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Trade performance of copra and desiccated coconut in India: A time series analysis

¹Prabhat Kumar, ²B Hanumanthe Gowda and ³Raghuramreddy Yeswanth

Chief Executive Officer, Coconut Development Board, Head Office, Kochi, Kerala, India

²Chief Coconut Development Officer, Coconut Development Board, Head Office, Kochi, Kerala, India

³Development Officer, Coconut Development Board, State Center, Junagadh, Gujarat, India

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Corresponding Author: Raghuramreddy Yeswanth

Abstract

India, the world's largest coconut producer with 20,535 million nuts in 2022-23 contributing significantly to its GDP, faces trade challenges despite its dominant production. Secondary data on the export and import of copra and desiccated coconut, classified under HS codes 12030000 and 08011100, respectively, was collected from sources such as the Directorate General of Foreign Trade (DGFT), Coconut Development Board (CDB), and the ITC Trade Map. This study investigates the performance and competitiveness of India's copra and desiccated coconut trade from 2011 to 2023, using Compound Annual Growth Rate (CAGR), Coefficient of Variation (CV), Cuddy-Della Valle Index (CDVI), and RCA to assess trade dynamics. While desiccated coconut exports have shown fluctuating trends, copra exports are concentrated in a few markets, primarily the UAE (56.81% share in 2023), Iran (15.72%), and Nepal (10.25%), highlighting the need for diversification. Results reveal that while copra export value has seen positive growth (3.15% CAGR), export volumes have declined (-3.44% CAGR), and imports have increased significantly (71.26% CAGR), indicating a growing dependence on external sources. Desiccated coconut exports have also experienced instability (CV of 132.50% for quantity and 113.77% for value), with declining quantities (-3.44% CAGR) despite rising value (5.83% CAGR). India's RCA for desiccated coconut has fluctuated (ranging from 0.15 to 1.82), indicating inconsistent competitiveness, while copra has shown stronger RCA (ranging from 1.9 to 16.83), though still facing competition from other major exporters. The study concludes that India needs strategic diversification, improved processing infrastructure, and supportive trade policies to enhance its competitiveness in the global coconut market and improve production strength for better trade performance.

Keywords: RCA, CAGR, HS Code, Export, Import, Copra, Desiccated Coconut Trade

Introduction

India is the largest coconut-producing country in the world and accounted for about 31% of the world's total production during 2021, with a production of 20,736 million nuts. India produced 20,535 million nuts during 2022-23, (CDB-2023) ^[1]. The crop contributes around Rs. 30,795 cr to the country's gross domestic product (GDP) during 2022-23. (indiantradeportal.2022) ^[2]. Indonesia, Philippines and India are the leading coconut growing countries and they jointly accounts for 75% of the global production of coconut.

In India, coconut is cultivated mainly in the coastal states viz., Kerala, Tamil Nadu, Karnataka and Andhra Pradesh and southern states account for 90 per cent of country's coconut production, viz., Kerala (27.41%), Tamil Nadu (26.40%), Karnataka (28.97%) and Andhra Pradesh (8.31%) (CDB 2022-23) ^[1].

In spite of being the global leader in coconut production, the export of coconut and its value added products from India constituted only 3469.44 crores (CDB 2023) ^[1]. Desiccated coconut is a well-established product from coconut. World production of desiccated coconut is around 4, 53,847 tones. In the recent years, export from India is showing a downfall (Fig 1). India is the the second largest exporter of copra to world with share of 30.70% of total world export of 112,854

tons. (UN COMTRADE-2023) ^[3]. The trade dynamics of copra and desiccated coconut in India have evolved over time, influenced by various factors such as global demand shifts, domestic production trends, changing consumer preferences, and policy interventions. The sector faces challenges related to fluctuating prices, climatic conditions affecting yields, and increasing competition from other coconut-producing countries.

Coconut Development Board (CDB), technology development and dissemination have given a boost to coconut processing and value addition. Many value added products complying with international standards have been introduced into the domestic market through different programs (Thasnimol & Prema 2017) ^[4]. India is not able to fully take the advantage of the global market. The study makes an attempt to investigate the performance and competitiveness of Copra and Desiccated coconut trade of India.

