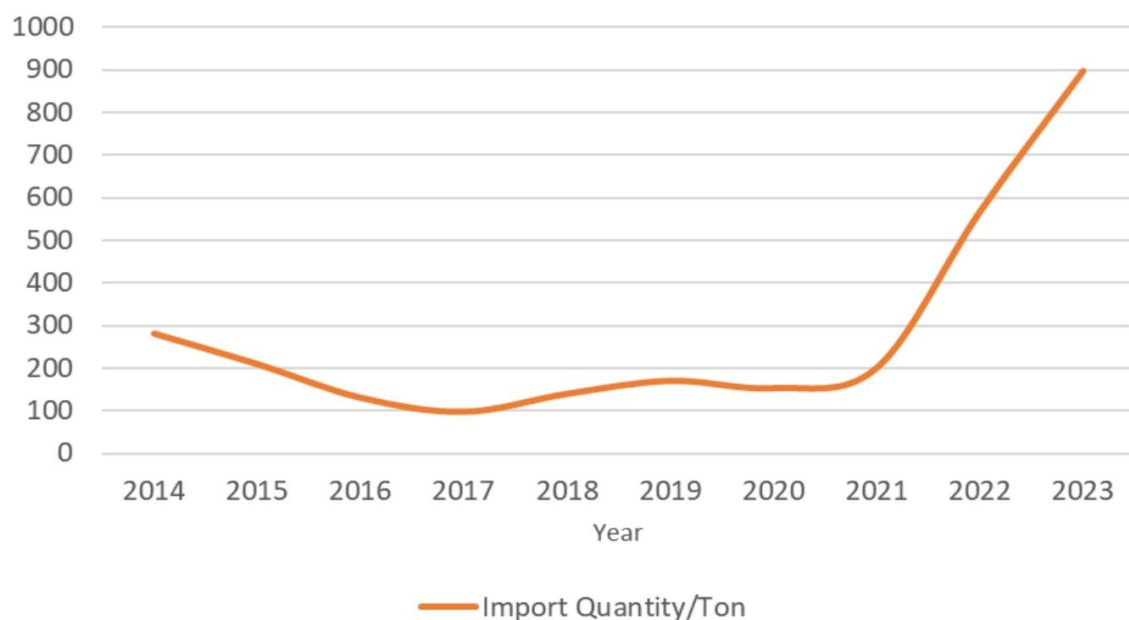


Figure 4.13: Indonesia's Tea Import Volume from China, 2014-2023

From 2014 to 2020, Indonesia's tea imports from China remained relatively low, with slight declines and overall fluctuations. Starting in 2021, Indonesia's tea imports from China grew significantly, peaking at nearly 899 tons in 2023. This surge may stem from rising market demand, supply chain optimization, supportive trade policies, and global market dynamics. Interestingly, this sharp rise occurred despite Indonesia being the second-largest tea producer in ASEAN. This paradox may be attributed to the shifting

structure of domestic tea production and consumption. In recent years, Indonesia's tea industry has faced challenges such as aging plantations, low productivity, and increasing domestic demand for premium and diversified tea varieties that may not be fully met by local supply.

Moreover, RCA (Revealed Comparative Advantage) analysis indicates a declining trend in Indonesia's tea export competitiveness, suggesting that while Indonesia remains a major producer, its relative advantage in exporting tea is weakening. This may be due to limited product upgrading, lack of branding, or stronger competition from other tea-exporting countries. As a result, Indonesia may be increasingly relying on imports—particularly from China—to meet specific domestic consumption needs, including flavored, high-end, or specialty teas. If the trend continues, China could further strengthen its position in Indonesia's tea market, though the sustainability of this growth remains uncertain (Figure 4.13).

From 2014 to 2023, Indonesia's RCA index shows a continuous downward trend, indicating a significant weakening of its comparative advantage in tea exports. This decline may be attributed to reduced domestic production competitiveness, changes in global market demand, or intensified competition from other countries. From 2014 to 2020, Indonesia's RCA values remained above 1, demonstrating a notable comparative advantage in tea exports. However, this advantage has gradually diminished. The RCA value fell sharply from 2.302 in 2014 to 0.757 in 2023, indicating a decline in Indonesia's international tea export competitiveness. While its comparative advantage remains, its strength is weakening (Figure 4.14).

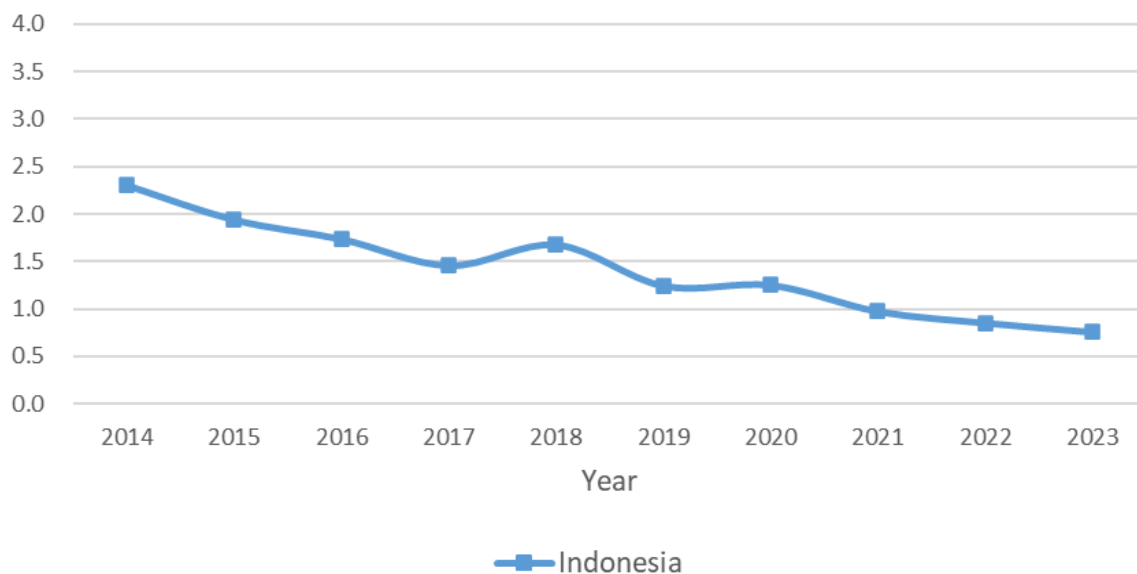


Figure 4.14: The RCA Index of Indonesia's Tea Exports, 2014-2023

Indonesia's tea import trade in recent years has fluctuated but remains relatively stable overall. As the second-largest tea producer in ASEAN, Indonesia's domestic tea consumption market holds great potential. Chinese holds a competitive advantage and growth opportunities in the Indonesian market.

4.2.8 Tea Trade Between China and Vietnam and the RCA Index of Vietnam

Under the combined influence of the BRI and RCEP, China and Vietnam have strengthened their economic and trade cooperation. In 2023, bilateral trade between China and Vietnam reached \$229.793 billion, with China firmly maintaining its position as Vietnam's largest trading partner. Tea is also a traditional crop in Vietnam, and drinking tea is a daily habit for many Vietnamese people (Yang, 2020). Vietnam's Ministry of Agriculture and Rural Development Report indicates that Vietnam has a tea cultivation area of approximately 123,000 hectares, with an annual production of about 1.02 million tons of fresh tea leaves. This helps Vietnam remain one of the world's top tea producers. Its

main tea varieties—green, black, and oolong—are primarily grown in the mountainous regions of northern and central Vietnam. Vietnam remains a crucial tea-exporting country globally, ranking fifth worldwide. In 2023, Vietnam’s primary tea export markets included Pakistan, Russia, China, and other Asian countries. Although Vietnam is a major global tea producer and exporter, its tea import volume is relatively small compared to its tea consumption. Vietnam’s tea imports mainly supplement domestic market demand, particularly for high-end tea varieties. According to relevant data, Vietnam’s tea imports primarily come from China and other Asian countries. Vietnam’s tea import volume remains relatively low, accounting for a small proportion of its consumption market.

Table 4.9 shows that from 2014 to 2023, Vietnam’s tea imports were primarily sourced from China, which consistently held the top position. China’s share fluctuated upward from 59.3% in 2014 to 71.4% in 2019 before declining to 53.2% in 2023. Indonesia ranked second throughout the period, with its share increasing from 15.9% in 2014 to 27.4% in 2020 and then stabilizing at around 23%. “Other Asia, nes” consistently held third, with its share fluctuating between 5% and 6%. Japan and Sri Lanka ranked fourth and fifth, respectively.

