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POLICY BRIEF - 77

Estimation of Coconut Processing, Transportation and Marketing Costs in India

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Background

The agriculture sector contributes about 13.56 per cent to India's national GDP and nearly 11 per cent of export earnings, while providing employment and income to around half of the country's population. Within this sector, coconut plays a vital role in ensuring food security, livelihood support, and value-added industrial development, particularly in the Asia-Pacific region. Owing to its diverse uses—as food, beverage, medicine, fibre, fuel, wood, and raw material—the coconut palm is popularly known as *Kalpavriksha* (Tree of Heaven).

India is the world's largest producer of coconut, accounting for about 31 per cent of global production in 2021–22, with an output of 19,241 million nuts. The coconut sector contributes approximately ₹30,796 crore to India's GDP and is deeply interlinked with the socio-economic life of small and marginal farmers in peninsular India (CACP, 2023). Although coconut production during 2021–22 declined by about 7.2 per cent compared with the previous year, the sector continues to offer substantial scope for employment generation and income enhancement through value addition and diversified uses.

Coconut is predominantly grown in the coastal regions of Andhra Pradesh, Karnataka, Kerala, and Tamil Nadu, which together account for over 90 per cent of the area and production in the country. Over the last seven decades, coconut cultivation in India has expanded significantly, with compound annual growth rates of 1.80 per cent in area, 2.67 per cent in production, and 0.84 per cent in productivity. Despite this progress, notable inter-state variations persist. Andhra Pradesh records the highest productivity, while Karnataka's productivity remains below the national average.

Coconut utilization in India is largely industrial in nature. About 91 per cent of the total production is consumed as mature coconut, of which 69 per cent is used by industry, primarily in the form of copra. Copra processing is divided into milling copra (69 per cent) and ball copra (31 per cent), which form the backbone of the edible oil, toiletry, and allied industries. Although production is concentrated in southern India, 60–70 per cent of consumption occurs in northern states, leading to high transportation and marketing costs and a strong presence of intermediaries.

Given the complex marketing structure and rising post-harvest costs, a detailed assessment of coconut processing, transportation, and marketing costs is essential for informed policy intervention.

Objectives of the Study

The policy brief draws on the All-India study with the following objectives:

1. To estimate the costs of per quintal processing of coconut into milling copra and ball copra.
2. To assess transportation costs incurred by farmers and intermediaries.
3. To estimate marketing costs across different channels.
4. To examine insurance coverage, MSP awareness, and price realization.
5. To derive evidence-based policy recommendations for improving farmer incomes and market efficiency.

Data and Methodology

Data Used

The study is based on both primary and secondary data. Primary data were collected from coconut farmers and intermediaries engaged in processing coconut into ball copra and milling copra across major coconut-producing states. The reference period for the primary survey was the agricultural year July 2021 to June 2022. Secondary data were sourced from State Departments of Agriculture and Horticulture, the Coconut Development Board (CDB), and other official online databases.

Scope of the Study

Coconut production and marketing in India face multiple challenges. On the production side, rising input and labour costs have increased the cost of cultivation. On the marketing side, the presence of multiple intermediaries has escalated marketing and transaction costs. Additionally, farmers have increasingly diversified away from coconut towards cash crops and commercial crops due to the price volatility of copra (both milling and ball copra), pest and disease incidence, and labour management constraints. These factors have intensified

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farmers' demands for higher MSP, direct government procurement, and stronger policy support for coconut cultivation.

Need for the Study

Although the Commission for Agricultural Costs and Prices (CACP) collects cost of cultivation data for coconut under the Comprehensive Scheme, systematic estimates of processing, transportation, and marketing costs of copra are not available. As a result, CACP relies on estimates provided by State Governments and the CDB. Recognizing this data gap, the Ministry entrusted the Agricultural Development and Rural Transformation (ADRT) Centre with the task of generating accurate and reliable estimates of post-harvest costs of coconut in India.

Coverage of the Study

The study focuses on Andhra Pradesh, Karnataka, Kerala, and Tamil Nadu, which together account for over 90 per cent of copra production and area in the country. Concentrating on these major producing states enables the generation of representative and nationally relevant estimates of processing, transportation, and marketing costs of coconut.

