

## Spicing Up India's Economy with Trade Performance of King and Queen of Spices

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### ABSTRACT

Spices play a crucial role in India's economy, with substantial global demand due to their aroma, taste, and medicinal properties. The trade of Indian black pepper and cardamom significantly contributes to economic growth. This study aims to assess the competitiveness and trade dynamics of pepper and cardamom in international markets. Secondary data were collected from the Spices Board and the International Pepper Community, covering the period from 2008-09 to 2021-22. The analysis reveals that Malaysia, Germany, Brazil, Vietnam, and India hold a comparative advantage based on the overall Revealed Symmetric Comparative Advantage (RSCA) for global pepper exports from 2008 to 2022. In contrast, Indonesia, the Netherlands, Peru, China, and the UAE are at a comparative disadvantage. India faces challenges against Vietnam, with an RSCA of -0.16, while Brazil, China, and Germany emerge as significant competitors. The Trade Stabilization Index indicates that Vietnam, India, Brazil, and China are in a growth phase, with outputs and exports exceeding domestic demand. For cardamom, from 2012-13 to 2022-23, Kuwait is identified as the most stable market for Indian exports, followed by Saudi Arabia, the UAE, and the USA. India experiences a comparative disadvantage against Guatemala and the UAE but maintains an advantage over Germany and Indonesia. Overall, the overproduction of spices necessitates effective regulation by the Spices Board to efficiently manage production and export demands.

**Keywords:** Pepper, cardamom, trade, Revealed Comparative Advantage, trade specialization Index, direction of trade

**JEL codes :** Q13, Q14, Q17

### I

### INTRODUCTION

India, referred to as the "Land of Spices," is a major player in the world spice trade, with cardamom and pepper as two of its main exports. Both spices have many culinary and medicinal uses worldwide and are essential to India's agricultural economy. The "King of Spices" pepper is widely grown throughout India, especially in Kerala, Karnataka, and Tamil Nadu. Until the late 20th century, pepper was mostly produced and exported from India. India's pepper production varied between 60,000 and 70,000 tonnes per year between 2015 and 2020, with Kerala producing about 45 per cent of the overall crop (Spices Board of India, 2020). Cardamom, also referred to as the "Queen of Spices," is grown mostly in Sikkim for large cardamom (*Amomum subulatum*) and in Kerala, Karnataka, and Tamil Nadu for small cardamom (*Elettaria cardamomum*). Between 2015 and 2020, India produced 19,000 to 22,000 tonnes of small cardamom annually, with roughly 60–70 per cent of Kerala's share (Food and Agriculture Organization, 2019).

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The global demand, the weather, and competition from other producers, such as Brazil and Vietnam, contributed to the fluctuations in Indian pepper exports. During 2018–2019, exports of 18,000 tonnes were worth USD 120 million (Ministry of Commerce and Industry, 2021). During 2019–2020, exports declined to 16,000 tonnes, valued at USD 100 million, due to heightened competition (Ministry of Commerce and Industry, 2021). During the COVID-19 pandemic, export quantities decreased to 15,000 tonnes, valued at USD 95 million (Ministry of Commerce and Industry, 2021). India's main export markets for pepper are the Middle East, the United States, and the European Union. The US and EU markets are critical because of their great demand for spices and strict quality standards (International Trade Centre, 2020). According to Yogesh and Mokshapathy (2013), market competitiveness, weather conditions, and foreign demand have all impacted the variability of Indian cardamom exports. India's main export markets for cardamom are the Middle East (especially Saudi Arabia and the United Arab Emirates), Europe, and the United States. The increasing demand for cardamom in regional cuisines and traditional treatments makes the Middle Eastern market particularly significant (International Trade Centre, 2020).

