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HARVEST TO HIGH VALUE: COMMERCIAL SPICE PROCESSING FOR VALUE ADDITION IN INDIAN HORTICULTURE: EVIDENCE FROM TELANGANA, INDIA

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ABSTRACT

The horticultural sector occupies a smaller share in the gross cropped area in our country, but it has a significant impact on the country's total food grain output, justifying it as the golden revolution, as seen in 2024–25, where the production crossed 367 million tonnes (Press Information Bureau, 2025). Spices are an important part of this, but most of what is grown is still sold raw without processing, so the opportunity cost is uncaptured. This study addresses this gap through a case study of Srivari Spices and Foods Limited, a commercial spice processing unit in Hyderabad, Telangana, which focuses on the cost of processing spices at the unit level and how well the unit grows financially. Primary data on production costs were collected for 2023–24, and five years of secondary financial data (2019–20 to 2023–24) were used to study financial performance. Among the three main products processed, chilli powder gave the highest net return per kilogram (₹ 254.42), with the best benefit–cost ratio (1.83), followed by coriander powder (₹ 173.43; 1.63) and turmeric powder (₹ 154.29; 1.52). All three products were profitable and were produced well above their break-even level. Financial ratios over the five years showed steady improvement in profitability, along with reasonably comfortable liquidity; total assets grew at a compound annual growth rate (CAGR) of 101.47 per cent, while the net profit ratio improved from 2.56 to 8.99 per cent. These results are discussed along the current government schemes such as PMFME, which directly support these types of spice processing and value addition industries.

Key words : Benefit-cost ratio, Horticultural economics, Spice processing, Value addition.

Introduction

Indian agriculture is undergoing a quiet revolution, and horticulture is at the centre of it. India produced approximately 367.72 million tonnes of horticultural crops in 2024–2025 by surpassing the total food grain output by having only 13–18 per cent of the total gross cropped area (Ministry of Agriculture and Farmers Welfare, 2026). Horticulture currently contributes approximately 33 per cent of agriculture's gross value added, with productivity above 12.5 tonnes per hectare, roughly five times that of food grains (Government of India, 2026). This indicates that horticulture has become an important engine for farm income growth. India is also the world's second-largest

producer of fruits and vegetables, along with a strong global position in spices, coconut and cashew. Spices, in particular, are highlighted because they are among the few horticultural crops that almost always undergo some processing before reaching consumers, which gives an opportunity to cash them by good value addition practices.

India is called the “land of spices.” Depending on the season and region, farmers cultivate at least one of the 52 spices regulated by the Spices Board of India, which are drawn from the 109 spices recognized internationally by the International Organization for Standardization. Their value is much more than that in the kitchen; they are used in pharmaceuticals, perfumery,

and cosmetics (Devi and Thyagarajan, 2020) and this steady demand has helped India remain the world’s largest producer, consumer, and exporter of spices (Devi and Jadav, 2018). In 2022–23 alone, the country harvested around 11.26 million tonnes of major spices and earned close to US\$3.73 billion in exports. Turmeric stands out, accounting for nearly 80% of global production, grown chiefly in Telangana, Maharashtra, Tamil Nadu and Andhra Pradesh.

Telangana leads by ranking among the top states for turmeric cultivation with Nizamabad and Jagtial as the main growing districts, and also holds the position of second-largest chilli producer nationally led by Khammam

focusing on its every costs and returns. Such ground-level case studies provide information that entrepreneurs, banks, and policymakers would find valuable. This study addresses this gap through a case study of Srivari Spices and Foods Limited, a Hyderabad-based processing unit sourcing from farmers across Telangana and Andhra Pradesh and selling through both direct-to-consumer and business-to-business channels. It is framed throughout as the Harvest-to-High Value Pathway (Fig. 2), tracing raw spices through processing, quality improvement, and branding into a high-value product feeding back into broader horticultural development.

