

SUPPLY CHAIN MANAGEMENT OF POMEGRANATE IN CHITRADURGA DISTRICT OF KARNATAKA

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ABSTRACT

Pomegranate (*Punica granatum* L.) belongs to family Punicaceae and is a favourite table fruit of the tropical and sub-tropical regions of the world. It grows in a wide range of climatic conditions and can grow up to 1800 meters above mean sea level. The main objectives of the study are to analyse forward linkages, backward linkages in the pomegranate supply chain. A sample of 90 pomegranate growers and 8 traders from Chitradurga district of Karnataka were selected purposively for the detailed enquiry. The results revealed that the main source of credit to the pomegranate growers was from Government banks, followed by PACS, Private Banks and traders. Ninety eight percent of the growers approached private consultants for varietal information and 80 % consulted departmental officers for INM and IPM information. For market information, all the respondents accessed traders and Television. The Producer – Distant market wholesaler was the major marketing channel as 60 % of the growers sold through this route followed by Producer - Exporter channel (23.3 %). The study indicated that the crop has good commercial potential and the area under this crop is significantly increasing in the study area. Hence, government should plan for establishing new processing units; provide scientific storage facilities and forward linkage in the region to safeguard the interest of pomegranate growers.

KEYWORDS: Pomegranate, Supply Chain Management, Distribution Network, Backward Linkages, Forward Linkages

INTRODUCTION

Pomegranate (*Punica granatum* L.) belongs to the Punicaceae family is a very popular sub- tropical fruit, native to Persia (Iran) and is one of the commercially important fruit crops of India (Holland et al., 2009). The edible part (aril) of the fruit is consumed as fresh arils or as processed products such as jams, jellies, wine, and beverages (Aarabi et al., 2008). Scientific evidence has linked increasing consumption of pomegranate fruit to improved human health as a result of active phenolic compounds which have potent pharmacological activities, including, antioxidant, anti-mutagenic, anti-hypertension, anti-inflammatory activities (Gil et al., 2000).

At the global level, India is the world's largest producer of pomegranates, followed by Iran. The other important producing countries are Turkey, USA, Spain and Israel (Pomegranate Association of South Africa, 2012). In India, Maharashtra was the leading producer of pomegranates followed by Karnataka, Andhra Pradesh, Gujarat and Tamil Nadu. The total area under cultivation of pomegranate in India in 2013-14 was 125 million hectares with a production of 820.3 million tonnes. Maharashtra was the leading pomegranate producing state with a production of 555.5 million tons in the year 2013-14 followed by Karnataka state which has produced 138.5 million tons. The most promising cultivars grown in India are Alandi, Dholka, Kabul, Kandhari, Muskat red, Vellode, Ganesh, G-137, Jyoti, Mridula, Phule Araktha and

Bhagwa. In Karnataka it is cultivated in Bijapur, Chitradurga and Bagalkot districts due to its dry, less humid and relatively hot agro climatic conditions. The trend shows that the area under cultivation for pomegranate is gradually increasing in Karnataka. Karnataka state contributes 20% of India's Pomegranate production and is mainly grown in North and North East parts of State. It is grown in 15,000 ha area with about 1, 50,000 Mt production with a productivity of 10Mt/ha. In productivity aspects, Karnataka stands third (10 MT/hectare) and above to national average of 7 MT/Hectars.

In the production of pomegranate, marketing plays a vital role. When the cultivators grow this crop primarily for market, Supply chain plays a very vital role in this sector and becomes even more important because of perishability nature and very short shelf life. It not only helps to cut costs, but also adds to maintain and improve the quality of produce delivered, which are perishable in nature (Veena et al., 2011). Owing to the very short shelf life and perishable in nature, these items require proper transportation, handling and storage facilities in order to reach in fresh state to a customer. It also manages the relationship between businesses responsible for the efficient production and supply of fresh produce products from farm level to ultimate consumers, to reliably meet the requirements of the customer in terms of quality, quantity, and price. Hence, a detailed study in this regard would help to identify the supply chain network of pomegranate cultivation in the district.

OBJECTIVES OF THE STUDY

The study was undertaken with the following specific objectives

- To identify and map supply chain for pomegranate in Chitradurga district of Karnataka,
- To analyse the backward and forward linkages of SCM of pomegranate from Chitradurga.