Extreme weather events, droughts, and unpredictable monsoons can all significantly impact output. For example, in Kerala in 2018, an abundance of rainfall resulted in a considerable decline in the yield of cardamom and pepper, which affected the country's supply and exports (Anantha and Sidana, 2019). India is up against fierce competition for both spices in the international market. Vietnam and Brazil have emerged as the world's top pepper producers, allowing them to sell it cheaper. Guatemala has also emerged as a significant rival in the cardamom market, providing consistent quality at reduced prices (Sandhu, 1993). Sustaining export performance requires upholding excellent quality and adhering to international norms. Pesticide residue and contamination issues have periodically hindered India's exports as foreign markets demand ever-tougher quality regulations (Jeromi and Nagarajan, 1996). Both pepper and cardamom have extremely erratic global prices, which are impacted by variables including speculative trading, demand-supply dynamics, and output levels in significant producing nations. Export revenue stability is threatened due to price volatility (Skariah, 2002). India possesses substantial potential to augment its export revenue via value-added services. Through the processing of pepper and cardamom into products such as powders, extracts, and essential oils, exporters can access higher-value markets within the food, cosmetic, and pharmaceutical sectors (Shinoj and Mathur, 2006; Varghese, 2007). With an emphasis on production trends, export dynamics, prospects, and difficulties, this article thoroughly examines the export performance of pepper and cardamom. The primary objective of this research is to explore the competitiveness of Indian pepper and cardamom in the global market. This involves analyzing factors influencing their trade performance, including pricing, quality, and market accessibility. Additionally, the study aims to investigate the direction of trade for both pepper and cardamom, seeking to identify patterns and shifts that may affect their export dynamics.

## II

## METHODOLOGY

*2.1. Revealed Comparative Advantage*

The calculation of the Revealed Comparative Advantage was used to quantify the growth of international trade specialization on certain commodities. The findings of the calculations could be utilized as a foundation for improving commodity exports (Balassa, 1965; Wardana, 2003).

$$RSCA = \frac{X_{ij} / X_j}{X_{iw} / X_w}$$

Where,

$X_{ij}$  is the export value of  $i$  commodity from  $j$  country;

$X_j$  is the total export value of  $j$  country;

$X_{iw}$  is the export value of  $i$  commodity from the world; and

$X_w$  is the total export value of the world.

*2.2 Trade Specialization Index (TSI)*

Hidayati (2017) defined the Trade Specialization Index (TSI) as a tool for analyzing the position of a commodity within the export and import framework.

$$TSP = (X_i - M_i) / (X_i + M_i)$$

Where,

$X_i$  is the value of commodity exports of a country; and

$M_i$  is the value of commodity imports of a country.

The values ranging from -1 to +1 were used to identify the growth stage of a commodity's trade. The critical stages are defined below:

1) Introduction stage (-1.0 to - 0.50): Industries in one country export new products, and later industries in other countries import these goods.

2) Global Market substitution stage (-0.51 to 0.00): Industrial competitiveness is low, the quality of the exports is not good, and production is below the domestic demand.

3) Growth stage (0.01 - 0.80): The industry has large-scale production and starts to activate export activities, and supply exceeds demand in the domestic market.

4) Maturity stage (0.81 - 1.00): Export commodities are already at the stage of technology-related standardization.

5) Re-import stage (1.00 - 0.00): Industries in other countries are less competitive in their domestic market, and demand is higher than domestic production.

### 2.3. Direction of Foreign Trade

An analysis of trade directions of Indian spice imports and exports was conducted using the first-order Markov chain technique. The transitional probability matrix was utilized to investigate the structural alterations in imports and exports. Lingo software was used in this work to analyze the Markov chain. This matrix's element  $P_{ij}$  represents the likelihood that exports will fluctuate between country  $j$ . The diagonal  $P_{ij}$  calculates the likelihood that a nation's export share will remain constant. Therefore, a study of the diagonal factors revealed an importing country's support to a specific exporting nation.

$$E_{jt} = \sum_{r=1}^r E_{ij} - P_{ij} + e_{jt}$$

Where,

$E_{jt}$  - Export from India during the year  $t$  to  $j^{\text{th}}$  country;

$E_{it-1}$  - Export to  $i^{\text{th}}$  country during the year  $t-1$ ;

$P_{ij}$  - The probability that exports will shift from  $i^{\text{th}}$  country to  $j^{\text{th}}$  country;

$e_{it}$  - The error term which is statistically independent of  $E_{it-1}$ ; and

$r$  - The number of importing countries.

