

Growth, Instability, and Competitiveness of Sri Lankan Tea Exports

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Abstract—Sri Lankan tea exports have significant impact on world tea exports as well as the country's economy. Although Sri Lanka is one of the leading tea-producing and exporting nations in the world, the percentage share of Sri Lankan tea, also renowned as Ceylon Tea in the global tea market has gradually decreased over the years. With this background, this study aims to comprehensively investigate the growth patterns, instability, competitiveness, and future prospects of tea exports, and propose recommendations to improve the tea export industry in Sri Lanka. Secondary data were sole source used in this study. The Compound Annual Growth Rate Analysis was employed to measure growth rates in production and exports of Sri Lankan tea, while instability in production and export indicators of tea in Sri Lanka was calculated by using the Cuddy Della Valle Instability Index. Further, a matrix association between growth rate and instability index was employed to classify the major tea importing destinations into four categories. Revealed Comparative Advantage Indices were employed to measure export competitiveness of Sri Lankan tea. Sri Lankan tea export quantity has shown negative growth, while tea export value has depicted positive growth during the period from 2011 to 2022. Tea exports, irrespective of the process, have shown low instability during the study period. At the same time, Iraq was the most stable market for Sri Lankan tea exports. According to the Revealed Comparative Advantage index results, Sri Lanka has shown very strong export competitiveness in the world tea market.

Keywords—Compound annual growth rate, competitiveness, cuddy della valle instability index, tea exports

I. INTRODUCTION

Tea is considered one of the key agricultural export commodities in Sri Lanka and it plays a vital role in the economy as well as the socio-cultural scenario of the country over the centuries. In 2021, tea exports as a percentage of total exports were about 11 per cent while it was 38 per cent of the total agricultural exports in Sri Lanka [1]. Sri Lanka is the 4th leading tea manufacturer and 3rd biggest tea exporter in worldwide [1]. Therefore, Sri Lankan tea exports had a tremendous impact on global tea export market as well as the country's economy. Even though the word "Ceylon" has become tantamount of the world's finest tea in over one hundred and fifty years, the percentage share of Sri Lankan tea in the world market has significantly decreased continuously [2]. Therefore, presently the Sri Lanka experienced the mislaid of its top position in the world tea market and many of its traditional country markets[3]. The Sri Lankan tea industry should be competitive among the other tea producing and exporting countries and maintain stability in the marketplace to acquire economic benefits to the country. According to

existing literature, there are some scientific evidence available in terms of the export trend in the global tea trade [4]. However, there are no recent studies available in this regard and no study has been made on the instability of tea exports over the years. According to existing literature there is no study can be found on the use of Revealed Comparative Advantage indices especially Revealed Symmetric Comparative Advantage (RSCA), Trade Balance Index (TBI) and product mapping to assess the export competitiveness of Sri Lankan tea internationally. With this background this study was aimed to examine the historical growth patterns and instances of instability in the domain of Sri Lankan tea exports. Further, the study examined the competitiveness of Sri Lankan tea exports among other leading tea exporting nations.

II. METHODOLOGY

This study solely depends on secondary data. The overall study period was 2011 to 2022. Tea export data (from 2011 to 2022) collected from the Sri Lanka Tea Board were used. World tea exports and imports in terms of total and country-wise were gathered from the International Trade Centre (ITC) Trade Map. Further, total merchandise exports data for the period of 2011 to 2022 in terms of World and major tea exporting nations were gathered from World Development Indicators (WDI).

A. Compound Annual Growth Rate Analysis (CAGR)

The growth rates of production and export indicators for Sri Lankan tea arrived by using the exponential type of compound growth function as follows [5].

$$Y = ab^t e_t \quad (1)$$

Where, Y = Dependent variable for which growth rate is to be estimated (Production (Mn kg) /Extent (ha) /Quantity exported (Mn kg)/ Total real export earnings (Rs. Bn))

a = Intercept

b = Regression Coefficient = (1+g), where g is the compound growth rate

t = Time variable (Years which takes values, 1, 2, ..., n)

e_t = Error term

The logarithmic form of the equation (1) as follows:

$$\log Y = \log a + t \log b + \log e_t \quad (2)$$

The compound growth rate (g) in per cent will be calculated by using the following association.

$$g = (\text{antilog of } (\log b) - 1) \times 100 \quad (3)$$

The significance of the coefficient was tested using the t statistics.

B. Instability Analysis

Co-efficient of variation (CV) and Cuddy Della Valle Index (CDVI) [6] was used to measure the instability in both production and export indicators of Sri Lanka tea for the period 2011 to 2022.