METHODOLOGY

This study was conducted in Chitradurga district as it ranks first in the Karnataka with respect to total area under Pomegranate. The primary data were collected from purposively selected 90 farmers and 8 intermediaries by personal interview method with the help of pretested and well-structured schedule. The data collected from the farmers pertained to the agricultural year 2015-16, which includes general characteristics of cultivation related to sample farmers. The secondary data were also collected from Directorate of Horticulture, Bangalore, District Statistical Office, and Chitradurga. The collected data were analysed by descriptive statistics, inferential statistics and producer's share in consumer rupee analysis was used to study the marketing efficiency.

RESULTS AND DISCUSSIONS

Mapping the Supply Chain Management

A supply chain map provides a graphic representation of the structure of the supply chain showing how products flow through the primary system as well as alternative channels. The supply chain map of pomegranate in the study area (Figure1) shows the movement of pomegranate from production to the consumers, passing through different stages and processors. The linkages are shown vertically from left to the right hand side. The top head lists major functions of the chain. The functions, in this case, include input supply, production, trading, marketing, processing and consumption. The vertical flow from left hand to the right hand side depicts the actors involved in carrying out to the different functions. The participants are actors of the supply chain are desired by boxes so that they can easily identify and other players, activities are presented differently. The information and support activities between the players are represented by dotted lines. There

are no efficient supply relationships between the different functions undertaken in the various segments of the pomegranate supply chain and actors who play the transactional roles in the chain as well as linkages with service providers.

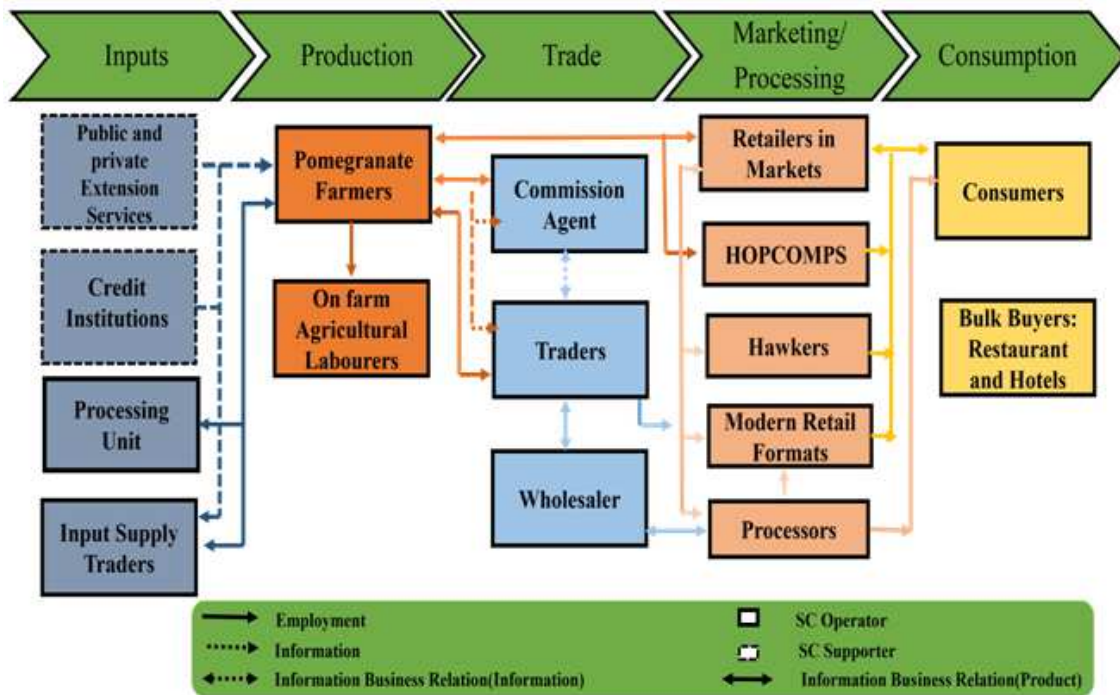


Figure 1: Mapping of Pomegranate Supply Chain

The actors in the supply chain include input suppliers, producers, commission agents, traders, wholesalers and consumers. The stakeholders, shown on the left hand side, assist and facilitate the actors in carrying out their functions. The enablers are mainly the institutions, both formal and informal as well as private institutions. The roles of the enablers can encompass several actors and functions in the supply chain. As seen in the diagram (Fig.2), some actors perform more than one function whereas the others are confined to only one function.

