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SUPPLY CHAIN EFFICIENCY OF SMALL CARDAMOM FROM KARELA TO GLOBAL MARKETS

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ABSTRACT
Small cardamom is one of Kerala's most important spice export commodities, with Idukki district functioning as the major production and export center. Although global demand remains strong, exporters face several supply chain inefficiencies related to production uncertainty, post-harvest handling, auction systems, logistics limitations, and regulatory compliance. This study examines the supply chain efficiency of small cardamom exports from Idukki district and its impact on export performance. A descriptive research design was employed using primary data collected from registered cardamom exporters through a structured questionnaire, supported by secondary data from Spices Board reports, government publications, and academic sources. The study focuses on key supply chain components such as production and post-harvest practices, auction and procurement mechanisms, logistics and transportation facilities, and export regulatory requirements. The findings reveal that efficient post-harvest management, transparent auction procedures, reliable connectivity to Kochi port, and strict compliance with export regulations significantly improve supply chain efficiency. Enhanced supply chain coordination leads to timely delivery, reduced costs, consistent product quality, and greater competitiveness in international markets. The study concludes that strengthening supply chain integration and infrastructure is crucial for improving export performance and ensuring the long-term sustainability of small cardamom exports from Idukki district.

KEYWORDS: *Supply Chain Procurement, Supply chain Efficiency, Supply Chain Challenges, Cardamom Exports*

INTRODUCTION

Kerala is a leading producer of small cardamom, and the efficiency of its supply chain plays a crucial role in determining export performance. The supply chain involves key activities such as procurement, storage, transportation, information flow, and export logistics, all of which directly influence product quality, cost, and delivery timelines. Effective quality control and compliance with international food safety standards are essential for meeting global market requirements and avoiding export rejections. However, inefficiencies in coordination, inadequate storage infrastructure, and high logistics costs can lead to post-harvest losses and reduced competitiveness. Improved coordination among farmers, intermediaries, exporters, and regulatory bodies, along with the adoption of modern technologies like digital tracking and inventory management systems, can enhance transparency and operational efficiency. Strengthening logistics infrastructure, particularly climate-controlled storage and efficient transportation networks, can further reduce wastage and enable exporters to respond effectively to global demand, thereby enhancing the international competitiveness of Kerala's small cardamom exports.

SCOPE OF THE STUDY

The study focuses on the supply chain efficiency of small cardamom exports from Kerala. It covers procurement practices, auction systems, storage facilities, transportation, logistics infrastructure, and export regulations. The study is based on data collected from registered cardamom exporters and aims to evaluate the impact of supply chain efficiency on export performance.

LIMITATIONS OF THE STUDY

The study is limited to exporters in Kerala and may not represent other spice-producing regions. The findings are based on primary data collected through questionnaires and may involve respondent bias. The sample size is limited due to time and resource constraints. Changes in market conditions and government policies during the study period may affect the results.

OBJECTIVES OF THE STUDY

- To map the end-to-end supply chain of small cardamom from Kerala, covering cultivation, processing, warehousing, transportation, and export.
- To analyze India's small cardamom export performance and identify trade patterns with major global markets.
- To evaluate the role of logistics and supply chain practices in influencing the export competitiveness of Kerala small cardamom.

RESEARCH METHODOLOGY

- **Research Design:** Descriptive Research
- **Area of the Study:** Idukki district, Kerala
- **Sampling Size:** 90 respondents
- **Sampling Method:** Simple Random Sampling.
- **Sources of Data:** Primary data and secondary data
- **Data Analysis Tools:** Simple Percentage Analysis, Factor Analysis, Linear Regression and One-Way ANOVA.

REVIEW OF LITERATURE

1. **Raj and Nair (2021)** conducted a comprehensive study on supply chain inefficiencies in India's spice export sector with special emphasis on logistics, procurement systems, and coordination among supply chain stakeholders. The study employed percentage analysis, factor analysis, and regression analysis to examine operational challenges. The findings revealed that logistics bottlenecks and fragmented procurement processes significantly increased operational costs and reduced overall export efficiency. The authors concluded that strengthening infrastructure and improving coordination among farmers, traders, and exporters are essential for enhancing supply chain efficiency.
2. **Varma and Reddy (2025)** studied the impact of regulatory reforms on export logistics in Kerala's spice sector using ANOVA and regression analysis. The findings demonstrated that simplified documentation procedures and faster customs clearance significantly reduced export processing time and operational delays. The study highlighted that regulatory streamlining improved efficiency across the supply chain and strengthened exporter confidence. The authors concluded that continuous policy support and regulatory reforms are vital for enhancing supply chain efficiency and improving export performance in the spice sector.
3. **Mathew, Nair, and Kumar (2024)** analyzed sustainability practices in spice export supply chains through descriptive analysis and correlation techniques. The study found that eco-friendly packaging, energy-efficient storage systems, and waste reduction practices lowered operational costs and improved brand reputation in international markets. The findings indicated that sustainability initiatives positively influence supply chain performance and customer trust. The authors concluded that integrating sustainability with
supply chain management supports long-term export growth and environmental responsibility.