Table 4.9: Rankings and Shares of Vietnam's Tea Import Sources, 2014-2023

Year	Rank-1		Rank-2		Rank-3		Rank-4		Rank-5	
2014	China	59.30%	Areas, nes	16.80%	Indonesia	15.90%				
2015	Areas, nes	54.50%	China	20.70%	Indonesia	14.00%	Other Asia	3.90%		
2016	Areas, nes	36.50%	China	26.50%	Indonesia	20.20%	Sri Lanka	6.70%	Other Asia	5.60%
2017	Other Asia	30.60%	China	21.30%	Indonesia	21.10%	Areas, nes	9.80%	Sri Lanka	7.40%
2018	China	65.20%	Indonesia	18.10%	Other Asia	6.70%	Japan	2.30%		
2019	China	71.40%	Indonesia	15.60%	Other Asia	5.20%				
2020	China	55.70%	Indonesia	27.40%	Other Asia	5.60%	Japan	2.50%		
2021	China	47.90%	Indonesia	23.40%	Other Asia	6.10%	Sri Lanka	5.90%	Argentina	3.80%
2022	China	53.20%	Indonesia	23.40%	Other Asia	6.00%	Sri Lanka	4.80%	Japan	2.70%
Cont.	Rank-6		Rank-7							Total
2014										92.10%
2015										93.00%
2016										95.50%
2017										90.20%
2018										92.30%
2019										92.10%
2020										91.20%
2021	Japan	2.90%	USA	1.80%						91.70%
2022										90.00%

Source: United Nations Comtrade database.

Vietnam's tea import market is highly concentrated, with China and Indonesia as its main suppliers. However, in recent years, the sources have become more diversified.

From 2014 to 2017, Vietnam's tea imports from China remained stable at around 1,000 tons. Between 2018 and 2019, import volumes increased significantly, peaking at approximately 5,006 tons in 2019, possibly driven by growing market demand or the promotion of China–Vietnam trade policies. However, starting in 2020, import volumes sharply declined due to the pandemic and supply chain disruptions, followed by a slow recovery in 2021–2022 (Figure 4.15).

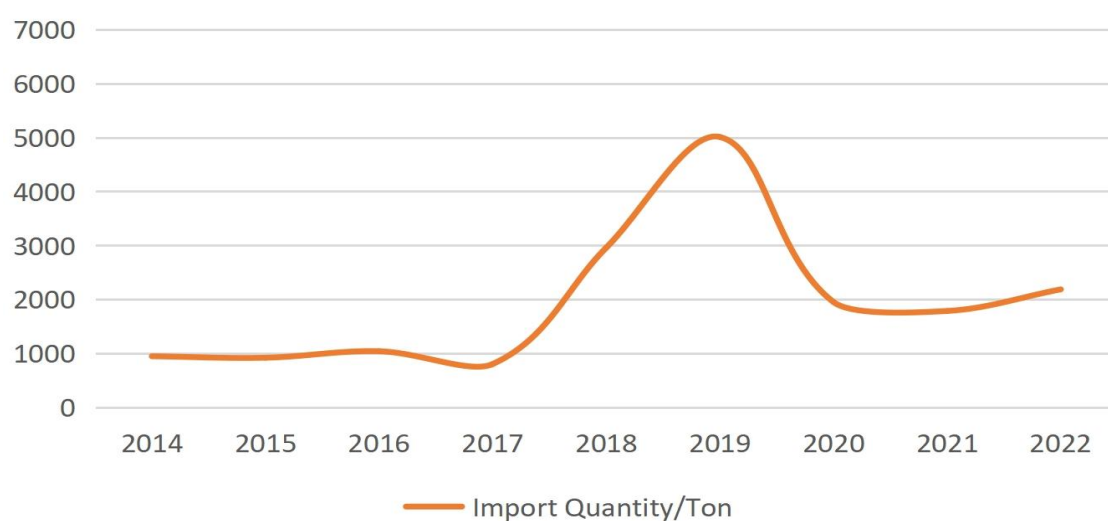


Figure 4.15: Vietnam's Tea Import Volume from China, 2014-2023

Vietnam's tea imports from China have shown a trend of stability, rapid growth, decline, and subsequent recovery. Whether import volumes will resume growth in the future will depend on market demand and the further development of China–Vietnam trade relations (Figure 4.15).

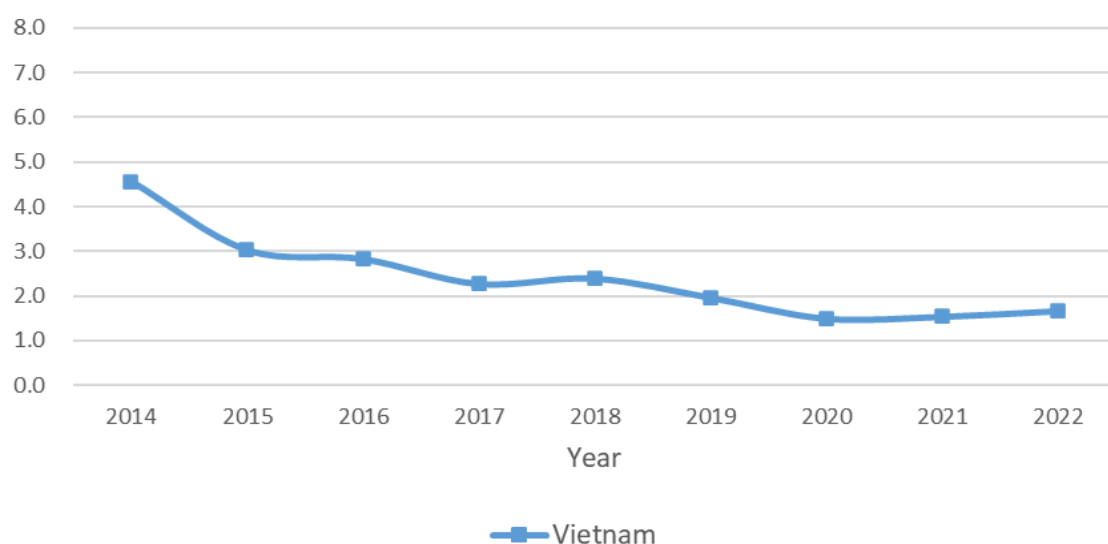


Figure 4.16: The RCA Index of Vietnam's Tea Exports, 2014-2023

Figure 4.16 illustrates that Vietnam's RCA values remained above 1 from 2014 to 2023, indicating a strong comparative advantage in tea exports. However, this advantage has gradually weakened. The RCA value significantly declined from 4.565 in 2014 to 1.667 in 2022, reflecting a reduction in comparative advantage. This suggests that while Vietnam maintains strong international competitiveness in tea exports, it is no longer as pronounced as before.

Vietnam's tea import volume has shown an overall increasing trend in recent years, driven by robust consumer demand in the market. Chinese tea has significant market opportunities and competitive advantages in exports to Vietnam.

4.2.9 The RCA Index of China's Tea Exports

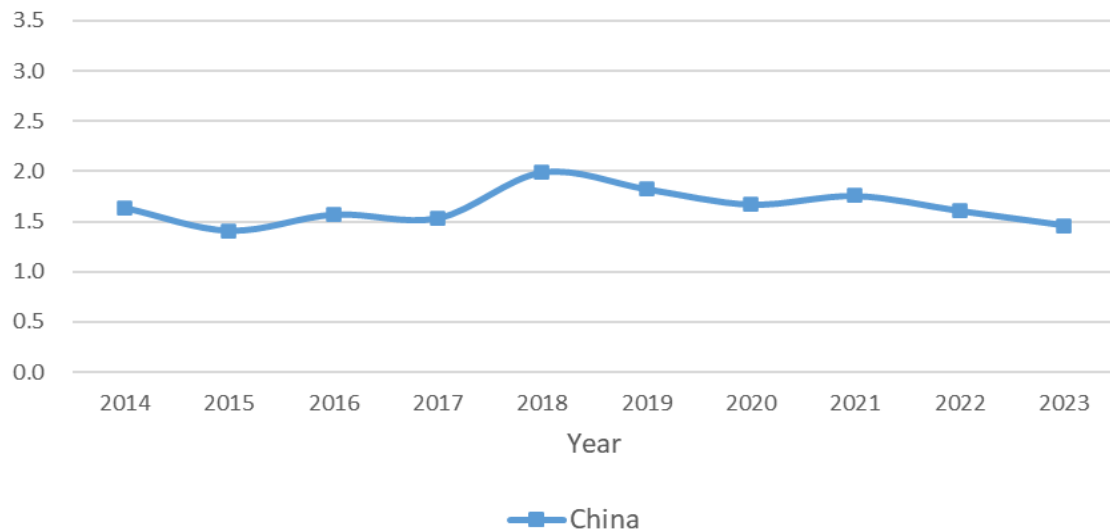


Figure 4.17: The RCA Index of China's Tea Exports, 2014-2023

China's RCA index remained above 1 from 2014 to 2023, indicating a sustained comparative advantage in tea exports. However, the RCA value fluctuated but generally remained high. Figure 4.17 shows China's RCA index gradually declined from nearly 2 to

around 1.5 in 2023. Between 2017 and 2018, the index peaked at nearly 2, reflecting enhanced competitiveness in the global tea market, potentially driven by growth in high-end tea exports or expanding international demand. Starting in 2019, however, the index began to decline, likely due to intensified global competition, increased domestic consumption demand, adjustments in the export structure, and changes in international trade and logistics costs. While the RCA value fluctuated over the decade, China's comparative advantage in tea exports remained relatively stable, reaching high levels in certain years.