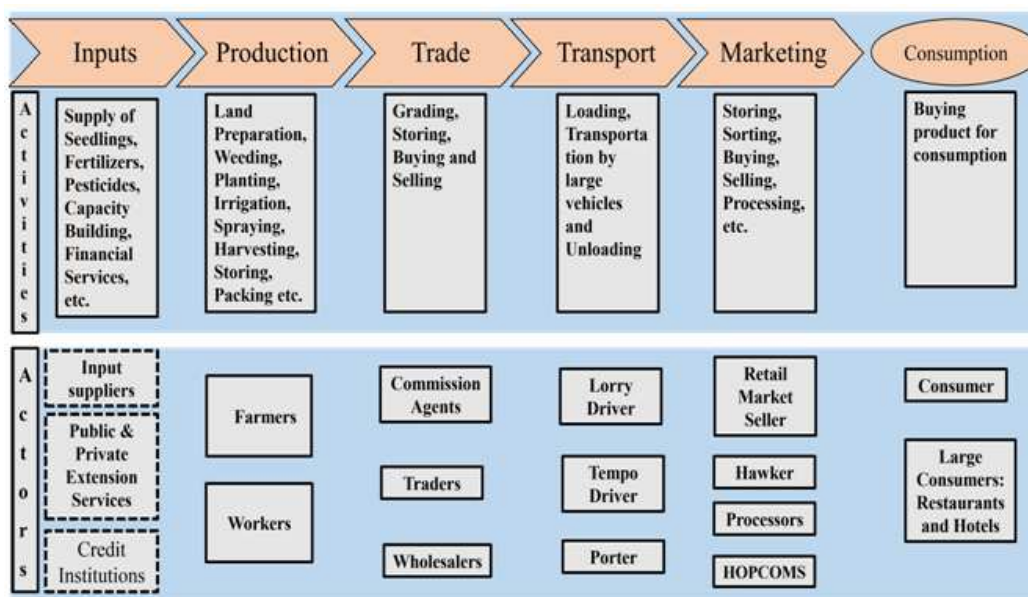


Figure 2: Mapping of Pomegranate Supply Chain

For example, the traders both collect the product from the farmers and supply them to the wholesalers or processors.

Functions of Various actors in Pomegranate Supply Chain

- Public and Private Extension Services: They Provide extension services to the farmers.
- Credit Institutions: Public and private institutions provides credit and information about schemes for pomegranate production.
- Input suppliers: Input suppliers include fertilisers and PPC companies, Government distributor's small wholesalers and even smaller retail shops that are sell small quantities of seed, fertiliser and pesticide to farmers at the taluk level.
- Commission Agents: He is a person who, on behalf of his principal and in consideration of commission upon the amount involved in each transaction, keeps in his custody the goods of his principal and sells the, same and holds himself liable to deliver to the buyer.
- Local Traders: Local traders are directly involved in buying and selling pomegranate from different remote district towns are markets and sale to the wholesalers at a profit. They often work as commission agent of the large whole seller's exporters.
- Retail Shops: The retail shops buy fresh pomegranate from the whole sellers and processed products from processors through their distributors and sell directly to the consumers.

Backward and Forward Linkages

Pomegranate supply chain is studied by identifying major players at various stages of supply chain management. From production of fresh pomegranate at farm level as reference point, the forward and backward linkages are traced. Forward linkages relate to movement of the produce at various stages of marketing, while backward linkage pertains to sourcing of inputs, credit facility and production management. Since pomegranate is cultivated in this district for a long time, the production inputs like planting material, manure and plant protection chemicals are sourced locally.

