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Economic analysis of value addition in mango pulp processing in Konkan region of Maharashtra state

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Abstract
The study entitled "Economic analysis of processing of Mango in south Konkan region of Maharashtra state" was undertaken to assess capital requirement, value addition, cost and returns of processed products of mango. The south Konkan region was selected purposively. Three tahsils from each district and thirty processing units from each district were finally selected for mango. Thus final sample consisted 60 processing units. Majority of the processing entrepreneurs are well experienced as indicated by existence of 90.00 percent units of mango processing were established before year 2010. Per unit capital investment in mango processing was Rs.53.30 lakh. Hence, the enterprises require a large amount of capital. Per quintal total cost of mango pulp production was Rs. 10486 and gross returns were Rs.14172 resulting in to net returns to the extent Rs. 3686 and input output ratio about 1:1.30. Mango processing is profitable venture and its profitability increases with scale of production. Input output ratio of mango pulp alone (1:1.30) was found to be improved (1:1.37) when other product such as mango leather (*poli*), mango mava, mango syrup were added together. Increase in the input output ratio and other financial indicator underlined importance of production of one or more products in addition of mango pulp. Per unit per year employment generated in mango pulp production was 2858.84 days. Mango syrup was highest profitable product with input output ratio to the tune of 1:2.94. The export of Jam, Jellies and Marmalade found to be is increasing at 20.87 percent per annum.

Keywords: Mango, value addition, cost, return, processing

1. Introduction
The mango, the most important tropical and subtropical fruits of the world. It is called as the king of fruits due to its nutritive value, taste, attractive fragrance and health promoting qualities. Mango occupies a prominent place among the fruits grown in India. It is outstanding source of vitamins A and C. Production of mango in India was 21.25 MT with area of 22.88 lakh hectares under cultivation (Anonymous, 2018). Out of which highest area was contributed by Andhra Pradesh 3.32 lakh ha followed by Uttar Pradesh 2.64 lakh hectare. The area under cultivation of mango in Maharashtra was 1.57 lakh ha (Anonymous, 2018). The south Konkan region of Maharashtra state is declared as an agro economic zone for mango. Various types of processed products are prepared from mango such as pickles, chutneys, squash, jam, juices, mango leather and mango pulp. However, mango pulp is a major processed product among all of these and many of other products are prepared from mango pulp. Hence, a attempt is made to study Value addition to mango pulp processing and its economic analysis, with specific objectives to study economics of processing of mango pulp, its break even analysis and value addition etc.

2. Materials and Methods
South Konkan region is having maximum processing units for mango and cashew. In view of this situation, to fulfill the objectives of the study the South Konkan region was selected purposively, which consist two districts. *viz:* 1) Ratnagiri and 2) Sindhudurg. Three tahsils from each district (Ratnagiri and Sindhudurg) having maximum number of processing units were selected purposively. The number of sample units interviewed from each selected tahsils was decided on proportionate basis so that larger representation by a tahsils having number of units could be achieved. Thirty processing units from each district were finally selected. Thus final sample consisted of 60 processing units. The primary data required for study were collected by "Survey Method" with the help of specially designed pre tested schedules. The data pertains to the year 2018-19.

2.1 Value addition Processes
The activities like sorting, grading, standardizing, cleaning, packing, storing, processing, advertising, transporting etc. which adds value to the produce at each stage are called value addition processes. Gross value addition is the difference between the value of end product and the value of raw material. Whereas net value addition is value of end product minus processing cost as well as cost of raw material. To assess the financial feasibility the analytical tools such as Break-even point, margin of safety were utilized for this study.

3. Results and Discussion
3.1 Capital investment
Capital investment is a important decision in deciding the scale of production. As the scale of production increases mango processing becomes more capital intensive. The per unit capital investment in mango pulp processing units is given in Table 1.

