

RESEARCH PAPER

# Value addition and supply forecast of sapota fruit in India

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## ABSTRACT

Fruit value chain involves any type of value addition to the horticultural produce which includes processes such as drying, grading, sorting, processing, packaging, advertising, marketing, etc., which adds value and enhance the shelf-life of value added products. The present study was conducted in Northern Karnataka with the objective to analyze the different cost and returns in its value chain management. The primary data related to procurement of raw materials and its rates, inventory management, costs of processing, marketing and its costs and different problems faced during value addition processes were obtained from the value addition units/ processors for the agricultural year 2013-14. The data was analysed using tabular analysis, growth rate analysis, ARIMA model of forecasting and Garrett Ranking Technique. The results were based on primary data collected, with the sample size of eight processing units, twenty wholesaler cum commission agents and twenty retailers for the selected fruit crop. The results revealed that the total cost incurred by the processors in processing of raw sapota into one quintal of fruit was of Rs. 1047. The degree of value addition was found to be 58 per cent. The marketing cost incurred by the retailers in marketing per quintal of sapota fruit was found to be Rs. 110. The supply of sapota in India showed a compound growth rate of 6.15 per cent annually over the period studied. Since the stake holders in value chain of sapota fruit are not integrated, there is a great opportunity to integrate and strengthen the value chain. The processors opined that higher raw materials cost and commission charges, transportation hurdles are the major problems in value addition of sapota. The concerned statutory bodies have to give due attention for providing proper approach roads to the farms, processing units, cold storage, marketing facilities and export opportunities.

**KEY WORDS :** Value chain, Processing, Supply forecast, Raw sapota, Marketing

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**H**orticulture crops being high value cash crops provide excellent opportunity for raising income of the farmers even in dry land areas. The total

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fruit production is 813 lakh tons and banana stands first with a production of 265 lakh tons contributing 32.60 per cent to the total fruit production (Handbook of Horticulture, 2014). Maharashtra stands first with highest sapota area (71,750 hectares) contributing 43.75 per cent of the total sapota area of the country followed by, Karnataka (19.25 %), Gujarat (18.00 %), Andhra Pradesh (7.63 %) and Tamil Nadu (5.63 %). In sapota production, Karnataka stands first with a production of 3.87 lakh tons contributing 26.53 per cent of the total sapota production followed by, Maharashtra (22.61 %),

Gujarat (20.22 %), Tamil Nadu (17.01 %) and Andhra Pradesh (8.57 %). The other important sapota growing states are Orissa and West Bengal. Ballari is the leading district in North Karnataka with respect to both in area and production of sapota. The total area and production of sapota in Ballari district was 1984 hectares and 43506 tons, accounting for nearly 17.91 and 29.83 per cent of area and production of sapota in North Karnataka, respectively during 2012-13. Belagavi (17.00 %), Dharwad (16.01 %), Haveri (14.72 %) and Bagalkot (9.09 %) are the other major sapota growing districts of North Karnataka. Total export of sapota fruits during 2013-14 was 2139.3 metric tons worth Rs. 4.52 lakhs. The major importers of Indian sapota are United Arab Emirates, Bahrain, Canada, Oman, South Africa, Qatar, United States and Singapore.

Sapota occupies the 8<sup>th</sup> position among all fruits production in the country accounting for 2.35 per cent of total fruit production (Handbook of Horticulture, 2014 and APEDA). Presently, the fruit crops are grown as major crops in wide producing areas. Even though the production is on higher side, the extent of spoilage and wastage (perishability) was also found maximum. So, there is a vast market potential for processing and value added products like jams, jellies, juice, wine and squash both in the domestic and international markets which is yet to be tapped. The present study attempts to evaluate the value addition aspects, the supply forecast of sapota fruit and analysing its cost and returns in value addition processes. The findings of the study would be helpful to the policy makers and researchers to draw meaningful inferences for the development in the area of horticulture in general and sapota in particular.