Table 1: Source of Information on Production and Marketing

Particulars	Varieties/Seedlings		Production		INM/IPM		Market and Price Information	
	Number	%	Number	%	Number	%	Number	%
Private consultant	88	98	72	80	9	10	15	17
KSDH	11	12	80	89	72	80	17	19
Traders	65	73	15	17	12	14	89	99
Newspaper	14	16	8	9	11	13	21	24
Television	56	63	25	28	14	16	79	88

*Note: Multiple responses by individual respondent

The source of information on production and marketing (Table 2.) reveals that private consultants in agriculture are emerging as a result of government support this may reason for the (98%) pomegranate growers sought information on varieties, seedlings and production counselling from private consultants. The highest percent of farmers bought information on production, technology and nutrient management from Karnataka State Department of Horticulture officials

which has huge network of extension personnel. In the case of market information, a majority (99%) of farmers consult traders as they are always available for consultation. Farmers also accessed information (88%) from TV because a number of programmes relating to agriculture is telecast for the benefit of viewers. In the case of information on integrated nutrient management (INM) and Integrated Pest Management (IPM), a majority (80%) consulted line departmental officials because they are the subject matter specialists and reliable source. Similarly, in the case of market information, all the farmers consulted traders and TV. In the case of prices, all the respondent farmers consulted traders and a majority of the farmers (88%) knew price related information through TV.

Table 2: Seedlings Selection by Pomegranate Growers

Particulars	Name of Varieties				Particulars	Type of Seedlings			
	Private Nurseries		Govt. Departments			Private Nurseries		Govt. Departments	
	Number	%	Number	%		Number	%	Number	%
Bhagwa	52	57.8	22	24.5	Tissue culture	32	35.6	51	56.7
Ganesh	21	23.3	38	42.2	Cuttings	58	64.4	39	43.3
Ruby	17	18.9	30	33.3					
Total	90	100	90	100	Total	90	100	90	100

With regard to the variety Selection the farmers growing pomegranate selected private nurseries for selection of Bhagwa variety (57.7%) followed by Ganesh (23.3%) and Ruby (18.9%). Similarly the grower's selected Government departments for selecting varieties like Ganesh (42.2%) followed by Ruby (33.3%) and Bhagwa variety (24.5%). In case of type of Seedlings, private nurseries were majorly supplying cuttings (64.4) and the Government department were majorly supplying tissue culture seedlings (56.7%) as private nurseries concentrate on cuttings and Government departments concentrate on tissue culture.

Table 3: Seedlings Selection by Pomegranate Growers

Particulars	Taluk Level Traders		PACS		RSK	
	Number	%	Number	%	Number	%
Chemicals and Fertilizers	64	71	18	20	8	9
Machinery	71	78	4	5	15	17

Table 3 depicts the selection of different retailers for purchase of different agricultural inputs such as chemicals, fertilizers and machineries. Seventy one per cent of the farmers preferred taluk level traders for the purchase of chemicals and fertilizers and again 78 per cent farmers preferred taluk level traders for the purchase of machineries this may be because the highest number of traders were available in the taluk and the farmers had more number of choice to select a particular trader for the purchase of different inputs.

Table 4: Seedlings Selection by Pomegranate Growers

Finance source	Number	Percentage
Private Bank	16	17.7
Government Banks	28	31.2
PACS	24	26.8
PCARDB	7	7.7
Traders	10	11.1
Money lenders	5	5.5
Total	90	100.0

Note: PACRDB

Table 4 depicts the main source of credit to the pomegranate growers was found to be from the government banks (31.2%) as the rate of interest for long term credit was found to be low and the credit was easily available to the growers when compared to PACS. The least preferred source of credit from the farmers was found to be from traders (11.1%), PCARDB (7.7%) and money lenders (5.5%) This is because, the traders and money lenders levied high rate of interest on the credit.

Marketing Channels Used by the Pomegranate Farmers

The pomegranate produce in the study area was marketed through three channels from producers to the ultimate consumers (Table 5). Three channels of marketing of pomegranate were identified in the study regions. Channel-I consisted of sale of produce by the producer to the commission agent-cum-wholesaler. Then, commission agent-cum-wholesaler sold the produce to the retailers in the distant wholesale markets. The commission agent-cum-wholesaler acts as a mediator between producer-seller and retailer. For the service, he charges 3 per cent commission of the total value of produce marketed. In this channel about 16.7 per cent of the farmers in Chitradurga district sold their produce

Table 5: Marketing Channels used by Pomegranate Growers

Marketing Channels	Marketing Channels	No. of Growers	Per cent
Channel-I	Producer → Commission agent → Retailer → Consumer	15	16.7
Channel-II	Producer → Distant market wholesaler	54	60.0
Channel-III	Producer → Exporter	21	23.3