The Transitional Probability  $P_{ij}$ , arranged in a (column x row) matrix, has the following properties.

$$0 \leq P_{ij} \leq 1$$

$$\sum_{i=1}^r P_{ij} = 1$$

Thus, the export proportions of each country during the period 't' were obtained by multiplying the exports to these countries in the previous period (t-1) with the Transition Probability Matrix. The Transitional Probability Matrix was estimated in

the Linear Programming (LP) framework by Minimization of Mean Absolute Deviation (MAD).

The LP formulation was stated as

$$\min OP^* + I_e$$

Subject to:

$$XP^* + V = Y$$

$$GP^* = 1$$

$$P^* \geq 0$$

Where,

$P^*$  - Vector in which probability  $P_{ij}$  are arranged;

$0$  - Vector of zeros;

$I$  - Appropriately dimensioned vector of area

$E$  - Vector of absolute errors (IUI);

$Y$  - Block diagonal matrix of lagged values of  $Y$ ; and

$V$  - Vector of errors; and

$G$  - Grouping matrix to add the row elements of  $p$  arranged in  $P^*$  to unity.

### III

#### RESULT AND DISCUSSION

India's pepper and cardamom export industry demonstrates distinct features and difficulties. As the largest producer, buyer, and exporter of spices worldwide, India is prominent in the spice market (Ashok, 2014). Due to variables like local demand and global rivalry, India's export of small cardamom has fluctuated, seeing periods of fall followed by consistent increases (Singh and Sarangi, 2014). However, low production, quality issues, and ineffective marketing chains have been problems for Indian pepper exports (Sivasankari and Rajesh, 2014). Cardamom is one of the main exports from India, along with pepper, ginger, and chilies, which are known for their exceptional quality and variety of spices (Govindasamy, 2015).

Compared to cardamom from Guatemala and Sri Lanka, Indian cardamom has superior physical and biochemical characteristics, along with unique flavor and aroma profiles (Ibrahim and Arunachalam, 2015). There have been ups and downs in the export of small cardamom from India, including times of negative growth rates and extreme volatility, mainly due to competition from Guatemala (Rajanbabu, 2015). Changes in the mean export unit value considerably contribute to the growth of export value, giving Indian spices, including cardamom, a distinct comparative advantage in exports (Sudjarmoko *et al.*, 2015). In general, pepper and cardamom have important roles in India's spice export business despite the difficulties and competition that cardamom encounters. When examining the economic factors, variations in the mean export unit value and quantity have affected the value of Indian spice exports, with

different spices contributing differently to the growth in export value (Aruna *et al.*, 2021). Improving the success of Indian cardamom and pepper exports requires addressing quality, production, and market competitiveness issues.

### 3.1. Cardamom

#### 3.1.1. RSCA Index of Cardamom

During 2013-17, Guatemala, India, UAE, Nepal, Singapore, and Vietnam had a comparative advantage, whereas Indonesia, the Netherlands, the EU, and Germany had a comparative disadvantage in world cardamom exports. During 2018-22, Indonesia had a comparative advantage from the disadvantage stage, and Guatemala maintained a comparative advantage throughout the decade of 2013-22 with an RSCA of 0.99. The UAE, India, Nepal, and Indonesia also had a comparative advantage. Meanwhile, the Netherlands, Singapore, the European Union, Germany, and Vietnam had comparative disadvantages, as shown in Table 1 and Figure 1.