Horticultural value chain of spice processing (Srivari Spices and Foods Limited)

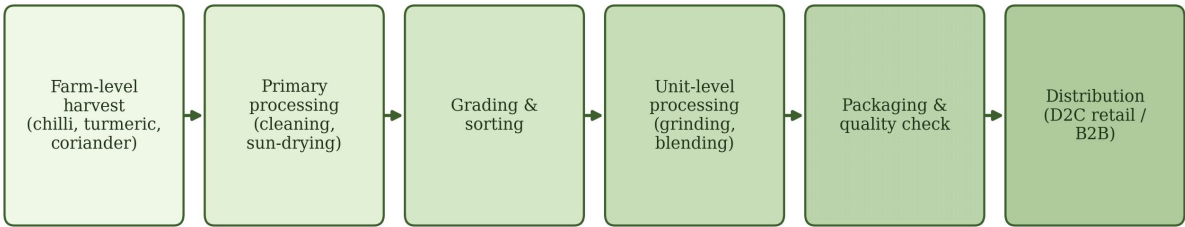


Fig. 1 : Horticultural value chain of spice processing followed by the unit.

and Warangal. With so much raw spice originating here, Telangana offers a fitting place to study if this produce is being converted into higher-value processed goods or whether much of it still leaves the farm untouched.

Producing large volumes of spice does not guarantee better incomes for farmers or processors; the postharvest stage carries many opportunities. Because horticultural produce is perishable, quality-sensitive, post-harvest handling is important to ensure the crop’s economic value at later stages (Soni and Modi, 2024). Viewed as a value chain, the path of spices from field to shelf passes through approximately six stages (Fig. 1). Each stage adds cost and value.

Despite this potential, India lags behind in processing compared to production. Limited storage, weak cold-chain infrastructure and a shortage of organized processing units contribute to a significant share of the harvest that is sold raw, leaving the extra value of processing largely unclaimed (Babu *et al.*, 2019 and Shukla *et al.*, 2015). Government schemes such as the Pradhan Mantri Formalisation of Micro Food Processing Enterprises (PMFME) scheme and, recently, the Spices Board’s SPICED program have been initiated to fill these gaps.

As India’s horticulture and spice sectors appear to be growing like the statistics given, it is worth examining to look at the functioning of a single processing unit

The Harvest-to-High Value Framework

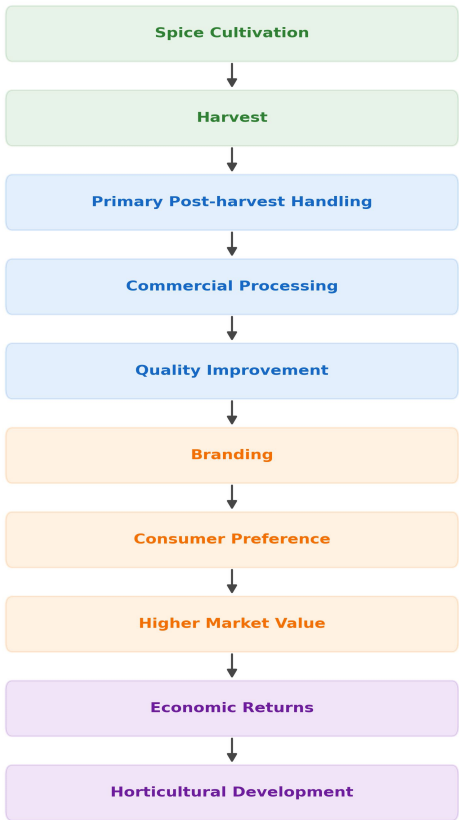


Fig. 2 : The Harvest-to-High value Framework.

Materials and Methods

This study used a case-study approach of Srivari Spices and Foods Limited in the Hyderabad district of Telangana, chosen purposively in 2019. This unit was selected because of its wide range of products, willingness to share records, and modernized processing operations that sell through both retail (around 15,000 direct-to-consumer outlets) and business-to-business channels.