Methodology

The study focused on the trade aspects of export and import of Copra and Desiccated coconut. It aims to provide a brief explanation of the sample selection process, the nature and sources of data collection, and the analytical tools employed.

The information was primarily gathered from secondary sources, including the ITC Trade Map and DGFT statistics for exporting and importing from 2011 to 2023 with HS code of 08011100 and 12030000 for Desiccated coconut and Copra respectively.

Compound Annual Growth Rate (CAGR):

The analytical tool used in this study is the Compound Annual Growth Rate (CAGR), as the analysis involves continuous data. Using the average annual compound growth rates for exports and imports is considered more appropriate for analyzing the movement of Copra and Desiccated coconut than linear growth rates. (Thasnimol & Prema, 2017) ^[4]. The following exponential formula was applied:

$$CAGR = \{Antilog (\log \text{ regression coefficient}) - 1\} * 100$$

Instability Analysis

Instability in export and import of Copra and DC was examined by using two different measures of instability such as Coefficient of Variation and Cuddy-Della Valle Index. A low value of this index indicates low instability in export and import and vice-versa. Coefficient of Variation (CV) is the simplest measure of instability (Cuddy and Della, 1978) ^[5]. CV can be calculated as follows:

$$CV = (\text{Standard Deviation} / \text{Mean}) * 100$$

The Cuddy-Della Valle Index is as follow:

$$CDVI (\text{Percent}) = CV \sqrt{(1 - R^2)}$$

Where, CV is the Coefficient of Variation in per cent, R^2 is the coefficient of determination from a time trend regression adjusted for its degrees of freedom. The ranges of CDVI are given as follows

- Low instability = 0 to 15
- Medium instability = 15 to 30

Export unit value and Import unit value

Export unit value and Import unit value examine unit-values are divided by the average unit value of the previous year to obtain elementary unit-value indices, from which outliers are detected and removed. The per unit value of Copra and Desiccated coconut per unit quantity exported and imported over the time.

Export value of year / Export quantity of year

$$\text{Export Unit Value (EUV)} = \frac{\text{Export value of the year}}{\text{Export quantity of the year}}$$

Import value of year

$$\text{Import Unit Value (IUV)} = \frac{\text{Import value of the year}}{\text{Import quantity of the year}}$$

Revealed Comparative Advantage (RCA)

Revealed Comparative Advantage Index shows how competitive is Copra and Desiccated coconut in export compared to its share in world trade. A product with high RCA is competitive and can be exported to countries with low RCA. The RCA index of country 'i' for product 'j' is often measured by the product's share in the country's exports in relation to its share in world trade (S. S. Pramod *et al*):

$$RCA_{ij} = \frac{\left(\frac{X_{ij}}{X_{it}} \right)}{\left(\frac{X_{wj}}{X_{wt}} \right)}$$

Where,

- X_{ij} and X_{wj} are the values of country 'i's exports of product j and world exports of product j and
- X_{it} and X_{wt} refer to the country's total exports and world total exports.

A value of less than unity implies that the country has a revealed comparative disadvantage in the product. Similarly, if the index exceeds unity, the country is said to have a revealed comparative advantage in the product.

Results and Discussion

Table 1 revealed that the major export destinations for Indian copra in 2023 is the United Arab Emirates (UAE-56.81%) as the leading market, followed by Iran (15.72%) and Nepal (10.25%). The exchange rate influenced the value and quantity of copra exported among the developed and developing countries.

The UAE's dominance is due to favorable trade agreements and demand for coconut products, and the trend of copra export is moving in same direction of increasing agricultural exports to Gulf countries (Singh, 2024) ^[6] (Soundaravalli, 2024) ^[7]. This reflects the trends in agricultural exports, influenced by trade policies and market dynamics. While the UAE remains the largest market for copra, there is a need for India to explore and diversify new market destination for export of copra and to reduce the risks associated. This would help protect exports from market fluctuations.