Sampling Method

A multi-stage sampling technique was adopted to select farmers and intermediaries for the study. In the first stage, major coconut-producing states were identified and selected. In the second stage, districts engaged in the production of ball copra and milling copra were identified in consultation with the State Horticulture Departments and officials of the Coconut Development Board (CDB). A performance index, based on production criteria using a normal distribution approach, was developed to classify districts into high-, medium-, and low-performing categories separately for ball copra and milling copra.

A similar performance-based criterion was applied in the subsequent stages for selecting clusters of taluks, blocks, and villages. In the final stage, farmers and intermediaries were selected through random sampling, ensuring that each selected farmer possessed a minimum of 20 coconut palms, thereby confirming active coconut production. Representation of all farmer categories was ensured through post-classification.

The initial sample design fixed 360 respondents for ball copra and 240 respondents for milling copra, resulting in a total sample size of 600 respondents per state. However, copra processing decisions were found to be highly influenced by prevailing market prices at different stages. Farmers often sold coconuts as tender nuts, mature nuts, or during storage, depending on price realizations, rather than following a fixed processing pattern. Consequently, intermediaries -particularly in states such as Andhra Pradesh - frequently purchased mature nuts from farmers and processed them into ball copra.

Due to these market-driven adjustments, minor variations in sample size across states were observed. Final sample selection was therefore carried out proportionately based on district-level performance. Primary data were collected from sample households using a structured and pre-tested questionnaire, covering information on household characteristics, landholding, number of coconut palms, cultivation, storage, processing and marketing costs, income, credit access, and insurance coverage.

Statistical Tools and Analytical Framework

The study employed standard statistical and economic tools to analyse the cost structure, processing, transportation, marketing, and profitability of coconut and copra.

- **Percentage Analysis** was used to examine distributions, shares, and proportions across variables.
- **Operational Landholding** was estimated as the sum of irrigated and dry land, excluding fallow land.
- **Multiple Response Analysis** was applied for variables where respondents reported more than one option, such as irrigation methods, storage facilities, awareness levels, constraints, and suggestions.
- **Cost of Cultivation** was estimated using the standard **CACP cost concepts (A1 to C3)**. These include variable costs, labour (human, animal, and machine), interest on working and fixed capital, rental value of land, and imputed family labour. Management cost was accounted for as **10 per cent of Cost C2**. Cost per nut was derived by dividing the total cost by the number of nuts produced.
- **Storage cost** comprised the annualized value of storage structures and waiting charges. Waiting charges were calculated as interest on the value of mature nuts—**eight months for ball copra** and **three months for milling copra**.
- **Processing Cost** included expenses on de-husking, breaking of nuts, and separation of copra from the shell, calculated on a **wage-per-nut basis and** varying by type of copra.
- **Transportation Cost** covered both **on-farm and off-farm movement** of coconuts and copra. Loading and unloading costs were estimated based on the **wage per bag multiplied by the number of bags transported**.
- **Marketing Cost** for farmers and traders included grading, packaging, packaging material, market cess (1 per cent of produce value), commissions, pilferage, transaction costs, and minor miscellaneous expenses.
- **Returns Analysis** involved estimation of **gross returns**, **net returns**, and **Benefit–Cost (B:C) ratio**, where profitability was assessed as the ratio of gross returns to total cost.

Results and Discussion:

Cost of Cultivation of Coconut: Ball Copra and Milling Copra

Cost of Cultivation of Ball Copra (Per Acre)

The cost of cultivation of coconut for ball copra production shows considerable variation across states, reflecting differences in labour use, input intensity, and land values. At the All-India level, the total cost of cultivation (Cost C3) was ₹35,377 per acre. Karnataka recorded the highest cost due to higher labour and land costs, while Andhra Pradesh and Kerala followed (**Table 1**).

Table 1: Cost of Cultivation of Ball Copra (₹/Acre)

State	Cost A1	Cost B2	Cost C2	Cost C3
Andhra Pradesh	25,897	41,210	43,829	48,212
Karnataka	31,241	44,175	50,844	55,928
Kerala	26,965	40,465	41,579	45,737
All-India	**19,871**	**30,030**	**32,161**	**35,377**

Source: Primary survey data, 2022, author's calculations

Cost A1 constituted more than half of the total cost across all states, indicating the dominance of operational expenses such as labour, fertilizers, and plant protection chemicals. Rental value of land and imputed family labour further increased total costs, particularly in Karnataka and Kerala.