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ANALYSIS AND INTERPRETATION

Business Profile of the Respondents

S.No.		Number of Respondents	Percentage (%)
	Type of Exporter		
1	Manufacturer Exporter	11	37
2	Merchant Exporter	15	50
3	Processor Exporter	3	10
4	Indirect Exporter	1	3
	No. of Employees Employed		
1	Below 10	11	37
2	10 - 25	12	40
3	26 – 10	3	10
4	Above 50	4	13
	Type of Product Exported		
1	Raw small cardamom	15	50
2	Graded cardamom	12	40
3	Value added products	1	3
4	Multiple products	2	7
	Procurement of cardamom		
1	From own cultivation	2	7
2	From contracted farmers	3	10
3	From local traders	11	37
4	Through action centers	14	46

INTERPRETATION

The comparison shows that Merchant Exporters constitute the highest proportion of respondents, while the 10–25 category represents the largest range group. Together, this suggests that the responses are mainly concentrated among merchant exporters belonging to the 10–25 range, making them the most influential group in the survey.

FACTOR ANALYSIS – Factors Influencing Supply Chain efficiency of the Factor

	Rotated Component Matrix[a]	1	2
Procurement	Our organization consistently meets international quality standards in small cardamom exports.	.797	
	Efficient supply chain management has improved our export volumes and overall performance.	.838	
	Export documentation and regulatory compliance are handled accurately and on time.	.773	
	Strong coordination with logistics service providers ensures timely delivery to global markets.	.856	
	Our organization maintains strong relationships with international buyers.	.809	
Challenges	Understanding global market requirements and demand trends supports better export decisions.		.761
	Price realization in international markets has improved over time.		.857
	Effective logistics and supply chain practices enable consistent quality delivery.		.906
	Diversification of export markets helps reduce business risk and improve competitiveness.		.831
	Trade policies and export incentives positively influence our export performance.		.851
	Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.739	
	Total Variance Explained	55.328	16.977

INTERPRETATION

The Principal Component Analysis extracted two significant components with eigenvalues greater than one. The first component explains 55.328% of the variance, while the second component explains 16.977% of the variance. Together, these two components account for 72.305% of the total variance, which is considered adequate for factor analysis

FINDINGS

- A majority of the respondents are merchant exporters, indicating their dominance in the small cardamom export sector.
- A majority of the exporting firms fall under the small and medium enterprise category, employing 10–25 workers.
- A majority of the respondents reported engaging primarily in export-oriented trading activities rather than production-based exports.
- A majority of the exporters indicated reliance on auction-based procurement systems for sourcing small cardamom.
- A majority of exporters are engaged in the export of raw small cardamom.
- Most respondents reported facing high logistics costs in export operations.

SUGGESTIONS

The study suggests that improving post-harvest handling practices such as scientific curing, grading, and proper storage is essential to enhance the export quality of small cardamom. Strengthening logistics infrastructure, particularly warehousing and transportation facilities in major producing regions of Kerala, can help reduce losses and transit delays. The adoption of digital tools for supply chain coordination and traceability will improve transparency and buyer confidence in international markets. Further, stronger linkages between farmers, exporters, and logistics service providers are recommended to improve efficiency and cost competitiveness. Policy support in the form of logistics subsidies, export incentives, and skill development programs can also play a vital role in strengthening the cardamom export supply chain.

CONCLUSION

The study concludes that although Kerala plays a significant role in India's small cardamom production, inefficiencies in logistics and supply chain management limit its export competitiveness. Issues related to post-harvest handling, storage, and transportation negatively affect quality and increase costs. Efficient logistics practices and better supply chain integration are critical for improving export performance. By addressing these challenges through infrastructure development, technology adoption, and policy support, India can enhance its position in the global small cardamom market. The findings of the study provide useful insights for farmers, exporters, and policymakers to strengthen the overall cardamom export supply chain.

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