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A study on price spread and marketing efficiency of mushroom enterprises in the western region of Tamil Nadu

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Abstract
Mushroom cultivation diversifies farming, providing quality food and addressing health and environmental concerns. Mushrooms, being diverse organisms, have played an important role in human welfare since ancient times. This study examines the price spread and marketing efficiency of mushroom enterprises in the western region of Tamil Nadu. The research focuses on the Coimbatore and Erode districts, which are major mushroom-producing areas, and involves a sample of 40 mushroom farmers from various scales of production. Data were collected through face-to-face interviews with farmers, wholesalers, and retailers. The results reveal different marketing channels and their impact on price spread and efficiency. Direct sales channels, such as selling directly to consumers, offer the highest marketing efficiency, allowing farmers to retain a greater share of the consumer price. Channels involving wholesalers and retailers have higher costs but provide broader market reach. A notable finding is the considerable variation in marketing costs, margins, and efficiencies across different channels. The study highlights the potential of optimizing marketing strategies and practices to improve profitability and sustainability in the mushroom industry. Recommendations include enhancing supply availability, streamlining loan processes, and boosting market support to raise awareness of mushrooms' nutritional benefits. Addressing challenges such as production inconsistencies and short shelf life will further enhance the industry's prospects.

Keywords: Mushroom enterprises, price spread, marketing efficiency

1. Introduction
Mushroom farming is becoming a major commercial activity worldwide. In India, it began recently and has become popular in states such as Himachal Pradesh, Punjab, Haryana, Uttar Pradesh, Maharashtra, Tamil Nadu, Karnataka, and Andhra Pradesh (Atri and Mridu. 2021) [1]. Haryana's districts of Sonipat, Panipat, and Gurgaon are known for significant mushroom production, particularly white button and oyster mushrooms (Gupta *et al.*, 2022) [7]. Mushroom cultivation diversifies farming, providing quality food and addressing health and environmental concerns (Moxley *et al.*, 2022) [10]. Mushrooms, being diverse organisms, have played an important role in human welfare since ancient times. They contribute to natural resource conservation and recycling agricultural waste (Deshpande and Arya, 2022) [4]. Mushroom farming is a profitable and sustainable option for small-scale farmers and agricultural workers. It offers extra income within a few months and does not require large land areas, making it accessible to those with limited space. This type of farming is a cost-effective way to utilize agricultural waste and can improve farmers' incomes beyond traditional crops (Ferdousi *et al.*, 2020) [6]. India's varied soil and climate conditions support the growth of different mushroom varieties across the country, offering significant opportunities for cultivation due to the availability of raw materials and suitable weather (Carrasco *et al.*, 2021) [3].
The global mushroom industry has grown rapidly in the past 20 years, with many new types of mushrooms now being commercially grown (Palanichamy *et al.*, 2023) [13]. Despite this growth, mushrooms are not yet a regular part of the diet for most Indian consumers (Shah, 2021) [14]. Though India has favorable conditions for growing mushrooms, including good weather, plenty of agricultural waste, and cheap labor, the country's mushroom industry has been slow to grow until around 2000 (Bhumarkar *et al.*, 2021) [2]. India currently produces about 0.15 million tonnes of mushrooms annually.

From 2010 to 2018, the industry grew at an average rate of 4.3% each year, with significant growth in the past two years. Of the mushrooms produced in India in 2018, 73% were white button mushrooms, followed by 16% oyster mushrooms, 7% paddy straw mushrooms, and 3% milky mushrooms. Compared to other vegetables, mushroom consumption in India is low, less than 100 grams per person per year. In 2016-2017, the Indian mushroom industry earned ` 7282.26 lakhs from exporting 1054 quintals of canned and frozen white button mushrooms (Gupta *et al.*, 2022) [7].

India's mushroom industry is mainly focused on white button mushrooms, which require advanced growing methods and significant investment (Singh *et al.*, 2020) [16]. There are two main types of mushroom growers in India: those who grow white button mushrooms year-round in controlled environments and those who grow them seasonally in winter (Jones, 2021). Seasonal cultivation is common in northern and western India. Farmers grow oyster, paddy straw and milky mushrooms seasonally in low-cost structures (Thakur, 2020) [17]. Oyster mushrooms are popular in Bihar, Chhattisgarh, Uttarakhand, and the northeastern states. Paddy straw mushrooms are common in Odisha and Chhattisgarh, while milky mushrooms are favored in Tamil Nadu (Dutta *et al.*, 2023) [5].

