Original Research Article

Analysis of marketing channels of papaya in middle Gujarat

ABSTRACT

This study investigates the marketing channels, price spread, and constraints faced by papaya producer and intermediaries in the middle Gujarat region, specifically in the districts of Vadodara, Anand, and Ahmedabad. A total of 150 farmers, 25 papaya wholesalers, and 25 papaya retailers were surveyed randomly using structured questionnaires to collect data on marketing channels, price spread, and constraints faced. Three main marketing channels were identified: Channel I (Farmer – Pre-harvest contractor – Wholesaler cum commission Agent – Retailer – Consumer), Channel II (Farmer – Wholesaler cum commission Agent – Retailer – Consumer), and Channel III (Farmer – Retailer – Consumer). The study reveals that Channel III is the most efficient and beneficial for papaya farmers, offering the highest net price, the lowest price spread, and the best marketing efficiency. Price spreads were notably high in Channel I at Rs.5000 per quintal, compared to Rs. 4670 per quintal in Channel II and a significantly reduced Rs. 2835 per quintal in Channel III. Constraints faced by papaya producers include disease and pests especially viral attacks, uncertain weather conditions, and high initial investment. Wholesalers and retailers face challenges related to transportation, wastage/spoilage, and lack of storage facilities. The findings suggest that adopting Channel III can enhance profitability for papaya farmers and improve the efficiency of the marketing chain. The study identifies the need for optimizing marketing channels and addressing constraints to ensure fair profit distribution and marketing of papaya.

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

1. INTRODUCTION

Fruits and vegetables (F&V) are considered in dietary guidance because of their high concentrations of dietary fiber, vitamins, minerals, especially electrolytes; and more recently phytochemicals, especially antioxidants [1,2]. According to World Health Organisation STEP-wise approach to surveillance surveys on chronic disease risk factors conducted in several African countries including Mauritius and in line with existing Food [16] and Agriculture Organisation data, fruit and vegetable intake (FVI) levels were found to be below the recommended daily intake of 400g/person [2,3]. Various reviews have associated low intake of fruits and vegetables with chronic diseases such as cardiovascular diseases, blood pressure, hypercholesterolemia, osteoporosis, many cancers, chronic obstructive pulmonary diseases, respiratory problems as well as mental health [2,4,5].

Papaya (*Carica papaya L.)* fruit is one of the healthiest, most delicious fruits of all times. No wonder papaya is reputably called the "Fruit of the Angels". It is sometimes referred to the "melon of health" as it is widely used as a folkloric herbal medicine [6]. Papaya is a popular tropical and subtropical fruit. For hundreds of years, it has been widely planted in tropical regions for its edible fruit, as well as in traditional ethnic health applications [7]. Herb parts (fruit, seeds, and leaves) are consumed as well as utilised as a pharmacological treatment for pain and illness[8,9]. Based on nutritional ratings and % Recommended Daily Allowance (RDA) for pro-vitamin A, ascorbic acid, potassium, folate, and fibre, papaya was classified in the top five nutritionally advantageous fruits[9,16] (together with guava, watermelon, grapefruit, and kiwifruit) among 38 common fruits [10] Papaya fruits, like many other tropical fruits, are high in antioxidants such as polyphenols, vitamins, minerals, protein, starch[9] and carotenoids [9,11,12]. Because of their propensity to donate hydrogen or electrons and generate stable radical intermediates, phenolic compounds are known to behave as antioxidants [9]. Antioxidant-phenolic compound consumption has been linked to the protection of chronic diseases such as cancer, diabetes, and cardiovascular disease [13]. Carotenoids are fat-soluble chemicals that have been linked to protection against cancer, age-related macular degeneration, [14] and heart disease [15].

According to the FAO report, global papaya production amounted to about 13.8 million metric tons in 2022, a decrease from around 14 million metric tons in 2021 [17]. The top 3 papaya-producing countries in the world (2021) are India ranks first with 5,540,000 tones production and 146,000 hectares of area under cultivation. Second rank Brazil with the production of 1,256,703 and the area under cultivation is 28,495. Third rank Indonesia with 1,168,265 tones of production and 12,279 hectares of area under cultivation of papaya [17].