1) Co-efficient of Variation (CV)

Co-efficient of Variation which was the simplest measure of instability which can be estimated as follows.

$$CV = (\text{Standard deviation}/\text{Mean}) * 100 \quad (4)$$

2) Cuddy Della Valle Instability Index (CDVI)

In this study, CDVI was employed to assess the instability in Sri Lankan tea exports as well as production indicators. The Cuddy-Della Valle Index can be expressed as follows.

$$CDVI = CV * (\sqrt{1 - R^2}) \quad (5)$$

3) Matrix Association between Growth Rate and Instability

Matrix association between growth rate and instability index was employed to classify the importing countries into four categories [7] as follows.

- 1) **High Growth and Low Instability (Highly Preferable):** A nation whose compound growth rate is greater than the average, but the instability is lower than the average value.
- 2) **High Growth and High Instability (This category is preferable based on the greatness of growth over instability index):** A nation whose compound growth rate and instability are greater than the average.
- 3) **Low Growth and Low Instability (Less Preferable):** A nation whose compound growth rate and instability index values are lesser than the average.
- 4) **Low Growth and High Instability (Not Preferable):** A nation whose compound growth rate is lesser than the average, and whose instability value is greater than the average.

C. Export Competitiveness Indices

In this study, export competitiveness of Sri Lankan tea was examined using various measures. Further, export competitiveness of other leading tea exporters was also calculated with an intention of comparing Sri Lankan export performance with its competitors.

1) Revealed Comparative Advantage (RCA)

In this study, standard Balassa's Index and its various modified measures were applied to measure the competitiveness of Sri Lankan tea exports in global market. Standard Balassa Index (RCA_{ij}) can be exhibited as follows.

$$RCA_{ij} = (X_{ij}/X_i)/(X_{wj}/X_w) \quad (6)$$

Where, X_{ij} represents the export value of the j^{th} product in the i^{th} country; X_i represents the total merchandise exports of i^{th} country; X_{wj} represents the total export value of the j^{th} product in the world; and X_w represents the total merchandise exports of world. Generally, the $RCA > 1$ means the country is really taking the advantage of exporting the commodity i .

RCA index ranges of the export competitiveness of agricultural commodities as follows; $RCA \geq 2.500$ – Very strong export competitiveness, $1.250 = RCA < 2.500$ – Strong export competitiveness, $0.800 = RCA < 1.250$ – Medium export competitiveness, and $RCA < 0.800$ – Weak export competitiveness [8].

2) Revealed Symmetric Comparative Advantage (RSCA)

The Revealed Symmetric Comparative Advantage (RSCA) index was proposed by Dalum et al., [9] and Widodo [10]. Revealed Symmetric Comparative Advantage (RSCA) index expressed as follows.

$$RSCA = (B-1) / (B+1) \quad (7)$$

Where B is original Balassa's revealed comparative advantage index and values of RSCA range in +1 and -1 with zero as neutral point with respect to comparative advantage.

3) Trade Balance Index (TBI)

Trade Balance Index (TBI) which was proposed by Lafay [11] was employed to analyze whether a country is a net exporter or net importer of tea. TBI can be expressed as follows.

$$TBI_{ij} = (X_{ij} - M_{ij}) / (X_{ij} + M_{ij}) \quad (8)$$

Where X_{ij} and M_{ij} represent the exports and imports of commodity j by country i . TBI index value ranges from -1 to +1. If TBI equals to the -1, country only imports. If TBI equals to the +1, country only exports. If any value is within the range of -1 to +1, the country exports and imports a commodity simultaneously.

4) Product Mapping

Product mapping can be obtained by combining both values of RSCA and TBI Indexes.

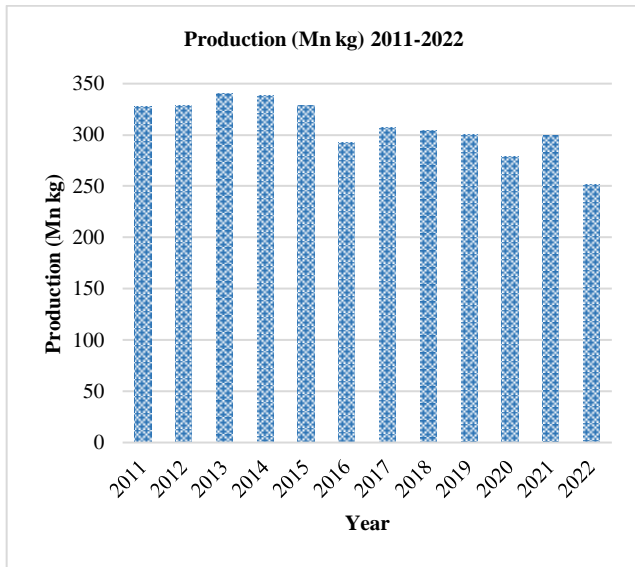
	Net Importer	Net Exporter
RSCA > 0	Group B Have Comparative Advantage, No Export Specialization (net importer) (RSCA > 0 and TBI < 0)	Group A Have Comparative Advantage, Have Export Specialization (net exporter) (RSCA > 0 and TBI > 0)
RSCA < 0	Group D Have Comparative Disadvantage, No Export Specialization (net importer) (RSCA < 0 and TBI < 0)	Group C Have Comparative Disadvantage, Have Export Specialization (net exporter) (RSCA < 0 and TBI > 0)
	TBI < 0	TBI > 0