Primary data were collected for the financial year 2023–24 through interviews with the staff at the unit. Secondary data from the unit's audited annual reports for five financial years, 2019–20 to 2023–24. Three products—chilli powder, turmeric powder, and coriander powder—made up most of the unit's processing volume (about 59% of total output in 2023–24); therefore, these were chosen for the detailed cost and return analysis.

Total production cost, break-even output in both quantity and value terms, and benefit–cost (B:C) ratio were determined using descriptive statistics. Financial performance was assessed using standard liquidity, turnover and profitability ratios, which were calculated from the balance sheet and profit-and-loss account for each of the five years. The compound annual growth rate (CAGR) was computed as $[(\text{End Value} \div \text{Beginning Value})^{1/n} - 1] \times 100$, where $n = 4$ represents the four annual growth intervals between 2019–20 and 2023–24.

Results and Discussion

Capital investment in processing infrastructure

Setting up the unit required a total capital investment of ₹ 646.79 lakh (Fig. 3). Plant and machinery took up by far the largest share, 67.2 per cent, or ₹ 434.83 lakh. The investment is concentrated heavily in processing equipment, rather than in storage or other, shows that the unit's business model is focused on processing and value addition.

Raw spice versus processed spice: where the value difference comes from

The commercial processing actually adds value rather than selling the spice raw. Table 1 summarises the dimensions in which the raw and the processed spices differ. This simple qualitative comparison of transforming a spice from its raw state to a processed, branded, packaged form puts it at a stronger market position. This is precisely the transformation that the Harvest-to-High Value Pathway is intended to describe.

Cost structure and returns of major spice powders

The per-kilogram economics reveal that chilli powder generated the highest net return at ₹ 254.42/kg followed

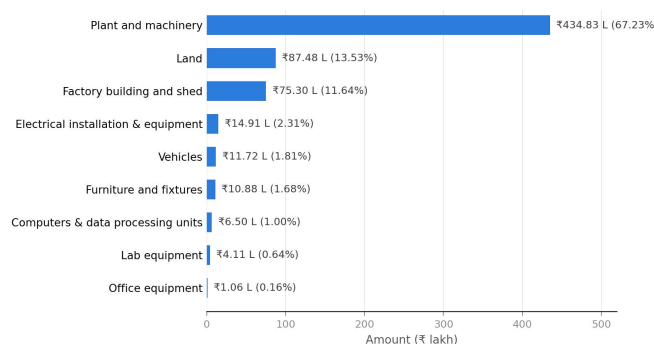


Fig. 3 : Composition of initial capital investment of the unit.

Table 1 : Comparison of raw and processed spice on key market-relevant parameters.

Parameter *	*Raw spice*	*Processed spice
Shelf life	Low	High
Market value	Moderate	High
Branding	Not possible	Possible
Consumer convenience	Low	High
Export readiness	Limited	High

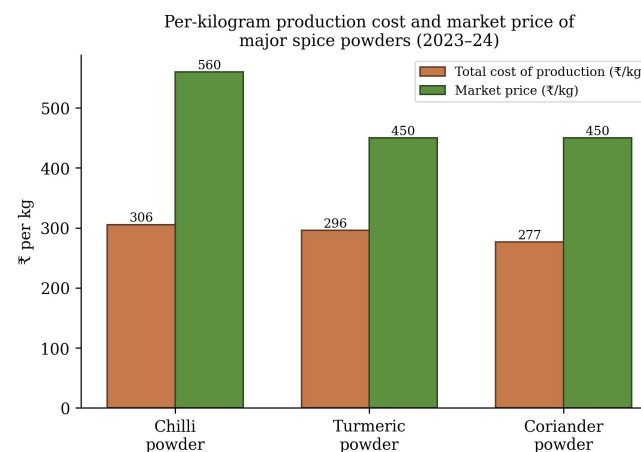


Fig. 4 : Per-kilogram production cost and market price of major spice powders (2023–24).

