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A Comparative Study on Marketing Cost, Marketing Margin and Price Spread for Open versus Protected Cultivation of Tomatoes

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

The study aims to analyse the marketing cost, marketing margin, price spread, value added in the marketing system and efficiency of different distribution channels in tomatoes marketing which was produced under open and protected environment in Karnataka. The Acharya's method of marketing efficiency was adopted for the study. The study was conducted during the year 2021 to 2022 in Karnataka. Primary data pertaining to the study were collected from 15 farmers each under open and protected cultivation practices in Kolar and Belagavi districts of Karnataka. The data related to market intermediaries are collected from 15 wholesalers, 15 retailers and 5 private companies from each district with the help of structured schedule. Three marketing channels were identified. These are producer to consumer, producer to wholesaler to retailer to consumer and producer to private companies to consumer. Though the channel comprising producer to consumer was more efficient and producer share in consumer rupee was the highest its share was very less out of the total volume of tomatoes marketed because of limited support from public bodies. The result shows that the channel involving producer to private companies to consumer was most prominent and had

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higher marketing efficiency and had better producer share in consumer rupee under both open and protected cultivation practices. The Government should take initiative through FPOs for upliftment of direct selling of produce to consumer.

Keywords: Marketing cost; marketing margin; price spread; marketing efficiency.

ABBREVIATIONS

ME : Marketing Efficiency
NP : Net price received by the producer
MC : Marketing cost
MM: Marketing margin

1. INTRODUCTION

Tomato (*Solanum lycopersicum*) is one of the most important vegetable crops in India and world's highly consumed vegetable. It was originated in western South America and domestication is thought to have occurred in Central America. The tomato arrived to India by the way of Portuguese invaders in 16th century. It was grown from the 18th century onwards under British rule. Tomatoes are also universally treated as "protective food" because it provides vitamins and minerals. It is an annual crop with crop duration of 110 to 140 days and it starts bearing from 50 to 60 days. Tomatoes are consumed directly as raw vegetables in sandwiches, salads, etc. Several processed food materials like paste, sauce, puree, syrup, ketchup, etc. are also prepared on a large scale. It is a good appetizer and its soup is said to good remedy for patients suffering from constipation. India is the world's second -largest producer of tomatoes accounting around 11 percent of world production (FAOSTAT, 2020).. The total tomato production is 21.18 million tonnes with productivity of 14.0 tonnes per ha (Ministry of Agriculture and Farmers Welfare, 2021). Orissa, Andhra Pradesh and Karnataka are the major tomato producing states in the country. It is considered an important commercial vegetable because of its shorter life duration and gives a high yield. Tomato is a potential vegetable in economic point of view and hence area under its cultivation is increasing day by day [1,2]. Due to adverse weather conditions in open cultivation, tomatoes cultivation under controlled environment practiced in all over India. The indeterminate types of tomatoes are cultivated under polyhouse structure with irrespective of weather conditions [3]. In addition to meeting the domestic market, the tomato has been identified as a potential export-oriented vegetable crop exported to the countries like Morocco, Canada, France, Belgium, United States, Turkey and China. Around 88.45 thousand metric tonnes of tomatoes had been exported during the year 2021 [4,5].

The marketing of tomatoes is a tedious task for the farmers. The farmers in the potential vegetable producing districts of Karnataka are confused in marketing activities. The exploitation of middleman in the regulated market, increased transportation cost and high labour wages for loading and unloading resulted in the lower net price received by the farmers [6-8]. The tomatoes producers in the study area are well versed in production activities but they are lagging behind in the marketing. To tap the efficient marketing channel and to suggest the better channel for the farmers in the study area and to strengthen the knowledge of farmers regarding marketing of tomatoes which was produced under open and protected condition, the present study was taken with the objective to study the price spread and marketing efficiency under open and protected cultivation of tomatoes in Karnataka.

2. MATERIALS AND METHODS

The present study concentrated on marketing cost, marketing margin, price spread and marketing efficiency for tomatoes produced under both open and protected conditions. The study was conducted during the period 2021-22 in Karnataka. Kolar and Belagavi districts are located in Southern and Northern part of the State respectively. These two districts are top two vegetable producing districts in Karnataka. Kolar and Belagavi districts were selected for the study as they are the highest vegetable producing districts in Karnataka. Tomato crop was selected based on production data from each district from 2017-18 to 2019- 20 (triennium average). The primary data pertaining to the study were collected from 15 farmers for both open and protected conditions and from each district. The data pertaining to market intermediaries were collected from 15 wholesalers, 15 retailers and 5 private companies from each district. The random sampling method had been employed for data

collection. The descriptive statistics and Acharya's method of marketing efficiency was adopted for analysis of marketing efficiency.