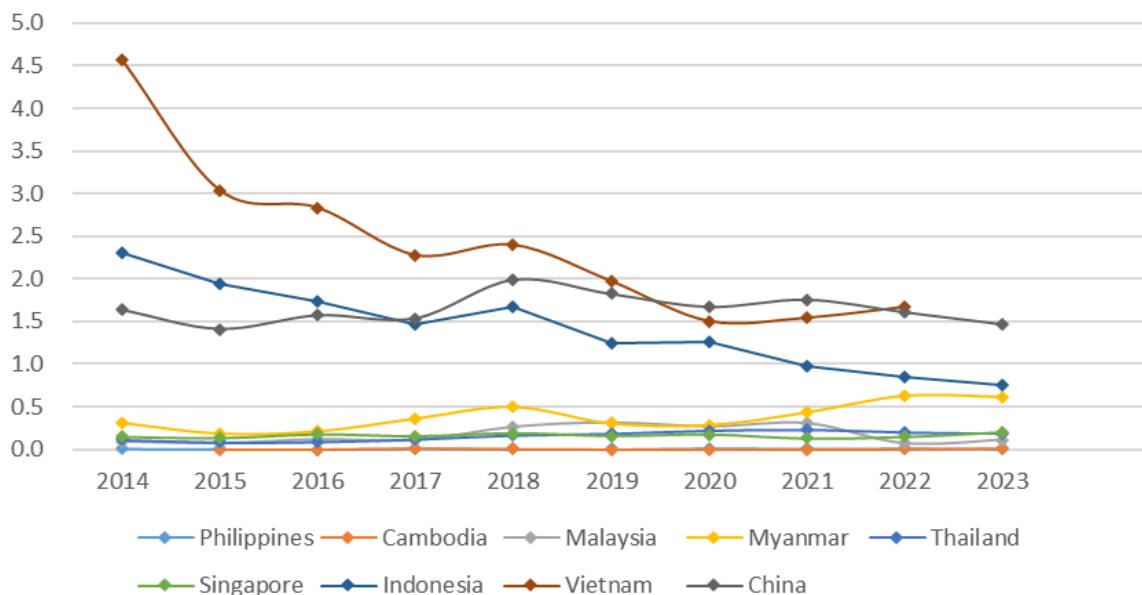


Figure 4.18: RCA Index of Tea Exports for China and the Eight ASEAN Countries

Figure 4.18 illustrates that from 2014 to 2023, the RCA indices of China and the eight ASEAN countries (Philippines, Cambodia, Malaysia, Myanmar, Thailand, Singapore, Indonesia, and Vietnam) clearly diverged. China and Vietnam demonstrate the strongest comparative advantages in tea exports, positioning themselves as major competitors in the international market. Although historically strong, Indonesia has experienced a decline in competitiveness more recently. Malaysia, Singapore, the Philippines, and Cambodia show

relatively weak comparative advantages in tea exports, facing significant competitive pressure in the international market. Thailand's competitiveness has gradually improved but remains below 1, indicating potential growth. The competitiveness of traditional market leaders in the region has weakened, while emerging markets are rising, driven by global competition, industrial restructuring, and policy support. This analysis provides a comprehensive understanding of the comparative advantages and disadvantages of China and the eight ASEAN countries in tea exports, providing a foundation for subsequent policy recommendations and trade potential assessments.

4.3 Descriptive Statistics, Correlation Analysis, and Multicollinearity Test Result

4.3.1 Descriptive Statistics

Descriptive statistics highlight the key characteristics of tea exports and related variables for China and the eight ASEAN countries. Analyzing statistical measures such as mean, standard deviation, minimum, and maximum values provides an initial understanding of the distribution and range of these data. These statistics provide essential information about the central tendency, dispersion, and extreme values of the sample data, helping us better understand the essential characteristics and overall situation of tea exports and their related variables. The data spans 30 years (1993 to 2022), capturing the overall trends and volatility in the tea trade over this extended period. This long period not only reflects the long-term development trends in the tea trade but also reveals fluctuations and changes over different periods, providing rich information for further analysis.

Table 4.10 presents the descriptive statistics for each variable. Analysis of the data in the table reveals the following conclusions:

Table 4.10: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
LTRA	240	14.119	2.343	7.804	19.467
LIMP	240	12.671	2.202	5.247	16.042
DEP	240	1.112	0.739	0.017	3.435
LEX	240	4.962	3.482	0.219	10.063
LDIS	240	11.957	0.662	10.419	13.151
PAN	240	0.100	0.301	0	1
LCGDP	240	28.904	1.158	26.821	30.515
LASGDP	240	25.311	1.478	21.653	27.908

Note: Obs represents the observed values, std. dev. represents standard deviations, min represents minimum values, and max represents maximum values.

This table presents the descriptive statistics for each variable and provides an initial analysis for understanding the characteristics of the tea trade between China and the eight ASEAN countries. By thoroughly examining the data, several key insights can be drawn. The research sample comprises 240 observations covering multiple years of tea trade between China and ASEAN.

Table 4.10 indicates that the standard deviation of COVID-19 surpasses the mean, suggesting enhanced variability in this variable. The results also show that the standard deviations of tea trade volume (*LTRA*), import volume (*LIMP*), and export volume (*LEX*) are close to or exceeding their respective means. This indicates significant volatility in these variables, which may be influenced by market demand and supply chain fluctuations. In contrast, the standard deviations of distance (*LDIS*) and China's GDP (*LCGDP*) are significantly smaller than their means, suggesting that these variables are relatively stable and less susceptible to short-term fluctuations. The value of COVID-19 is taken as 1 for the years 2020, 2021, 2022, and 0 otherwise.

These descriptive statistics provide valuable preliminary information that helps understand the performance differences in tea trade between China and the eight ASEAN countries, laying a solid foundation for subsequent empirical analysis.

4.3.2 Correlation Analysis

The primary aim of correlation analysis is to explore the relationships between variables, thereby understanding which factors significantly impact tea exports (*LTRA*). This step is crucial as it identifies variables with statistical significance related to tea exports, providing a basis for further regression analysis and modeling.

Correlation analysis quantifies the linear relationships between variables and describes the strength and direction of these relationships using correlation coefficients. A positive correlation coefficient indicates that the two variables move in the same direction, meaning that as one variable increases, the other also increases. A negative correlation coefficient indicates that the two variables move in opposite directions, meaning that as one variable increases, the other decreases. Correlation analysis includes the significance level (typically represented by its p-value) to assess whether the correlation coefficient is statistically significant. The significance level provides confidence in the correlation relationship, with a lower p-value (typically less than 0.05) indicating higher confidence that the correlation is genuine rather than a random occurrence.

Table 4.11 presents the correlation coefficients between variables and their significance levels (p-values in parentheses). By analyzing these correlation coefficients, we can preliminarily assess which variables have significant linear relationships with tea trade volume (*LTRA*).

Table 4.11: Correlation Analysis

Variable	LTRA	LIMP	DEP	LEX	LDIS	PAN	LCGDP	LASGDP
LTRA	1.000							
LIMP	0.879*** (0.000)	1.000						
DEP	0.367*** (0.000)	0.307*** (0.000)	1.000					
LEX	-0.315*** (0.000)	-0.446*** (0.000)	-0.419 (0.000)	1.000				
LDIS	0.396*** (0.000)	0.231*** (0.000)	0.170*** (0.008)	-0.040 (0.542)	1.000			
PAN	0.323*** (0.000)	0.147** (0.023)	0.027 (0.682)	0.058 (0.372)	0.181*** (0.005)	1.000		
LCGDP	0.558*** (0.000)	0.238*** (0.000)	0.055 (0.395)	0.113* (0.080)	0.748*** (0.000)	0.445*** (0.000)	1.000	
LASGDP	0.598*** (0.000)	0.512*** (0.000)	0.168*** (0.009)	-0.114* (0.078)	0.515*** (0.000)	0.225*** (0.000)	0.514*** (0.000)	1.000

Note: Asterisks (***), (**) and (*) indicate statistically significant at 1%, 5% and 10% levels, respectively.

4.3.3 Multicollinearity Test Results

To ensure the model's reliability, we must further examine and address potential multicollinearity issues. This can be achieved by calculating the Variance Inflation Factor (VIF), which helps identify which independent variables have high correlations with other independent variables. Adjusting the model accordingly reduces the impact of multicollinearity on the analysis results. This approach enhances the accuracy and interpretability of the regression analysis, ensuring that the model correctly reflects the independent effects of each variable on the dependent variable.

Table 4.12: Multicollinearity Test Result

Variable	VIF	1/ VIF
LCGDP	3.24	0.31
LDIS	2.71	0.37
LASGDP	1.84	0.54
LIMP	1.76	0.57
LEX	1.53	0.65
PAN	1.34	0.74
DEP	1.27	0.79

Generally, a VIF value exceeding 10 is indicative of severe multicollinearity issues. Analyzing the VIF values for each variable in the table reveals that all variables have VIF values below 10, indicating that none of the variables exhibit severe multicollinearity.

Based on the results of the multicollinearity test, Table 4.12 shows that all variables have a VIF of less than 10, indicating no significant multicollinearity issues in the model. Among the variables, *LCGDP* has the highest VIF at 3.24, which is still within the acceptable range. The other variables have relatively low VIF values, the lowest being *DEP* at 1.27. The correlation between the variables in the model is low, and the impact of multicollinearity on the regression analysis results can be considered negligible. This provides a solid theoretical basis for subsequent regression analysis and conclusions.

4.4 Panel Unit Root Test Results

Unit root tests determine the stationarity of time series data, which is a crucial step in time series analysis. The stationarity of time series data refers to the property where its statistical characteristics (e.g., mean and variance) remain constant over time. If time series data has a unit root, it implies that the data is non-stationary and must be differenced to achieve stationarity. The following discussion presents the results of the unit root tests for each variable, including the ADF and IPS test statistics and p-values (Table 4.13).