Cost of Cultivation of Milling Copra (per acre)

The cost of production of milling copra was relatively higher compared to ball copra due to additional processing and higher labour requirements, presented in **Table 2**. At the All-India level, the total cost (Cost C3) was ₹47,610 per acre. Kerala incurred the highest cost, followed by Karnataka and Andhra Pradesh, while Tamil Nadu recorded the lowest cost of cultivation.

Labour cost emerged as the largest cost component in Karnataka and Tamil Nadu, whereas the rental value of owned land significantly contributed to higher costs in Andhra Pradesh and Kerala. These patterns highlight the influence of state-specific production conditions and factor prices on milling copra economics.

Table 2: Cost of Cultivation of Milling Copra (₹/Acre)

State	Cost A1	Cost B2	Cost C2	Cost C3
Andhra Pradesh	21,793	38,206	42,201	46,421
Karnataka	25,496	35,536	44,410	48,851
Kerala	22,817	41,607	47,545	52,300
Tamil Nadu	27,013	32,368	35,852	39,437
All-India	**24,821**	**38,037**	**43,281**	**47,610**

Source: Primary survey data, 2022, author's calculations

Returns from Coconut Cultivation: Ball Copra and Milling Copra

Returns from Ball Copra Cultivation (Per Acre)

Table 3 explains that returns from ball copra–oriented coconut cultivation vary widely across states, mainly due to differences in productivity, price realization, and cost structure. At the All-India level, gross returns were ₹48,941 per acre, yielding net returns of ₹17,825 and a Benefit–Cost (B:C) ratio of 1.57.

Table 3: Returns from Ball Copra Coconut Cultivation (₹/Acre)

State	Cost C3	Gross Returns	Net Returns	B:C Ratio
Andhra Pradesh	48,212	99,038	50,826	2.05
Karnataka	26,344	37,302	10,958	1.42
Kerala	45,737	53,991	8,254	1.18
All-India	**31,116**	**48,941**	**17,825**	**1.57**

Source: Primary survey data, 2022, author's calculations

Andhra Pradesh recorded the highest profitability, driven by higher yields of mature nuts and favourable price realization. Karnataka and Kerala reported relatively lower net returns due to higher production costs and lower yields, particularly in Kerala.

Returns from Milling Copra Cultivation (Per Acre)

Milling copra cultivation shows relatively stable but moderate profitability across states. At the All-India level, gross returns amounted to ₹38,020 per acre, with net returns of ₹13,224 and a B:C ratio of 1.53 showed in **Table 4.**

Table 4: Returns from Milling Copra Coconut Cultivation (₹/Acre)

State	Cost of Production	Gross Returns	Net Returns	B:C Ratio
Andhra Pradesh	24,280	34,677	10,397	1.43
Karnataka	21,931	37,919	15,988	1.73
Kerala	38,175	53,546	15,371	1.40
Tamil Nadu	16,821	30,475	13,654	1.81
All-India	**24,796**	**38,020**	**13,224**	**1.53**

Source: Primary survey data, 2022, author's calculations

Tamil Nadu emerged as the most economically efficient state, recording the highest B:C ratio (1.81), despite moderate gross returns, owing to its lower cost of production. Karnataka and Kerala achieved similar net returns, but Kerala's higher costs reduced its profitability ratio.

Economics of Coconut Processing:

Ball Copra Processing: Cost and Returns

Ball copra processing is mainly concentrated in Karnataka and involves prolonged storage and intensive manual operations. The processing cost is moderate, but marketing and storage substantially add to total expenses. Despite this, ball copra fetches a premium market price, supported further by by-product value (husk and shell).

The total cost of producing one quintal of ball copra is ₹10,427, of which the cost of raw coconuts alone accounts for nearly three-fourths of the total cost. Among post-harvest expenses, marketing cost (₹1,368) is the single largest component, followed by storage and processing costs, clearly presented in **Table 5.**

On the returns side, the sale value of ball copra (₹14,083) forms the major share of income, while by-products contribute an additional ₹1,031, improving overall profitability. After accounting for all costs, farmers earn a net return of ₹3,656 per quintal, resulting in a Benefit–Cost ratio of 1.45, indicating that ball copra processing is profitable but with moderate margins, largely constrained by high marketing expenses.