TABLE 1. AVERAGE RSCA INDEX OF CARDAMOM EXPORTING COUNTRIES (2013-2022)

(1)	2013-2017 (2)	2018-2022 (3)	2013-2022 (4)
GUATEMALA	0.990	0.990	0.990
INDIA	0.639	0.443	0.541
UAE	0.939	0.917	0.928
INDONESIA	-0.094	0.236	0.071
NEPAL	0.926	0.802	0.864
NETHERLAND	-0.728	-0.556	-0.642
SINGAPORE	0.437	0.347	0.392
EU	-0.935	-0.956	-0.946
GERMANY	-0.629	-0.441	-0.535
VIETNAM	0.171	-0.498	-0.164

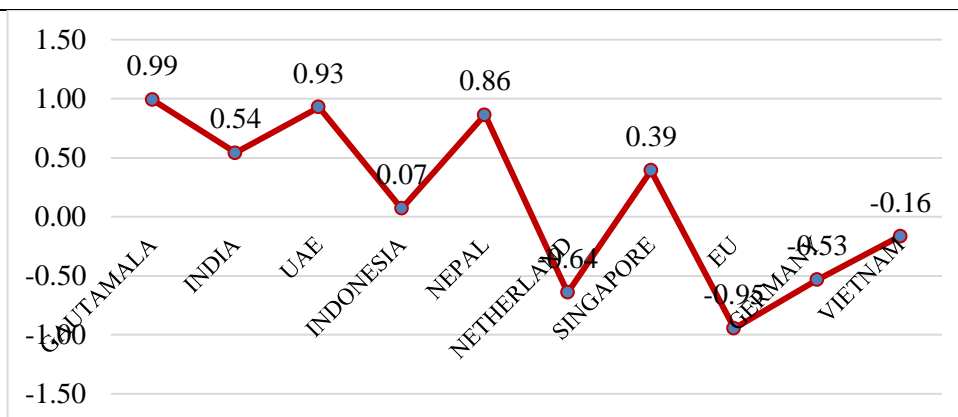


Figure 1. Average RSCA Index of Cardamom (2013-2022)

In the export of cardamom, India had a comparative disadvantage in cardamom trade with its rival countries, Guatemala and UAE, with an RSCA of -0.67 and -0.77, respectively, during 2013-2022. Guatemala and UAE were the major competitors to Indian cardamom exports since they had dominated the world market. India had a sizable comparative advantage over three competitors in the cardamom export market from 2013 to 2022, Germany (0.81), Indonesia (0.99), and the Netherlands (0.41), since the RCA values were greater than zero, as shown in Table 2.

TABLE 2. INDIA'S REVEALED SYMMETRIC COMPARATIVE ADVANTAGE INDICES  
CARDAMOM WITH RESPECT TO ITS COMPETITORS (2013-22)

(1)	GUATEMALA (2)	UAE (3)	GERMANY (4)	INDONESIA (5)	NETHERLAND (6)
RSCA	-0.670	-0.770	0.819	0.980	0.410

### 3.1.2. Trade Specialisation Index of Cardamom

During the decade of 2013-2022, Guatemala, UAE, and the Netherlands were in the maturity stage, being at the point of development where the standardization of technology for cardamom export had already occurred. In contrast, India and Germany were engaged in extensive output and began to increase export-related operations, and supply exceeded demand in the domestic market, as shown in Table 3.

TABLE 3. TRADE SPECIALISATION INDEX OF WORLD EXPORT OF CARDAMOM (2013-2022)

(1)	INDIA (2)	GUATEMALA (3)	UAE (4)	GERMANY (5)	NETHERLANDS (6)
TSI	0.32	0.99	0.82	0.62	0.99

### 3.1.3. Direction of Trade in Cardamom

Results in Table 4 showed Kuwait as the most stable market (78.21 per cent), followed by Saudi Arabia (67.36 per cent), UAE (41.24 per cent), and the USA (31.27 per cent). Kuwait loses its market to the UAE (51 per cent) and the UK (43 per cent), whereas it gains share from the UK (33 per cent), USA (23 per cent), and Canada (21 per cent). The unstable markets are Canada, the UK, the EU, and Egypt.