In the western region of Tamil Nadu, mushroom production is a significant industry, accounting for around 21-30% of the state's overall production. Although growing mushrooms is seen as a profitable venture, many farmers face obstacles in adopting it. These challenges include a lack of essential supplies such as spawn and compost, problems in obtaining loans, insufficient marketing support, low awareness of mushrooms' nutritional benefits, limited technical guidance, inconsistent production levels, the short shelf life of mushrooms, transportation difficulties, labor-intensive compost preparation, few post-harvest processing options, and a lack of regulatory frameworks. Despite these issues, mushroom farming offers a low-risk, high-reward opportunity due to the premium market prices. This research paper will explore the price distribution among different participants in the mushroom business and assess the marketing efficiency of mushroom enterprises. The goal is to offer insights into the price spread and marketing performance of mushroom cultivation.

2. Materials and Methods

The Western part of Tamil Nadu has been chosen as a study area since it accounts for the highest share of total mushroom production in Tamil Nadu. The Coimbatore and Erode districts of the western zones of Tamil Nadu were specifically chosen as it is the leading growing region of the state The participants for the present analysis are preferred using simple random Sampling. The study sample size was 40. The study respondents were mushroom farmers who have been growing mushrooms on small, medium, and big scales, under the study's objectives. For each of the chosen areas, a list of mushroom-growing farmers, wholesalers, and retailers was compiled independently. Primary data were collected from the mushroom enterprises, wholesalers and retailers through face-to-face interviews using a well-structured interview schedule.

Table 1: Distribution of sample in the study area

No. Sample Respondents	Coimbatore	Erode	Total
Mushroom Enterprise	20	20	40
Wholesalers	5	5	10
Retailers	5	5	10

2.1 Price Spread

The price spread is the variance between the net price obtained by the consumer and the price received by the producers (Naik and Maurya, 2020) [11].

Price spread=Pp -Pf

Where,
Pp= Price received by the intermediary
Pf = Price received by the producer

2.2 Producer Share in Consumer Rupee

Producer Share in Consumer Rupee refers to the proportion of the retail price, paid by the consumer, that the producer receives (Narasalagi and Shivashankar, 2020) [12]. This metric is expressed as a percentage. The formula to determine the producer share in consumer rupee (Ps) is as follows:

PS = (Price Received by the Producer ÷ Retail Price) × 100

2.3 Marketing efficiency

Marketing efficiency is a measure of how well a market structure fulfills its intended role or function (Sikander *et al.*, 2022). It gauges the level of market performance. In the current research, the calculation of marketing efficiency for mushrooms is based on a specific formula as follows:

a. Shepherd's formula

The evaluation of marketing efficiency can be achieved by calculating the ratio between the total value of goods marketed and the associated marketing costs. A higher ratio indicates higher efficiency, while a lower ratio suggests lower efficiency (Kumar *et al.*, 2023) [9]. In this study the efficiency of the Mushroom marketing system is assessed using the specified marketing efficiency measures.

$$\text{Marketing Efficiency} = \frac{\text{Value of produce sold or retail price (V)}}{\text{Total marketing cost + margin (I)}}$$

The efficiency increases with the ratio and vice versa.

3. Results and Discussion

3.1 Existing marketing channels by mushroom enterprises and price spread of mushroom

The key marketing pathways in the research region were:

Marketing Channel I

Enterprise →Wholesaler/Commission Agent → Retailers → Consumer

Marketing Channel II

Enterprise → Wholesaler/Commission Agent → Consumer

Marketing Channel III
Enterprise → Retailers → Consumer

Marketing Channel IV
Enterprise → Consumer

3.2 Price spread of mushrooms across diverse marketing channels

Price spread serves as a significant metric for evaluating marketing efficiency. It demonstrates how much the price of a product increases as it moves through different intermediaries in the marketing chain. This increase includes the marketing costs borne by intermediaries and their profit margins. Given the perishable nature of mushrooms, their price spread tends to be higher, leading to increased consumer prices. This study examines the price spread to discern the distribution of marketing costs and margins within mushroom marketing.
The various marketing channels used by enterprise and their price spread are discussed below separately.

Table 2: Price spread and enterprise share in consumer price borne by various categories of mushroom cultivators in channel – I

Price spread (Rs. /Kg)	I	
Particulars	**Rs.**	**%**
I. Enterprise/Unit		
Gross price received	170	78.68
Net price received	163.27	75.56
Marketing cost	6.73	3.11
II. Wholesaler		
Price paid	170	78.68
Price received	186.53	86.33
Marketing cost	1.53	0.71
Marketing margin	15	6.94
III. Retailers		
Price paid	186.53	86.33
Price received	216.07	100.00
Marketing cost	4.54	2.10
Marketing margin	25	11.57
IV. Consumer	216.07	100.00
Price spread (Rs. /Kg)	46.07	
Farmer share in consumer		
price	78.68	

