

RESEARCH PAPER

Economics of tamarind seed powder processing unit in Karnataka

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ABSTRACT

Tamarind seed is an underutilized by-product of the tamarind pulp industry. Only a small portion of the seed, in the form of tamarind kernel powder and it used as a sizing material in the textile, paper and jute industries. Though many applications of this seed are possible, there have been hardly any other uses for it including using it as an additive in food formulations. The excellent gelling cum adhesive characteristics of the decorticated seed powder can lead to several applications in food and pharmaceutical industries which are evident by the number of research papers as well as patent applications. In this perspective an analysis has been made to know the cost and returns of tamarind seed processing units. The analytical tools such as NPV, IRR, Payback period and B : C ratio were used to analyze the data. The study was based on the primary source and it was used to analyze the financial feasibility of tamarind processing units in study area. Results showed that processing of 1kg of tamarind seed will give 0.70 kg (70 %) of tamarind kernel seed powder and 0.30 kg (30%) of hard brown testa. Here main product was tamarind kernel seed powder and by-product was hard brown testa. It was observed that the tamarind seed processing unit was found to be financially sound and economically feasibility in terms of net present value with Rs. 15,526.68, IRR 37.00 per cent, B : C ratio of 3.80 and payback period was 2.30 years. The total variable cost was Rs. 24,354.30 (60.25 %), total fixed cost was Rs. 16,080.97 (39.78 %) and total processing cost was Rs. 40,421.32 (100%). The derived Gross return was Rs. 55,948 and net return was Rs. 15,526.68.

KEY WORDS : Tamarind, Tamarind seed, Tamarind kernel powder, Financial feasibility, Processing unit, Value addition, Capacity utilization

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Tamarind (*Tamarindus indica* L.) is most important common fruit tree. The tamarind tree produces pod-like fruit that contains an edible pulp used in cuisines around the world and a mature tree may attain a maximum height of 30 meters. Tamarind is originated in Madagascar and is now extensively cultivated in India, Myanmar, Bangladesh, Malaysia, Sri Lanka, Thailand, several African, Central American and South American countries are large producers of

tamarind in the world. The tamarind tree has the ability to grow in poor soils because of their nitrogen fixing capability and with standing long periods of drought makes them ideal low input, high yielding trees. Tamarind is a multipurpose tree species, almost every part of it finds some use. The fruit contains about 55 per cent pulp, 34 per cent seed, and 11 per cent shell and the fibre in a pod. In India, it is chiefly grown in Karnataka, Madhya Pradesh, Andhra Pradesh and Tamil Nadu. Tamarind is one of the most important common fruit trees found grown all over India.

There is also good export possibility of the tamarind dried or pulp and scope of availability of market for tamarind base products. According to spice board of India, the area 50.0 (000' ha), production is 203.0 (MT/ha) and the yield is 4.0 MT/ha in 2018-19. For direct consumption 90 per cent and remaining 10 per cent for export as a tamarind fresh, tamarind dried and also as a processed products. The ingredients in the pulp make it one of the cheapest multi-vitamin and multi-mineral diets for the poor. The ripe fruit is harvested in the months of March to May and provides the much needed labour for the poor during the lean season in plucking as well as de-seeding stages. The findings were similar to the findings of Kumar and Bhattacharya (2008).

Tamarind seeds are also good source of essential fatty acids, minerals particularly calcium, phosphorus and potassium is relatively high compared to other legumes. Further tamarind kernel powder, tamarind seed polysaccharide, tamarind gum are very useful in textile, paint, and in many pharmaceutical industries. Compounds extracted from tamarind seed, have applications such as excipients in drug delivery systems, in curing diseases and disorders, as immunity booster. Various extracted components from tamarind seeds are useful as additives, emulsifying, and gelling agent in food industry. Tamarind seeds are flattened, glossy, and orbicular to rhomboid. They are 3-10 cm x 1.3 cm in size. They are dicotyledonous. Seeds are hard, red to purple brown in color. Seed chambers are lined with a parchment like membrane. Cotyledons are thick. Seed size varies between 320-700 g per kg of fruit. Tamarind seed consists of the seed coat or testa (20-30%) and the kernel or endosperm (70-75%). The findings were similar which are appeared in Bagul *et al.* (2015).

