

An economic study on cashew processing and its by- products

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SUMMARY : The by-products of cashew viz., Cashew Nut Shell Liquid (CNSL), shell cake, testa and cashew apples are commercially exploitable. The method of processing affects the outturn, quality of the output, health of the workers, quality of by products and the cost of production. To use these byproducts economically and to create awareness on the business opportunities in cashew processing, the present study attempts to find out the economic feasibility of cashew nut and oil (CNSL). The overall cost of production of kernels has been found to be Rs. 4784.11 and Rs. 4616.63 per quintal of raw nuts processed in steaming and drum roasting methods, respectively. The total sale proceeds from the sale of cashew kernels, shells and testa have been Rs.5347.53 and the profit per quintal of raw nuts processed has been Rs. 563.43 in steaming method, whereas in drum roasting method the total sale proceeds has been Rs. 4693.62 and the profit per quintal of raw nut has been Rs 76.99. Thus it is concluded that the steam processing method realized better returns than drum roasting method due to the adoption of latest technology in the cashew processing methods in India. The two methods of extraction of CNSL viz., kiln method and expeller method are adopted by farmers/processors. The BCR and IRR analysis worked out to 1.15 and 47.40 per cent in kiln method, whereas, they have been 1.14 and 41.38 per cent in expeller method. The solutions to the problems confronting cashew nut processing lies in intensifying research in order to develop cost – effective, eco- friendly technology to boost efficiency and productivity and to reduce costs of processing.

KEY WORDS : Cost of processing, Steaming method, Cashew nut shell liquid, IRR

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Cashew cultivation in India was introduced by the Portuguese during 16th century. India is the largest producer, processor, exporter and the second largest consumer of cashewnut in the world. Among the agricultural commodities exported from India during 2003-04, cashewnut held the second position contributing to 1.50 per cent of the total export earnings. (Singh, 2002).

The total area under cashew in the world is 30.93 lakh hectares. In terms of area under cultivation, India ranks first with 7.70 lakh hectares constituting 25 per cent of area under cashew in the world (The Cashew Statistics, 2004). Out of the total world production of 18.93 lakh tonnes during 2004, India ranked first with 5.30 lakh tonnes (26.41 per cent).

Cashew occupies an area of 9.23 lakh hectares in the country as on 2009-2010 with a production of 6.13 lakh MT. Of these, 2.00 lakh ha of the plantations developed from the beginning of 8th Plan alone have been with superior clones of

high yielding varieties. It generates employment in the processing and agrarian sector employing over three lakh persons with 95 per cent of them being women.

Cultivation of cashew in India confines mainly to the peninsular areas. As per latest statistics, out of total area under cashew, Andhra Pradesh ranks first (19.83 per cent), followed by Maharashtra (18.96 per cent), Orissa (15.49 per cent), Tamil Nadu (14.41 per cent), Karnataka (12.78 per cent), Kerala (7.80 per cent), Goa (5.96 per cent), West Bengal (1.19 per cent) and others (3.57 per cent).

Cashew processing :

In cashew industry, there are different methods of processing of cashew in India. Many processors are still using the traditional methods, though a number of modern innovative methods are widely used in India. The method of processing affects the outturn, quality of the output, health of the workers, quality of by products and the cost of production. The adoption of appropriate methods of processing can bring efficiency in the form of higher outturn, better quality kernels and cashew nut shell liquid. It also reduces unit cost of production, besides

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reducing the environmental pollution and creates an environment for a contented, motivated and healthy workforce, which is an important asset of any enterprise.

India was the first country to hit the world market with cashew kernels and it was she who pioneered cashew processing as an industry. The raw cashew nuts collected from the growing areas are moved to the factories for processing. It is ensured that the raw nuts are thoroughly cleaned and are free from all foreign matter before they are taken for processing. The processing of cashew is done by any of the four methods viz., Sun drying, drum roasting, oil bath roasting and steam cooking. The export of cashew kernels in 2009-10 was 1.08 lakh tonnes valued at Rs.2905.82 crores but the import of raw nuts was 7.53 lakh tonnes valued at Rs. 3037.35 crores.