Table 4.13: ADF and IPS Test Statistics

Variables	ADF		IPS	
	Intercept	Trend & Intercept	Intercept	Trend & Intercept
<i>Level</i>				
LTRA	7.4941	22.5707	1.2976	-1.2405
LASGDP	2.6302	9.1517	3.0243	0.7796
LCGDP	7.3784	1.0875	0.7716	3.9749
LDIS	10.3808	8.4508	0.7626	1.2770
LIMP	18.0663	20.4011	1.1394	-0.2098
LEX	23.1248	15.5376	-1.3903*	-0.6501
<i>First Difference</i>				
Δ LTRA	96.1981***	73.3912***	-8.3583***	-6.8348***
Δ LASGDP	70.8734***	48.0234***	-6.4105***	-4.4972***
Δ LCGDP	42.6839***	26.3236**	-3.9883***	-2.2073**
Δ LDIS	115.9580***	89.7749***	-10.4220***	-8.4879***
Δ LIMP	121.4460***	104.4720***	-13.5409***	-10.4663***
Δ LEX	72.9241***	60.7939***	-6.6091***	-5.7665**

Note: Asterisks (***), (**) and (*) indicate statistically significant at 1%, 5% and 10% levels, respectively.

The unit root tests in this study are conducted under two scenarios. The first includes only the intercept, and the second includes both the intercept and the trend. The tests performed are the ADF and IPS tests. Table 4.5 presents the results of panel data unit root tests. This study adopts both the ADF and IPS tests to ensure robustness. The tests are conducted under two forms: (1) an intercept (Intercept) and (2) a trend and an intercept (Trend & Intercept). The level (Level) and first difference (First Difference) of the variables are examined.

The level test results show that, except for the *LEX* variable that is significant at 10% in the IPS intercept test, the ADF and IPS test statistics for all other variables fail to reject the null hypothesis of a unit root. This indicates that all series are non-stationary at their levels. After taking the first difference of the variables, the test statistics for all variables under both methods reject the null hypothesis of a unit root at 1% (only Δ LCGDP and Δ LEX in the IPS test with a trend and intercept are significant at 5%). This demonstrates that all variables are I (1) series, i.e., first-order integrated series.

These test results provide the necessary prerequisites for subsequent cointegration tests. This indicates that the non-stationary characteristics of the variables must be considered when establishing econometric models to mitigate spurious regression issues. Moreover, the stationarity of the first differences of the variables provides a statistical basis for employing an error correction model.

4.5 Panel Cointegration Test Results

4.5.1 Kao's Panel Unit Root Test Result

Kao's Panel Unit Root Test is a statistical method for panel data that primarily detects whether a cointegration relationship exists among data series. This test determines if multiple time series in panel data share a common long-term equilibrium relationship, even if each time series might be non-stationary. The Kao test results of this study are presented below.

Table 4.14: Kao Cointegration Test Result

	t-Statistic	Prob.
ADF	-7.590	0.000
Residual variance	0.285	
HAC variance	0.133	

Table 4.14 presents the results of the Kao cointegration test, which evaluates whether there is a long-term cointegrating relationship between variables in panel data. The ADF statistic is -7.590 , with a corresponding p-value of 0.000 , significantly less than the commonly used significance level of 0.05 . This indicates that the null hypothesis, which states that no cointegration exists between the variables, can be rejected. Therefore, the results support the alternative hypothesis, suggesting a significant cointegrating relationship between the variables.

The residual variance is 0.285, while the HAC variance is 0.133. By adjusting for heteroscedasticity and autocorrelation, the ladder enhances the robustness of the estimates, indicating that the adjusted model errors are more precise and reliable. The findings demonstrate a significant long-term cointegrating relationship among the variables in the panel data model, providing a statistical foundation for further causal analysis and policy recommendations.

4.5.2 Pedroni Panel Cointegration Test Result

The Pedroni cointegration test is a statistical method used to examine whether there is a cointegration relationship among multiple time series in panel data. Pedroni (1999) introduced this test and extended cointegration analysis to panel data, making it applicable to multivariate panel data analysis. This method is beneficial for examining long-term equilibrium relationships in cross-country or cross-regional data. In traditional cointegration tests, the focus is typically on the cointegration relationship between time series (e.g., the Engle–Granger test or the Johansen test). However, in the context of panel data, the heterogeneity across entities (countries or regions) must be considered. The Pedroni test assesses the cross-sectional and temporal dimensions of panel data, providing a more effective and flexible cointegration testing framework. This offers researchers a versatile and efficient tool for investigating panel data cointegration relationships. The Pedroni test is widely applied in economics, finance, and social sciences to explore long-term equilibrium relationships across countries or regions. Table 4.15 presents the results of the Pedroni cointegration test.

Table 4.15: Pedroni Panel Cointegration Test Result

Alternative hypothesis: common AR coefs. (within-dimension)				
	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	-0.947	0.828	-1.584	0.943
Panel rho-Statistic	0.350	0.637	-0.150	0.440
Panel PP-Statistic	-7.214	0.000	-8.667	0.000
Panel ADF-Statistic	-7.519	0.000	-8.071	0.000
Alternative hypothesis: individual AR coefs. (between-dimension)				
	Statistic	Prob.		
Group rho-Statistic	0.678	0.751		
Group PP-Statistic	-11.642	0.000		
Group ADF-Statistic	-8.303	0.000		

The Pedroni panel cointegration test results indicate that the p-values of the Panel PP-Statistic, Panel ADF-Statistic, Group PP-Statistic, and Group ADF-Statistic are all significant at 0.000. This indicates that these statistics reject the null hypothesis of no cointegration among the variables at 5% significance (Table 4.15). Rejecting the null hypothesis suggests that a long-term stable equilibrium relationship between the explanatory and dependent variables in the panel data exists. This long-term equilibrium relationship implies that even though there may be deviations or fluctuations between the variables in the short term, they tend to converge to a dynamic equilibrium state over the long term.

4.6 Analysis Results of Panel Data Model

This section explores the correlation between the tea trade volume between China and ASEAN countries and various influencing factors. The factors analyzed include the GDP of ASEAN countries, China's GDP, the COVID-19 pandemic, exchange rates, geographical distance, the quantity of tea imported from China by ASEAN countries, and the degree of trade dependence of ASEAN countries.

The PMG model is employed, and its results indicate that these variables significantly impact the economy from different perspectives.

Table 4.16: Results of Panel Data Model of the Relationship between Tea Trade Volume and Various Influencing Factors in China

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LASGDP	0.223	0.053	4.184	0.000
LCGDP	0.783	0.116	6.731	0.000
PAN	-1.038	0.284	-3.658	0.000
LEX	0.124	0.030	4.168	0.000
LDIS	-0.286	0.140	-2.038	0.043
LIMP	0.837	0.034	24.563	0.000
DEP	0.4583	0.100	4.586	0.000
C	-22.213	1.681	-13.218	0.000
Short-run (Mean-Group) Coefficients				
COINTEQ	-0.384	0.089	-4.305	0.000
D(LNTRA(-1))	-0.040	0.064	-0.624	0.534
D(PAN)	0.764	0.171	4.455	0.000
D(LNIMP)	0.625	0.146	4.265	0.000
Log-Likelihood:	-74.953			

The regression results in Table 4.16 show that the trade volume between China and ASEAN countries is significantly influenced by various factors. The findings show that all determinant signs align with the anticipated outcomes: ASEAN countries' GDP, China's GDP, exchange rates, tea imports, and trade dependence all significantly positively impact trade volume. This indicates that economic growth, currency appreciation, and increased import demand promote trade growth. In contrast, the pandemic and geographic distance negatively impact trade volume, with the pandemic significantly inhibiting bilateral trade. Overall, economic growth, trade demand, and economic interdependence between China and ASEAN countries are key drivers of tea trade growth, while the pandemic and distance are the main limiting factors.

The long-run regression equation estimated by PMG can be expressed as follows:

$$\text{LNTRA} = 0.223 \cdot \text{LNASGDP} + 0.783 \cdot \text{NCGDP} - 1.038 \cdot \text{PAN} + 0.124 \cdot \text{LNEX} \\ - 0.286 \cdot \text{LNDIS} + 0.837 \cdot \text{LNIMP} + 0.458 \cdot \text{DEP} - 22.213$$

Table 4.16 shows that the GDP of ASEAN countries (*LASGDP*) has a statistically significant impact at 1%. It positively correlates with the trade volume between China and ASEAN countries. This indicates that for every 1% increase in the natural logarithm of ASEAN countries' GDP, the trade volume increases by approximately 0.22%. The GDP of China (*LCGDP*) also has a statistically significant effect at 1%. It is positively related to the trade volume, suggesting that for every 1% increase in the natural logarithm of China's GDP, the trade volume rises by approximately 0.78%.

Exchange rates (*LEX*) show a significant and positive relationship with trade volume at 1%. This implies that for every 1% increase in the exchange rate, the trade volume increases by approximately 0.12%. ASEAN countries' tea imports (*LIMP*) exhibit a significantly positive impact at 1%. This indicates that for every 1% increase in the natural logarithm of tea imports, the trade volume increases by approximately 0.84%. Trade dependence (*DEP*) shows a significantly positive effect at 1%. This implies that for every 1% increase in trade dependence, the trade volume increases by approximately 0.46%.