## METHODOLOGY

Based on the highest area and production of sapota

in the state, two districts, Ballari and Haveri for sapota fruit from North Karnataka were purposively selected for the study. To elicit the required data regarding value addition processes like procurement, sorting, grading, processing, packing, storage, transportation and marketing, a total of 8 processing units, 20 wholesalers and 20 retailers were randomly selected for the study from the selected regions. The study was based on the primary data, which was collected from all the different value chain actors, with the help of pre-tested, comprehensive schedule. The data pertains to the agricultural year 2013-14. The secondary data on area, production and productivity of sapota fruit was collected for a period of twelve years from 2001-02 to 2014-15 from the Directorate of Horticulture, Bangalore and District Statistical Office. The information on country wise quantity of different fruits exported was obtained for a period of twelve years *i.e.* from 2002-03 to 2014-15 from various published issues of APEDA. The data was analysed using analytical tools like tabular analysis, growth rate analysis, ARIMA model of forecasting and Garrett Ranking Technique.

## ANALYSIS AND DISCUSSION

The findings of the present study as well as relevant discussion have been summarized under the following heads :

### Capacity utilization in sapota value addition :

The capacity utilization in sapota processing unit is depicted in Table 1. It is evident from the table that, the installed capacity of sapota unit per hour was around 2.5 quintals. The number of working days was found to be 120 days in a year. The average hours of working per day was found to be similar (8 hours/day) along with the working shift of one shift (8 hours) per day. The annual

Table 1 : Capacity utilization in value addition processes of sapota processing units		(n=8)
Sr. No.	Particulars	Sapota ripening unit
1.	Number of working days/annum	120
2.	Number of shifts/day	1
3.	Duration of each shift (hours)	8
4.	Number of working hours/ annum	960
5.	Annual installed capacity (qtls)	10000
6.	Quantity processed/day (qtls)	80
7.	Annual quantity processed (qtls)	9600
8.	Capacity utilization (%)	96

installed capacity was found to be around 10,000 quintals. The total quantity processed per day was worked out to be 80 quintals, with the total annual quantity processing of 9,600 quintals. The total capacity utilization was found higher to the tune of 96 per cent. The higher capacity utilization in the case of sapota ripening was because of absence of other value addition processes except ripening, in the study areas. Since, sapota cannot be consumed in raw and any other value added form in selected study areas, except for table purpose, majority of the farmers produce goes to ripening units of wholesaler cum commission agents with a pre contract basis and pre fixed prices, with no other alternative option.

**Inventory management in sapota processing unit :**

The inventory maintained by the processing unit in value addition process of sapota, along with the details of inventory cost is presented in Table 2. In sapota ripening unit, the processor has to procure nearly 500-

550 quintals per time with annual requirement of 9650 quintals of sapota (17-18 times) along with calcium carbide of around 4 to 4.5 quintals, out of 43 quintals of total requirement with a periodicity of 9-10 times per year. Wholesaler cum commission agents were the main source for procurement of raw materials for ripening of sapota.

**Cost of processing raw sapota into fruit :**

The observed results of cost of processing per quintal of sapota fruit is presented in Table 3. The average total cost of processing raw sapota into one quintal of fruit was found to be Rs. 1047. Of which, the total variable cost (1028/qtl) formed a substantial component (98.22%) of the total processing cost. The total fixed cost being Rs. 18.6 per quintal, accounted for only 1.78 per cent of the total processing cost. Of the total variable cost, the procurement cost of raw sapota (Rs. 862/qtl) accounted for 82.35 per cent, followed by

**Table 2: Inventory management in value addition processes of sapota processing units**

Sr. No.	Particulars	Sapota ripening unit	Rate of procurement (Rs. /unit)
1.	Total quantity of raw materials procured in value addition	Sapota (9650 qtls) [500-550 qtls] Calcium carbide (43 qtls) [4-4.5 qtls]	800 28000
2.	Source of procurement	WS/CA and wholesale shops/ local dealers	
3.	Periodicity of procurement (per year)	17-18 times	
4.	Lead time (days)	-	
5.	Method of procurement	Outright purchase or contract basis	

Note: Figures in ‘( )’ indicate the total quantity procured in a year ; Figures in ‘[ ]’ indicate the quantity procured per time ; WS/CA= Wholesaler cum commission agent.