During 2009-10, the major buyers of Indian kernels were USA (28.49 per cent), U.A.E. (16.79 per cent), Netherlands (9.54 per cent), Japan (5.21 per cent), U.K., (4.14 per cent), Saudi Arabia (3.54 per cent), France (3.53 per cent), Spain (2.57 per cent) and Belgium (2.28 per cent) (The Cashew Statistics, 2010).

The main constraint in processing industries was heavy dependence on imports due to shortage of adequate raw nuts from indigenous sources. To bridge the gap between the industrial demand and the present trend in production, steps are needed to increase the production of raw nuts. This can be achieved by the adoption of high yielding varieties to suit the different agro ecological regions of India.

In the first three decades of independence, *i.e.*, from 1947-1977, India accounted for 99 per cent of the world trade in cashew kernels. The development of cashew crop in Brazil and manufacturing facilities in East Africa led to the competition in cashew kernel market and India's share progressively has been reduced to 50 per cent of the global trade.

All the processing units in India put together have a processing capacity of 16 lakh tonnes of raw nuts per year, but the domestic production is less than six lakh tonnes. Hence, there is a need for import of raw cashewnuts for processing and re-export.

In this scenario, a systematic investigation was felt necessary to study the feasibility of cashew processing in India. It is hypothesized that the cost of processing varies among the different processing units. The specific objective was to find out the processing feasibility of cashew processing units.

EXPERIMENTAL METHODS

In general, the two methods, *viz.*, drum roasting method and steaming method were used for cashew processing. In Andhra Pradesh, majority of the industries (80 per cent) are following drum roasting method, while in Tamil Nadu 90 per cent of industries are using steaming method. To study the feasibility of processing of cashew industries, 20 units from Palasa region of East Godavari district in Andhra Pradesh and 20 units from Panruti taluk of Cuddalore district in Tamil Nadu were selected randomly, since, drum roasting and steaming methods are widely followed in these regions, respectively.

CNSL (Cashew Nut Shell Liquid) is produced by two methods *viz.*, kiln method and expeller method. The economic feasibility of CNSL producing units were studied by taking 10 units each under kiln method and expeller method in Cuddalore district. The tools of analysis *viz.*, cost of production, BCR and IRR were employed to analyse the economic feasibility of the cashew processing technology. The reference period of the study was 2008-09.

EXPERIMENTAL FINDINGS AND ANALYSIS

The experimental findings of the present study have been presented in the following sub heads:

Cashew nut processing :

The processing feasibility of the cashewnut has been analysed for the drum roasting and steaming methods separately which were prevailing in the selected states.

Capital investments of processing units :

The various particulars of fixed capital for cost of processing, *viz.*, land, building and machineries were collected and presented in Table 1.

It could be seen from Table1 that the capital investment of the processing unit was the highest on buildings (73.99 per cent) followed by machinery and equipments (15.56 per cent) and land (10.45 per cent). The heavy investment on land and buildings for about 85 per cent was due to the provision of work space to carry out their processing activity. Since the processing units are labour intensive, the investment on machinery and equipments was low. It is seen that the total

Table 1: Capital investments of processing units

Sr. No.	Particulars	Tamil Nadu		Andhra Pradesh	
		Steaming		Drum roasting	
		Amount (Rs.)	Percentage	Amount (Rs.)	Percentage
1.	Land	98560.57	10.45	97540.23	11.10
2.	Buildings	697750.00	73.99	724541.12	74.25
3.	Machinery and equipments	146650.85	15.56	1326647.24	14.20
	Total	942961.42	100.00	954748.55	100.00

capital investment in the processing units were Rs.942961.42 and Rs.954748.55 in Tamil Nadu and Andhra Pradesh, respectively.

It is evident that from the table that the annual installed capacity in steaming method was 5890 quintals and in drum roasting method it was 5160 quintals. Also, the capacity utilization was higher in steaming method (64.68 per cent) than the drum roasting method (51.89 per cent) of processing.

Cost of processing :

The per quintal cost of processing of cashewnuts in steaming and drum roasting methods is presented in Table 2.

It could be seen from Table 2 that the overall cost of processing per quintal of cashewnuts in steaming method was Rs.634.11 and it was Rs.606.63 in drum roasting method. Interest on capital was the major component in the total cost of processing of cashew nut constituting 49.27 per cent and 51.12 per cent of the total cost in the two methods, respectively.