Table 1: Capital investment in mango pulp production

Sr. No.	Particulars	Value (Rs. Lakh)	Percent
1	Land	3.37	(6.72)
2	Building	26.78	(53.39)
3	Machinery	12.35	(24.63)
4	Vehicle	3.99	(7.96)
5	Furniture	0.04	(0.07)
6	Other fixed capital	3.63	(7.23)
Total		50.16	(100.00)

It was observed that the per unit total capital investment in mango pulp processing was Rs. 50.16 lakh, out of which maximum Rs.26.78 lakh (53.39%) was invested in buildings, followed by machinery Rs. 12.35 lakh (24.63%). It was concluded that mango processing business requires large amount of capital.

3.2 Raw material for production of mango pulp
The information regarding per unit raw material used in production of mango pulp is given in Table 2

Table 2: Per unit raw material used in mango pulp production

Sr. No.	Particulars	Qty	Value (Rs. Lakh)	Percent
1	Mango fruits (MT)	139.9	35.93	(91.87)
2	Preservatives - Kms (Kg)	0.42	0.03	(0.08)
3	Sugar (MT.)	7.92	3.14	(8.05)
Total			39.10	(100.00)

The items of raw material for mango pulp processing were ripened mango fruits, preservatives citric acid and sugar. The per unit quantity of mango fruits was 139.90 MT, which contributed about 91.87 percent of share of total value of raw material. The cost of mango fruits was Rs. 35.93 lakh. The cost of sugar was about eight percent out of total cost which was worked out to Rs. 3.14 lakh and quantity of sugar used was 7.92 MT. The quantity of preservatives was estimated to 0.42 Kg (Rs.3060). Thus, the per unit total cost of raw material required was Rs. 39.10 lakh.

3.3 Production and returns
The information regarding per unit mango pulp production and returns received from production of mango pulp is given in Table 3.The per unit mango pulp production was 86.23 q. and returns from sale of mango pulp were Rs. 121.08 lakh. Out of which 60.45 percent (Rs. 73.87 lakh) were received from 850 gm tin packing and 38.63 percent (Rs. 47.20 lakh) were from 3.1 kg tin packing. The total sale of by product such as mango stone was Rs.1.13 lakh. Thus, gross returns were Rs.122.21 lakh.

Table 3: Per unit production and returns in mango pulp processing

Sr. No.	Particulars	Unit	Qty.	Value (Rs. Lakh)	Percent
1	Mango pulp production	Kg	86235.00	121.08	(99.07)
	a) Tin (850 gm)	Kg	59784.71	73.87	(60.45)
	b) Tin (3.1 Kg)	Kg	26450.29	47.20	(38.63)
2	By product	Kg	15423.00	1.13	(0.93)
3	Gross returns	Rs. Lakh		122.21	(100.00)

3.4 Economics of mango pulp processing
The information regarding per unit total of processing per unit economics of mango pulp processing is presented in Table 4.The total cost of mango pulp production was Rs. 90.43 lakh, out of which maximum share (70.72%) was in case of variable cost i.e. Rs. 63.95 lakh, followed by marketing cost Rs. 19.09 lakh about 21.11 percent and fixed cost Rs. 7.39 lakh to the extent of 8.17 percent.

Table 4: Per unit economics of mango pulp processing

Sr. No.	Particulars	Value (Rs. Lakh)	Percent
A)	Variable cost	63.95	(70.72)
B)	Fixed cost	7.39	(8.17)
C)	Marketing cost	19.09	(21.11)
	Total cost	90.42	(100.00)
D D)	Gross returns (Rs.)	122.21	(100.00)
1	Net returns	31.78	(26.01)
2	Input output ratio	1: 1.30	

The per unit net returns were Rs. 31.78 lakh. The input output ratio was worked out to Rs. 1:1.30 indicating profitability of business.