Source: Widodo, (2008) [10]

III. RESULTS

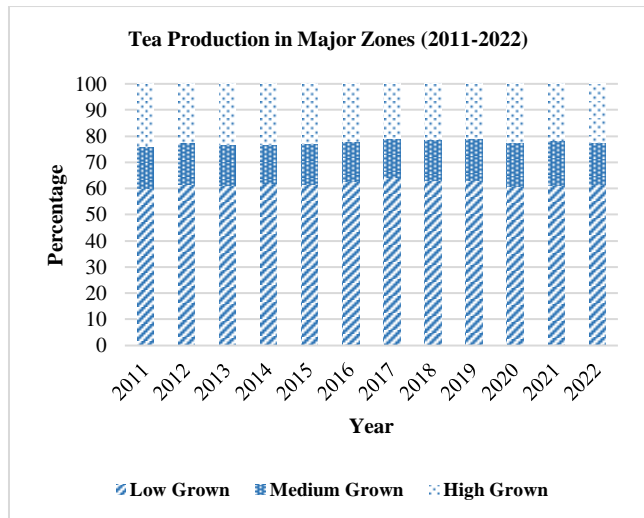
A. Production Patterns of Sri Lankan Tea

The tea production of Sri Lanka showed a negative trend throughout the selected study period (2011-2022). The highest tea production can be seen in the year 2013, due to favourable climatic conditions in all tea growing areas [12]. The lowest tea production can be seen in 2022 due to an inadequate supply of chemical fertilizers [13].



Source: Authors' Compilation Based on Sri Lanka Tea Board Statistics (2023)

Fig. 1. Tea production trends (2011-2022)



Source: Authors' Compilation Based on Sri Lanka Tea Board Statistics (2023)

Fig. 2. Tea production in major zones (2011-2022)

The terms "up-country," "mid-country," and "low-country" can be used to describe three main tea-producing regions in Sri Lanka. The low-country tea shows over 60 per cent of the contribution to Sri Lanka's total tea production through the period from 2011 to 2022 (see. Fig. 2). High-country, mid-country and low-country tea are popular in different niche markets worldwide due to their distinctive tastes and other specialties. For example, as stated in [1], Uva teas from up country are popular in Germany and Japan.

Medium-country tea is popular in countries such as Australia, Europe, Japan and North America due to its unique thick colour. Further, there is a huge demand for Sri Lankan low-country teas from Western Asia, the Middle East, CIS, and BRICS countries.

B. Compound Annual Growth Rates for Production Indicators of Sri Lankan Tea

The results in Tab. 1 revealed that tea extent shown a positive growth rate while production shown a negative and significant growth rate through the period from 2011 to 2022 irrespective of the elevation type. However, the total production of Crush, Tear, and Curl tea (CTC tea) has shown positive growth while orthodox and green tea production in the country has shown negative growth rates throughout the study period.

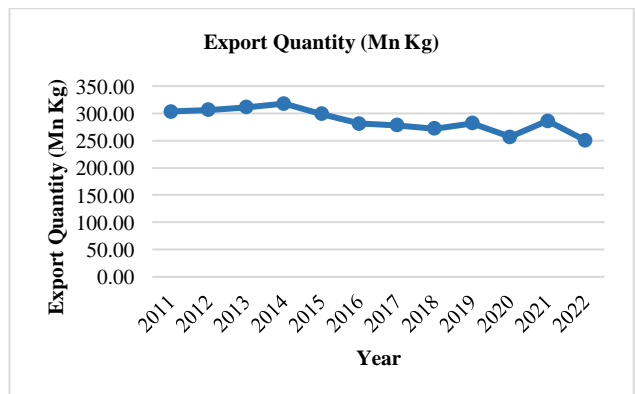
TABLE 1: COMPOUND ANNUAL GROWTH RATES FOR PRODUCTION INDICATORS OF TEA (2011-2022)

Indicator	Compound Growth Rate (% per annum)
Extent (ha)	0.81 ^{NS} (0.009)
Production (Mn kg)	-1.58* (0.004)
Production According to Elevation	
High Grown (Mn kg)	-2.74* (0.005)
Medium Grown (Mn kg)	-2.06* (0.004)
Low Grown (Mn kg)	-1.38* (0.004)
Production According to Process	
Orthodox (Mn kg)	-1.85* (0.004)
CTC (Mn kg)	1.00 ^{NS} (0.006)
Green Tea (Mn kg)	-4.31* (0.01)

