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Research Article

Tea exports from India: Growth patterns, market stability, transition dynamics and future outlook

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Abstract

This study analysed the growth performance, instability, changing export patterns of Indian tea over a last 20 years period and export projections for next five years. The secondary data sourced from the UN Comtrade was collected for the study purpose. The findings of the analysis revealed that the export of tea from India experienced a significant and positive growth trend at 1 per cent level of significance. The instability index for export value was lower than that of the export quantity suggesting that export earnings were relatively more stable compared to the fluctuations observed in export volumes. In terms of stability of export destinations, Iraq was identified as most stable country in importing tea from India with the highest retention of India's tea export share followed by Russia, countries aggregated 'others' category, Iran and UAE. On the other hand, the USA was found to be the least stable country indicating poor retention of trade share and limited reliability for sustained tea exports. Indian tea export projections indicated positive trends in Russia, Iran and the countries pooled under the category 'others' reflecting strengthening market potential in these destinations.

Keywords: Export projections, Growth, Stability, Tea, Transition Probability Matrix (TPM)

Introduction

Tea ranks among the most popular beverages consumed around the world and occupies significant position in international agricultural trade. Tea industry contributes substantially to employment generation, rural livelihoods and foreign exchange earnings in many tea producing countries including India. India holds a prominent position in the global tea industry as a major producer, consumer and exporter of Tea. The major tea producing states are Assam, West Bengal, Tamil Nadu, Kerala, Himachal Pradesh and Tripura. The Indian tea industry has undergone significant transformations due to globalisation, technological advancements, changing consumer preferences and increased competition from China, Kenya, Sri Lanka and Vietnam. These countries compete with India in terms of production volume, product quality, price competitiveness and market access. According to Tea Board reports, India moved to third position among global tea exporters in 2024 (Tea Board India, 2025).

The Tea Board of India, functioning under the Ministry of Commerce and Industry seeks to strengthen India's competitiveness in global tea markets through various developmental and promotional initiatives. India's tea exports reached an all time high of 280.40 million kilograms in 2025 from 256.17 million kilograms in 2024 registered a growth of approximately 9.46 per cent. Indian tea export earnings also increased significantly from Rs. 7167.41 crore in 2024 to Rs.8488.43 crore in 2025 (Business standard, 2026). The importance of tea exports extends beyond the economic benefits. Tea industry supports livelihoods of millions of plantation workers, small growers, processers, traders and exporters. Tea exports also serves as an indicator of the global competitiveness of Indian Tea. Strong export performance reflects industry's ability to satisfy international quality requirements and adapt to changing consumer preferences.

Indian tea export performance has experienced fluctuations over time due to competition from other exporting countries, changing consumer preferences, climate uncertainties, rising production costs and regulatory requirements. The recent years have witnessed an improvement in export in terms of volume as well as earnings but maintaining long term competitiveness remains a major concern. Therefore, in this context, the present research examines the export performance of tea from India in terms of analysing the growth trends, export stability, changes in trade direction towards different destination countries and projecting the exports for the next five years.

Materials and methods

Data

The required secondary data for a period of 20 years (2005-06 to 2024-25) was collected from the UN Comtrade.

Analytical techniques

Growth rate analysis

For computing compound annual growth rate of export of tea from India, the exponential function of the following form was used.

$$Y = a\, b^t e^{Ut} \quad (1)$$

Where,
Y = Export
a = Intercept

b = Regression coefficient
'a' and 'b' are the parameters to be estimated
t = time period
U_t= Disturbance term in year 't'

The equation (1) was transformed into log linear form and written as;

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

Equation (2) was estimated by using Ordinary Least Squares (OLS) technique.

Compound annual growth rate (g) was then computed by using the formula;

$$g = (b - 1) \text{ X } 100 \quad (3)$$

Where,
g: Compound growth rate in per cent per annum
b: Antilog of log b

The standard error of the growth rate was estimated and tested for its significance with student's t test.

Instability analysis

The coefficient of variation was used as a measure of the variability in export of tea. The coefficient of variation was computed by using the following formula;

$$CV = \frac{\text{Standard Deviation } (\sigma)}{\text{Mean } (\bar{X})} \text{ x } 100 \quad \cdots\cdots(4)$$

Linear trend was fitted to the original data of export of tea from the country for a period of 20 years. The trend coefficients were tested for their significance. Whenever the trend of series found to be significant; the variation around the trend rather than the variation around mean was used as an index of instability. The formula suggested by Cuddy and Della (1978) was used to compute the degree of variation around the trend. The coefficient of variation was multiplied by the square root of the difference between the unity and coefficient of multiple determinations (R^2) to obtain the Instability Index.