India produces 2,03,000 MT annually and tamarind products possess good export potential. Tamarind fresh,

Tamarind dried and Tamarind seed powder are the major products for exporting to other countries. The by-product of tamarind seed powder was export majorly US, Australia, China and UK. About 182.7 to 192.85 MT of tamarind is processed and lot of labour is engaged in this processing in India. Even though, traditional processing is widespread, its commercial uses are unknown and underdeveloped. In this perspective an analysis has been made to know the cost and returns of tamarind processing units.

METHODOLOGY

To fulfill the specific objectives of Karnataka was selected for the study. The state is having dry land area and having highest production of tamarind. In Karnataka, four districts namely Bengaluru, Kolar, Tumkur and Chikkabalapura were selected. From each district one processing unit were selected. For collection of primary data, the respondents were selected by random sampling method. In Karnataka four processing units were selected and 25 farmers, 10 traders, 10 wholesalers, 10 retailers were selected in each district. Thus the total sample size is 224. For this particular objective, total cost and returns were computed for a year of 2018-19 based on primary data were collected from processing units. For evaluating the present objective tamarind seed powder processing unit was selected from Kolar district in Karnataka. However, for understanding the financial feasibility of tamarind processing unit, the statistical tools like NPV, IRR, B : C ratio and payback period were used to analysis the data and to arrive at valid conclusion.

ANALYSIS AND DISCUSSION

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

Procurement of tamarind seed in Karnataka:

Table 1 it shows that procurement management of tamarind seeds from 2003-04 to 2017-18. Over the years from the quantity of raw material has been increased growth of 500 metric ton to 745 metric ton and compound annual growth rate of 2.24 per cent and the value of raw material was also has been increasing growth of 4.97 per cent. Performance of tamarind seed processing unit was good. Because year by year the procuring quantity of raw material was increased and its prices of procuring

Sr. No.	Years	Quantity of raw material (MT)	Value of raw material cost (Rs./MT)
1.	2003-04	500	8,410
2.	2004-05	550	8,750
3.	2005-06	600	9,000
4.	2006-07	610	9,500
5.	2007-08	622	10,000
6.	2008-09	643	12,000
7.	2009-10	647	12,855
8.	2010-11	658	13,460
9.	2011-12	670	13,700
10.	2012-13	681	14,000
11.	2013-14	686	14,265
12.	2014-15	690	14,500
13.	2015-16	700	15,020
14.	2016-17	730	15,420
15.	2017-18	745	16,000
	CAGR (%)	2.24	4.97

raw material also increased because of pre-planted trees were come for yielding, this processing unit's product spreading by exporting and transporting to other processed products. Tamarind seed powder has been demanded because it has used in pharmaceuticals, textile industries, used as an additive in food processing industries and also more demand for tamarind kernel. So, that the tamarind seed processing has showing good performance over the years, similar observations has been find in Malhotra and Vashishtha (2007).

Capacity utilization of tamarind seed powder processing unit:

Table 2 represents the capacity utilization Karnataka starch manufacturing company. The initial installed capacity was 3.80 MT/day, having the number of working days was 240 day/annum, number of shifts were 2 per day, duration of shift was 8 hours, total annual installed capacity was 950 MT, quantity processed per day 3 MT, But actual annual capacity was 745 MT, The capacity utilization was 78.42 per cent and remaining 21.58 per cent was not utilized because some of the reasons means nothing but plant present capacity and it determines the practically plant production capacity and the actual quantity processed and how much extend the actually used its installed production capacity. These capacity

Sr. No.	Particulars	Units	Amount (Rs.)
1.	Installed capacity	MT/ day	3.80
2.	Number of working days	days/annum	240.00
3.	Number of shift	per day	2.00
4.	Duration of shift	Per/hour	8.00
5.	Annual installed capacity	MT	950.00
6.	Quantity processed	day (MT)	3.00
7.	Annual quantity processed	MT	745.00
8.	Capacity utilization	%	78.42

utilization and actual quantity processed were analyzed by analyzing of 15 years average the values were obtained that 900 metric tons of annual installed capacity and actual quantity processed annually 750 metric tons with the capacity utilization of 78.42 per cent.

Important findings of the study are presented in terms of economic analysis and financial feasibility. The capacity utilization of tamarind seed powder processing unit in Kolar district is depicted in Table 2. The processing plant has a total processing capacity of 950 MT per year, whereas it is currently processing 745 MT per year and running at 78.42 per cent of plant capacity. The tamarind seed having low cost and tamarind seed processing plant having higher capacity utilization because tamarind seed powder orders were more and has more demand to Indian textile industries. The tamarind seed powder was a major processed product for export from India to other countries (Rao *et al.*, 2015).