Note: Figures in parentheses shown standard errors for their respective coefficients, * indicates coefficients are significant at 5 per cent, NS represents not significant

Source: Authors' Work Based on Sri Lanka Tea Board Statistics (2023)

C. Growth Patterns in Sri Lankan Tea Exports

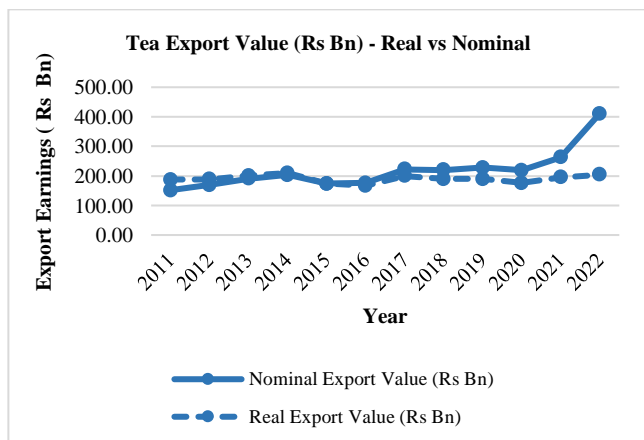


Source: Authors' Compilation Based on Sri Lanka Tea Board Statistics (2023)

Fig. 3. Total tea exports quantity (2011-2022)

From 2011 to 2022, the tea export quantity shows a downward trend while tea export value has an upward trend. The highest tea export quantity can be seen during 2014 and this may be owing to the crowning tea production quantities in the preceding year (see. Fig. 1). The lowest tea export quantity can be seen in 2022 throughout the study period

owing to the lowest tea production in year 2022. However, the highest value in tea export earnings in nominal terms can be seen in 2022 and this may be due to the rupee devaluation during the same year (see Fig. 4). As depicted in Fig. 4, the total tea export earnings in terms of both nominal and real values shows an upward trend throughout the study period (2011-2022).



Note: For real value - GDP Deflator, base year = 2015
Source: Authors' Compilation Based on Sri Lanka Tea Board Statistics (2023) and World Bank Data (2023)

Fig. 4. Total tea exports value (2011-2022)

D. Growth Rates and Instability of Sri Lankan Tea Exports

The secondary data on annual tea exports of Sri Lanka with respect to both quantity and value from 2011 to 2022 were used for this analysis.

TABLE 2: COMPOUND ANNUAL GROWTH RATES AND INSTABILITY OF TEA EXPORTS FROM SRI LANKA (2011-2022)

Indicator	Process	Compound Growth Rate (% per annum)	Instability (CDVI)
Export Quantity	Black Tea	-2.11* (0.003)	3.61
	Green Tea	-1.89* (0.005)	6.34
	Instant Tea	5.72* (0.008)	9.47
Export Value	Black Tea	0.55 ^{NS} (0.005)	6.48
	Green Tea	1.44 ^{NS} (0.007)	8.86
	Instant Tea	7.63* (0.01)	11.04

Note: Figures in parentheses shown standard errors for their respective coefficients, * indicates coefficients are significant at 5 per cent, NS represents not significant

Source: Authors' Work based on SLTB Data (2023)

According to Tab. 2, Instant tea exports have shown significant and positive growth rates with regard to both volume and earnings. Consequently, black tea and green tea exports have exposed adverse growth rates in terms of quantity while it shown positive growth rates in terms of value. Tea exports have shown low instability in terms of both quantity and earnings irrespective of the process type.

TABLE 3: COMPOUND GROWTH RATES AND INSTABILITY OF CATEGORY-WISE SRI LANKAN TEA EXPORTS FOR THE PERIOD OF 2011-2022

Indicator	Category	Compound Growth Rate (% per annum)	Instability (CDVI)
	Bags	-1.51* (0.006)	6.83

Export Quantity	Bulk	-0.95* (0.001)	1.19
	Packets (>3kg)	5.82* (0.008)	9.38
	Packets (1kg-3kg)	1.86 ^{NS} (0.035)	36.60
	Packets (3Kg-5kg)	-1.63 ^{NS} (0.01)	12.67
	Packets (4g-1kg)	-3.04* (0.004)	4.66
	Packets (5kg-10kg)	-3.23* (0.008)	9.53
Export Earnings	Bags	-0.12 ^{NS} (0.007)	7.83
	Bulk	0.32 ^{NS} (0.005)	6.38
	Packets (>3kg)	7.85* (0.01)	11.20
	Packets (1kg-3kg)	1.07 ^{NS} (0.035)	37.50
	Packets (3kg-5kg)	-0.54 ^{NS} (0.011)	12.60
	Packets (4g-1kg)	-1.06 ^{NS} (0.007)	8.45
	Packets (5kg-10kg)	-2.65* (0.008)	9.21