$$\text{Instability Index } (I_x) = CV \text{ X} \sqrt{(1 - R^2)} \quad (5)$$

Markov chain model

Annual export data of tea was used for analysing the direction of trade and changing pattern of export of tea from India. The trade directions of Indian tea exports were analysed using the first order Markov chain approach. The lingo software was adopted to study the transition probability matrix. Central to Markov chain analysis is the estimation of the transitional probability matrix 'P' whose elements, P_{ij} indicate the probability of exports switching from country 'i' to country 'j' over time. The diagonal element P_{ij} where i=j, measures the probability of a country retaining its market share or in other words, the loyalty of an importing country to a particular country's exports. The average exports to a particular country was considered to be a random variable which depends only on the past exports to that country, which can be denoted algebraically as

$$E_{jt} = \sum_{i=1}^{n} [Ei_{t-1}] P_{ij} + e_{jt}$$

Where,
E_{jt}= exports from India to the j^{th} country in the year t
Ei_{t-1} = exports of i^{th} country during the year t-1
P_{ij} = the probability that exports shift from i^{th} country to j^{th} country
e_{jt} = the error term which is statistically independent of Ei_{t-1}
n = the number of importing countries

The transitional probabilities P_{ij}, which can be arranged in a (c x n) matrix, have the following properties.

$$\sum_{i=1}^{n} P_{Ij} = 1 \text{ And } 0 \leq P_{Ij} \leq 1$$

Thus, the expected export share of each country during period't' was obtained by multiplying the exports to these countries in the previous period (t-1) with the transitional probability matrix. Thus, transitional probability matrix (T) was estimated using linear programming (LP) framework by a method referred to as minimization of Mean Absolute Deviation (MAD).

$$\text{Min. } OP^* + I e$$

Subject to
$X P^* + V = Y$
$GP^* = 1$
$P^* \geq 0$

Where
P^* is a vector of the probabilities P_{Ij}
O is the vector of zeros
I is an appropriately dimensioned vector of export
e is the vector of absolute errors
Y is the proportion of exports to each country
X is a block diagonal matrix of lagged values of Y
V is the vector of errors
G is a grouping matrix to add the row elements of P arranged in P* to unity.

Using the estimated transitional probabilities, the exports of Indian tea to various destinations were predicted by multiplying the same with the respective shares of base year. The export shares to different countries were predicted for the years 2025-26 to 2029-30 by using 2 step, 3 step, 4 step, 5 step and 6 step transitional probabilities.

Results and discussion

Growth rate and stability in export of tea from India

It is evident from that table 1 that the export quantity recorded a positive annual growth rate of 1.60 per cent per annum while export value showed a comparatively

Table 1: Growth rate and stability in export of tea from India

Particulars	Export	
	Quantity (Metric Tonnes)	Value (Crore Rs.)
CAGR (%)	1.60***	5.42***
Instability Index (%)	11.62	7.92

*** Significant at 1 per cent level

higher growth of 5.42 percent per annum. The positive and statistically significant (1%) growth rates suggest a steady increase in export of tea over the last two decades. The higher growth rate in export value compared export quantity indicates that the export earnings increased at faster pace than the physical exports which might be due to the fact that better international prices for Indian tea, value addition, improved product quality and favourable market conditions. The results differs from the findings of Sumathy (2026) who reported a negative growth rate in export quantity but are consistent with the findings of Ibrahim and Mohammed Ishad (2024) who observed positive growth in export value.

The instability indices highlight moderate fluctuations in exports of Indian tea during the study period. Export quantity exhibited an instability index of 11.62 per cent which is higher than that of export value (7.92%). This reveals that export quantities were relatively more volatile than the export value. The lower instability index in export value suggests that despite fluctuations in export quantity, export revenues were maintained due to favourable price movements in the international markets. The similar findings were observed by the Ibrahim and Mohammed Ishad (2024) who also reported low instability in export value but comparatively higher than the present results.

Direction of trade of Indian tea to different destinations

The estimated transition probability matrix presented in Table 2 revealed notable differences in the market stability across importing countries. Among the major destinations, Iraq was found to be the highly stable, reliable, loyal and dependable market with the highest retention probability of 79.71 per cent of its previous trade share followed by Russia (79.53%) and the countries pooled under the category 'others' (76.73%) indicating relatively consistent trade patterns. Iran showed a probability of retention of its previous trade share of about 69.19 per cent indicating moderate stability and the ability to maintain considerable portion of its import share over time. The UAE retained 58.66 per cent of its market share suggesting moderate loyalty but at the same time presence of competitive pressures from alternative destinations. The similar findings were observed by Jagadeesh *et al.* (2024). In contrast, the USA recorded lowest retention probability of 37.12 per cent indicating the relatively unstable nature of the USA market and its vulnerability to competition from other importing countries.