Geographical distance (*LDIS*) has a significantly negative effect at 5%. This suggests that for every 1% increase in the natural logarithm of distance, the trade volume decreases by approximately 0.29%. The COVID-19 pandemic (*PAN*) has a significantly negative effect at 0.1%. It is negatively correlated with trade volume, implying that the pandemic decreases the trade volume by approximately 1.04%.

The constant term "C" has a coefficient of -22.213, indicating that with all other variables held constant, tea trade volume shows a fixed negative bias of -22.213. This

result is highly significant at 1%, indicating a statistically meaningful impact that requires further analysis and attention to understand its underlying causes.

Relevant literature indicates a close relationship between bilateral trade and GDP, particularly in emerging markets and developing countries, where GDP growth significantly promotes agricultural and food trade (Anderson & van Wincoop, 2003). With the growth of China's GDP, its production capacity and consumption demand have continuously expanded, providing a solid foundation for the production and export of Chinese tea. At the same time, China's economic growth has also strengthened trade cooperation with ASEAN countries, particularly in terms of agricultural products like tea. ASEAN countries, especially Vietnam, Thailand, and Malaysia, have seen increased demand for high-quality tea following economic growth and industrial upgrading. As a major tea producer, China has met these markets' demand for high-quality tea, driving the growth of the bilateral tea trade (Zhang & Li, 2021). The growth of ASEAN countries' GDP has enhanced their purchasing power and consumption levels, leading to a sustained increase in their demand for Chinese tea. As the ASEAN economy improves, tea has gradually become part of daily consumption, boosting the demand for Chinese tea imports. In the ASEAN region, more economically developed countries such as Vietnam and Malaysia have seen a steady rise in the import of Chinese tea, becoming key markets for Chinese tea exports (Nguyen & Zhang, 2019). Overall, the growth of China's and ASEAN's GDP has jointly driven the increase in the China–ASEAN tea trade, reflecting the rise in demand and market expansion resulting from economic growth in these regions. The expansion of economic scale has enhanced production capacity and increased market demand for high-quality tea. This, in turn, has driven the continuous growth of bilateral tea trade volume.

With the stability or moderate depreciation of the RMB exchange rate, the price of Chinese tea in ASEAN markets becomes relatively lower, enhancing the competitiveness of Chinese tea in these markets while driving trade volume growth. Studies indicate that exchange rate fluctuations significantly impact agricultural trade, particularly for price-sensitive commodities like tea in the international market. As the RMB depreciates relative to the currencies of ASEAN countries, the price advantage of Chinese tea in ASEAN markets becomes more pronounced, stimulating an increase in import demand. Particularly in major markets such as Vietnam, Thailand, and Malaysia, a weaker RMB lowers the export price of Chinese tea, making ASEAN consumers and importers more willing to increase their purchases of Chinese tea, thereby boosting bilateral tea trade volume (Chen & Zhou, 2020). Additionally, exchange rate stability is a key factor in promoting the growth of China–ASEAN tea trade. A stable RMB exchange rate helps reduce exchange rate risks in cross-border trade, enabling ASEAN importers to forecast future procurement costs more accurately and make appropriate purchasing decisions. Stability in exchange rates also increases market confidence, further promoting the steady growth of bilateral tea trade. The positive correlation between exchange rates and China–ASEAN tea trade indicates that exchange rate fluctuations directly affect the price competitiveness of Chinese tea. They also influence import demand and market confidence, driving the growth of bilateral trade volume. A moderate depreciation of the RMB and exchange rate stability create a favorable trading environment for Chinese tea in the ASEAN market.

ASEAN countries have relatively limited self-sufficiency in tea production, especially in producing high-quality tea. This has driven a steady increase in demand for imported high-quality tea, with China—one of the world’s leading producers—meeting the ASEAN markets’ strong demand. With the economic growth in the ASEAN region,

consumer demand for healthy, high-quality tea has been steadily increasing, making tea an integral part of daily life in these countries. As a result, demand for Chinese tea imports has risen significantly, especially in countries like Vietnam, Malaysia, Thailand, and Indonesia, where Chinese green and black teas have a strong market presence. Research indicates that as economic development and household incomes rise, ASEAN countries' imports of Chinese tea have increased yearly, directly contributing to the growth in tea trade volume between China and ASEAN (Nguyen & Xing, 2021). ASEAN countries' tea import volumes are also driven by reprocessing and re-exporting activities. Countries such as Malaysia and Singapore often reprocess imported Chinese tea and re-export it, further expanding the demand for Chinese tea in ASEAN markets and boosting trade volumes. Therefore, the import volume of tea in ASEAN affects domestic consumption and promotes trade flow within the region, driving up the overall tea trade volume between China and ASEAN (Li & Zhang, 2020). The growth in tea import volumes in ASEAN countries has directly contributed to the increase in tea trade between China and ASEAN, reflecting the ongoing demand and dependency of ASEAN markets on Chinese tea. The rise in imports enhances the market share of Chinese tea in ASEAN while supporting the continuous development of bilateral trade.

Relevant studies indicate that growing trade dependence reduces barriers, particularly within regional cooperation and free trade frameworks, improving the circulation of agricultural products and food (Krugman, 1991). In the tea trade between China and ASEAN, ASEAN countries have a high degree of trade dependence, particularly Vietnam, Thailand, and Malaysia, which maintain close economic cooperation with China. A high level of trade dependence means that ASEAN countries rely more on importing Chinese tea to meet domestic consumption demands or for reprocessing and re-exporting.

Relevant studies (Bouët & Nimenya, 2023) indicate that countries with higher trade dependence often have more robust trade policies and cooperation mechanisms, facilitating the cross-border flow of tea and other agricultural products. Moreover, high trade dependence encourages China and ASEAN countries to strengthen cooperation in tariff reduction and customs facilitation, further lowering tea trade costs. For instance, since implementing CAFTA, reducing tariffs and non-tariff barriers has significantly increased bilateral tea trade volume. The empirical analysis shows that increased trade dependence can significantly promote the development of tea trade between China and ASEAN by facilitating trade, enhancing market connections, and reducing transaction costs. This reflects the high level of trade complementarity and cooperation potential between the two parties.

The COVID-19 pandemic has negatively impacted the tea trade between China and ASEAN, leading to a decline in trade volume. Early uncertainties in global trade, lockdowns, and restrictions hindered cross-border transportation, disrupting the stability of the tea supply chain. The China Tea Circulation Association Report (2021) indicates tea export logistics faced obstacles during the initial stages of the pandemic, with reduced port and border clearance efficiency limiting the smooth flow of the tea trade. Although it is often assumed that consumers preferred purchasing locally produced agricultural products during the pandemic, thereby reducing the demand for imported tea, this pattern was not uniform across all ASEAN countries. In fact, countries like Cambodia, Thailand, and Vietnam showed an increase in tea imports from China during the post-COVID period, suggesting that other factors such as changes in domestic production capacity, consumer preferences for Chinese tea, or post-pandemic trade recovery efforts also played a significant role. The downturn in the service sector, particularly in catering and tourism,

further decreased the demand for tea, suppressing ASEAN countries' imports of Chinese tea. Research shows that the COVID-19 pandemic caused a substantial shock to global trade, especially in agricultural products, as supply chain disruptions and uncertainty became major reasons for trade declines (Baldwin & Tomiura, 2020). Logistics restrictions and changes in consumer preferences during the pandemic negatively affected the tea trade between China and ASEAN, resulting in a decline in trade volume.

Geographical distance significantly weakens cross-border trade efficiency by increasing transportation and time costs, particularly impacting agricultural trade. As tea is an agricultural product with high quality and freshness requirements, its cross-border circulation is more susceptible to distance constraints. In actual trade, the geographical distance between ASEAN countries and some regions of China is relatively long, resulting in longer transportation times and higher cold chain logistics costs. Gravity model studies suggest that geographic distance negatively impacts trade, with each 1% increase reducing volume by about 0.3% to 0.5% (Tinbergen, 1962). Silva and Tenreyro (2006) suggest that rising transportation costs directly lead to a decline in agricultural trade volume, especially for high-end tea and other value-added products, where transportation distance becomes a major limiting factor. Hummels and Schaur (2013) emphasize that long-distance transportation may cause product losses, reducing the competitiveness of exported tea in the import market while further weakening ASEAN demand for Chinese tea. At the same time, ASEAN countries with greater geographical distance from China have a certain level of self-sufficiency in tea production, with import demand primarily concentrated in neighboring countries. Generally, geographical distance negatively impacts tea trade between China and ASEAN by increasing transportation costs and reducing competitiveness. Longer distances restrict further growth in trade volume. This aligns with

the predictions of the gravity model and validates the presence of negative effects of distance on bilateral agricultural trade.

Factors such as GDP, exchange rates, import volume, and trade dependence are key drivers of tea trade growth between China and ASEAN countries. Factors like the pandemic and geographic distance significantly constrain trade volume. The influence of these variables aligns with the gravity model and relevant literature, providing theoretical support for a deeper understanding of the determinants of bilateral tea trade.