Note: Figures in parentheses shown standard errors, * indicates significance at 5 per cent, NS represents not significant; (0-15 = low instability, 15- 30 = medium instability and 30 & above = high instability)

Source: Authors' Work based on SLTB Data

Out of different product categories, exports of tea packets (> 3kg) showed the maximum value of growth rates among other categories in terms of both export volume and earnings throughout the study period (2011 -2022). All categories except exports of tea packets (>3kg) and packets (1kg- 3kg) showed negative growth rates in terms of export quantity. Tea in bulk, packets (>3kg), and packets (1kg-3kg) showed positive growth rates in export value. Exports of tea packets (1kg- 3kg) showed high instability in terms of both quantity and value while other categories showed low instability (see. Tab. 3).

E. Results of the Instability Index and Compound Growth Rates by Import Destination

This section focuses on major importers of Sri Lankan tea exports. During the years 2001 to 2023, these nominated importers were ranked among the top ten. Major importing nations of Sri Lankan Tea were Russia, Iran, Iraq, UAE, Turkey, Azerbaijan, and others (Tab. 4). All major import destinations and others except Iraq and Turkey indicated negative growth rate in terms of export quantity. Iraq exhibited the highest growth rate of 6.40 per cent and 6.93 per cent in terms of export quantity and values respectively. Russia and Iran shown negative growth rates in tea export earnings. Moreover, total tea exports from Sri Lanka were negatively growing in terms of volume while positively growing in terms of earnings from 2011 to 2022.

TABLE 4: DESTINATION-WISE GROWTH RATES FOR TOTAL TEA EXPORTS FROM SRI LANKA (2011-2022)

Country	Compound Growth rate (% per annum)	
	Export Quantity	Export Value
Russia	-6.66* (0.004)	-5.78* (0.01)
Iran	-10.67* (0.011)	-7.84* (0.01)
Iraq	6.40* (0.007)	6.93* (0.008)
UAE	-1.73 ^{NS} (0.031)	0.01 ^{NS} (0.034)
Turkey	5.05* (0.017)	5.71 ^{NS} (0.026)

Azerbaijan	-0.09 ^{NS} (0.005)	1.07 ^{NS} (0.01)
Other	-2.16* (0.004)	0.47 ^{NS} (0.003)
Total	-2.05* (0.003)	0.11 ^{NS} (0.006)

Note: Figures in parentheses shown standard errors for their respective coefficients, * indicates coefficients are significant at 5 per cent, NS represents not significant

Source: Authors' Calculation Based on Sri Lanka Tea Board Statistics (2023)

F. Instability Results: Destination-Wise Analysis

The results of the CDVI with the CV of Sri Lankan tea exports for different export indicators are presented in Tab. 5. According to CDVI values, other countries showed the lowest instability in quantity (5.28%) and value (6.13%) of tea exports in Sri Lanka. During the study period (2011-2022) all importing destinations exhibited instability in tea exports from Sri Lanka in terms of different export indicators. Of major importing countries Iraq is the most stable market for Sri Lankan tea exports in terms of volume (5.62%) and earnings (9.46%). Further, UAE (32.22%) was the most unsteady market in terms of tea quantity exported from Sri Lanka during 2011 to 2022 while Turkey (30.77%) was the most unsteady market in terms of tea export earnings.

TABLE 5: DESTINATION-WISE INSTABILITY ANALYSIS OF SRI LANKAN TEA EXPORTS (2011-2022)

Destination	Export Quantity		Export Value	
	CV (%)	CDVI (%)	CV (%)	CDVI (%)
Russia	26.02	6.90	25.25	12.62
Iran	34.23	9.63	30.23	14.40
Iraq	23.13	5.62	25.12	9.46
UAE	32.22	32.22	26.29	11.84
Turkey	27.87	14.65	30.77	30.77
Azerbaijan	6.40	6.40	16.42	16.19
Other	9.38	5.28	6.29	6.13
Total	8.13	3.61	6.75	6.75

Source: Authors' Calculation Based on Sri Lanka Tea Board Statistics (2023)

Import destinations for Sri Lankan tea exports were classified into four categories depend on the results of growth rate analysis and instability index [6]. The average value of the compound growth rate of export quantity is -1.41 per cent while the growth rate of export earnings is 0.88 per cent. If the compound growth rate is larger than the calculated average value it illustrates high growth and fewer than the average value it exhibits low growth. The average instability index values of export volume and export earnings are 11.53 and 14.49 per cent respectively (Tab. 6). If the CDVI instability index value is superior than the average value it shows high instability and fewer than the average value it shows low instability.