Table 2 provides a comprehensive insight into the intricacies of marketing expenses across various segments of the mushroom cultivation process within Channel – I. The data, presented in terms of Rupees per kilogram, reveals the financial dynamics involved in each stage. At the level of the Enterprise/Unit, the gross price received for mushrooms amounts to 170 Rs., encompassing 78.68% of the total value. After deducting expenses, the net price received stands at 163.27 Rs., equivalent to 75.56%. The marketing cost associated with this stage is 6.73 Rs., constituting 3.11% of the total. Transitioning to the Wholesaler phase, the price paid by them is 170 Rs., representing 78.68% of the value. Upon reselling, the price received is 186.53 Rs., forming 86.33%. Their marketing cost remains minimal at 1.53 Rs., contributing just 0.71%. The Wholesaler's marketing margin is 15 Rs., amounting to 6.94%. At the Retailer level, the price paid for mushrooms is 186.53 Rs., accounting for 86.33% of the value. Upon reselling to the consumer, the price received becomes 216.07 Rs., constituting 100% of the value. Marketing costs for retailers sum up to 4.54 Rs., The Retailer's marketing margin is 25 Rs., representing 11.57%. Table 3 meticulously dissects the financial aspects of mushroom marketing in different stages, enabling a better understanding of cost distribution and margins among various stakeholders.

Table 3: Price spread and enterprise share in consumer price borne by various categories of mushroom cultivators in channel – II

Price spread (Rs. /Kg)	II	
Particulars	**Rs.**	**%**
I. Enterprise/Unit		
Gross price received	170	83.74
Net price received	163.27	80.43
Marketing cost	6.73	3.32
II. Wholesaler		
Price paid	170	83.74
Price received	203	100.00
Marketing cost	3	1.48
Marketing margin	30	14.78
IV. Consumer	203	100.00
Price spread (Rs. /Kg)	33	
Farmer share in consumer price	83.74	
Marketing efficiency	5.11	

Table 3 Marketing cost borne by various categories of mushroom cultivators in Channel – II, provides a detailed glimpse into the financial intricacies of mushroom marketing across different stages within the specified channel. The data, presented in terms of Rupees per kilogram, underscores the economic dynamics at play at each phase. Starting with the Enterprise/Unit level, the gross price received for mushrooms stands at 170 Rs., representing 83.74% of the total value. After deducting expenses, the net price received is 163.27 Rs., equivalent to 80.43%. The marketing cost incurred during this stage amounts to 6.73 Rs., contributing 3.32% to the total. Transitioning to the Wholesaler phase, the price paid for mushrooms is 170 Rs., comprising 83.74% of the value. Upon reselling, the price received by the Wholesaler rises to 203 Rs., encompassing 100% of the value. The marketing cost associated with this stage is 3 Rs., representing 1.48% of the total. Notably, the Wholesaler's marketing margin stands at 30 Rs., which is 14.78%. This table offers a comprehensive analysis of the financial aspects of mushroom marketing in the context of Channel – II. It sheds light on the distribution of costs and margins across different stages of the process, thereby enhancing our understanding of the economic dimensions that influence mushroom cultivation and trade.

Table 4: Price Spread and Enterprise share in Consumer price borne by various categories of mushroom cultivators in Channel – III

Price spread (Rs. /Kg)	III	
Particulars	**Rs.**	**%**
I. Enterprise/Unit		
Gross price received	180	85.90
Net price received	176.73	84.34
Marketing cost	3.27	1.56
III. Retailers		
Price paid	180	85.90
Price received	209.54	100.00
Marketing cost	4.54	2.17
Marketing margin	25	11.93
IV. Consumer	209.54	100.00
Price spread (Rs. /Kg)	29.54	
Farmer share in consumer price	85.90	
Marketing efficiency	6.39	

Table 4 Marketing cost borne by various categories of mushroom cultivators in Channel – III, provides a detailed breakdown of the economic aspects involved in mushroom marketing within the specified channel. The data presented in Rupees per kilogram offers insights into the financial dynamics at different stages of the marketing process. Commencing at the Enterprise/Unit level, the gross price received for mushrooms amounts to 180 Rs., constituting 85.90% of the total value. Post expenses deduction, the net price received equals 176.73 Rs., making up 84.34% of the total. The marketing cost incurred during this stage is 3.27 Rs., representing 1.56% of the total. Shifting focus to the Retailer stage, the price paid for mushrooms is 180 Rs., accounting for 85.90% of the value. Upon reselling, the price received by the Retailer increases to 209.54 Rs., encompassing 100% of the value. The marketing cost in this phase stands at 4.54 Rs., representing 2.17% of the total. Notably, the Retailer's marketing margin is 25 Rs., making up 11.93%. This table contributes to a comprehensive understanding of the financial dynamics of mushroom marketing in Channel – III. Analysing the distribution of costs and margins across distinct stages, it provides valuable insights into the economic factors influencing mushroom cultivation and trade in this particular marketing pathway.