4.7 Measurement of Trade Potential

The concept of trade potential has been widely applied in the study of international trade relations, particularly in analyzing trade between China and ASEAN countries. Based on the gravity equation, trade potential estimates the bilateral trade volume between China and ASEAN countries. As a core tool in international trade research, the gravity model derives its principle from the gravitational formula in physics. It assumes that the trade volume between two countries is proportional to their economic sizes and inversely proportional to geographical distance or other trade costs. This study integrates an extended gravity model with additional factors such as ASEAN countries' tea import volume, exchange rates, external dependency, and the impact of the pandemic to provide a more comprehensive explanation of bilateral trade flows. As predicted by the gravity model, trade potential refers to the maximum trade volume that could be achieved between two countries under ideal conditions. Comparing the gravity model's predicted trade volume with actual trade volume helps assess whether trade potential is fully realized (Gul & Yasin, 2011).

Liu and Jiang (2002) categorize trade potential into three types based on the ratio of actual bilateral trade volume to predicted bilateral trade volume in their study on bilateral trade potential, detailed below.

4.7.1 Reconstructive Potential

This category refers to trade partners whose bilateral trade has approached or reached the maximum potential predicted by the gravity model, with actual trade volumes significantly higher than or equal to the predicted levels. Specifically, the ratio of actual trade to predicted trade is greater than or equal to 1.2. This suggests that trade potential is fully realized, leaving little room for growth unless policies or external conditions change significantly.

4.7.2 Exploratory Potential

For this category of trade partners, bilateral trade potential has not been fully realized, and there is still room for expansion. The ratio of actual trade to predicted trade lies between 1.2 and 0.8. This suggests that while the current trade volume exceeds the predicted value, there is still room for growth compared to the maximum potential trade volume. This implies that further bilateral trade expansion could be achieved through policy optimization, improved market access, or the removal of trade barriers.

4.7.3 Significant Potential

This category refers to trade partners with significant untapped bilateral trade potential, where actual trade volumes are far below the predicted maximum. Specifically, the ratio of actual trade to predicted trade is less than or equal to 0.8, indicating that current trade volumes have not reached the theoretical levels. This often reflects underutilized trade potential due to trade barriers, policy constraints, or other external factors. By

implementing effective policy adjustments or improving the trade environment, substantial growth potential could be achieved. Categorizing trade potential into these three types helps identify fully utilized partnerships and those with growth potential, offering policymakers targeted insights.

Table 4.17: Trade Potential Values for China’s Tea Exports to Eight ASEAN Countries

Year/Country	Indonesia	Singapore	Cambodia	Thailand	Myanmar	Philippines	Vietnam	Malaysia
1993	0.99	1.03	1.02	1.03	1.07	1.05	1.05	1.09
1994	0.99	1.03	1.17	0.98	0.99	1.02	0.97	1.05
1995	1.05	1.02	1.12	1.00	0.99	0.98	0.98	1.05
1996	1.04	1.03	1.05	1.01	0.96	0.98	0.90	1.05
1997	0.94	1.02	1.08	1.00	1.00	0.99	0.92	1.02
1998	0.92	1.01	1.09	0.99	0.99	1.00	0.88	1.01
1999	0.92	1.00	1.10	0.99	0.95	1.01	0.91	1.02
2000	0.90	0.99	1.09	0.99	0.96	1.01	0.91	1.02
2001	0.87	0.99	1.07	0.98	1.01	1.01	0.93	1.00
2002	0.88	0.98	1.06	0.99	1.00	1.00	0.91	0.99
2003	0.87	0.99	0.85	1.01	1.02	1.00	0.90	1.00
2004	0.90	0.99	1.04	0.99	1.03	1.00	0.90	1.00
2005	0.86	0.97	1.02	0.95	1.03	1.01	0.91	1.00
2006	0.85	0.98	1.01	0.97	1.00	0.97	0.88	1.02
2007	0.90	0.98	0.99	0.96	0.98	0.98	0.89	1.02
2008	0.89	0.96	0.98	0.94	0.99	0.96	0.89	1.02
2009	0.89	0.96	0.98	0.95	0.99	0.98	0.89	1.00
2010	0.88	0.96	0.96	0.95	1.01	1.06	1.02	1.01
2011	0.91	0.96	0.95	0.95	1.00	1.07	1.04	1.01
2012	0.89	0.96	0.96	0.95	0.98	1.00	1.02	1.01
2013	0.87	0.96	0.96	0.97	0.97	1.03	1.02	1.03
2014	0.91	0.96	0.95	0.98	1.01	0.96	0.99	1.05
2015	0.87	0.96	0.93	0.96	1.00	0.96	1.00	1.03
2016	0.98	0.96	0.93	0.98	1.00	0.99	1.00	0.88
2017	0.88	0.96	0.92	0.98	0.98	1.04	0.99	1.05
2018	0.91	0.96	1.06	0.97	1.01	1.05	0.97	1.06
2019	0.90	0.98	1.05	0.98	1.01	1.03	0.98	1.07
2020	1.03	1.07	1.12	1.03	1.11	1.11	1.03	1.13
2021	0.97	1.03	1.03	1.02	1.08	0.97	1.03	1.14
2022	1.03	1.06	1.08	1.02	1.00	1.00	1.03	1.13
Average potential value	0.92	0.99	1.03	0.98	1.00	1.01	0.96	1.03

Source: Calculated by the author.

Table 4.17 and Figure 4.19 show that between 1993 and 2022, China’s tea export trade potential with the eight ASEAN countries was generally close to the theoretical values, with most countries’ potential values remaining stable around 1. This indicates that the tea trade in the region has become relatively mature. Cambodia and Malaysia

consistently exhibit potential values higher than 1, particularly Cambodia. This suggests a strong demand for Chinese tea in these markets and a well-developed trade relationship with China. This phenomenon can be attributed to favorable bilateral trade policies, low tariff levels, and stable market demand between these countries and China. In contrast, Indonesia and Vietnam show long-term potential values below 1, with Indonesia's average potential value being only 0.92. This indicates that China's trade potential in these two markets has not been fully realized, possibly due to insufficient market demand, competition from rivals, and logistical or trade barriers.

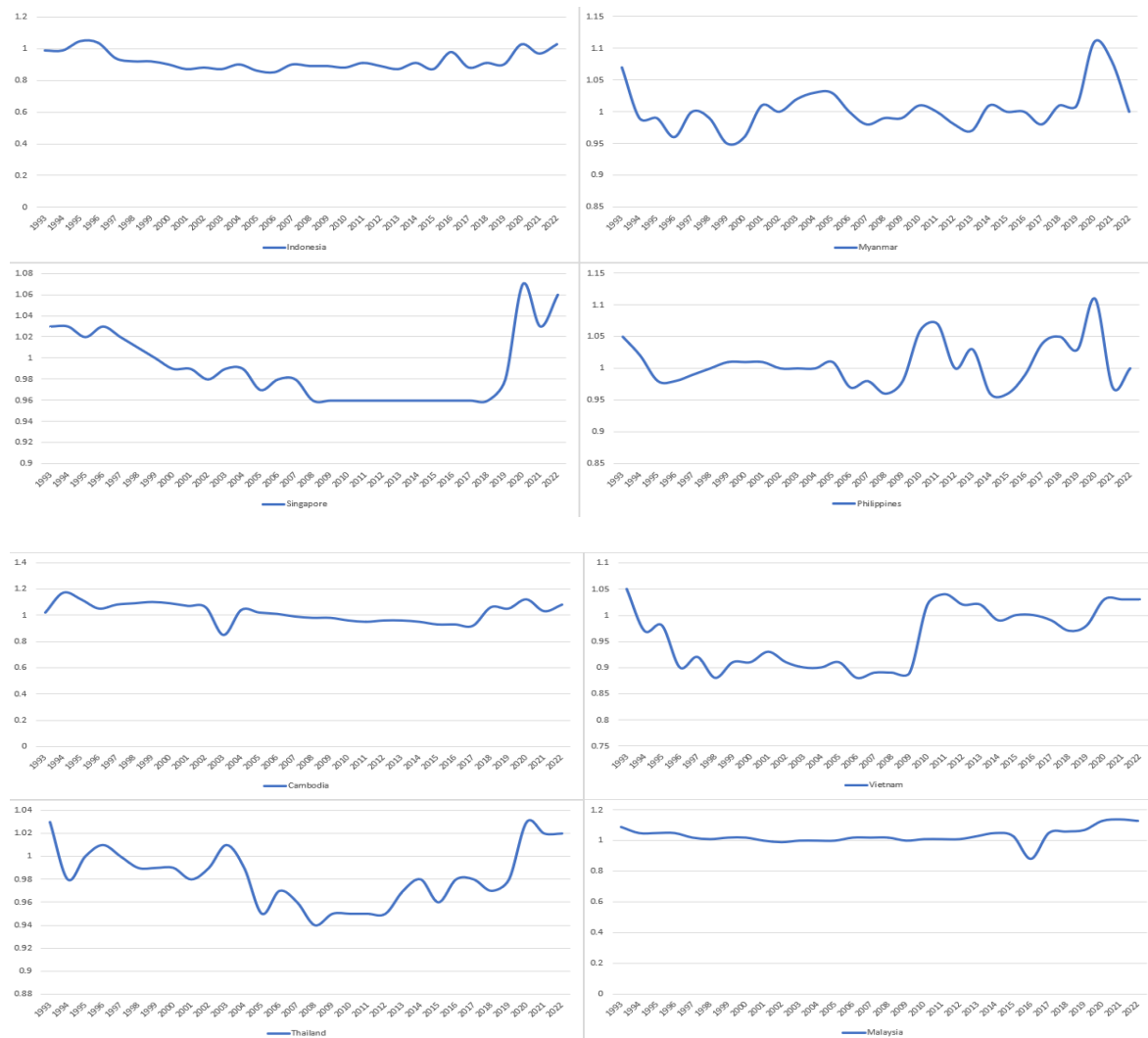


Figure 4.19: China's trade potential with eight ASEAN countries

From a temporal perspective, the trade potential values of ASEAN countries have remained stable overall. However, between 2020 and 2022, the potential values for several countries, such as Indonesia, Cambodia, and Malaysia, show a noticeable increase (Figure 4.19). This may be related to the recovery of international logistics post-pandemic, the deepening of regional economic cooperation, and the formal implementation of bilateral trade agreements between ASEAN and China, such as RCEP. In contrast, the potential values for Vietnam and Thailand have stabilized after the pandemic. This indicates that their trade volumes have approached theoretical potential levels with relatively high trade efficiency.