**Table 3 : Cost of processing raw sapota into sapota fruit**

Sr. No.	Particulars	Unit	Price (Rs./ unit)	(Per quintal of sapota fruit)	
				Quantity	Total (Rupees)
<b>Variable cost</b>					
1.	Raw sapota procurement cost	Kg		100	862.00 (82.35)
2.	Calcium carbide	Grams	280.00	450	126.00 (12.04)
3.	Power, fuel and water	Rupees	-	-	6.00 (0.57)
4.	Wages to casual labour	Rupees	-	-	16.00 (1.53)
5.	Interest on working capital	Rupees	-	-	18.00 (1.72)
	Total variable cost			-	1028.00 (98.22)
<b>Fixed cost</b>					
1.	Interest on fixed capital	Rupees	-	-	7.50 (0.72)
2.	Depreciation on buildings at 5 per cent	Rupees	-	-	8.00 (0.76)
3.	Insurance and license fee	Rupees	-	-	3.10 (0.30)
4.	Total fixed cost	Rupees	-	-	18.60 (1.78)
	Total processing cost (A+B)	Rupees		-	1046.60 (100)

Note: Figures in parentheses indicate percentage to total

cost of 0.45 kg of calcium carbide (12.04%). The remaining items, viz., cost of power, fuel, water, interest on working capital and wages to casual labour altogether accounted for only Rs. 40 (3.82%). In the total fixed cost (Rs. 18.6/qtl), interest on fixed capital accounted for 0.72 per cent of the total processing cost, while depreciation on building, insurance and license fee accounted for remaining 1.06 per cent of the total processing cost. It was because of the commission charges incurred by the processor along with the cost of raw sapota, while procuring from the wholesaler cum commission agents. So, by going for pre contract or outright purchase with the farmers, the processor can avoid these commission charges, which in turn reduces the procurement cost.

#### Cost of marketing sapota fruit :

The average marketing costs incurred by the processors, wholesalers cum commission agents and the retailers for marketing one quintal of sapota fruit are depicted in Table 4. It can be seen from the table that, the total cost incurred in marketing of one quintal of sapota fruit by the processor cum wholesaler cum commission agent and retailer were found to be Rs. 183 and Rs. 110, respectively. Of the total marketing cost of incurred by the processor cum wholesaler cum commission agent (Rs. 183), packing material was a major cost item with Rs.125 (68.49%) per quintal of ripened sapota, followed by transportation (15.34%). Other important items were weighing and packing (Rs. 8), rent on shop/godown (Rs. 5.5), electricity (Rs. 1.5), value of storage

losses (Rs.2.5), grading charges (Rs.4), loading and unloading (Rs. 4.5) and advertisement cost (Rs. 3.5), all these togetherly accounted for 16.17 per cent of the total marketing cost. Out of the total marketing cost (Rs. 110.3) incurred by the retailer in marketing one quintal of sapota, commission charges alone constituted Rs. 42.25 (38.30%), followed by transportation (22.67%), packing material (9.07%) and the remaining items constituting around 29.96 per cent of the total marketing cost. These results are in line with the findings of Nirgude *et al.* (2007) and Kerutagi *et al.* (2009).

In the case of sapota ripening unit, the total marketing cost incurred in marketing of one quintal of sapota fruit from all the value chain actors was found to be Rs. 293. Out of which, packing material cost (46.11%) accounted for the maximum, followed by transportation cost (18.10%), commission charges (14.43%) and weighing and packing charges (5.64%). The other items which include rent, electricity and value of storage losses, grading, loading and unloading and advertisement cost (Rs. 46) altogether accounted for 25.72 per cent of the total marketing cost. Intermediaries involved in the marketing of selected value added product imposed high commission charges, which was to be considered as a major marketing problem as opined by the sample value chain actors. This problem can be overcome by directly selling the products to the retailers and to the consumers by the processing units, thus, resorting to direct marketing. As the fruits are highly perishable, the fruit processors are in need of infrastructure facilities like proper access to roads for smooth transport, cold storage