The off-diagonal elements provide additional insights into the movement of the market shares among the destinations. The UAE lost its considerable market share to "others" category (32.12%) and the USA (9.21%). This indicates that the exporters might have increasingly

Table 2: Direction of trade of Indian tea to different destinations

	UAE	Russia	USA	Iran	Iraq	Others
UAE	0.5866	0.0000	0.0921	0.0000	0.0000	0.3212
Russia	0.0000	0.7953	0.0000	0.0362	0.0000	0.1685
USA	0.1945	0.0313	0.3712	0.0000	0.0000	0.4031
Iran	0.0000	0.0000	0.0000	0.6919	0.0400	0.2681
Iraq	0.2029	0.0000	0.0000	0.0000	0.7971	0.0000
Others	0.0326	0.0459	0.0862	0.0680	0.0000	0.7673

diversified their exports towards alternative destinations. Russia transferred a substantial proportion of its market share to 'others' category (16.85%) and Iran (3.60%) although its overall retention remained high.

The USA exhibited the greatest degree of disloyalty and unstable among the importing markets. It lost more than 40 per cent of its market share to 'others' category (40.31%) while 19.45 per cent shifted to UAE and 3.13 per cent to Russia. The substantial diversion of exports away from the USA might be due to changing market conditions, increased competition, and emergence of more attractive export destinations during the study period.

Iran retained a significant portion of its market share but lost 26.81 per cent to the 'others' category and 4 per cent to Iraq. Similarly, Iraq despite being the most stable market lost 20.29 per cent of its trade share to UAE. These transitions demonstrate the existence of competition among importing countries, even though the magnitude of such shifts remains relatively small compared to high probabilities of retention.

The countries pooled under the category 'others' acted as a major absorbing market throughout the study period. It gained substantial trade share from the USA (40.31%), UAE (32.12%), Iran (26.81%) and Russia (16.85%) while retaining 76.36 per cent of its own market share. This shows the ability of the countries pooled under the category 'others' to attract market share from major importing countries and suggests increasing diversification of export markets and reduced dependence on limited number of destinations.

Export projections of Indian tea

Export projections of Indian tea estimated using transition probability matrix are represented in Table 3. The projected export share to the UAE exhibited a declining trend, decreasing from 14.71 per cent in 2025-26 to 11.33 per cent in 2029-30. Similarly, exports to Iraq were projected to decline from 6.90 per cent 3.98 per cent. The USA also showed decreasing trend in importing tea from India, falling from 9.45 per cent in 2025-26 to 8.95 per cent in 2029-30.

In contrast, Export projections to Russia, Iran and the group of countries classified under the category 'others' displayed an increasing trend indicating an improvement in India's competitiveness in these markets. The projected export share to Russia increased from 9.55 per cent in 2025-26 to 11.63 per cent in 2029-30, while Iran share rose substantially from 8.26 per cent to 11.69 per cent over the same period. Likewise export share of the 'others'

Table 3: Export projections of Indian tea **(**Crore. Rs)

	UAE	Russia	USA	Iran	Iraq	Others
2025-26	1149.87	746.39	738.83	645.70	539.60	3997.17
	(14.71)	(9.55)	(9.45)	(8.26)	(6.90)	(51.13)
2026-27	1057.87	800.11	724.87	745.49	455.95	4033.27
	(13.53)	(10.23)	(9.27)	(9.54)	(5.83)	(51.59)
2027-28	985.39	844.06	714.32	818.94	393.25	4061.60
	(12.60)	(10.80)	(9.14)	(10.48)	(5.03)	(51.95)
2028-29	929.02	879.98	706.18	873.27	346.22	4082.90
	(11.88)	(11.26)	(9.03)	(11.17)	(4.43)	(52.23)
2029-30	885.52	909.26	699.79	913.61	310.90	4098.47
	(11.33)	(11.63)	(8.95)	(11.69)	(3.98)	(52.43)

Figures in the parentheses indicate percentage to total

category increased from 51.13 per cent to 52.43 per cent. These trends suggest a gradual shift in the geographical distribution of Indian tea exports towards emerging and diversified markets.

Conclusion

The positive growth in export of tea from India in last two decades highlights the robust performance, resilience, and increasing global competitiveness of the Indian tea industry in the international market. Comparatively higher instability index was observed in export quantity than the export value indicates that the export earning remained stable and the need for policy measures to ensure consistent production and supply for sustaining export growth in the long run. Among the major destinations for India's tea export, the Iraq emerged as the most dependable market demonstrating the highest retention of its import share followed by Russia, countries pooled under the category 'others', Iran and UAE. This indicates the Indian export policies on tea to focus on strengthening trade relations with these stable markets to maximise export earnings. Conversely, the USA exhibited the lowest market stability with least retention of its previous year trade share indicating the limited reliability of this market for sustained tea exports underscoring the importance of exploring and developing alternative export destinations. The forecasted trends indicate a changing geographical distribution of Indian tea exports, with stronger growth prospects in Russia, Iran and the countries pooled under the category 'others'.

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