Looking ahead, China should develop more targeted market expansion strategies for countries with potential values below 1, such as Indonesia and Vietnam. These strategies could include improving tea quality, strengthening brand building, enhancing marketing efforts, and fostering closer trade cooperation with these nations. For countries with higher potential values, such as Cambodia and Malaysia, maintaining sustainable market demand is crucial to avoiding over-reliance or market saturation risks. By deepening regional cooperation, promoting trade facilitation, and optimizing supply chains, China can further consolidate its position in the ASEAN tea market, improving the overall efficiency and quality of regional tea trade. These strategies will help achieve sustained growth and high-quality development of the tea trade between China and ASEAN countries.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Overview

Chapter Five summarizes and synthesizes the study's key findings. First, the study is summarized, followed by policy recommendations. The chapter presents the conclusions, recommendations, and limitations of the study's findings. Section 5.1 provides a concise summary. Section 5.2 offers an in-depth analysis of the study's findings. Section 5.3 presents policy recommendations, Section 5.4 discusses the research limitations, and Section 5.5 suggests directions for future research.

5.2 Conclusion

This study provides a comprehensive analysis of the trade potential and key factors influencing China's tea exports to eight ASEAN countries: Cambodia, Indonesia, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam. As a traditional product deeply rooted in Chinese culture, tea serves as a symbol of cultural transmission in the international market and constitutes a significant component of China's agricultural economy. In recent years, economic and trade cooperation between China and ASEAN countries has become increasingly robust. Given the significance of tea as a major trade commodity, in-depth research on its trade potential and influencing factors is crucial for fostering sustainable economic and trade relations between China and ASEAN, offering theoretical and practical implications. This study focuses on two core themes: trade potential and its determining factors. Using scientific research methods and comprehensive data analysis, it investigates the multifaceted factors and development trends influencing China's tea exports. The research employs two classical and effective empirical models:

the RCA model and an enhanced Gravity model. The RCA model quantifies the competitiveness of China's tea in the global market, revealing its comparative advantage and position in the global trade system. The enhanced Gravity model further analyzes key factors affecting bilateral tea trade between China and ASEAN countries, including economic size, geographic distance, the impact of the pandemic, and external dependency. To ensure the robustness and reliability of the empirical results, this study integrates the PMG panel model to dynamically estimate and validate the long-term data, providing a more reliable and comprehensive analysis.

The study spans 30 years from 1993 to 2022, encompassing the accelerated phase of globalization and critical stages of deepening economic cooperation between China and ASEAN countries (e.g., establishment and development of the China-ASEAN Free Trade Area). This long-term perspective on data analysis reveals historical trends and structural shifts in the tea trade, examining how trade patterns evolve in response to external environmental changes and policy adjustments over time. The study examines the advantages and challenges of China's tea exports within the context of the global economic environment and regional cooperation. By addressing these themes, this research contributes valuable insights into the dynamics of the tea trade. It offers practical implications for enhancing trade relationships between China and ASEAN countries in the future. The main findings are summarized below.

Firstly, this study summarizes the historical development and current background of the tea trade between China and the eight ASEAN countries, conducting an RCA index analysis of tea exports from China and these countries. The findings indicate that China and Vietnam have the strongest comparative advantages in tea exports and are major

competitors in the international market. While Indonesia has shown strong performance in the past, its competitiveness has declined more recently. Malaysia, Singapore, the Philippines, and Cambodia have relatively weaker comparative advantages in tea exports, facing significant competitive pressure in the international market. Thailand's competitiveness has gradually improved but remains below 1, indicating potential for further enhancement. Given the strong trade ties and comparative advantages shared by China and Vietnam in the tea industry, there is great potential for further deepening bilateral cooperation. Specific measures could include establishing a China–Vietnam Tea Industry Cooperation Platform under the coordination of the China-ASEAN Agricultural Cooperation Center. This platform may promote mutual recognition of tea processing standards, geographic indication (GI) co-certification for premium tea regions, and collaborative efforts in green tea certification and branding in global markets. Furthermore, a joint Tea Technology and Innovation Center could be set up along the China–Vietnam border region, focusing on modern processing techniques, pest control, and climate-resilient tea varieties. These initiatives would enhance both countries' positions along the global value chain, improve product differentiation, and reduce direct price-based competition in key markets. Previous studies (e.g., Li & Nguyen, 2020; Zhao et al., 2022) have highlighted the effectiveness of such coordinated agricultural strategies in enhancing cross-border agro-industrial competitiveness between China and Vietnam, particularly in fruits, rubber, and aquaculture. The tea sector could follow a similar path of cooperation.

For Indonesia whose tea export competitiveness has declined in recent years-there is a need to revitalize the sector through strategic interventions. Policy recommendations include modernizing tea cultivation methods, introducing sustainable farming practices, investing in quality control and value-added processing, and strengthening domestic-

foreign partnerships for technology and knowledge transfer. In addition, the Indonesian government could collaborate with China through bilateral trade initiatives to promote capacity building, market access facilitation, and mutual recognition of quality certifications. These efforts would help Indonesia fully unlock its underutilized tea export potential and reposition itself competitively in the regional and global tea markets.

Secondly, the empirical results highlight several key factors significantly impacting the tea trade between China and ASEAN countries. The study reveals that the GDP of ASEAN countries, China's GDP, tea import volumes of ASEAN countries, external dependency levels of ASEAN countries, exchange rates, geographic distance, and the impact of the COVID-19 pandemic are critical variables influencing trade volume. Among these, the GDP of ASEAN countries, China's GDP, tea import volumes of ASEAN countries, external dependency levels, and exchange rates are positively correlated with trade volume. This indicates that higher economic output, greater import demand, and closer international trade ties contribute to the growth of tea trade between China and ASEAN. Conversely, geographic distance and the COVID-19 pandemic negatively correlate with trade volume. Longer distances may increase transportation costs and logistical challenges, while the pandemic disrupted supply chains, reduced demand, and barriers to international trade. These findings underscore the complex interplay of economic, geographic, and external factors influencing trade flows. They suggest that strengthening economic cooperation, optimizing trade policies, and improving logistical infrastructure can help mitigate the negative effects of distance and external shocks, promoting deeper trade integration between China and ASEAN countries in the tea sector.

Thirdly, the analysis of China's tea export trade potential to the eight ASEAN countries shows that between 1993 and 2022, China's tea export trade potential to these nations generally approached its theoretical value, with most member countries maintaining potential indices close to 1. This indicates that the tea trade system within the region is relatively mature and stable. Notably, Cambodia and Malaysia consistently show potential indices above 1, with Cambodia in particular exhibiting strong demand for Chinese tea and a well-established, closely connected trade partnership with China. This trend may be attributed to favorable bilateral trade policies, preferential tariff arrangements, and stable market demand between these countries and China. In contrast, Indonesia and Vietnam have long maintained potential indices below 1, with Indonesia's average potential index being only 0.92. This suggests that the trade potential for Chinese tea in these markets has not been fully realized. Over time, ASEAN countries' trade potential indices have remained relatively stable. However, from 2020 to 2022, most countries—including Indonesia, Cambodia, and Malaysia—saw significant growth. This growth was driven by the recovery of global logistics networks after the pandemic, the strengthening of regional economic cooperation, and the positive effects of key bilateral and multilateral trade agreements, such as the RCEP. In contrast, the potential indices for Vietnam and Thailand tended to stabilize post-pandemic, reflecting that the tea trade volumes in these two countries have approached their theoretical potential limits, indicating high trade efficiency and maturity.

5.3 Policy Recommendations

This study explores the trade potential and constraints of tea trade between China and eight ASEAN countries. Drawing from the earlier analysis, policy recommendations are presented from both the government and enterprise perspectives.

5.3.1 Recommendations from the Chinese Government Perspective

5.3.1.1 Deepening Trade Cooperation under RCEP

China–ASEAN trade cooperation has strengthened significantly in recent years, supported by the China–ASEAN Free Trade Area and the RCEP. The RCEP provisions—including tariff eliminations, improved customs processes, and reduction of non-tariff barriers—offer a strong foundation for expanding tea exports. Tariff reductions across ASEAN, such as Laos, the Philippines, and Thailand reducing tea tariffs to 0%, enhance China's export competitiveness. Strategic, country-specific policy alignment is required to maximize these benefits.