by coriander powder (₹ 173.43/kg) and turmeric powder (₹ 154.29/kg), even though it also had the highest total production cost (Fig. 4). Raw material was the biggest cost for all three products accounting for 58 to 65 per cent of total per-unit cost which shows how strongly input prices shape the economics of spice processing. The advantage of chilli powder has come not from lower costs, but from a higher selling price (₹ 560/kg versus ₹ 450/kg for the other two), which points to stronger demand for processed chilli over the study year. Turmeric powder is the interesting case as it had the second-highest raw material cost but ended up with the lowest net margin, because it sold at the same price as coriander powder while costing more to make. This matches what Agarwal *et al.* (2020) and Navyashree *et al.* (2024) also found,

Table 2 : Compound annual growth rates (CAGR) of key indicators, 2019–20 to 2023–24.

Indicator	2019–20	2023–24	CAGR†(%)
Total assets (₹ lakh)	333	5,486	101.47
Fixed asset turnover ratio	2.61	13.50	50.81
Gross profit ratio (%)	3.22	12.81	41.23
Net profit ratio (%)	2.56	8.99	36.89
Current ratio	2.20	1.87	–3.98
Quick ratio	1.84	0.74	–20.37

Source: Computed from company annual reports. †CAGR = $[(\text{End} \div \text{Start})^{1/4} - 1] \times 100$; $n = 4$ annual intervals. Negative values indicate decline over the period.

chilli-based products outperforming turmeric in net returns from processing.

Total cost, returns and benefit–cost ratio

Looking at the bigger level, all three products were produced beyond their break-even level in 2023–24, so the unit had a comfortable margin of safety on each product line. The benefit–cost ratio was 1.83 for chilli powder, 1.63 for coriander powder, and 1.52 for turmeric powder (Fig. 5), which is above the minimum of 1.0 needed for a product to be considered worthwhile. On a total, the three products brought in total returns of ₹ 2,727.00 lakh against a total cost of ₹ 1,572.33 lakh for the year which means, every product was profitable, but chilli powder was clearly the strongest performer of the three. This aligns with Baral *et al.* (2021), who also found favourable benefit–cost ratios for turmeric-based enterprises in South Asia.

Financial performance, 2019–20 to 2023–24

Between 2019–20 and 2023–24 (Fig. 6), the unit has grown significantly in size where total assets rose from about ₹ 333 lakh to ₹ 5,486 lakh (Fig. 7), mostly on growing inventory and receivables as the business expanded. On comparing liquidity, the current ratio averaged 2.21 across the five years which is above the usual benchmark of 2.00 so the unit was reasonably well placed to meet its short-term obligations. This matches Rao and Lokeswari (2020) and Sawalkar *et al.* (2021), who reported similarly healthy liquidity in other agro-processing units in India. Profitability also improved steadily suggesting the unit became more efficient at converting sales into actual profit in its growth phases (Fig. 7). A ratio-based analysis of the same enterprise by Katkuri *et al.* (2025) covering the same five-year period, described the unit as “financially stable with efficiency in operations and reasonable profitability”.