Table 5: Price Spread and Enterprise share in Consumer price borne by various categories of mushroom cultivators in Channel – IV

Price spread (Rs. /Kg)	IV	
Particulars	**Rs.**	**%**
I. Enterprise/Unit		
Gross price received	185	100.00
Net price received	181.73	98.23
Marketing cost	3.27	1.77
IV. Consumer	185	100.00
Price spread (Rs. /Kg)	0	
Farmer share in consumer price	100.00	
Marketing efficiency	56.57	

In the context of Channel – IV, as depicted in Table 5 Marketing cost borne by various categories of mushroom cultivators, a comprehensive breakdown of the economic dynamics involved in the last leg of mushroom marketing is presented. This table 5 unveils a detailed financial analysis that offers insights into the costs and margins associated with this specific marketing pathway. At the initial stage, within the Enterprise/Unit, the gross price received for mushrooms is 185 Rs., constituting the entire 100% value. Post the deduction of expenses, the net price received stands at 181.73 Rs., accounting for a significant 98.23% of the total value. The marketing cost, incurred during this phase, amounts to 3.27 Rs., representing a mere 1.77% of the total value. From a more extensive perspective, this table underscores the distinct financial aspects involved in Channel – IV mushroom marketing. A meticulous analysis of costs, margins, and price spread, provides a deeper comprehension of the intricate economic forces governing this marketing pathway, thereby enhancing our understanding of mushroom cultivation and trade dynamics within this context.

3.3 Marketing Cost, Marketing Margin and Marketing efficiency of different marketing pathways in the research region

Table 6: Estimation of total Marketing Cost & Margin and Marketing efficiency of different marketing channels

Channel (Rs. /Kg)	I	II	III	IV
Particulars				
Total marketing costs	12.8	9.73	7.81	3.27
Total marketing margin	40	30	25	0
Total	52.8	39.73	32.81	3.27
Price spread (Rs. /Kg)	46.07	33	29.54	0
farmer share in the consumer price	78.68	83.74	85.90	100.00
Marketing efficiency	4.09	5.11	6.39	56.57

Table 6 provides a comprehensive overview of the marketing efficiency associated with different marketing pathways within the research region. The concept of marketing efficiency refers to the ratio of the total marketing margin to the total marketing costs, demonstrating how effectively costs are managed and how much of the final product's value reaches the producers. Upon examining the data, it is evident that Channel IV showcases the highest marketing efficiency with a value of 56.57. This signifies that within this marketing pathway, mushroom growers retain a substantial portion of the final price, reflecting minimal marketing costs and maximum profit margins. On the other hand, Channel I demonstrate the lowest marketing efficiency with a value of 4.09, implying that a significant portion of the final price goes towards covering marketing costs, leaving a relatively smaller margin for the growers.

In summary, this table underscores the significance of efficient marketing strategies in determining the overall profitability of mushroom cultivation. It highlights the varying levels of efficiency across different marketing pathways, shedding light on the potential financial gains for growers, and thus provides valuable insights for optimizing marketing practices in the mushroom industry within the research region.

4. Conclusion

In conclusion, the study on the price spread and marketing efficiency of mushroom enterprises in the western region of Tamil Nadu reveals both challenges and opportunities for the industry. The findings demonstrate that while mushroom farming in this area offers a profitable venture for farmers, various obstacles such as inadequate access to essential supplies, limited marketing support, and high production costs hinder its full potential. However, different marketing channels present unique advantages and efficiency levels.

Channels with direct sales to consumers show the highest marketing efficiency, allowing farmers to retain a greater share of the consumer price. Meanwhile, channels involving wholesalers and retailers incur higher costs but provide broader market reach. To maximize the industry's growth, it is essential to address the existing challenges and adopt optimized marketing practices tailored to each channel's efficiency. By improving infrastructure, market access, and education about mushrooms' nutritional benefits, the mushroom industry in Tamil Nadu can achieve sustained and equitable growth for all stakeholders.

A thorough assessment of the mushroom industry in the western region of Tamil Nadu reveals both promising opportunities and notable challenges. Recommendations to improve marketing efficiency include enhancing the availability of essential inputs such as spawn and compost, streamlining loan processes, and increasing market support to boost awareness of mushrooms' nutritional benefits. Encouraging technical guidance and consistent production levels can also help farmers. Addressing the perishable nature of mushrooms through better post-harvest processing and storage options could mitigate short shelf life concerns. Improved transportation infrastructure and support for labor-intensive activities such as compost preparation can drive profitability. A focus on optimizing marketing channels and engaging directly with consumers may help reduce price spread. On the downside, limitations include a lack of regulatory frameworks, low consumption rates among consumers, and limited awareness of mushrooms' health benefits. Despite these challenges, there remains significant potential for sustainable growth in the mushroom industry through targeted support and investment.

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