Table 5: Cost and Returns from Ball Copra Processing (₹ per quintal)

Particulars	Amount (₹)
Cost of raw coconuts	7,745
Storage cost	574
Processing cost	618
Transportation cost	122
Marketing cost	1,368
Total Cost	**10,427**
Sale value of ball copra	14,083
By-products value	1,031
Gross Returns	**15,114**
Net Returns	**3,656**
B:C Ratio	**1.45**

Source: Primary survey data, 2022, author's calculations

Milling Copra Processing: Cost and Returns

Milling copra processing is widely practiced across southern states and benefits from higher processing volumes. Although processing and storage costs are relatively higher than ball copra, better scale efficiency and strong by-product values enhance overall profitability.

Table 6: Cost and Returns from Milling Copra Processing (₹ per quintal)

Particulars	All-India
Cost of raw coconuts	6,805
Processing cost	1,190
Marketing cost	692
Storage cost	2,658
Transportation cost	760
Total Cost	**12,105**
Sale value of milling copra	14,675
By-products value	6,350
Gross Returns	**21,025**
Net Returns	**8,920**
B:C Ratio	**1.74**

Source: Primary survey data, 2022, author's calculations

The total cost of producing one quintal of milling copra is ₹12,105, which is higher than ball copra mainly due to storage (₹2,658) and processing costs (₹1,190). However, the cost of raw coconuts is lower (₹6,805) compared to ball copra, reflecting better conversion efficiency. Milling copra generates substantially higher gross returns (₹21,025), driven not only by the sale value of copra (₹14,675) but also by a very high by-product value (₹6,350). As a result, milling copra yields a net return of ₹8,920 per quintal, more than double that of ball copra, with a B:C ratio of 1.74, indicating superior economic viability.

Policy Recommendations

1. **Revision of MSP:** Farmers incur high costs in production, processing, transportation, and marketing due to small and marginal landholdings and rising input prices. Hence, an upward revision of MSP for both milling and ball copra is recommended to ensure remunerative returns.
2. **Promotion of Farmer Collectives:** Given limited economies of scale, strengthening Farmer Producer Organizations (FPOs) and other collective models is essential to reduce costs and enhance farmers' bargaining power in the market.
3. **Quality Improvement and Capacity Building:** A large proportion of farmers produce low-quality milling copra due to limited awareness of grading standards, resulting in significant price discounts and difficulty in realizing MSP. Training on quality production, grading, and post-harvest management through the Coconut Development Board and line departments is strongly recommended.
4. **Market Intelligence and Price Stabilization:** Seasonal demand fluctuations across coconut products lead to price instability, adversely affecting both milling and ball copra producers. Integrating coconut and its products into Marketing Intelligence Cells and disseminating timely market information to farmers is necessary.
5. **Strengthening Crop Insurance Awareness:** Climate variability poses significant risks to coconut farmers, yet awareness of plantation-specific insurance schemes remains low. Focused awareness campaigns are needed to improve coverage and risk mitigation.
6. **Redesign of Insurance Products:** A considerable share of insured farmers are dissatisfied due to low compensation, high premiums, delayed settlements, and inappropriate loss assessment methods. There is a need to redesign insurance products with transparent and plantation-appropriate loss estimation mechanisms.
7. **Enhancing Digital Market Access:** Low awareness has limited farmers' participation in the e-NAM platform. Capacity-building initiatives are required to promote digital marketing and reduce dependence on intermediaries.
8. **Promotion of Value Addition and R&D:** Support from research institutions and agricultural universities is essential to promote value addition in coconut products. Encouraging start-ups, entrepreneurs, and industries through government support schemes can enhance income and employment opportunities.
9. **Promotion of Coconut Oil Consumption:** The declining demand for edible coconut oil due to cheaper substitutes calls for promotional efforts in domestic markets, alongside the development of cost-effective oil extraction technologies.
10. **Public Distribution and Institutional Consumption:** Inclusion of coconut and coconut products in school mid-day meals and the Public Distribution System (PDS), along with favourable trade policies, can boost domestic consumption and support coconut farmers.

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