Capital investment in tamarind seed powder processing unit:

The purchasing of land 1.50 acre it was the worth of the Rs. 13.89 lakhs, land infrastructure development with the value of Rs. 3.00 lakhs. The total area of requirement in the building 6,160 sqft and the building construction of total cost of Rs. 35.42 lakhs and plant and machinery cost were Rs. 22.75 lakhs and working capital with the worth of Rs. 3.5 Lakhs. The total capital investment was Rs. 78.56 lakhs were presented. In Table 3 revealed that the investment required for setting up the unit was Rs. 78.56 lakhs. Hence, the investment cost on tamarind seed powder processing unit has been more feasible. Investing the capital on tamarind seed powder processing unit was to increase the revenue in long-term and to bring significant changes in the profit of the

Table 3 : Capital investment in Karnataka starch manufacturing company

Sr. No.	Investment particulars	Units	Rs. Lakhs
1.	Land (1.50 acre)	Rs.	13.89
2.	Land development	Rs.	3.00
3.	Civil work (Rs. 575* 6160 sqft)	Rs.	35.42
4.	Plant and Machinery	Rs.	22.75
5.	Working capital	Rs.	3.5
	Total capital		78.56

company by avoiding over or more investment or under investment. So, planning and analyzing of capital investment has been more important. The working capital was used for day to day expenses and it was efficient. However, here working capital management leads to improve the operating performance of the business concern and it helps to meet the company's short-term liquidity. Similar findings were observed in case of Kishore and Murthy (2017) who studied the capital

investment of desiccated coconut powder unit.

Economics of tamarind seed powder processing in Karnataka:

Karnataka starch manufacturing company was computed for cost and returns of tamarind seed kernel powder was explained in the Table 4. Hence, broadly discussed that the total processing of tamarind seed kernel powder cost per ton was Rs. 40,421.32. It was observed that cost of raw material contributed 39.58 per cent. Total variable cost also indicated that the trend with a contribution of Rs. 24,354.30 per ton and 60.25 per cent. So, the total cost was Rs. 22,090 (54.65 %) and total marketing cost was Rs. 671 (1.66 %). Likewise day to day expenses of total working capital was Rs. 22,761 (56.31 %). The interest on working capital at 7 per cent was Rs. 1,593.27 (3.94 %). Total variable costs and marketing cost was Rs. 24,354.30 (60.25 %). The

Total 4 : Economics of tamarind seed powder processing unit in Karnataka					(Rs./MT)	
Sr. No.	Particulars	Units	Quantity	Price (Rs.)	Total cost	%Total
	Variable cost					
1.	Tamarind seed (Raw material)	MT	1	16,000	16,000	39.58
2.	Repairs and maintenance	Rs.		100	100	0.25
3.	Labour wages	No's	4	500	2,000	4.95
4.	Telephone charges	Rs.		40	40	0.10
5.	Electric power charge	units	600	6.5	3,900	9.65
6.	Miscellaneous cost	Rs.	-	-	50	0.12
I	Total cost	Rs.	-	-	22,090	54.65
II	Total Marketing cost	-	-	-	671	1.66
1.	Total working capital (I+II)	-	-	-	22,761	56.31
2.	Interest on working capital @7%	Rs.	-	-	1,593.27	3.94
III	Total variable cost (A+B)	-	-	-	24,354.30	60.25
	Fixed cost	-	-	-		0.00
1.	Rental value of land	-	-	-	116.25	0.29
2.	Depreciation on machinery at 10%	Rs.	-	-	8,451.13	20.91
3.	Depreciation on land and building at 10%	Rs.	-	-	3,621.13	8.96
4.	Salaries to permanent employees	No's	2	1,000	2,000	4.95
5.	Insurance premium	Rs.	-	-	165	0.41
6.	License fee	Rs.	-	-	4.5	0.01
7.	Interest on fixed capital @ 12%pa	Rs.	-	-	1722.96	4.26
	Total cost				14358.01	35.52
IV	Total fixed cost	Rs.	-	-	16080.97	39.78
	Total processing Cost (III+IV)	Rs.	-	-	40421.32	100.00
	Value of main product	kg	725			-
	Sale price	kg	725	75.64	54,839	-
	Seed husk	kg	75	10	750	-
	Total Value of by-product	Rs.	-	-	750	-
	Gross returns	Rs.	-	-	55589	-
	Net returns	Rs.	-	-	15167.68	-