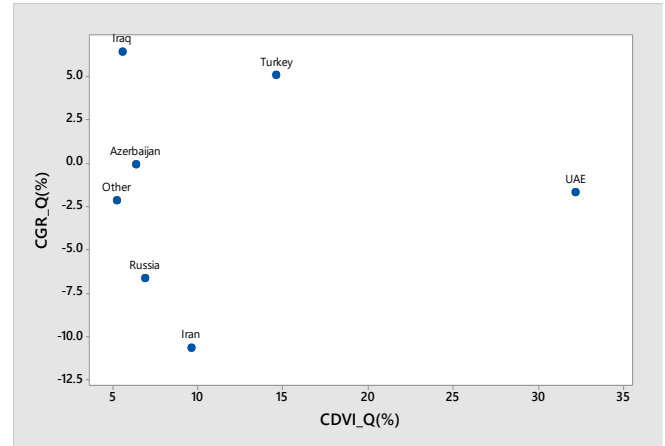
TABLE 6: DESTINATION-WISE GROWTH RATE AND INSTABILITY INDEX

Country	Compound Growth Rate (% per annum)		CDVI (%)	
	Export Volume	Export Earnings	Export Volume	Export Earnings
Russia	-6.66	-5.78	6.90	12.62
Iran	-10.67	-7.84	9.63	14.40
Iraq	6.40	6.93	5.62	9.46

UAE	-1.73	0.01	32.22	11.84
Turkey	5.05	5.71	14.65	30.77
Azerbaijan	-0.09	1.07	6.40	16.19
Other	-2.16	0.47	5.28	6.13
Average	-1.41	0.08	11.53	14.49

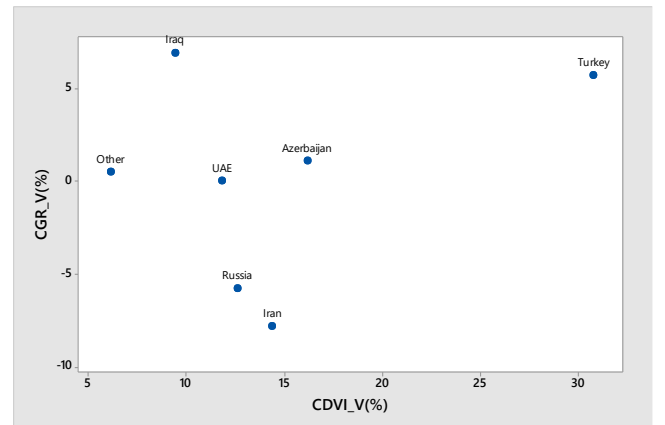
Source: Authors' Calculation Based on Sri Lanka Tea Board Statistics (2023)

The matrix relationship between growth rate and instability in terms of export volume and earnings were demonstrated in Fig. 5 and Fig. 6 respectively.



Source: Authors' Compilation

Fig. 5. Compound annual growth rate vs instability index an emphasis on tea export volume



Source: Authors' Compilation

Fig. 6. Compound annual growth rate vs instability index an emphasis on tea export earnings

- (1) High growth and low instability** (Highly Preferable): Iraq was recorded in this highly desirable category which has high growth rate and low instability in terms of both volume and earnings of Sri Lankan tea exports. Azerbaijan with respect to quantity of tea exports fall under this category while other countries fallen to this category in terms of value of exports.
- (2) High growth and high instability** (This category is preferable based on the magnitude of growth over instability index): of major importing countries only Turkey in both tea export quantity and earnings, has fallen into this category. Further, Azerbaijan in terms of value of tea exports fall into this category.

- (3) **Low growth and low instability** (Less Preferable): Among major importers, Russia and Iran was reported under this category with respect to tea export quantity and earnings. These countries were less desirable for Sri Lankan tea exports. Other countries were fallen in to this class in terms of the tea exports volume while UAE was fallen to this category in terms of export value.
- (4) **Low growth rate and high instability** (Not Preferable): UAE with respect to quantity of exports fallen to this group. Therefore, different approaches and strategies are required to increase the growth rate and to reduce the instability.

G. Export Market Share of Sri Lankan Tea in Global Trade

Export market share of top three leading tea exporters for each HS code category of tea exports (HS 0902, HS 090210, HS 090220, HS 090230 and HS 090240) and Sri Lanka were calculated based on the recently available data on ITC Trade Map. The results were depicted in Tab. 7.