Table 1: Major export destination of Indian copra 2023

S. No.	Country	Values in Rs. Lacs	%share	Quantity in (000 kgs)	% Share
1	UAE	9878.99	56.81	10299.52	60.61
2	Iran	2733.76	15.72	2876.02	16.92
3	Nepal	1782.16	10.25	1208.88	7.11
4	Afghanistan	1513.44	8.70	1597.90	9.40
5	Vietnam	298.34	1.72	196.23	1.15
6	Hong Kong	210.49	1.21	115.31	0.68
7	Pakistan	190.57	1.10	197.00	1.16
8	USA	134.80	0.78	56.02	0.33
9	UK	125.57	0.72	47.65	0.28
10	Bangladesh	91.83	0.53	99.00	0.58
11	Others	428.31	2.46	300.57	1.77
	Total	17388	100	16994	100

The international trade of Indian desiccated coconut reflects a growing market with significant export destinations, majorly to the USA (15.41%), Nepal (14.14%), and the UAE (12.70%) contributing around 42 to 45% in terms of value and quantity exported. The table highlights that majority of importing countries viz., UAE (15.95%), Saudi Arab (5.12%), Iraq (4.28%), Kuwait (2.61%) and Qatar (4.32%) are gulf countries, and these indicate the demand for Indian desiccated coconut in Middle East.

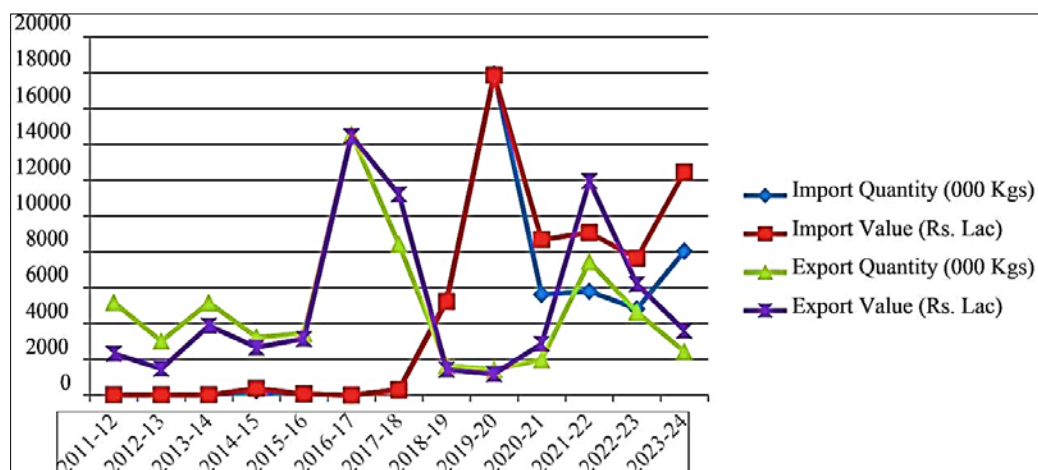
The results show that these countries are crucial for India's desiccated coconut exports, which are influenced by production methods, quality standards, and economic factors. The production of desiccated coconut in India is economically viable, with net returns varying by unit size, indicating potential for growth in exports (Arjuman, 2013). Investment in processing technology is crucial, as advancements can enhance product quality and marketability (Rastogi, 2019) ^[8].

Table 2: Major export destination of Indian Desiccated coconut 2023

Importing countries	Value in Rs. Lakhs	Percentage	Qty in (000kgs)	Percentage
U S A	555	15.41	241	9.96
NEPAL	510	14.14	524	21.70
UAE	458	12.70	385	15.95
LIBYA	301	8.34	206	8.53
SAUDI ARAB	200	5.55	124	5.12
CANADA	200	5.55	100	4.16
U K	158	4.37	83	3.42
IRAQ	153	4.26	103	4.28
QATAR	149	4.14	104	4.32
KUWAIT	118	3.28	63	2.61