Descriptive statistics provide simple summaries about the sample and about the observations that have been made. It deals with the presentation of numerical facts or data in either tables or graph form and with the methodology of analysing the data. The percentages were calculated in the present study.

Acharya's method [9]: Acharya's marketing efficiency measures include the total marketing cost, net marketing margins of intermediaries, price received by farmer and price paid by the consumers. The Acharya's method of marketing efficiency formulae has been presented as follows:

ME=NP/(MC+MM)

Where,

ME = Marketing Efficiency
NP = Net price received by the producer (₹/q)
MC = Marketing cost (₹/q)
MM = Marketing margin (₹/q)

3. RESULTS AND DISCUSSION

3.1 Pattern of Distribution of Tomatoes Produced under Open and Protected Environment

Three distinctive channels have been identified in marketing of tomatoes in the study area and they were channel-I – producer to consumer, channel-II – producer to wholesaler to retailer to consumer and channel-III – producer to private companies to consumer. Majority of the farmers in the study area followed channel-II (53.33%), followed by channel-III (40%) and channel-I (33.33%) for marketing of tomatoes produced under open condition. Whereas, under protected cultivation, the maximum number of farmers preferred to sell the tomatoes through channel-III (around 53%), followed by channel-II (around 47%). While, around 33 per cent of the farmers followed channel-I. The producers who had grown tomatoes under protected cultivation had rate contract with private companies on wholesale basis. The private companies lift the produce at the door steps of the producers. Hence, the producers grown tomatoes under protected cultivation preferred channel-III the most. The quality produce were marketed through this channel. Still to meet the demand of local people, the producer also depended on channel-II to certain extent.

3.2 Marketing Cost Incurred for Open versus Protected Cultivation of Tomatoes under Different Marketing Channels

The producers growing tomatoes under open and protected cultivation, sold the produce in all three channels. The total marketing cost incurred by producer, wholesaler, retailer and private companies under different marketing channels are presented in Table-2.

3.3 Marketing Cost Incurred for open Cultivation of Tomatoes under Different Marketing Channels

The marketing cost incurred by market intermediaries in different channels under open cultivation of tomatoes are reported in Table-2. The result reveals that the total marketing cost incurred in channel-I was nil and in channel-II it was ₹ 71.39 and in channel III was ₹ 52.29 for handling of 100 kg of every tomatoes under each of the channels.

In the channel-II, around 43 per cent of the total marketing cost was born by producer, about 35 per cent of the total marketing cost was expended by retailers and the remaining marketing cost in the channel (22%) was incurred by wholesaler. The producer (₹ 18.77 per quintal) and wholesaler (₹ 7.30 per quintal) spent maximum amount on transportation of the produce. The distance of the field to the market might be more which induced high transportation cost to producer. Wholesaler also spent substantially on transportation of tomatoes to the retailers. At retailer level also around ₹ 6.06 per quintal was spent on transportation of the produce. The second most important component was loading and unloading charges at both producer level (₹ 4.61 per quintal) and at wholesaler level (₹ 4.40 per quintal). Whereas, at retailer level it was the most important component was (₹ 6.06 per quintal). The retailers faced problem of hamali service. Hence, the retailers paid high wages resulted in huge investment on loading and unloading .The remaining marketing cost in the channel was shared by commission charges at producer level, packaging charges at wholesaler and retailer level and miscellaneous charges at each stage.

Table 1. Pattern of distribution of tomatoes produced under open and protected environment

n=30 for each cultivation practices

Sl. No.	Particulars	Numbers*	Percentage
1.	**Open cultivation**		
a.	Channel-I	10	33.33
b.	Channel-II	16	53.33
c.	Channel-III	12	40.00
2.	**Protected cultivation**		
a.	Channel-I	4	13.33
b.	Channel-II	14	46.67
c.	Channel-III	16	53.33

** denotes the multiple responses*

In the case of channel-III, with respect to producers marketing cost, the maximum cost was spent on transportation (₹ 9.13 per quintal). The private companies also expended around 20 per cent of the total marketing cost for transportation (₹ 10.47 per quintal). The next foremost component at producer level was loading and unloading charges (₹ 5.08 per quintal). At private companies' level also, it was loading and unloading charges (₹ 8.21 per quintal). The above mentioned costs altogether constituted around 63 per cent of the total marketing cost in the channel. The rest of the marketing cost was shared by remaining components at each stage.