Note: Channel-II was the popular channel among the growers

In the second channel, producer himself sold the produce to the distant wholesaler who arrived at the study area during the harvesting season from outside the state, from Maharashtra, Andhra Pradesh and Tamil Nadu etc. In this channel, marketing costs were traced only up to the distant wholesaler since the cost incurred by him could not be traced out. This channel was the most popular channel in the study area since the distant wholesaler himself came to the door steps of the farmer to purchase the produce saving considerable amount to the farmers in the form of transportation cost. About 60.0 per cent of the farmers in Chitradurga district preferred to sell their produce through this channel. In channel-III, some of the large farmers in the study area themselves took the produce to the collection point indicated by the exporters and sold it directly to them in anticipation of higher price for their produce. Through this channel 23.3 percent of the farmers in Chitradurga district sold their produce.

Marketing Cost Incurred by the Pomegranate Farmers

The marketing cost incurred by the producer was assessed when he sold through different intermediaries such as commission agent, distant wholesaler and exporter in pomegranate marketing (Table).When the produce was sold through the commission agent-cum-wholesaler, the major item of cost was commission charges with 59.07 per cent followed by packing material (17.39%) and transportation cost (16.54%).The total cost incurred by the producer seller when he sold to the commission agent was Rs. 1726.71 per ton of the produce as the commission charges and cost of transportation was bared by the producer. There were only two items of cost when the producer-seller sold his produce to the distant wholesaler. The items of cost were grading charges with Rs. 18.65 per ton (55.08%) required for assembling the produce into different lots for easy transaction and miscellaneous charges with Rs. 15.21 per ton (44.92%). The total cost of marketing incurred by the producer when sold to the distant wholesaler was Rs. 33.86 per ton of the producer and

ultimately this practice was the most popular among the farmers of the study area as the sale through this channel was quite affordable to the farmer as he bared minimum cost in marketing the produce.

Table 6: Marketing Cost Incurred by Pomegranate Growers

Items of Cost	Cost Incurred by Selling to		
	CA cum WS	Distant WS	Exporter
Packaging material	300.25 (17.39)	--	--
Grading	20.21 (1.17)	18.65 (55.08)	12.65 (5.38)
Loading	30.00 (1.74)	--	30.00 (12.77)
Transportation	285.56 (16.54)	--	250.00 (63.85)
Unloading	30.00 (1.74)	--	30.00 (12.77)
Weighing charges	15.00 (0.87)	--	--
Commission charges	1020.00 (59.07)	--	--
Miscellaneous charges	25.69 (1.48)	15.21 (44.92)	12.28 (5.23)
Total	1726.71 (100.00)	33.86 (100.00)	334.93 (100.00)

Note: CA – Commission agent, WS – Wholesaler

When the produce was sold to the exporter, the major cost incurred was on transportation of the produce to the collection point with Rs. 250.00 per ton (63.85%) followed by loading and unloading charges (12.77% each), grading charges (5.38%) and miscellaneous charges (5.23%). The total cost incurred by the producer when sold to the exporter was Rs. 334.93 per ton of the produce. Hence it can be say that the farmer when selling to the commission agent incurred high marketing cost because of high commission charges, cost on packaging material and transportation cost as the commission agent was located far away from the production area. The farmer incurred minimum marketing cost when he sold to the distant wholesaler since the distant wholesaler arrived to the doorsteps of farmer during the harvesting season wherein the farmer incurred a very minimum cost. Some of the large farmers in the study area sold their produce to the exporters with considerable cost on transportation in anticipation of higher returns.

Marketing Cost Incurred by Intermediaries

The cost incurred by the commission agent-cum-wholesaler in Chitradurga district on various items in marketing of pomegranate is presented in Table 7. It could be observed from the Table that the major cost incurred by the commission agent in Chitradurga district was on storage loss with Rs. 633.88 (75.54%) followed by labour cost (9.71%), cost of storage (5.79%), miscellaneous charges (4.12%) shop rent (3.23%) and license fees (1.62%). The total cost incurred by the commission agent-cum-wholesaler was Rs. 878.86 per ton of the produce handled. The cost incurred by the retailer on various items in marketing of pomegranate in the study area is presented in Table 4.14. It could be revealed from the Table that in Chitradurga district, the retailer incurred major cost on storage loss with Rs. 1064.47 per ton (84.67%) followed by transportation cost (6.62%), loading and unloading charges (4.77%), miscellaneous charges (3.28%) and municipality charges (0.66%). The total cost incurred by the retailer was Rs. 1257.20 per ton.