TABLE 4. TRANSITION PROBABILITY OF TOP TEN IMPORTERS OF CARDAMOM FROM INDIA  
(2012-2022)

Exporters	UAE	Kuwait	US	Canada	UK	Malaysia	Australia	EU	Saudi Arabia	Egypt	Others
UAE	<b>0.41</b>	0.12	0.00	0.00	0.29	0.00	0.00	0.04	0.00	0.05	0.00
Kuwait	0.51	<b>0.78</b>	0.00	0.00	0.43	0.00	0.06	0.00	0.00	0.00	0.00
USA	0.00	0.23	<b>0.31</b>	0.46	0.01	0.02	0.00	0.01	0.07	0.00	0.00
Canada	0.00	0.21	0.43	<b>0.00</b>	0.00	0.00	0.03	0.05	0.00	0.09	0.19
UK	0.00	0.33	0.13	0.23	<b>0.00</b>	0.06	0.14	0.06	0.05	0.00	0.00
Malaysia	0.00	0.00	1.00	0.00	0.00	<b>0.00</b>	0.00	0.00	0.00	0.00	0.00
Australia	0.00	0.00	0.00	0.00	0.00	0.00	<b>0.39</b>	0.00	0.00	0.00	0.61
EU	0.31	0.00	0.69	0.00	0.00	0.00	0.00	<b>0.00</b>	0.00	0.00	0.00
Saudi Arabia	0.00	0.00	0.00	0.00	0.18	0.03	0.00	0.00	<b>0.61</b>	0.00	0.02
Egypt	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	<b>0.00</b>	0.00
Other	0.00	0.00	0.13	0.10	0.02	0.17	0.00	0.04	0.00	0.00	<b>0.55</b>

### 3.2. Pepper

#### 3.2.1. RSCA of Pepper

The overall period (2008-2022) showed that Malaysia, Germany, Brazil, Vietnam, and India were in the comparative advantage stage, whereas Indonesia, Netherlands, Peru, China, and UAE were in the comparative disadvantage stage. During 2018-22, Germany shifted from the comparative advantage to the comparative disadvantage stage, whereas China changed the other way, as shown in Table 5.

TABLE 5. AVERAGE RSCA INDEX OF WORLD EXPORT OF PEPPER (2008-22)

YEARS (1)	2008-12 (2)	2013-17 (3)	2018-22 (4)
INDONESIA	-0.295	-0.290	-0.109
NETHERLANDS	-0.279	-0.300	-0.435
MALAYSIA	0.420	0.212	0.331
PERU	-0.648	-0.695	-0.748
GERMANY	0.117	0.076	-0.014
CHINA	-0.553	-0.361	0.414
UAE	-0.932	-0.950	-0.934
BRAZIL	0.113	0.104	0.029
VIETNAM	0.121	0.588	0.320
INDIA	0.160	0.271	0.194

In the export of pepper, India had a comparative disadvantage in cardamom trade with its rival country, Vietnam, with an RSCA of -0.16. From 2008 to 2022, Brazil, China, and Germany were the major competitors to Indian cardamom exports since they dominated the world pepper market, as shown in Table 6. India had a sizable comparative advantage over three competitors in the pepper export market from 2008 to 2022, Brazil (0.95), China (0.32), and Germany (0.15), since the RCA values were greater than zero.

TABLE 6. AVERAGE RSCA INDEX OF PEPPER EXPORT IN INDIA WITH IT'S COMPETITOR (2008-22)

	VIETNAM (2)	BRAZIL (3)	CHINA (4)	GERMANY (5)
(1) RSCA	-0.167	0.958	0.328	0.152

#### 3.2.2. Trade Specialisation Index of Pepper

During 2008-2022, Vietnam, India, Brazil, and China were in the growth stage where these countries were engaged in extensive output, began to increase export-related operations, and supply exceeding demand for the domestic market.