In 2021, India's total papaya production reached 5,540,000 tonnes. The country has a total cultivation area of 146,000 hectares dedicated to papaya farming. With an average yield of 37,945 kg per hectare [17], this signifies the nation's proficiency in papaya cultivation.The top three states contributing significantly to papaya production in 2021-22 were Andhra Pradesh, Gujarat, and Maharashtra, in that order. Andhra Pradesh lead by producing 1,503,180 tonnes of papaya, accounting for 26% of the total papaya production in India. Following closely, Gujarat produced 1,107,880 tonnes, making up 19% of the total production. Maharashtra secured the third position with a production of 496,120 tonnes, contributing 8.6% to India's overall papaya production [18].

According to Trademap, Papaya exports fetched a total of $330 million globally [19]. Mexico, due to its proximity to the US is no. 1 rank with one-third of total exports. India is the largest producer of papaya in the world but it occupies a low 17 rank. India’s exports have progressively declined from $8.72 million in 2015 to $2.6 million in 2021 while total exports have grown by 13% during the same period. Our main markets are Nepal, Qatar, UAE, and Kuwait [19].

Gujarat is the second-largest producer of papaya in India as of 2022. In Gujarat, papaya cultivation spans an estimated 18,288 hectares, resulting in a total yield of

1,105,515 tons. With a productivity rate of 60.78 tons per hectare. Among the districts in Gujarat, Kutch leads as the top papaya producer with a production of 149,450 tons. Following closely, Tapi ranks second with 128,918 tons, while Vadodara secures the third position with a production of 123,484 tons [20].

Fruits are subjected to high price variability, and this leads to farm income fluctuation, affecting the livelihood of the farmers[16,21]. Recent years have seen rising concerns over the efficacy of marketing of fruits, with some arguing that this is causing high and volatile consumer costs with just a fraction of the consumer rupee going to the farmers. Because of their fragility, seasonality, and size, horticulture crops can be difficult to market. This paper's goal is to analyse many facets of their marketing, with a special emphasis on the marketing channels for papaya that have been set up to address shortcomings and enhance marketing effectiveness. The price spread along the marketing channel is directly proportional to the number of market intermediaries involved [21]. Farmers are eager to sell their products in markets where they may earn a good profit. On the other hand, small and marginal papaya growers usually sell their produce locally or to village merchants at lower prices due to insufficient market infrastructure, a lack of market information, and inadequate storage facilities. The interests of both the producer and the consumer should be considered during the papaya marketing process. Papayas frequently have to travel long distances to get to their destination, involving a lot of intermediaries who profit from the deal. As a result, the producer's share falls and the retail price rises. Thus, the purpose of the current study is to investigate how shares are allocated among all parties engaged in the papaya marketing process.

1.1 OBJECTIVES

To identify the different marketing channels of papaya

To estimate the price spread and marketing efficiency of identified marketing channels of papaya

To identify the constraints faced by producers and intermediaries

2. METHODOLOGY

The study was conducted in the middle Gujarat region. Three districts Vadodara, Anand, and Ahmedabad were purposively selected due to their higher papaya production compared to the other districts in the region. A total of 150 farmers were randomly chosen, with fifty farmers selected from each of the three districts. Additionally, using random sampling techniques, 25 papaya wholesalers and 25 papaya retailers were selected from Ahmedabad, Vadodara, and Anand, resulting in a total of 200 respondents for the study.

To identify the marketing channels of papaya, a structured schedule was developed. Respondents were asked to provide details on when, where, and how they sell their papayas, as well as other activities they undertake at their level.

2.1 Price spread

To analyze the price spread the following formula was used[22].