The Fig.1 the trade dynamics of desiccated coconut (HS 08011100) in India from 2011 to 2023 reveal significant fluctuations in both import and export. It indicates a notable increase in imports, particularly in recent years 2018-2020, while exports have shown variability. Imports surged from 14,000 kg in 2011-12 to over 8 lakh kg in 2023-24. The import value rose from Rs. 18.95 lac to Rs. 12,461.46 lakhs. The import of desiccated coconut into India has increased

primarily due to a gap between domestic coconut production and the growing demand, often driven by cheaper imports from countries like Sri Lanka, where the cost of production is lower and leading to increased dependence on imported desiccated coconut. Efficient drying methods, such as infrared drying, improve product quality and reduce energy consumption, making Indian desiccated coconut more competitive internationally (Yahya *et al.*, 2024) ^[9].

**Fig 1:** Trade dynamics of desiccated coconut (HS 08011100) in India from 2011 to 2023

The Table no. 3, growth of desiccated coconut exports and imports from 2011 to 2023 reveals significant trends in international trade, characterized by varying growth rates and instability. The export quantity have shown a negative compound annual growth rate (CAGR) of -3.439 percent, indicating a decline in exports, while showing positive

growth of 5.32% in term of value is due to the exchange rates of the importing countries. While imports have experienced a substantial positive CAGR of 92.97% which is highly significant (1%), suggesting a growing demand for desiccated coconut in domestic market as production cost is lower in imports.

Table 3: Growth of Desiccated coconut export and import 2011-2023

Parameters	Export qty	Export Value	Import qty	import value
CV	132.501	113.770	71.327	79.855
Instability	131.576	110.829	55.540	50.678
CAGR	-3.439NS	5.832NS	92.971*	99.833*
p-value	0.509	0.379	0.001	0.001

*significance at 1% and NS- non significant

The instability of Indian desiccated coconut in both export and import markets are influenced by various factors, trade policies, and production challenges. India holds a small share in the global desiccated coconut export market, with limited competitiveness against other producing countries (Jayasekhar *et al.*, 2019) ^[10]. High instability in export (131.57 in quantity and 110.82% in value indices in coconut

production, particularly in states like Tamil Nadu and Karnataka, contribute to variations in exports (Narmadha, 2022) ^[11]. The import instability, 55.54% and 50.67% in quantity and value respectively, is due to sudden increase in import only to particular period 2018-2020 due to production cost variation among domestic and international market (Thasnimol, 2020) ^[12].

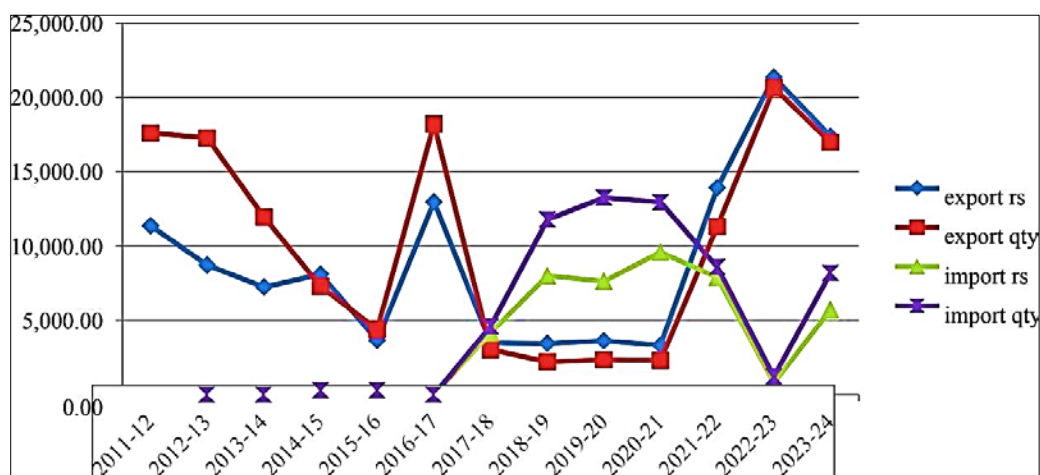


Fig 2: Trade dynamics of Copra (HS 12030000) in India from 2011 to 2023

The Fig.2 shows that copra exports and imports from India reveal significant fluctuations over the years, reflecting trends in international trade. The highest export value was recorded in 2022-23 at Rs. 21,385.78 lakh crores, indicating a strong market demand for copra. Export quantities varied significantly, with a notable drop in 2017-18 and increased in

2021-22, indicating the volatility in production in major growing states. Imports began in 2014-15, with a steady rise, peaking in 2020-21 at Rs. 9,587.11 lakh crores, the import quantity also increased, particularly in 2018-19 and 2020-21, indicating supply shortages.