3.4 Marketing Cost Incurred for Protected Cultivation of Tomatoes under Different Marketing Channels

Table-2 also represents the marketing cost incurred by the producer, wholesaler, private companies and retailers under protected cultivation of tomatoes. In channel-I, cent per cent of the total marketing cost was incurred by the producer (₹ 17.00 per quintal) in which the maximum amount was spent on transportation of tomatoes (₹ 7.50 per quintal, 44%), followed by packaging and miscellaneous charges. The producer harvested tomatoes and sold at weekly sandies under this channel.

The marketing cost incurred by producer, wholesaler and retailer was ₹ 34.91 per quintal (around 45%), ₹ 24.02 per quintal (around 31%) and ₹ 19.17 per quintal (around 24%) respectively in channel-II. Wherein, the majority of cost was spent on transportation at each stage in this channel. The farmers involved in marketing of tomatoes under this channel were found selling the produce at far away markets, especially in metropolitan cities. Hence, they had to spend substantially on transportation.

In the case of channel-III, the total marketing cost incurred by producer was ₹ 29.26 per quintal (around 41%) and by private companies was ₹ 42 per quintal (around 59%). Among the different operations, transportation cost was the major one which snatch away maximum share of the marketing cost incurred by the producer (around 27%) and private companies (around 21%). The remaining total marketing cost incurred by the producer was on loading and unloading charges, packaging charges, commission and miscellaneous charges. But, the commission charge was not paid by other market intermediaries in the channel.

It was observed that transportation and loading and unloading are the major components with maximum costs across all the channels under both the cultivation practices. This might be due to distance location of farm and markets which included high transportation cost. The farmers in the study area were laggard in adoption of own logistics. Hence, the rental vehicles demanded high price. For loading unloading, the farmers, wholesalers, private companies and retailers hired human labour with high wage rates or salary. Organizing farmer producer organizations for the crop would reduce the problem to a considerable extent. Till them group hiring of vehicles for transportation of the produce or custom hiring of vehicles and labour would help in reducing the marketing costs at different levels.

Table 2. Marketing costs incurred for open versus protected cultivation of tomatoes in different marketing channels

(₹/q)

Sl. No.	Particulars	Open cultivation				Protected cultivation					
		C-II	%	C-III	%	C-I	%	C-II	%	C-III	%
Marketing costs incurred by producer											
a.	Transportation	18.77	26.29	9.13	17.46	7.50	44.12	21.27	27.23	19.57	27.47
b.	Loading and unloading charges	4.61	6.46	5.08	9.72	4.75	27.94	4.86	6.22	4.81	6.75
c.	Packaging	2.11	2.96	1.75	3.35	3.00	17.65	2.14	2.74	1.69	2.37
d.	Commission charges	3.00	4.20	0.00	0.00	0.00	0.00	3.00	3.84	0.00	0.00
e.	Miscellaneous charges	2.11	2.96	2.58	4.93	1.75	10.29	3.64	4.66	3.19	4.47
Total marketing cost by producer		**30.60**	**42.86**	**18.54**	**35.46**	**17.00**	**100.00**	**34.91**	**44.70**	**29.26**	**41.06**
Marketing costs incurred by wholesaler											
a.	Loading and unloading charges	4.40	6.16	-	-	-	-	6.32	8.09	-	-
b.	Transportation	7.30	10.23	-	-	-	-	8.76	11.22	-	-
c.	Packaging	2.13	2.99	-	-	-	-	5.76	7.38	-	-
d.	Miscellaneous charges	1.93	2.71	-	-	-	-	3.18	4.07	-	-
Total marketing cost by wholesaler		**15.77**	**22.09**	**-**	**-**	**-**	**-**	**24.02**	**30.76**	**-**	**-**
Marketing cost incurred by private companies											
a.	Cleaning	-	-	2.50	4.78	-	-	-	-	3.70	5.19
b.	Loading and unloading charges	-	-	8.21	15.70	-	-	-	-	9.00	12.63
c.	Transportation	-	-	10.47	20.02	-	-	-	-	14.70	20.63
d.	Packaging	-	-	7.50	14.34	-	-	-	-	8.10	11.36
e.	Miscellaneous charges	-	-	5.07	9.70	-	-	-	-	6.50	9.12
Total marketing cost by private companies		**-**	**-**	**33.75**	**64.54**	**-**	**-**	**-**	**-**	**42.00**	**58.94**
Marketing cost incurred by retailer											
a.	Cleaning	3.96	5.54	-	-	-	-	5.23	6.70	-	-
b.	Loading and unloading charges	9.33	13.07	-	-	-	-	2.88	3.69	-	-
c.	Transportation	6.06	8.49	-	-	-	-	7.13	9.13	-	-
d.	Packaging	2.58	3.62	-	-	-	-	2.35	3.01	-	-
e.	Miscellaneous charges	3.08	4.32	-	-	-	-	1.58	2.02	-	-
Total marketing cost by retailers		**25.02**	**35.05**	**-**	**-**	**-**	**-**	**19.17**	**24.55**	**-**	**-**
Total marketing cost		**71.39**	**100**	**52.29**	**100**	**17.00**	**100**	**78.10**	**100**	**71.26**	**100**