Table 7: Marketing Cost Incurred by Intermediaries

Particulars	Cost Incurred (Rs.)	Per cent
Marketing cost incurred by the commission agent cum wholesaler		
Labour cost	85.31	9.71
Cost of storage	50.87	5.79
Storage loss (2 % of the produce)	663.88	75.54
license fee	14.22	1.62
Shop rent	28.35	3.23
Miscellaneous expenses	36.23	4.11
Total	878.86	100.00
Marketing cost incurred by the retailer		
Transportation cost	83.25	6.62
Loading and unloading	60.00	4.77
Municipality charges	8.25	0.66
Storage loss (3 % of the produce)	1064.47	84.67
Miscellaneous expenses	41.23	3.28
Total	1257.20	100.00

Costs and Margins in Different Channels Intermediaries

Channel-I: Marketing costs and margins of the agencies involved in the marketing of pomegranate indicated that the producer's share in consumer's rupee in channel-I was 87.26 per cent after deducting the costs and margins of the intermediaries involved in the channel. The total marketing cost incurred by producers accounted for 4.68 per cent of consumer's price.

Table 8: Costs and Margins in Different Channels Intermediaries (Rs. /ton)

Particulars	Channel-I		Channel-II		Channel-III	
	Rupees	%	Rupees	%	Rupees	%
Gross Price received by the producer	42193.95	87.26	43690.05	100.00	45116.01	100.00
Marketing cost of producer	1726.71	4.68	33.86	0.10	334.93	0.67
Net price received by producer	40467.24	82.58	43656.19	99.90	44781.08	99.33
Marketing cost of Commission agent-cum-Wholesaler	878.86	2.38	--	--	--	--
Profit of Commission agent/WS	912.55	2.47	--	--	--	--
Retailer's purchase price	43985.36	92.11	--	--	--	--
Cost of the Retailer	1212.29	3.29	--	--	--	--
Profit of retailer	1697.67	4.60	--	--	--	--
Consumer's purchase price	46895.32	100.0	--	--	--	--
Marketing Margin/price spread	4701.37	12.74	--	--	--	--
Producer's share in consumer rupee	--	87.26	--	--	--	--

Channel-II: The total marketing cost incurred by commission agent-cum-wholesaler and retailer amounted to Rs. 878.86 per ton and Rs. 1212.29 per ton respectively. The price spread in first channel was Rs. 4,701.37 (12.74%). The shares of the commission agent and the retailer were Rs. 912.55 and Rs. 1697.67 respectively. The net price received by the producer seller accounted for Rs. 40467.24 (82.58%) after deducting the marketing cost of Rs. 1726.71 (4.68%).

Channel-III: In this channel the producer-seller sold his produce directly to the exporter by transporting his produce to the collection point as indicated by the exporter. The cost of marketing incurred by the producer-seller was Rs. 334.93 per ton (0.67%) as the produce was to be transported to exporter's collection point from the production places. In this channel the net price received by the producer was Rs. 44,781.08 per ton accounting for 99.33 per cent, which was

marginally less compared to the channel-II.

CONCLUSIONS

Price spread is one of the important measures of marketing efficiency which indicates the share of producer in the consumer's rupee. Besides this, it also indicates the share of various market intermediaries in the consumer's rupee in return to their services as the commodity moves from the producer to consumer. Among the different channels of marketing of pomegranate in the study area, channel-II was the most popular and successful channel of marketing by the producer-seller (Table). This was the most popular channel of marketing in the study area, since in this channel the net price received by the producer was maximum among all the channels of marketing and the distant wholesaler who arrived to production point during the harvesting season of the crop helped the farmer in saving the time and transportation cost of the producer-seller in the districts. Moreover, in this channel, the producer seller received immediate payments after the sale by incurring minimum cost on marketing of the produce as compared to the other channels of marketing in the study districts.

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