Table 4: Growth of Copra export and import 2011-2023

Parameters	Export qty	Export Value	*Import qty	*import value
CV	146.22	153.47	111.14	115.52
Instability	145.82	142.69	96.88	98.47
CAGR	-3.44NS	3.15NS	71.26NS	69.24***
p-value	0.6202	0.5630	0.1019	0.0997

Note: * import data 2014-2023

***significance at 10% and NS- non significant

Table 4 shows that copra exports have a negative Compound Annual Growth Rate (CAGR) of -3.44% in quantity due to limited domestic supply. However, export value has grown at a positive CAGR of 3.15 Percent, influenced by exchange rate with importing countries. Imports of copra, which began

only in 2014-15, have shown a strong positive trend with a high CAGR of 71.26 Percent. As importing copra from Indonesia is considered cost effective due to its large production capacity and competitive pricing (Ella *et al.*) ^[13]. Export instability is significantly high, with 145.82% for

quantity and 142.69% for value, mainly due to low productivity and high domestic demand. On the other hand, imports show better stability compared to export, with a CDVI of 96.88% for quantity and 98.46% for value, suggesting more predictable import trends (Singh, 2024) ^[6]. Although exports have declined, rising imports highlight India's dependence on copra. There is need for policy changes to boost domestic production and stabilize the market.

Table 5: Export and Import Unit value of Desiccated coconut 2011-2023

Year	Export Unit value	Import Unit value
2011-12	0.45	1.35
2012-13	0.49	0.77
2013-14	0.75	0.97
2014-15	0.82	1.51
2015-16	0.92	1.02
2016-17	0.99	0.00
2017-18	1.33	1.00
2018-19	0.87	0.98
2019-20	0.82	1.00
2020-21	1.46	1.55
2021-22	1.60	1.56
2022-23	1.34	1.59
2023-24	1.49	1.55

Table no. 5 revealed that export and import unit values of desiccated coconut from India reflect significant trends influenced by trade policies and market dynamics. Over the years, the export unit value has shown an overall upward growth, indicating increased competitiveness in the global market, while import unit values have remained relatively stable. The export unit value increased from 0.45 in 2011–12 to 1.60 in 2021–22, depicting a strong growth trend. Trade liberalization has enhanced opportunities for Indian coconut exports, particularly post-2000, as indicated by improved comparative advantages (Thasnimol, 2020) ^[12]. The import unit value has fluctuated but remained around 1.00 to 1.59, suggesting stable demand for desiccated coconut in India. The relatively high import values compared to export values indicate that India may be importing lower priced product. While the export unit value has improved, challenges such as low productivity and market volatility persist, impacting the overall competitiveness of the Indian coconut sector.

Table 6: Export and Import Unit value of Copra 2011-2023

Year	Export Unit value	Import Unit value
2011-12	0.45	0
2012-13	0.49	0
2013-14	0.75	0
2014-15	0.82	0.72
2015-16	0.92	0.71
2016-17	0.99	0.00
2017-18	1.33	0.91
2018-19	0.87	0.68
2019-20	0.82	0.58
2020-21	1.46	0.74
2021-22	1.60	0.92
2022-23	1.34	0.67
2023-24	1.49	0.70

The table, no 6 shows a general increase in export unit values

from 0.45 in 2011-12 to 1.60 in 2021-22, followed by a slight decline to 1.34 in 2022-23, before rising again to 1.49 in 2023-24. In contrast, import unit values remained relatively low, with a peak of 0.92 in 2021-22 due to low productivity of domestic coconut. The export unit value rose consistently, indicating growing demand for copra in the importing countries. Import unit values remained low, with a maximum of 0.92 in 2021-22, indicating limited competition on domestic production. The disparity between export and import values may reflect India's self-sufficiency in copra production. While the export values show a positive trend, the low import values suggest that India may not be heavily reliant on import of copra, potentially indicating a robust domestic market.

