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Market dynamics and economic analysis of organic tomato in a developing region: Evidence from Prayagraj, Uttar Pradesh

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Abstract

Purpose: This study investigates the socio-economic conditions, marketing channels, and economic viability of organic tomato production in Prayagraj, Uttar Pradesh, a developing region with growing organic demand.

Design/methodology/approach: A structured survey was conducted with 180 respondents, including organic tomato farmers, traders, and consumers. Data collected focused on socio-economic characteristics, marketing channels, costs, margins, price spreads, and marketing efficiency.

Findings: The study finds that organic tomato cultivation is primarily carried out by middle-aged, semi-educated farmers with small to medium landholdings. Marketing inefficiencies and high intermediary margins pose significant challenges, with a dominant share of the market controlled by traditional retailer channels (70%). The emerging role of e-commerce offers potential for reducing intermediary margins. The marketing efficiency ratio (MER) of 1.5 suggests room for improving the value chain through better direct-to-consumer models.

Originality/value: This paper provides novel insights into the organic tomato supply chain in Prayagraj, a region characterized by small-scale organic farming. It highlights the need for policy interventions to improve marketing efficiency, reduce intermediary costs, and promote e-commerce solutions to enhance profitability for farmers.

Keywords: Direct marketing, E-commerce, marketing efficiency, organic farming, price spread

Introduction

Organic agriculture in India has gained significant traction due to rising health consciousness and consumer demand for environmentally sustainable products. Tomatoes are one of the most widely cultivated and consumed vegetables in India, and organic tomatoes are emerging as a niche product in urban markets. However, the organic farming sector in rural areas faces numerous challenges, including high production costs, inefficient marketing channels, and low farmer profitability. This study examines the market dynamics of organic tomato production in Prayagraj, Uttar Pradesh. It explores the socio-economic profile of farmers involved in organic tomato cultivation, evaluates the marketing channels, and assesses the economic efficiency of these marketing channels. The findings aim to identify constraints in the organic tomato value chain and suggest strategies for enhancing market efficiency and farmer income.

Methodology

Primary data was collected using a structured questionnaire from 180 respondents, including 120 organic tomato farmers, 30 traders, and 30 consumers. A stratified sampling technique was used to ensure that different socio-economic groups were represented. The survey included questions related to socio-economic status, landholdings, income levels and marketing channels.

Results and Discussion

Socio-Economic Profile of Respondents

Age Distribution

Age Group	Number of Respondents	Percentage (%)
18–30 years	18	10%
31–40 years	50	28%
41–50 years	60	33%
51–60 years	40	22%
Above 60	12	7%

The majority of the organic tomato farmers in Prayagraj are aged between 31 and 50 years (61%). This age group is more likely to be engaged in organic farming, possibly due to a combination of experience, financial stability, and a willingness to innovate. Younger farmers (18–30 years) represent a smaller segment (10%), suggesting that organic farming in the region is still seen more as a supplementary activity rather than a primary source of livelihood for younger generations. Older farmers (above 60 years) account for only 7%, highlighting the lower participation of senior citizens in organic farming, possibly due to the physically demanding nature of the work and limited access to modern farming techniques.

Landholding Size

Category	Landholding (in acres)	Number of Respondents	Percentage (%)
Marginal	0–1	45	25%
Small	1–2	25	14%
Semi-Medium	2–4	28	16%
Medium	4–10	42	23%
Large	>10	40	22%

Organic tomato farmers in Prayagraj predominantly have small landholdings, with 58% of the farmers owning less than 2 acres of land. This is consistent with the pattern of organic farming in India, where small and marginal farmers dominate the sector. The predominance of small landholdings suggests that organic farming is often practiced by resource-constrained farmers who are seeking to reduce costs and improve sustainability. However, smaller landholdings may limit the farmers' ability to scale up production, which can have implications for profitability and market reach.

Income Level

Income Level (Annual)	Number of Respondents	Percentage (%)
₹20,000 - ₹40,000	70	39%
₹40,000 - ₹60,000	55	31%
₹60,000 - ₹80,000	30	17%
₹80,000 and above	25	13%

The income level of organic tomato farmers in Prayagraj is relatively low, with the majority of farmers earning between ₹20,000 and ₹60,000 annually (70% of respondents). This aligns with the notion that organic farming, particularly for tomatoes, is often a secondary source of income rather than the primary livelihood. The relatively low income levels also point to the financial challenges faced by organic farmers, such as high production costs, marketing inefficiencies, and limited access to premium markets that would offer higher returns. These figures suggest that organic tomato farming remains a viable option for

supplementary income but is not yet a full-fledged economic activity for most farmers. Most farmers earn between ₹20,000 and ₹60,000 annually, suggesting that organic tomato farming remains a secondary source of income for many.