**Table 4: Marketing costs in marketing of value added product of sapota**

Sr. No.	Particulars	Sapota ripening units (Rs. /quintal)		
		Processor cum WS cum CA	Retailer	Total
1.	Transportation	28.00 (15.34)	25.00 (22.67)	53.00 (18.10)
2.	Rent	5.50 (3.01)	5.00 (4.53)	10.50 (3.59)
3.	Electricity	1.50 (0.82)	1.00 (0.91)	2.50 (0.85)
4.	Value of storage losses	2.50 (1.37)	2.50 (2.27)	5.00 (1.71)
5.	Grading	4.00 (2.19)	3.25 (2.95)	7.25 (2.48)
6.	Packing material	125.00 (68.49)	10.00 (9.07)	135.00 (46.11)
7.	Weighing and packing	8.00 (4.38)	8.50 (7.71)	16.50 (5.64)
8.	Loading and unloading	4.50 (2.47)	5.00 (4.53)	9.50 (3.24)
9.	Advertisement cost	3.50 (1.92)	7.80 (7.07)	11.30 (3.86)
10.	Commission	-	42.25 (38.30)	42.25 (14.43)
	Total	182.50	110.30	292.80

Note : Figures in parentheses indicate percentage to total

Note: WS= Wholesaler

CA= Commission agents

and processing units, but inadequacy of these facilities posed much problem in processing and marketing of these fruits in the study area. The results were similar with the results of Ramachandra, 2006.

**Cost and margins in sapota value addition :**

The results of costs and margin and price spread in sapota fruit (per quintal) is presented in Table 5. In the case of value addition units of sapota, the processor

Table 5 : Costs and margin in marketing of value added product of sapota		(Per quintal)	
Sr. No.	Particulars	Sapota	
		Rs.	Per cent
1.	Processors purchase price	800.00	27.77
2.	Cost of the processor	1261.00	43.77
3.	Selling price of processor	2071.00	71.88
4.	Margin of the processor	810.00	28.11
5.	WS/CA purchase price	-	-
6.	Cost of WS/CA	-	-
7.	Selling price of WS/CA	-	-
8.	Margin of WS/CA	-	-
9.	Purchase price of retailer	2071.00	71.88
10.	Cost of the retailer	110.30	3.83
11.	Selling price of retailer	2881.30	100.00
12.	Margin of retailer	700.00	24.29
13.	Consumer's purchase price	2881.30	100.00
14.	Marketing margin/price spread	2081.30	72.23
15.	Processor's share in consumer rupee (%)		43.77

Note: WS= Wholesalers

CA= Commission agents

Table 6 : Supply forecast of the sapota fruit for different value addition process		
Sr. No.	Year	Actual demand (000 MT)
1.	2001-02	593.50
2.	2002-03	913.10
3.	2003-04	921.30
4.	2004-05	1076.50
5.	2005-06	1114.00
6.	2006-07	1216.00
7.	2007-08	1258.00
8.	2008-09	1308.00
9.	2009-10	1346.80
10.	2010-11	1424.00
11.	2011-12	1425.80
12.	2012-13	1495.00
13.	2013-14	1744.30
14.	2014-15	593.50
CAGR (%)		6.15
<b>Forecast demand</b>		
15.	2015-16	1712.81
16.	2016-17	1872.50
17.	2017-18	1902.02
18.	2018-19	2020.17
19.	2019-20	2077.97

purchase each quintal of raw sapota at Rs. 800 and included his cost of procurement, processing, storage and marketing of around Rs. 1,261, sells at Rs. 2,071 with a profit of Rs. 810 per quintal. The retailer purchases one quintal of sapota at Rs. 2,071, adds his marketing cost of Rs. 110 and sells at Rs. 2,881 to the consumers, with a profit of Rs. 700 per quintal (24.29%) As a result, the marketing margin or price spread was found to be Rs. 2,081 (72.23%) and around 43.77 per cent as the processors share in consumers rupee for marketing of per quintal of product. The results were at par with Rajgopal (1987). Thus, the processors can confidently go for value addition to the fruits, which add value to these products and results in higher profit margins and returns. Since the sales realized and net returns after meeting the all the value addition and marketing costs are bounteous, there is bright scope for entrepreneurs in the cases of value addition of selected fruits in these areas and thus, they can be encouraged and educated to take-up the processing activities and harvest the benefits.