Price spread = Consumer price – Price received by producer

$$PS = Cp - Pf$$

Where;

PS = Price Spread

Cp = Consumer price

Pf = Price received by farmer

2.2 Marketing efficiency

The marketing efficiency in various channels in the study area was analyzed using Acharya's approach [23].

$$\text{MarketingEfficiency} = \frac{Pf}{Mc + Mm}$$

Where P_f = Net price received by the farmer

Mc = Total marketing cost

Mm = Total marketing margin

2.3 Garret ranking

To identify the challenges faced by papaya growers and intermediaries, respondents were asked to suggest potential constraints encountered by them. The Garret Ranking method [24] was used to identify the most constant faced by the respondents.

$$\text{Per cent position} = \frac{100\,(Rij - 0.5)}{Nj}$$

Where: - Rij = Rank given for the ith variable by jth respondents
Nj = Number of variables ranked by jth respondents
This approach was adopted to comprehensively examine the marketing channels, price spread, and challenges faced by papaya growers and intermediaries in the middle Gujarat region.

3. RESULTS AND DISCUSSION

3.1 Marketing channels of Papaya

Production of an agricultural/horticultural commodity is complete only when it reaches the hands of those who need it, i.e., the consumers[25]. All the commodities may not be produced in all the areas, because of variation in agro-climatic conditions. Hence, there arises a need for their movement from producers to ultimate

consumers. Here, an attempt has been made to identify the marketing channels involved in the marketing of papaya in the study area. Papaya was observed to adopt the following channels in itsmarketing.

Table No. 1 Marketing channels of Papaya

Channel No	Marketing Channel
Channel I	Farmer –Pre-harvest contractor – Wholesaler cum commission Agent – Retailer – Consumer
Channel II	Farmer – Wholesaler cum commission Agent – Retailer – Consumer
ChannelIII	Farmer – Retailer – Consumer

Three channels were found in the study area. In the study area, most farmers followed channel-I to move papaya, while channel-III was less followed by farmers for moving papaya.

4.2 Price spread and marketing efficiency of identified marketing channels of papaya

Table No.2 Price spread and marketing efficiency of identified marketing channels of papaya(Rs per quintal)

	Channel-I	Channel-II	Channel-III
Producer			
i) Sale price	1000	1800	2200
Cleaning, grading, and packing cost		110	110
Loading and unloading charges		60	40
Transportation cost		120	85
Wastage		150	150
Other costs		85	105
ii) Total marketing cost	-	525	490
iii) Net price received	1000	1275	1665
Pre-harvest contractor			
i) Purchase price	1000	-	-
Cleaning, grading, and packing cost	110		
Loading and unloading charges	60		
Transportation cost	120		
Wastage	150		
Other costs	65		
ii)Total marketing cost	505	-	-
iii) marketing margin	360	-	-
iv) Sale price	1865	-	-
Wholesaler cum commission agent			
i) Purchase price	1865	1800	-
Cleaning, grading, and packing cost	85	85	
Loading and unloading charges	40	40	
Transportation cost	70	70	
Wastage	250	250	
Other costs	120	120	

ii) Total marketing cost	565	565	-
iii) Marketing margin	535	535	-
iv) Sale price	2965	2900	-
Retailer			
i) Purchase price	2965	2900	2200
Loading and unloading charges	40	40	40
Transportation cost	70	70	120
Wastage	750	750	650
Other costs	90	90	40
ii) Total marketing cost	950	950	850
iii) Marketing margin	2085	2085	1450
iv) Sale price	6000	5935	4500
The price paid by a consumer	6000	5935	4500
Total marketing cost	2020	2050	1385
Total marketing margin	2980	2620	1450
Price Spread	5000	4670	2835
Marketing efficiency (Acharya's Method)	0.2	0.27	0.59

In the above table Price spread and marketing efficiency of identified marketing channels of papaya with cost have been shown. Papaya moves through these 3 marketing channels in middle Gujarat region. These channels offer valuable perspectives on the profit margins and efficiency for the farmer. Channel-I and Channel-II, have multiple intermediaries from the producer to the consumer. A detailed review of the performance of each channel can guide farmers in optimizing their profitability and reducing expenses.