Marketing Channels

Marketing Channel	Percentage (%)
Farmer to Consumer (Direct Sales)	10%
Farmer to Retailer to Consumer	70%
Farmer to Organic Retail Stores	5%
Farmer to E-commerce Platform	15%

The marketing channels for organic tomatoes in Prayagraj reveal a heavy reliance on traditional retailer-based models. The dominant channel is farmer-to-retailer-to-consumer, accounting for 70% of the sales. This reliance on middlemen increases the cost of tomatoes for consumers and reduces the income that farmers receive from their produce. The presence of multiple intermediaries between farmers and consumers not only increases the price spread but also reduces the profitability for the farmers. On a positive note, there is emerging potential for e-commerce platforms (15%) to provide an alternative, direct-to-consumer marketing channel. E-commerce has the ability to bypass traditional middlemen, thereby reducing marketing costs and increasing the share of profits that reach farmers. However, for e-commerce to reach its full potential, challenges such as logistics, customer awareness, and reliable online platforms must be addressed. Direct sales from farmer to consumer are minimal (10%), indicating that while it is a more profitable option, it is not widely adopted, likely due to logistical and market access constraints faced by farmers. Organic retail stores account for only 5% of the marketing channels, which indicates that specialized organic stores are still underdeveloped in the region.

Marketing Costs and Efficiency

Marketing Costs

Stage	Cost per Kg (₹)	Percentage of Total Cost
Farm Gate (Production)	₹12	30%
Transportation & Storage	₹5	12.5%
Packaging & Handling	₹3	7.5%
Total	₹20	50%

The cost breakdown shows that the farm gate cost, which includes production costs, is the largest component (₹12 per kg or 30% of the total cost). Transportation and storage costs contribute ₹5 per kg (12.5%), while packaging and handling costs are ₹3 per kg (7.5%). The total marketing cost of ₹20 per kg represents 50% of the cost structure, which is substantial given the relatively low income levels of farmers.

Marketing Efficiency Ratio (MER)

Metric	Value
Marketing Efficiency Ratio (MER)	1.5
Value to Consumer per ₹1 Marketing Cost	₹ 1.50

The Marketing Efficiency Ratio (MER) of 1.5 suggests that for every ₹1 spent on marketing, consumers are receiving ₹1.50 worth of value. While this indicates that there is some

efficiency in the current system, there is certainly room for improvement. The relatively low MER indicates that the value chain could benefit from a reduction in intermediary costs and a more direct link between farmers and consumers.

Implications and Strategies for Improvement

Improving Marketing Efficiency

One of the key findings of this study is the significant room for improving marketing efficiency. The high role of intermediaries reduces the profitability of organic tomato farming in Prayagraj. Direct marketing models, such as farmer-to-consumer sales through farmers' markets or e-commerce platforms, could improve the efficiency of the supply chain by cutting down the number of middlemen and reducing overall marketing costs.

E-commerce as an Emerging Channel

E-commerce platforms have the potential to revolutionize the marketing of organic tomatoes in Prayagraj. Direct access to urban consumers who are increasingly interested in organic produce could allow farmers to capture higher prices for their produce. However, challenges such as infrastructure, delivery logistics, and digital literacy need to be addressed to fully realize the potential of e-commerce. Additionally, farmers may need support in setting up online sales channels and gaining certification for organic produce, which can increase consumer trust.

Government and Policy Support

Government intervention can play a significant role in improving the situation for organic tomato farmers in Prayagraj. Providing support for organic certification, establishing organic farming clusters, and promoting farmer producer organizations (FPOs) can help streamline the supply chain. Government-backed initiatives for branding and marketing organic tomatoes could enhance the visibility of the produce, thereby opening new avenues for sales. Moreover, subsidies or financial assistance for marketing infrastructure and technology adoption (e.g., e-commerce platforms and online payment systems) could help farmers reduce costs and increase their income.

Expanding Direct-to-Consumer Models

Promoting direct sales to consumers through farmers' markets, community-supported agriculture (CSA) programs, and partnerships with organic retail stores could also help reduce intermediaries and improve the share of profits retained by farmers. For this to succeed, farmers need to be supported with training, market access, and infrastructure for storage, packaging, and transportation.

Conclusion

In conclusion, organic tomato farming in Prayagraj is an emerging sector, but faces significant challenges related to marketing inefficiencies, high intermediary margins, and limited market access. Although organic tomato cultivation is a promising and sustainable farming practice, the socio-economic conditions of farmers and inefficiencies in the marketing channels reduce its overall profitability. The study highlights the need for innovative marketing solutions such as direct-to-consumer sales and the promotion of e-commerce platforms, which can help reduce costs and improve income for farmers. Support from the government

and the private sector in the form of infrastructure development, certification, and branding initiatives will be crucial to enhance the viability and growth of the organic tomato sector in Prayagraj.

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