3.5 Price Spread and Marketing Margins for Open versus Protected Cultivation of Tomatoes under Different Marketing Channels

Price spread, marketing margin, price received by the producer in the consumer's rupee and marketing efficiency were calculated for one quintal of tomatoes handled and are presented in Table-3.

3.6 Price spread and marketing margins for open cultivation of tomatoes under different marketing channels

The tomatoes are marketed through all three channels. With respect to channel-I, the farmer involved in farm gate sales such that marketing cost was nil in this channel. The producer sold tomatoes directly to ultimate consumer at the rate of ₹ 1,460 per quintal. The price received by the producer in the consumers' rupee was around ₹ 1,460 per quintal, which means producer share in consumer's rupee is 100 per cent.

It is observed under channel-II that, the producer sold the tomatoes to wholesaler for about ₹ 1,442 per quintal which includes marketing cost incurred by producer which was ₹ 30.60 per quintal. Hence, the price received by the producer was found to be ₹ 1,411 per quintal. The wholesalers marketing cost was ₹ 15.77 per quintal and attained the profit margin of around ₹ 371 per quintal by selling the tomatoes at a rate of ₹ 1,828 per quintal to retailers in the market. The retailer's marketing cost was ₹ 25 per quintal and profit margin was found to be ₹ 650 per quintal. The retailer sold the tomatoes to consumer for ₹ 2,504 per quintal. Producer share in consumer rupee was around 56 per cent. The value added in the marketing system was ₹ 1,092 per quintal. The marketing efficiency worked out was 1.29.

In the case of channel-III, the sampled respondents sold tomatoes to private companies for ₹ 1,970 per quintal which included the marketing cost of ₹ 18.55 per quintal and the farmers received the price of ₹ 1,952 per quintal of tomatoes. The marketing cost incurred by private companies was around ₹ 34 per quintal, which includes distribution costs. The private companies sold to ultimate consumer for ₹ 2,853 per quintal through their retail outlets. Producer share in consumer's rupee was around 68 per cent in this channel. The value added to the marketing system was around ₹ 901 per quintal in this channel and the marketing efficiency was 2.12.

3.7 Price Spread and Marketing Margins for Protected Cultivation of Tomatoes under Different Marketing Channels

Table-3 also reveals the results of price spread, marketing cost, marketing margin in different channel under protected cultivation of tomatoes. In channel-I the producer sold tomatoes directly to the consumer for ₹ 2,000 per quintal. The marketing cost incurred by the producer was around ₹ 17.00 per quintal. The price received by the farmer was ₹ 1,983 per quintal which was around 99.15 per cent share in consumers' rupee. The marketing efficiency was 116.65 under this channel. The farmers involved in direct distribution in weekly sandies on their own risk in anticipation of higher returns.

In the case of channel-II, the producer sold the produce in APMC market to wholesalers for ₹ 1,929 per quintal of tomatoes. The marketing cost and price received by the producer were around ₹ 35 and ₹ 1,894 respectively. The wholesalers marketing cost was ₹ 24 per quintal for handling of tomatoes and received the profit margin of ₹ 423 per quintal by selling tomatoes to retailers for ₹ 2,376 per quintal. The retailers marketing cost recorded was ₹ 19.15 per quintal of tomatoes. The retailers received the profit margin of ₹ 643 per quintal by selling tomatoes for ₹ 3,038 per quintal to ultimate consumers. The farmers received around 62.33 per cent, for each rupee paid by the consumer. The marketing efficiency evaluated was 1.65 under this channel.

With regard to channel-III, the producer sold tomatoes to private companies at ₹ 2,100 per quintal. The marketing cost incurred by producer was ₹ 29.26 per quintal. The marketing cost incurred by the private companies was ₹ 42.00 per quintal and sold to ultimate consumer through their own retail outlets for ₹ 2,950 per quintal. The private companies gained the profit margin of ₹ 829 per quintal. The producers share in consumers' rupee was around 70 per cent and the marketing efficiency calculated was 2.30 under this channel for marketing of tomatoes grown under protected cultivation.