raw material it means tamarind seed cost was less compare to tamarind fresh because it is by-product of tamarind fresh. The raw material cost less, even though the net profit was more comparing to tamarind fresh. Because, tamarind seed kernel powder has more demand in Indian textile industries, pharmaceuticals manufacturing industries and cosmetics manufacturing industries. Electric power charge was another factor which had considerable effect on total cost Rs. 3,900 (9.65 %) and the management of the tamarind seed powder unit did mention that the availability of labour charges of Rs. 2,000 (4.95 %), does affect the work considerably. The cost of marketing and interest on working capital were other important factors. It has to be noted that tamarind seed powder has more demand and have less competition compare to other tamarind main products like tamarind fresh, tamarind concentration and tamarind juice. The supplying of tamarind seed kernel powder is a by-product, available cheaply from different districts and states. The observations were showing that push marketing strategy like supplying tamarind seed kernel powder mainly to customer groups like Indian textile industries, pharmaceutical manufacturing industries, cosmetic manufacturing industries and food processing industries. All these factors can make rise in net returns (Dinesh and Ramasamy, 2016).

Financially feasible of tamarind seed powder processing unit in Karnataka:

Table 5 results shown the cash flow examination of the tamarind seed powder processing unit disclosed that the net present value was Rs. 43,35,000. It was positive at the end of the economic life of the project which was considered as 15 years. The internal rate of return or income generating capacity of the unit was also satisfactory with an IRR of 37.00 per cent. It was higher than the present bank rate. The B : C ratio of the unit was found to be 3.80 means the investor could get back Rs. 3.80 for every rupee invested. It was more than unity. The pay-back period was found to be 2.30 years meaning the investors can get back the initial investment

within that period. Hence, the Tamarind seed powder processing unit satisfies the entire required standard to be called financially feasible. The feasibility techniques has been analyzed were discussed that in Table 4, the net present worth of processing units has been shown the end of the economic life of the project *viz.*, 15 years was found to be Rs. 43,35,000. It was positive and therefore assuring the norms of feasibility with respect to NPV. It has to be noted here that the net present value would be much higher if only actual costs are taken into consideration. It could be concluded that the investment in tamarind dried processing unit has been found to be viable. The similar to findings were discussed in Mutanal *et al.* (2016).

The benefit cost ratio is one more method of judging the worthiness of fund which was invested on processing unit. The rate of discount considered was 10 per cent. The benefit cost ratio of tamarind seed powder processing was Rs. 3.80. The analysis exhibits regarding all tamarind processing units can be considered a good benefit as the expected benefits. It goes on to show that investment in all tamarind processing units were economically feasible and financially sound. It was noted that in some of the previous studies on financial feasibility, a different method of calculating the B: C ratio was used *viz.*, taking the ratio of net discounted cash flow to the initial investment. This method would give a higher B: C ratio. However, this method did not take into account the total costs incurred during the life of the project. The internal rate of returns shows the rate of return that the project could generate out of its returns. If the rate of return of project is higher than the existing bank rate, it can be considered as a financially sound investment. It was observed that 37.00 per cent was being generated from the project's return over its economic life. Considering the average of bank rates of all banks comes to around 12.00 per cent, it can be noted that the rate of return from project is slightly higher. However, if only the actual costs are considered, the net returns after discounting would be higher and the rate of return can be much higher than 12.00 per cent. The findings were

Table 5 : Financial feasibility of different processing units in the study area

Sr. No	Particulars	Units	Tamarind seed powder unit
1.	Net present value (NPV)	(Rs. Lakhs)	43.35
2.	Internal rate of return (IRR)	%	37.00
3.	B:C ratio	Rs.	3.80
4.	Payback period	Years	2.30

similar to the findings of Karthick *et al.* (2013). So, the criteria of internal rate of return have been considered as satisfactory and the project can be considered as financially feasible with good rate of return. The payback period indicates the time required for the investor to get back the establishment cost. It was observed that the payback period of tamarind seed powder processing was 2.30 years. Hence, the foregoing results revealed that the NPV was positive, B:C ratio was more than unity, IRR was more than the existing bank rate and the investor could get back their initial investment within 2 to 3 years in the processing unit. Thus, the results of the study justify the decision of farmer to take up of tamarind seed processing units was a worthy and profitable investment. The findings were similar to the findings of Buyinza *et al.* (2010).

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