Table 7: Revealed Comparative Advantage of Desiccated coconut export 2014-2023

Years	RCA	Competitive index	Per cent
2014	0.42	0.0071	0.71
2015	0.34	0.0055	0.55
2016	1.82	0.0299	2.99
2017	1.49	0.0252	2.52
2018	0.25	0.0042	0.42
2019	0.15	0.0026	0.26
2020	0.27	0.0043	0.43
2021	0.53	0.0095	0.95
2022	0.76	0.0139	1.39
2023	0.32	0.0058	0.58

The comparative advantage of desiccated coconut exports from India between 2014 and 2023 reveals fluctuating competitiveness in the global market. The Revealed Comparative Advantage (RCA) values indicate a peak in 2016 (1.82) but a decline in subsequent years, suggesting challenges in maintaining a strong export position.

The RCA values show significant variability, with a notable drop to 0.15 in 2019, indicating reduced competitiveness. The competitive index also reflects a downward trend, peaking at 0.0299 in 2016 and falling to 0.0058 in 2023, suggesting diminishing market presence. (Narmadha & Karunakaran 2022) ^[11]. India's RCA is lower than that of major coconut exporters like Indonesia and the Philippines, which dominate the market with higher RCA values. (Jayasekhar *et al.*, 2017) ^[14]. Despite being a leading coconut producer, India's share in the desiccated coconut export market remains limited, indicating a need for strategic improvements (CDB 2023) ^[1]. The need for strategic improvements in marketing and production is evident to enhance India's competitive advantage in coconut products (Bedi, 2016) ^[15]

Table 8: Revealed Comparative Advantage Copra export 2014-2023

Years	RCA	Competitive index	Per cent
2014	6.61	0.1115	11.15
2015	1.09	0.0176	1.76
2016	7.33	0.1202	12.02
2017	3.13	0.0527	5.27
2018	1.71	0.0287	2.87
2019	2.54	0.0437	4.37
2020	3.34	0.0526	5.26
2021	7.28	0.1297	12.97
2022	12.62	0.2311	23.11
2023	16.83	0.3070	30.70

The table no.8 revealed the India's copra export competitiveness from 2014 to 2023 showing significant fluctuations in the Revealed Comparative Advantage (RCA) and competitive index. The RCA values indicate a strong comparative advantage in recent years, particularly in 2022 and 2023, suggesting an increasing global competitiveness for Indian copra. While Indian copra exports show increasing trend, the competitive markets includes strong players like Indonesia, which maintains a higher RCA average of 41.55 from 2017 to 2021 (Rahmawati *et al.*, 2023) ^[13]. This indicates that India must continue to innovate and enhance its export strategies to sustain and improve its market position.

Conclusion

India remains a global leader in coconut production, yet its trade performance in copra and desiccated coconut faces challenges. Despite the country's highest production, export growth has been inconsistent, and imports have surged in recent years, particularly for desiccated coconut. The study reveals that India's copra exports are concentrated in a few markets, primarily the UAE, Iran, and Nepal, highlighting the need for diversification to mitigate market risks. Although the export value of copra has grown, export volumes have declined due to domestic supply limitations. Copra imports have increased, suggesting growing dependence on external countries, particularly from cost-effective producers like Indonesia. For desiccated coconut, exports have shown instability, with declining quantities but increasing export value due to fluctuating exchange rates. However, rising imports, particularly between 2018-2020, depicts the competitive pricing, which affects domestic producers. India has the potential to enhance its competitiveness in the global coconut trade. Strategic diversification, improved processing infrastructure, and supportive trade policies will be crucial in overcoming existing challenges and utilizing India's strong production base for better trade performance.

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