3.5 Per quintal cost and returns in mango pulp production
The information regarding per quintal cost and returns in mango pulp production is presented in Table 5.
The per quintal total cost was Rs. 10486 out of which variable cost was Rs. 7416 and fixed cost Rs. 857. The per quintal gross returns were Rs. 14172 resulting in to net returns to the tune of Rs. 3686. The input output ratio at overall level was 1: 1.30. Similar results were also observed in a study conducted by Joshi (1997) [2] in his study on mango processing in Ratnagiri district wherein the input output ratio was 1: 1.35. As depicted in table 5, the per kg cost and gross returns at overall level were Rs. 108 and Rs. 141, respectively, resulting in to per kg (mango pulp) net profit of Rs. 33.

Table 5: Per quintal cost and returns in mango pulp production. (Value: Rs.)

Sr. No.	Particulars	Overall
1	Variable cost	7416
2	Mango fruits	4166
3	Fixed cost	857
4	Transport cost	528
5	Total marketing cost	2214
6	Total cost	10486
	Returns (Rs.)	
8	a) Mango pulp	14041
9	b) By product	132
10	Gross returns(Rs.)	14172
11	Net returns	3686
12	B.C. Ratio	1.30: 1
13	Per tin cost (3.1 Kg)	336
14	Per tin cost (850 gm)	92
15	Cost per kg	108
16	Gross returns per kg	141
17	Net returns per kg of mango pulp	33

3.6 Break-even point in mango pulp processing

The information regarding breakeven point in mango pulp production is presented in Table 6. The fixed cost and total revenue were Rs. 7.39 lakh, and Rs. 121.08 lakh, respectively. The per kg selling price and per Kg variable cost at overall level was Rs. 139.78 and Rs. 78.85, respectively. The breakeven point that is the quantity at which all costs allocated to a product are equal to revenue from sale of mango pulp. The break even quantity was 11212 Kg. However actual levels of production maintained by processors were 86235 kg resulting into margin safety to the tune of 75023 Kg. The percentage of margin of safety was sufficiently high (i.e. 14.74 percent.)

Table 6: Breakeven point in mango pulp production

Sr. No.	Particulars	Value
1	Fixed cost (Rs. Lakh)	7.39
2	Total revenue(Rs. Lakh)	121.08
3	Output (Kg)	86235
4	Per kg selling price (Rs.)	139.78
5	Per kg variable cost(Rs.)	78.85
6	Break – even point (kg)	11212
7	Margin of safety (kg)	75023
8	Margin of safety (Rs. Lakh)	105.33
9	Margin of safety (%)	14.74

3.7 Value addition in mango pulp processing

The information regarding per quintal value addition in mango pulp processing is presented in Table 7.The per quintal sale value of final product was Rs. 13978. The per quintal purchase value was Rs. 4333.The per quintal processing cost was worked out to Rs. 8767. The per quintal net added value was estimated about Rs. 5211. The cost of mango fruits required for one quintal mango fruits was Rs. 4333; indicating two times increase in the original value of fresh mango.

Table 7: Per quintal value addition in mango pulp processing

Sr. No.	Particulars	Value
1	Sale value of final product (Rs. / q)	13978
2	Purchase value of mango fruits (Rs. / q)	4333
3	Gross value added (Rs. / q)	9645
4	Per quintal processing cost (Rs. / q)	8767
5	Net added value (Rs. / q)	5211
6	Added value (%)	
7	a) Gross (Rs. / q)	222.57
8	b) Net (Rs. / q)	120.25

The net added value percentage at overall level was 120.25 percent. Hence, value addition gives higher return which is indicated by the higher percentage of net added value.

4. Conclusions

It was concluded that the capital investment is relatively higher in mango pulp processing. The mango pulp production is profitable venture in Konkan region of Maharashtra. The per quintal net returns were Rs 3686 and benefit cost ratio was Rs. 1.30: 1. It was also revealed that the mango processing units are operating at scale 86235 Kg and break-even point was 11212 Kg indicated sufficiently higher quantity of margin of safety (75023 Kg).Per quintal gross and net value addition was 222.57 and 120.25 percent, respectively which underlined the importance of processing. Thus mango processing is economically remunerative enterprise, in south Konkan region of Maharashtra.

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