Table 3. Price spread and marketing margins for open versus protected cultivation of tomatoes in different marketing channels

(₹/q)

Sl. No.	Particulars	Open cultivation			Protected cultivation		
		C-I	C-II	C-III	C-I	C-II	C-III
1.	Price received by farmers	1460.05	1411.16	1951.93	1982.98	1893.68	2070.74
2.	Marketing cost incurred by farmers	0.00	30.60	18.55	17.00	34.92	29.26
3.	Selling price of producers	1460.05	1441.76	1970.48	1999.98	1928.60	2100.00
4.	Wholesalers purchase price	-	1441.76	-	-	1928.60	-
5.	Marketing cost incurred by wholesalers	-	15.77	-	-	24.03	-
6.	Net profit margin by wholesaler	-	370.90	-	-	422.90	-
7.	Private companies purchase price	-	-	1970.48	-	-	2100.00
8.	Marketing cost incurred by private companies	-	-	33.75	-	-	42.00
9.	Net profit margin by private companies	-	-	866.33	-	-	828.70
10.	Retailers purchase price	-	1828.43	-	-	2375.53	-
11.	Marketing cost incurred by retailers	-	25.02	-	-	19.15	-
12.	Net profit margin by retailers	-	650.07	-	-	643.35	-
13.	Retailers selling price	-	2503.52	2853.06	-	3038.00	2950.00
Price spread							
I	Price paid by consumer	1460.05	2503.52	2853.06	1999.98	3038.00	2950.00
II	Total marketing cost	0.00	71.39	52.30	17.00	78.10	71.26
III	Total profit margins of intermediaries	0.00	1020.97	866.33	0.00	1066.25	828.70
IV	Price received by farmer	1460.05	1411.16	1951.93	1982.98	1893.68	2070.74
V	Value added by the marketing system	0.00	1092.36	901.13	17.00	1144.32	879.26
VI	**Producer share in consumer rupee (%)**	**100.00**	**56.37**	**68.42**	**99.15**	**62.33**	**70.19**
VIII	**Marketing efficiency**	**-**	**1.29**	**2.12**	**116.65**	**1.65**	**2.30**

In the channel-I the consumers took an advantage to harvest themselves and preferred superior quality of the produce in open cultivation practices. Hence, farmers marketed the produce at higher selling price compared to APMC market price. The quantity of tomatoes handled in channel-I are negligible out of the total quantity harvested. The farmers sold tomatoes through channel-II at lower market price compared to other two channels. The probable reason might be due to average level quality of tomatoes are marketed in regulated market which induced lower price. The farmers sorted and graded the tomatoes in the farm itself. The superior quality of the produce was sold to private companies. The private companies paid higher prices compared to regulated market.

Therefore few farmers in the study area marketed in collection centres which were located nearest to the farm and received higher returns. The producer share in consumer rupee was found higher in channel-I under both open and protected cultivation of tomatoes. But, the quantity distributed through channel-I are negligible. Hence, farmers in the study area failed to sell large quantity of produce through channel-I. The next best channel was channel-III under both the cultivation practices, where the farmers received higher share in consumers rupee with higher marketing efficiency compared to channel-II. The value added was higher in channel-II because, the market intermediaries are found more in this market system against other channels under both the cultivation practices. Hence, it could be concluded that sorting and cleaning fetches different market prices in different markets where farmers should not depend on only one channel. The utilization of diversified channels would lead to optimum returns.

4. CONCLUSION

The study revealed that three channels existed in the study area for open and protected cultivation of tomatoes. The marketing efficiency which was computed by Acharya's method revealed that channel-I comprising of Producer to Consumer had higher efficiency wherein it was indeterminate in open cultivation and higher in protected cultivation. Among the other channels, channel-II and channel-III were commonly found in the study area. Channel-III comprising of Producer to Private Companies to Consumer was the most prominent and efficient channel where producer share in consumer rupee and marketing efficiency were also higher compared to channel-II both cultivation practices in existing marketing situation. The tomato producers should add value at their level, which could be on individual basis or in group or cooperative and try to minimize the intermediaries which will reduce the price spread and increase the marketing efficiency. The farmers should be encouraged for direct selling of tomatoes. The sorting and grading is necessary components the farmers should follow to gain better returns.

5. LIMITATIONS OF THE STUDY

The present study restricted to major two tomato producing districts of Karnataka. In future one can took the study including few more potential areas.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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