TABLE 7. TRADE SPECIALISATION INDEX OF WORLD EXPORT OF PEPPER (2008-2022)

TSI (1)	2008-2012 (2)	2013-2017 (3)	2018-2022 (4)
VIETNAM	0.80504	0.826714	0.772074
BRAZIL	0.934819	0.953051	0.930576
CHINA	0.816582	0.77783	0.258051
GERMANY	-0.25488	-0.31809	-0.25466
INDIA	0.747826	0.639038	0.474927



Germany was in the introduction stage, where the industry in one country exported novel items, which were later imported by evolving industries in other nations.

### 3.2.3. Direction of Trade in Pepper

The USA retained 74 per cent and the UK 58 per cent of India's black pepper exports during 2012-2022. These two and 'others' are predicted to remain stable importers, while Canada showed less stability.

TABLE 8. TRANSITION PROBABILITY OF TOP TEN IMPORTERS OF PEPPER FROM INDIA (2012-2022)

Exporters	UK	USA	UAE	Nepal	Indonesia	Ecuador	Malaysia	China	Bangladesh	Canada	Others
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
UK	<b>0.58</b>	0.04	0.00	0.00	0.29	0.00	0.00	0.04	0.00	0.05	0.00
USA	0.07	<b>0.74</b>	0.00	0.00	0.13	0.00	0.06	0.00	0.00	0.00	0.00
UAE	0.00	0.23	<b>0.20</b>	0.46	0.01	0.02	0.00	0.01	0.07	0.00	0.00
Nepal	0.00	0.21	0.43	<b>0.00</b>	0.00	0.00	0.03	0.05	0.00	0.09	0.19
Indonesia	0.00	0.33	0.13	0.23	<b>0.00</b>	0.06	0.14	0.06	0.05	0.00	0.00
Ecuador	0.00	0.00	1.00	0.00	0.00	<b>0.00</b>	0.00	0.00	0.00	0.00	0.00
Malaysia	0.00	0.00	0.00	0.00	0.00	0.00	<b>0.39</b>	0.00	0.00	0.00	0.61
China	0.31	0.00	0.69	0.00	0.00	0.00	0.00	<b>0.00</b>	0.00	0.00	0.00
Bangladesh	0.00	0.00	0.61	0.00	0.18	0.03	0.00	0.00	<b>0.16</b>	0.00	0.02
Canada	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	<b>0.00</b>	0.00
Other	0.00	0.00	0.13	0.10	0.02	0.17	0.00	0.04	0.00	0.00	<b>0.55</b>

#### IV

#### CONCLUSION

The study highlights the crucial role of spices, specifically black pepper and cardamom, in India's economy due to their global demand. Using secondary data from 2008-09 to 2021-22, the study assesses India's global pepper and cardamom trade competitiveness. The findings indicate that India enjoys a comparative advantage in pepper exports over Brazil, China, and Germany but faces competition from Vietnam. The Trade Stabilization Index suggests that Vietnam, India, Brazil, and China are in a growth phase, while Germany remains in the introduction stage of pepper exports. The USA and UK have remained stable importers of Indian black pepper, with the USA retaining 73.72 per cent and the UK 56.98 per cent of India's black pepper exports between 2012-2022. In cardamom trade, the study identifies Kuwait as the most stable market for Indian exports, followed by Saudi Arabia, the UAE, and the USA. However, India faces a comparative disadvantage against Guatemala and the UAE, though it maintains an advantage over Germany and Indonesia. The study concludes that overproduction of spices, mainly pepper and cardamom, requires regulation by the Spices Board to manage production and export demand effectively. Additionally,

improving quality, production processes, and market competitiveness is essential for India to sustain and grow its position in the global spice trade.

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