TABLE 7: WORLD MARKET SHARE OF TOP THREE LEADING TEA EXPORTERS AND SRI LANKA'S POSITION IN GLOBAL TRADE

Commodity	Country 1	Country 2	Country 3	Sri Lankan Rank in Global Trade
Tea (HS 0902)	China (26.65)	Sri Lanka (16.13)	Kenya (13.82)	2 (16.13)
Tea, green (HS 090210)	China (56.41)	Japan (7.25)	Germany (4.51)	5 (3.76)
Tea, green (HS 090220)	China (68.01)	Vietnam (10.12)	Japan (7.61)	11 (0.43)
Tea, black (HS 090230)	Sri Lanka (27.72)	China (11.99)	United Arab Emirates (10.91)	1 (27.72)
Tea, black (HS 090240)	Kenya (29.67)	Sri Lanka (18.48)	India (14.50)	2 (18.48)

Note: Figures in Parenthesis Indicated Percentage Share of World Export in 2021 (in Value term US\$)
Source: Authors' Calculation Based on ITC Trade Map Data, (2023)

In the year 2021, China was the leading tea exporter in the world and it was followed by other major tea exporting nations such as Sri Lanka, Kenya, India, and the United Arab Emirates. Sri Lanka was the market leader of black tea exports, in the packaging category not exceeding three kilograms (090230), in 2021. Further, Sri Lanka ranked in second place in the same year, in terms of black tea exports, in packaging exceeding three kilograms (090240).

China was the leading export nation of green tea exports in year 2021. Sri Lanka ranked fifth in the same year with green tea exports in packaging not exceeding 3 kilograms (090210) valued at 51,112 US \$ Thousand. However, in year 2021 Sri Lanka ranked in 11 in terms of green tea exports in packaging exceeding three kilograms (090220).

H. Export Competitiveness of Tea Exports of Sri Lanka

Mean scores of the Revealed Comparative Index (RCA), Revealed Symmetric Comparative Index (RSCA), and Trade Balance Index (TBI) for leading tea exporters in the world were calculated by using secondary data from 2011 to 2022. Product mapping was obtained by combining the both mean values of RSCA and TBI Indices. Mean scores of all indices and product mapping were exhibited as follows.

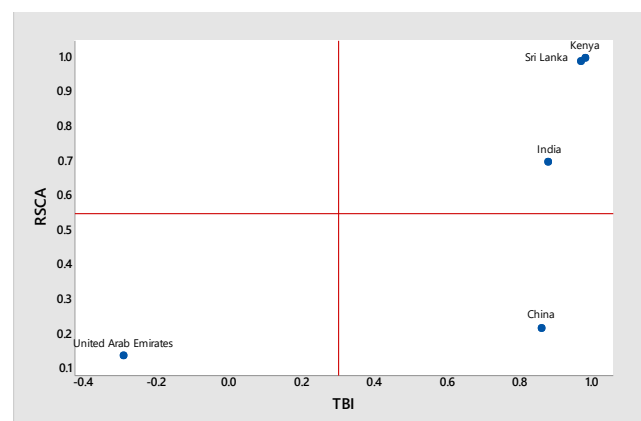
TABLE 8: MEAN SCORES OF RCA, RSCA, TBI FOR LEADING TEA EXPORTERS IN WORLD (2011-2022)

Country	Mean Values		
	RCA	RSCA	TBI
China	1.57	0.22	0.86
Sri Lanka	314.11	0.99	0.97
Kenya	497.27	1.00	0.98
India	5.71	0.70	0.88
United Arab Emirates	1.31	0.14	-0.29

Source: Authors' Calculation Based on ITC Trade Map Data, (2023) and World Development Indicators, (2023)

Tab. 8 depicts the mean scores of RCA, RSCA, and TBI indices for the top five tea exporters in the world for 2011-2022. According to the RCA index results all countries have a comparative advantage in exporting tea (0902). Kenya (497.27) indicates the highest RCA value for tea exports from 2011 to 2022 while United Arab Emirates (1.31) indicates the lowest RCA for total tea exports. Kenya (1.00) shows the highest RSCA value while United Arab Emirates (0.14) indicates the lowest comparative advantage among them. TBI values show the competition level of tea trade among leading exporting countries during the study period. All countries except United Arab Emirates show positive values while Kenya (0.98) became the first place in tea exporting having the highest TBI value. According to TBI values United Arab Emirates shows very poor export competitiveness among leading tea exporters.

Sri Lanka, Kenya, and India have a comparative advantage in tea exports and export specialization. Therefore, they are net exporters belong to Group A. China has comparative disadvantage and have export specialization. Therefore, net exporter belongs to Group C. United Arab Emirates has comparative disadvantage but no export specialization. Therefore, it can be known as a net importer and belongs to Group D.