In Channel-I,the pre-harvest contractor, who buys the papaya from the producerfor the price of Rs. 1000per quintal, incurs a total marketing cost of Rs. 505per quintal and marketing margin Rs. 360 per quintal, resulting in a sale price ofRs. 1865 per quintal. The wholesaler cum commission agent purchase papaya at the price ofRs. 1865 per quintal. He adds a marketing margin of Rs. 535 per quintal and Rs. 565 per quintal marketing costthen sell to retailer at Rs. 2965 per quintal. Finally, the retailer incurring marketing margin ofRs. 2085 per quintal and Rs. 950 per quintal marketing cost offers the papaya to consumer for Rs. 6000per quintal by adding, more than six times the producer's original price. The producer sell papaya for a price of Rs. 1000 per quintal, but by the time the papaya reaches the consumer, the price increases to Rs. 6000 per quintal. This large price spread ofRs. 5000 per quintal shows the significant margins captured by the many intermediaries in the channel. In the channel total marketing cost is Rs. 2020 per quintal, marketing margin ofRs. 2980 per quintal and net price received by farmer is Rs. 1000 per quintal. The marketing efficiency, calculated using Acharya's Method, is a 0.2, indicating that the channel is less profitable for farmers.

Channel-II have less intermediaries than Channel-I, but it still not the best option for the farmer. The farmer sells papaya for a higher price of Rs. 1800per quintal, with a total marketing cost of Rs. 505 per quintal and a net price received by farmer of Rs.

1265per quintal. The wholesaler cum commission agent adds a marketing margin of Rs. 535 per quintal and marketing cost of Rs. 565 per quintalto the Rs. 1800per quintal purchase price, then wholesaler sale in to retailer forRs. 2900 per quintal. Finally, the retailer incurring marketing margin of Rs. 2085 per quintal and Rs. 950 per quintal marketing cost offers the papaya to consumer for Rs. 5935 per quintal.Suggesting a significant price increase along the marketing chain. The price spread and marketing efficiency improve marginally, reaching Rs. 4670per quintal and 0.27, respectively, this channel is slightly better than channel I for farmer.

Channel III is the most promising and effective channel for papaya farmers. In this channel, the producer offers papaya for the price of Rs. 2200per quintal while incurring the total marketing cost of Rs. 490per quintal. This yields a net received price of Rs. 1665per quintal for the farmer.Retailer directly purchase the papaya from producer at the price of Rs. 2200 per quintaland incurs a marketing margin of Rs. 1450per quintal and marketing cost of Rs. 1450 per quintal and sell to the consumer at Rs. 4500 per quintal. The price spread is significantly decreased to Rs. 2835per quintal, and marketing efficiency rises to an amazing 0.59, indicating a more equitable distribution of profits in the marketing chain. Offers much lower price to the consumer than prices in other channels.

The data clearly shows that Channel III is the most efficient and beneficial marketing channel for papaya farmers. It provides the highest net price received, the lowest pricing spread, and the best marketing efficiency. The total marketing cost is also the lowest, at Rs. 1385per quintal, making it the least expensive channel for marketing. Furthermore, the marketing margin is the lowest, at Rs. 1450per quintal, implying smaller costs and margins for intermediaries. It is clear from the survey that of market intermediaries increases the percentage share of producer decreases automatically. Similar finding has been reported by [26].

Marketing channel I exist for long-distance markets like Jammu & Kashmir, Himachal Pradesh and other distant states where papaya are not grown. In this channel, farmers are selling the papaya to pre-harvest contractors. Pre-harvest contractor sells the papaya to the long distant wholesaler cum commission agent. The role of the Wholesaler cum commission Agent is to sell the papaya to retailers. Then retailers sell the papaya to consumers. Papaya production is not widespread, so mostly this marketing channel is adopted.

Marketing channel II exists for a short-distance market like Ahmedabad, Baroda, Surat and other districts within the state. In this channel, farmer sell the papaya to the wholesaler. Farmers' role in this channel is to produce and transport to the wholesaler. The role of the Wholesaler cum commission Agent is to sell the papaya to retailers. Then retailers sell the papaya to consumers. For this channel, only the farmer has contact of the wholesaler or has good relations with wholesalers and have near mandis adopt this channel.

Marketing channel III exists for a short-distance supply of papayas. In this channel farmer sell the papaya to the retailer directly. Farmers' role in this channel is to

produce papayas. The retailers operating in the nearby area of papaya farms, directly purchase the papaya from the farmer, then the retailer sells them to the consumer. This is limited to the retailers who are operating in the nearby areas of papaya cultivation, so they can directly purchase papaya from the farmer, so this channel is least adopted.