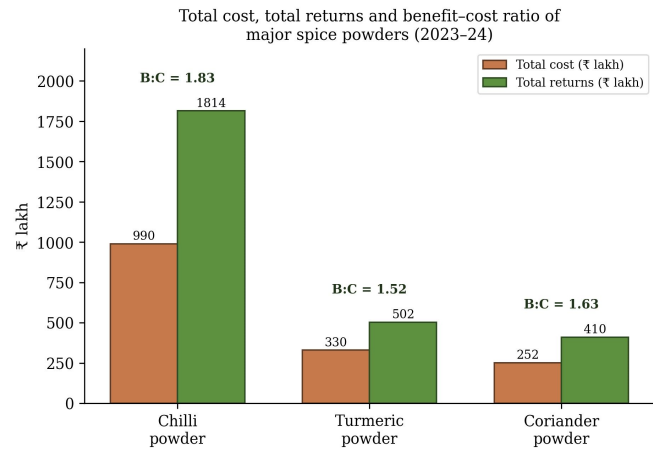
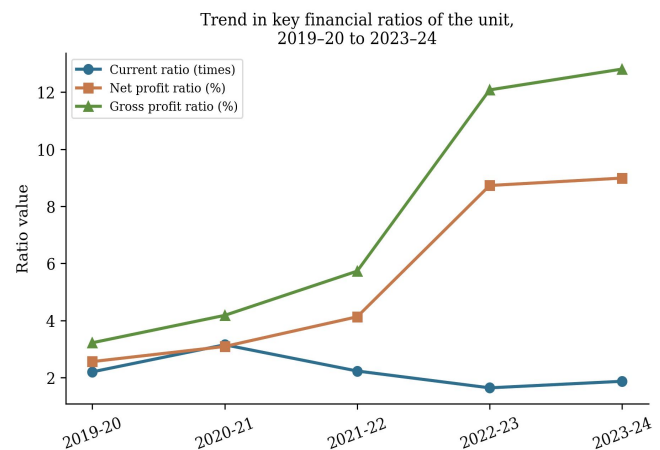
**Fig. 5 :** Total cost, total returns and benefit–cost ratio of major spice powders (2023–24).**Fig. 6 :** Trend in key financial ratios of the unit, 2019–20 to 2023–24.

Table 2 presents CAGR values for key performance indicators, computed as $[(\text{End Value} \div \text{Beginning Value})^{1/n} - 1] \times 100$ with $n = 4$ (four annual growth intervals from 2019–20 to 2023–24). Total assets recorded the sharpest growth at a CAGR of 101.47 per cent which reflect quick scaling of the enterprise considering the unit incorporated in 2019 only to a significant regional processor in four years. Both the profitability ratios improved at CAGRs above 36 per cent which confirms that the volume growth took place along the improvement in financial efficiency. Liquidity ratios have shown negative CAGRs as this is consistent with the pattern seen in inventory-driven, fast-growth enterprises where the stock and receivables expand faster than the most liquid assets. The business was actually scaling to meet rising demand by strategically compressing liquidity ratios temporarily even as profitability improved. The negative CAGR on liquidity should be understood as a sign for aggressive growth rather than financial distress.

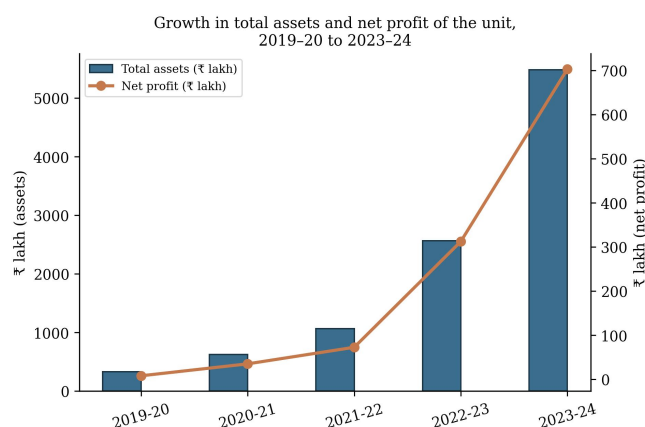
SWOT analysis of the enterprise

A structured SWOT analysis has supported

Table 3 : SWOT analysis of the enterprise under study based on quantitative findings and qualitative field observations.