Source: Authors' Calculation
Fig. 7. Product mapping for tea export competitiveness

IV. CONCLUSION

This study found that the total tea extent has increased while total tea production of Sri Lanka has decreased during the period from 2011 to 2022. In the same period, tea exports had negative growth while tea export value has depicted positive growth. The highest tea export quantity was seen during the year 2014 and this may be owed to the utmost tea production in the preceding year and programmes such as subsidy schemes and extension programmes implemented by Sri Lanka Tea Board. Consequently, the lowest tea export quantity was in the year 2022 due to the lowest tea production resulted from the shortage of agrochemicals and fertilizers. However, the highest value in export earnings was in the same year and this may be due to Sri Lankan Rupee (LKR) depreciation and high demand during the year 2022.

In this context, Sri Lankan tea production in terms of both quantity and quality should be improved in order to increase the growth of tea export quantity. Total tea production by elevation and process can be improved by implementing financial support schemes and agricultural extension programmes. These types of programmes can be implemented by the government and Sri Lanka Tea Board. Further, varietal improvement can be done by the Sri Lanka Tea Research Institute.

All tea export types by the process which are named as black tea, green tea, and instant tea exports show low instability. When considering category-wise tea exports, exports of tea packets (> 3 kg) showed the highest growth rate throughout the period with effect from January 2011 to December 2022 while exports of tea packets (1 kg - 3 kg) showed the highest instability. Further, there is a high interest in value-added tea products in the modern world. Hence, more research and development projects should be conducted on value addition.

The major import destination-wise results exhibited that Iraq has shown the highest positive growth rates in tea export volume and earnings. Further, it was revealed that Iraq was the most stable market for Sri Lankan tea exports because it had a high compound annual growth rate and low instability throughout the study duration (2011-2022). Moreover, Iraq has fallen into the top ten importing countries of Sri Lankan tea for more than two decades. According to the recent statistics obtained from the Sri Lanka Tea Exporters Association, Iraq has remained in the highest position for the period with effect from January 2023 to June 2023.

As a leading tea producer and exporter Sri Lanka should apply suitable export promotion strategies to evolve in existing stable markets and find potential markets for Ceylon tea. For example, by having bilateral trade agreements and

introducing trade representatives, Sri Lanka can increase its market share in export destinations.

The findings of the RCA, RSCA and TBI indices are closely compatible with each other throughout the study period. Sri Lanka, Kenya and India have a comparative advantage in tea exports and have export specialization. Therefore, they are net exporters in world tea export market. Moreover, further research efforts should be made to analyze determinants that affect the Sri Lankan tea export competitiveness.

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REFERENCES

- [1]. Export Development Board. (2022). Industry Capability Report Tea, Colombo; Export Development Board Sri Lanka.
- [2]. Kithsiri, K.H.S., Jayamanna, V.S., & Abewickrama, L.M. (2020). Evaluation of Competitiveness of Ceylon Tea in the World Market. *Sri Lankan Journal of Agriculture and Ecosystems*, 2(1): 89-98.
- [3]. Hilal, M.I.M. (2020). Sri Lanka's Tea Economy: Issues and Strategies. *Journal of Politics and Law*, 13(1).
- [4]. Hilal, M.I.M. (2012). Export Trend in Global Tea Trade: A Cross Countries Analysis with Reference to Sri Lankan and Indian Tea Industry. UMT 11th International Annual Symposium on Sustainability Science and Management 09th – 11th July 2012, Terengganu, Malaysia (pp. 291-303)
- [5]. Vilhekar, R.A., Pokharkar, V.G., & Yadav, D.B. (2022). Growth and instability of area, production and productivity of acid lime in India and Maharashtra. *The Pharma Innovation Journal*, SP-11(5): 101-105.
- [6]. Cuddy, J.D.A., & Valle, P.A. (1978). Measuring the Instability of Time Series Data. *BULLETIN*, 40.
- [7]. Thaker, N., Bhatt, J., & Trivedi, S. (2022). Performance Analysis of Cumin Export from India. *International Journal of Advanced Research in Commerce, Management & Social Science (IJARCMSS)*, 5(1): 59-64.
- [8]. Long, Y., (2021). Export competitiveness of agricultural products and agricultural sustainability in China. *Regional Sustainability*. (2). 203-210.
- [9]. Dalum, B., Laursen, K., & Villumsen, G. (1998). Structural change in OECD export specialisation patterns: De-specialisation and 'stickiness'. *International Review of Applied Economics*. 12(3): 423-443.
- [10]. Widodo, T. (2008). Dynamic Changes in Comparative Advantage, Japan "flying geese" model and its implications for China: *Journal of Chinese Economics and Foreign Trade Studies*. 1(3): 200-213.
- [11]. Lafay, G. (1992). The Measurement of Revealed Comparative Advantages: In *International Trade Modelling*. pp. 209-234. Springer US.
- [12]. Central Bank of Sri Lanka. (2013). Annual Report, Colombo: Central Bank of Sri Lanka.
- [13]. Central Bank of Sri Lanka. (2022). Annual Report, Colombo: Central Bank of Sri Lanka.