4.3 Constraints faced by papaya producers and intermediaries

Table No. 3 Constraints faced by papaya producers

Sr. No	Particulars	Garrett Score	Rank
1	Disease and pest	67.55	1
2	Labour intensive	55.41	4
3	Animal attack	38.65	8
4	Uncertain weather conditions	63.83	2
5	Higher initial investment	58.77	3
6	Small land holding	40.35	7
7	Water scarcity	33.66	9
8	Duplication of seeds	41.65	6
9	Lack of technical knowledge	50.17	5

The above table ranks the constraints faced by papaya farmers. Among all constraintsDisease and pestranked 1st. In disease and pest virus attack is most severe constraint for papaya farmers, [8]uncertain weather conditions and higher initial investment ranked at 2nd& 3rd respectively. Followed by labour intensive ranked 4thand Lack of technical knowledge ranked 5th. Duplication of seedsranked 6th, Small land holdingranked 7th, andAnimal attackranked 8th, while water scaricity ranked 9th is the least significant constraint.

Table No.4 Constraints faced by papaya wholesaler

Sr. no.	Particular	Garrett Score	Rank
1	Inadequate transportation facility	69.16	1
2	Lack of market information	28.68	6
3	Lack of storage facility	55.80	3
4	Large no. of intermediaries	42.96	5
5	Wastage/spoilage	61.20	2
6	Inconsistent quality	43.20	4

The papaya wholesaler faces significant constraints in which major constraint was inadequate transportation ranked 1st. Wastage/spoilage ranked 2nd, lack of storage facility ranked 3rd, inconsistent quality and large number of intermediaries ranked 4th and 5th respectively, lack of market information was the least constraint for wholesaler which ranked 6th.

Table No.5 Constraints faced by papaya retailer

Sr. No.	Particular	Garrett score	Rank
1	Wastage/spoilage	59.60	1
2	Inadequate transportation facility	58.60	2
3	Lack of market information	36.00	5
4	Large no. of intermediaries	41.40	4
5	Irregular Quality	54.40	3

The table highlights the main constraints faced by a papaya retailer, ranked by severity. The most severeconstraint is wastage/spoilage which ranked 1^{st,} inadequate transport facility ranked 2nd, irregular quality and large number of intermediaries ranked 3rd and 4th respectively, lack of market information ranked 5th which is least severe constraint. Retailers suffered more from loss of product due to it being climacteric and suffering much rotting and degradation. Losing quality reduced price realization, thus needed to have developed storage capacity and suffered lesser wastage. They also suffered price variation due to local variety and interstate superior variety and thus the produce with lesser shelf-life withered away[27].

4. CONCLUSION

The study found Three marketing channels in the study area. Among these channels, more farmers followed channel-I to move papaya, and while channel-III was less followed by farmers for moving papaya.Channel I found highest price spread of Rs. 5000 per quintal and lowest marketing efficiency 0.20, channel II found price spread of Rs. 4670 per quintal and marketing efficiency 0.27, channel III found lowest price spread of Rs. 2835 per quintal and highest marketing efficiency 0.59. channel III is the most efficient and advantageous marketing channel for papaya farmers. It not only provides the best net price to farmers, but also has the lowest price spread of Rs. 2835per quintal and the highest marketing efficiency of 0.59. This suggests a more equitable allocation of earnings across the marketing chain. In the papaya marketing channels farmerfacenumber of constraints that limit its overall efficiency and profitability. Major constraint faced by farmers is disease and pest, specially virus attack is most trouble causing for the farmers followed by uncertain weather conditions. Wholesalers face inadequate transportation facilities as well as waste/spoilage, whereas retailers face both waste/spoilage and insufficient transportation facilities.Wholesalers can address transportation and spoiling concerns by investing in cold chains and innovative technologies, as well as leveraging improved infrastructure and government incentives. Retailers can implement cold chains, optimise inventory, and boost local sourcing using government incentives and coordinated transportation.

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