Strengths	Weaknesses
1. Established two-state market presence in Telangana and Andhra Pradesh (15,000+ direct retail outlets) 2. Diversified product portfolio across three major spice categories 3. Modern mechanised processing infrastructure (₹ 434.83 lakh in plant and machinery) 4. Total assets grew at CAGR of 101.47% over 2019–20 to 2023–24, demonstrating exceptional scale-up capacity 5. Improving profitability	1. Raw material dominates per-unit cost (58–65% across product lines), leaving margins exposed to input price shocks 2. Quick ratio declined below 1.0 (0.74 in 2023–24), indicating short-term liquidity pressure 3. Capital structure heavily concentrated: 67.2% of fixed investment locked in plant and machinery.
Opportunities	Threats
1. PMFME 35% capital subsidy: potential benefit of ₹ 226.38 lakh on ₹ 646.79 lakh investment 2. SPICED programme (₹ 422.30 crore outlay): Mission Value Addition directly supports grinding-intensive operations 3. Planned Nizamabad spice park in Telangana improves raw material proximity for regional processors 4. India's spice export trajectory (US\$3.73 billion in 2022–23) creating growing demand for processed output 5. Product line diversification underway (whole-wheat flour addition), reducing single-commodity risk	1. Seasonal and climate-driven price volatility in raw chilli and turmeric markets 2. Intensifying competition from established national spice brands with larger marketing budgets 3. Power-intensive grinding operations exposed to energy cost escalation 4. Tightening FSSAI and APEDA food safety compliance requirements adding to overhead costs

Source: Primary field survey and analysis of company annual reports, 2023–24

**Fig. 7** : Growth in total assets and net profit of the unit, 2019–20 to 2023–24.

quantitative findings of this study with qualitative observations noted from the staff during primary data collection presented in Table 3.

Contribution of commercial spice processing to horticultural development

Keeping aside the unit-level numbers and summarising at a general level, Table 4 summarises the contribution across several dimensions rated qualitatively from the evidence gathered in this study and the broader literature cited throughout this paper.

Policy relevance: linking these findings to current government schemes

These results connect to two schemes, which are

currently aiding India's food-processing sector. At the national level, the Spices Board's SPICED programme (Sustainability in Spice Sector through Progressive, Innovative and Collaborative Interventions for Export Development) for the period up to 2025–26 includes a dedicated Mission Value Addition and Mission Clean and Safe Spices which aim at the similar kind of processing infrastructure and quality improvement this case study documents, along with support for Spice Incubation Centres for new entrants (Spices Board of India, 2024). The grinding machinery accounted for 47.2 per cent of this unit's plant and machinery investment, and the categories where temperature control directly affects essential-oil retention and product quality, targeted SPICED support for modern grinding technology could have disproportionately affected the competitiveness of units at this scale.

The same applies for PMFME where the scheme's 35 per cent capital subsidy for individual micro food processing units which translates this unit's scale (₹ 646.79 lakh in fixed assets) to a potential beneficiary of approximately ₹ 226.38 lakh, an amount that exceeds the combined capital cost of land (₹ 87.48 lakh) and factory building (₹ 75.30 lakh), and is enough to finance the unit's entire computers, electrical installations etc., with capital to spare. By 2025, PMFME had formalised more than 59,000 micro food processing enterprises and sanctioned over 1.6 lakh loans across the country

Table 4 : Contribution of commercial spice processing to horticultural development.

Dimension *	*Contribution
Value addition	High
Shelf-life enhancement	High
Employment generation	High
Export potential	Moderate
Farmer linkages	Moderate
Rural entrepreneurship	High
Branding	High

(Ministry of Food Processing Industries, 2025). Here, the enterprise under study has already grown above the micro-enterprise scale that PMFME mainly targets, but it is a concrete example of exactly the kind of formalisation and mechanisation these schemes are designed to accelerate smaller units following a similar model in Telangana.

International perspective: lessons from other spice-exporting countries

Vietnam built its pepper and cinnamon trade by focusing mostly on downstream processing rather than relying completely on raw export volumes. Despite having low raw exports in early 2020s, their export earnings boosted because of higher realised prices and greater share of value added products like ground pepper, sauces (Vietnam Pepper and Spice Association, 2024). Along with the raw and semi-processed exports, Indonesian exporters have shifted to nutmeg oil, and nutmeg butter paving for new market segments that raw nutmeg alone could not reach and importantly, giving smallholders and cooperatives a stake in higher-value output (Tracex tech, 2026).