#### Supply forecast of sapota fruit :

The estimated supply of the sapota fruit in the country was worked out using ARIMA model and CAGR by making use of the past 14 years supply data for the next five years is presented in Table 6. The supply of sapota fruit in the country have grown at a compound growth rate of 6.15 per cent annually over the period studied. Using the ARIMA model, the forecast supply for the year 2015-16 through 2019-20 will be 1,713, 1,873, 1,902, 2,020 and 2,078 thousand metric tons, respectively. There is a massive demand for these fruits and its value

added products and this higher demand has led to strong competition as more and more small-scale processors has started to process these value added products of fruits, as a result there is a great demand for these fruits. Yin and Min (1999) has also found the increasing trend in the supply of fruit crop over the period of time.

#### Constraints in sapota value addition :

The problems faced by the sapota processors with their Garrett scores are presented in the Table 7. The major problems faced by the sapota value addition units in value addition processes were the difficulty in getting stocks on time or higher lead time (I rank), followed by difficulty in raw materials procurement (sourcing the raw materials) which ranked II, inadequate grading, processing, storage, market information and transportation facilities (III rank), difficulty in fetching premium price for the value added products (IV rank). The other problems in the order of their importance were lack of financial facility and higher interest rates (V rank), high competition and risky investments (VI rank), high commission charges and high processing cost (VII rank), inadequate trained and skilled persons for processing and marketing (VIII rank) and finally, the problems of least importance were interruption in power supply (IX rank) and maintenance and repairs problem of machineries and equipments (X rank). The results were at par with Dhandhalya and Shiyani (2012).

#### Conclusion :

There is a great demand for the sapota fruit and other value added products like jam, jellies, from the

Table 7 : Problems faced in value chain of sapota fruit			(n=8)	
Sr. No.	Particulars	Sapota ripening		
		Garrett mean scores	Rank	
1.	Difficulty in raw materials procurement	74	II	
2.	Inadequate grading, processing, storage, market information and transportation facilities.	61	III	
3.	High competition and risky investments	49	VI	
4.	Difficulty in getting stocks on time (higher lead time)	77	I	
5.	High commission charges and processing cost	40	VII	
6.	Lack of financial facility and higher interest rates	51	V	
7.	Inadequate trained and skilled persons for processing and marketing	39	VIII	
8.	Difficulty in fetching premium price	60	IV	
9.	Interruption in power supply	26	IX	
10.	Maintenance and repairs problem (equipments)	23	X	

international markets. It is evident from the study that, even though the production of sapota is on higher side and is increasing over the period of time, the extent of spoilage and wastage was also found maximum. Thus, in order to overcome this problem, the different value addition processes have to be encouraged by encouraging processing units, food parks, etc., in the study areas. Concerned authorities have to provide financial assistance, subsidies on updated and improved technologies, equipments and machineries and other assistances like tax concessions, organizing growers and processors associations. Thus, a good amount of value can be added to these value addition units and makes the processing a profit venture. This may attract more number of entrepreneurs in coming years to establish the value addition units in the study area. In this connection, organizing Farmers Commodity Interest Group (FCIG's) would be of great help to overcome the middlemen involvement and commission agents on one hand and establishing the processing units of their own to reduce the cost in the marketing chain of value added products on the other. The exploitation by village traders, wholesalers and retailers in marketing of fruits is too much evident by the marginal portion of processor's share in consumer rupee in comparison with wholesalers and retailers in the study areas. So, processors can avoid this by selling their produce directly to the consumers through their own outlets or through their own

organizations.

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