5.3.1.2 Enhancing Domestic Supply and Industrial Capacity

Local governments should promote scaled and modern tea plantations through automation and efficient resource allocation. Upgrading tea production equipment and improving processing standards will reduce costs and increase output quality. A scientific pesticide monitoring system is vital to meet ASEAN's import standards while balancing compliance and productivity. Localized approaches such as green and low-carbon farming models can unlock high-end markets. Governments must also build integrated service systems covering the full tea value chain, support R&D, standardize production, and align development strategies with regional characteristics.

5.3.1.3 Promoting Global Branding and Market Expansion

To support the internationalization of Chinese tea, macro-level coordination should include hosting global expos and tea cultural events. Integrating tea with tourism and lifestyle industries can create new demand channels. The government should accelerate brand building by funding leading tea companies to establish international outlets and

trading centers. Creating a unified image of "Chinese tea" as a high-quality and culturally rich product is key to global market expansion. Digital platforms, including cross-border e-commerce and VR promotions, should be leveraged to enhance global engagement.

5.3.1.4 Institutional Support

Industry organizations and research institutions should enhance China's presence in international standard-setting, helping shape fair trade rules. Establishing industry cooperation platforms and early warning systems is essential to manage trade risks. Investment in R&D on tea cultivation, health benefits, and technological innovation should be prioritized. Talent development must be enhanced through education and vocational training focused on international regulations. Institutions should also support businesses throughout the tea export process with regulatory guidance, technical assistance, and brand development strategies.

5.3.2 Recommendations from Chinese Enterprises

5.3.2.1 Market Differentiation and Targeted Expansion

Enterprises must adopt flexible strategies tailored to each market using trade potential indices to prioritize high-opportunity regions. Product structures should align with income levels—premium and organic for developed markets, cost-efficient for developing ones. Understanding consumer preferences for flavor, packaging, and tea types is essential. Marketing should be culturally aligned, leveraging festivals, expos, and online platforms to deepen engagement.

5.3.2.2 Strengthening Brand Power and Innovation

Chinese tea companies should focus on creating globally recognized brands by offering high-value-added products. Drawing from new tea beverage models, enterprises can target younger demographics with innovative product designs. Ensuring traceability and international quality standards through supply chain management is vital. R&D in intelligent machinery and green processing will support industry upgrades. Talent development through university–industry collaboration will ensure the availability of professionals familiar with global trade norms.

5.3.2.3 Meeting ASEAN Residue Standards and Compliance

Proactive adaptation to ASEAN’s evolving pesticide residue standards is crucial. Enterprises should monitor technical barriers, adopt green cultivation methods, and implement comprehensive quality control systems. Pursuing organic and green food certifications can build consumer trust and market access. Collaborating with ASEAN partners in joint research and development can tailor products to local needs. Participation in trade expos and regular staff training will further enhance regulatory alignment and competitiveness.

5.3.2.4 Promoting Tea Culture and Enhancing Soft Power

Tea culture is a key differentiator for Chinese exports. Enterprises should infuse cultural elements into branding—such as the elegance of Longjing or the health qualities of Pu’er tea. Innovation in product presentation, such as artistic packaging and modern tea wares, can attract younger markets. Online campaigns, tea-themed events, and education-based marketing in ASEAN can deepen consumer appreciation. Collaborating with local institutions to integrate tea culture into festivals, tourism, and curricula will embed Chinese

tea more deeply into ASEAN societies. These efforts position Chinese tea as both a cultural ambassador and a premium global product.

5.4 Study Limitations

While this study provides valuable insights into the trade potential and constraints of China's tea exports to ASEAN countries, several limitations must be acknowledged. These limitations primarily relate to data quality, the scope of analysis, and methodological constraints, all of which may affect the accuracy, depth, and applicability of the findings. Addressing these gaps in future research will help strengthen the robustness and policy relevance of subsequent analyses.

5.4.1 Data Quality and Availability Constraints

This study encountered several challenges related to the quality and availability of data, which affected the accuracy of model parameter estimation. Issues such as outdated or inconsistent import statistics, data lags, varying reporting standards across countries, and limited access to key variables undermined the reliability of trade flow predictions and reduced the generalizability of the findings. Gaps in historical data and differences in national statistical capacities contributed to uneven data quality, introducing potential biases and affecting model stability. Additionally, due to data limitations, the study could not adequately capture non-tariff barriers, consumer behavior, and geopolitical influences, thereby limiting the analytical depth and predictive power. Future research should prioritize the collection of more accurate, timely, and multidimensional datasets to enhance analytical robustness and policy relevance.

5.4.2 Lack of Category-Specific Tea Trade Analysis

Due to data constraints, this study focused on the aggregate trade volume of tea between China and the eight ASEAN countries, without disaggregating by tea type (e.g., black tea, green tea). While this macro-level approach provides a broad overview of trade patterns, it fails to capture nuanced differences in consumer preferences, pricing structures, production costs, and demand trends across tea categories. As tea consumption is often influenced by cultural traditions and regional habits, the absence of category-specific analysis limits the study's ability to identify key market opportunities or challenges. For instance, the rising demand for green tea in some ASEAN markets or declining black tea consumption in others may go unnoticed. Future studies should incorporate disaggregated trade data to explore these distinctions, providing targeted insights that support more strategic market development and policy interventions.

5.4.3 Limitations in Variable Selection for Gravity Model Construction

The selection of variables in the gravity model significantly influences the model's explanatory power and policy relevance. While the study incorporated core variables such as GDP, population size, and geographical distance, several important factors were excluded due to data limitations. These include non-tariff measures, trade facilitation indicators, logistics performance, cultural affinity, political relations, and dynamic short-term variables such as economic shocks or pandemic impacts. The inability to account for such factors introduces biases and limits the model's applicability in real-world contexts. Additionally, proxy variables such as geographic distance may not fully reflect transport costs, infrastructure quality, or market access. Critical elements such as consumer preferences, product differentiation, and brand recognition—especially important in the tea sector—were also excluded. To address these shortcomings, future research should

enhance variable selection by integrating big data analytics, real-time trade intelligence, and interdisciplinary approaches from economics, political science, and cultural studies. Doing so will improve the depth, accuracy, and practical utility of gravity models for understanding trade dynamics in the tea sector.

5.5 Recommendations for Future Research

Although this study advances the calculation of China's tea trade potential with eight ASEAN countries and examines the constraints on trade flows, many areas still require further exploration in future research.

First, with the continuous advancement of data collection technologies and the improvement of international cooperation mechanisms, researchers can access more accurate and comprehensive tea trade data. As higher-quality data becomes available, future research can build upon the existing foundation to explore this topic further. For example, time series analysis using data with a longer period and higher precision can help reveal the dynamic patterns and long-term trends in trade flow variations. This will contribute to a more comprehensive understanding of the tea trade relationship between China and the eight ASEAN countries and provide a scientific and precise basis for future trade policy formulation. Moreover, researchers should strengthen cooperation with industry associations, international trade organizations, and national statistical departments to obtain authoritative and comprehensive trade data. By leveraging big data analysis and the Internet of Things technologies, trade data can be updated in real-time, reducing delays and omissions in information. Researchers could also explore establishing open data-sharing platforms that integrate data from multiple sources, eliciting efficient and accurate

data support. These measures will effectively improve the completeness and reliability of the data, laying a solid foundation for the scientific validity of future research.

Second, as global consumers become more health-conscious and lifestyle preferences evolve, the demand for tea and its derivative products is significantly transforming. Future research should focus more on the determinants of tea trade in specific subcategories, including but not limited to the trade characteristics of different tea types (black tea, green tea, white tea, etc.), the development trends of new tea beverages, and the international market performance of tea processing products (tea powder, instant tea drinks, etc.). Research in these areas will help reveal the market potential of different tea products and provide policymakers and businesses with more targeted suggestions and guidance to drive innovation and market expansion in the tea industry.

A significant direction for improvement is to enhance the comprehensiveness of variable selection. Future research should explore and analyze potential factors influencing trade flow—variables beyond the scope of this study—such as logistics efficiency, specific tariff policies, cultural similarity, and geopolitical factors. Researchers should collect relevant data extensively and ensure that variable selection is theoretically grounded and empirically supported. To handle the uncertainty and complexity in variable selection, future studies could employ more advanced statistical methods and techniques. For example, using Bayesian estimation can provide more reliable parameter estimates in situations with higher uncertainty. At the same time, machine learning techniques can process large-scale data more efficiently, uncovering non-linear patterns and potential relationships hidden in complex trade dynamics. Modern econometric tools, such as

dynamic panel and mixed-effects models, should be widely applied in future international trade studies.

Through these efforts, researchers can build more accurate, comprehensive, and universally applicable gravity models for trade, providing strong support for international trade research. This will enhance the scientific and practical aspects of academic research while offering essential references for the internationalization of China's tea industry and its long-term strategic planning in the ASEAN market. Thus, future research should focus on integrating theory and practice, improving data quality, innovating methodologies, and deepening exploration of various fields. These efforts will contribute valuable insights and wisdom to the sustained growth of China's tea trade, the promotion of international trade development, and the enhancement of cultural exchange.

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