Sri Lanka's Ceylon cinnamon industry has shown that modern spice processing is important as upgradation of technology, quality control and food safety standards are key strategies for enhancing value addition and restoring the global competitiveness (UNIDO, 2024). China demonstrates that vertically integrated processing enhances competitiveness with advanced technologies, aiding it to trade nearly 50 per cent of the global ginger export value despite producing less raw ginger than India (MarkNtel Advisors, 2026).

India's opportunity: By analysing these four cases, we can conclude to a common lesson that countries focus on producing high value from raw spices. They capture more export value per tonne than countries that continue to export mostly raw material, despite their lower raw production volumes. India already has an advantage of

leading the world in raw spice production but, there is this uncaptured gap between the raw production and the huge potential to obtain higher value. Enterprises of this kind studied here, the SPICED and PMFME schemes that support them are the elements through which India could fill these lacunae.

Why commercial spice processing matters for Indian horticulture

The observations of this case study matter beyond the particular enterprise studied because commercial spice processing yields several other benefits like:

- i. Employment:** Processing units give rise to employment opportunities in grinding, packaging etc., that are additional to on-farm employment.
- ii. Farmer income:** Demand from processing units gives farmers a more predictable buyer to support better on-farm price realisation
- iii. Export earnings:** Raw spice to processed products increase the form utility and fetch more export revenues
- iv. Food safety:** Commercial-scale processing ensures standardised methods which are directly support FSSAI and export-market food-safety compliance.
- v. Post-harvest loss reduction**
- vi. Branding :** A well branded product can build consumer trust and repeat purchase in a way that differs from raw commodity sale
- vii. MSMEs :** Most of India's spice processing capacity is within the MSME segment that PMFME is specifically designed to support
- viii. Value chain integration :** Processing is the stage where production, demand, and policy support meet. Focusing on this subsequently strengthens the horticultural value chain.

Limitations

This study has certain limitations when interpreting its findings. Firstly, as it is based on a single processing enterprise, the costs and returns may not generalise to other units of different scale, product mix, or location. Secondly, the study being region-specific, differs to other spice-growing states with varied costs, infrastructure. Thirdly, the financial performance analysis relies on cross-sectional data for five years which limits the projection of the observed trends. Future research in extending this work through different multi-unit comparative studies across states would definitely highlight the greater importance of spice processing.

Conclusion

This case study suggests that spice processing is economically viable for ensuring value addition in India's horticulture sector. The processing unit required an initial capital investment of ₹ 646.79 lakh, with 67.23% (₹ 434.83 lakh) invested in plant and machinery, reflecting its technology-intensive nature. Chilli powder emerged as the most profitable product, recording the highest net return of ₹ 254.42/kg and a B:C ratio of 1.83. Overall, the resulted in B:C ratio of 1.73, with all products operating above their break-even levels. Financial performance improved substantially during 2019–20 to 2023–24, as total assets increased from ₹ 333 lakh to ₹ 5,486 lakh (CAGR 101.47%), while the net profit ratio rose from 2.56% to 8.99%. These findings confirm that commercial spice processing not only increases profitability but also strengthens value chains. Broadly, the findings conclude the role of post-harvest handling for strategic horticultural value enhancement. As depicted by Harvest-to-High Value Pathway, commercial enterprises not only enhance the competitiveness of India's spice sector, but also contribute subsequently to the long-term growth of horticultural industries. As horticulture has surpassed food grains production at the national level, focused schemes like SPICED and PMFME support processing infrastructure. The numbers from this one enterprise offer a reasonably encouraging case for investing further in spice-processing capacity as part of the state's broader horticultural growth story. While the present study provides useful evidence from a commercial spice-processing enterprise, similar studies across different processing units and regions would help to establish broader conclusions. Future research may also assess consumer acceptance and the environmental implications of spice processing to support sustainable horticultural development.

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