The high cost on interest on working capital was due to the high rate of interest (14.56 per cent) charged by commercial banks and required huge capital for five to 10 months in a year.

This was followed by piece rate wages for workers 19.93 per cent and 18.19 per cent in these methods, respectively, which was also high due to the labour intensity of processing units. The cost of packing material accounted for about 13 per cent, since the packing of graded kernels has been done in 25 lb. (11.34 kg) capacity tins to maintain the quality of kernels.

The overall cost of production of kernels was found to be Rs. 4784.11 and Rs. 4616.63 per quintal of raw nuts processed in steaming and drum roasting methods, respectively. The cost of raw material was the major component in the cost of production of kernels, constituting 86.64 per cent and 86.86 per cent of the total cost of production of kernels in steaming method and drum roasting methods, respectively.

Out-turn of kernels and by- products :

The total sale proceeds from the sale of kernels and profit per quintal in steaming and drum roasting methods are presented in Table 3.

It could be seen from Table 3 that one quintal of rawnuts when processed under steaming method resulted in 24.46 kg

Sr. No.	Particulars	(Per quintal)			
		Steaming		Drum roasting	
		Amount (Rs)	Percentage	Amount (Rs)	Percentage
I. Fixed cost					
1.	Depreciation on buildings @ 5 %	14.56	2.30	12.57	2.07
2.	Machinery and equipments @10 %	6.72	1.06	5.75	0.009
3.	Fixed capital @ 12.5% per annum	42.96	6.77	40.15	6.62
4.	Interest on working capital @14.50% per annum	312.45	49.27	310.11	51.12
II Variable cost					
5.	Packing material (carton and tins)	85.35	13.46	82.15	13.54
6.	Wages	126.35	19.93	110.25	18.19
7.	Salaries	21.36	3.37	20.15	3.32
8.	Factory overheads including (administrative)	24.36	3.84	25.15	4.14
III	Total cost of processing	634.11	100.00	606.63	100
IV	Raw material cost	4150	86.74	4010	86.86
V	Total cost of production of kernels	4784.11	100	4616.63	100.00

Sr. No.	Particulars	Steaming		Drum roasting	
		Amount (Rs)	Percentage	Amount (Rs)	Percentage
I	Total quantity of rawnuts processed (q.)	3810		2678	
	Cashew kernels	24.46		21.26	
	Shells	72.54		76.04	
	Testa	3.00		2.70	
II	Return from cashew kernels @ Rs.208/=	5087.68		4422.08	
	Shells @RS.3.5/=	253.89		266.14	
	Testa @ Rs.2/=	6.00		5.40	
III	Total returns	5347.57		4693.62	
	Net profit per quintal of raw nuts processed	563.46		76.99	
IV	Benefit cost ratio	1.12		1.02	

of kernels but the average was 30 per cent, 72.54 kg of shells and 3.0 kg of testa on an average, whereas in drum roasting

method, it was 21.26 per cent of kernels, 76.04 per cent of shells and 2.70 per cent of testa on an average.

Table 4 : Cost and returns – Kiln method

Sr. No.	Particulars	Amount (Rs.)	Percentage
I	Fixed capital		
	Construction of kiln	35000	
II	Fixed cost		
1.	Interest of fixed capital (@ 11.5 per cent)	4025	
2.	Rental value of land	3000	
	Total fixed cost	7025	1.38
III	Variable cost		
1.	Cost of cashew shell	413250	81.48
2.	Labour charges	22500	4.44
3.	Wooden logs	19000	3.75
4.	Container cost	1975.5	0.38
5.	Interest on working capital @ 9.5 per cent	43434.7	8.56
	Total variable cost	500142.2	98.61
	Total cost	507167.2	100
IV	Returns		
	Sale of CNSL	561000	83.85
	Value of shell waste	108000	16.14
	Total return	669000	100
	Net income	161832.8	
	Cost of production /kg of oil	7.68	
	Benefit cost ratio (BCR)	1.15	
	Internal rate of return (IRR)	47.40	

Table 5 : Cost and returns – Expeller method

Sr. No.	Particulars	Amount (Rs.)	Percentage
I	Fixed capital		
	Machineries	325000	
	Building	50000	
		475000	
II	Fixed cost		
1.	Interest on fixed capital (@ 11.5 per cent)	54625	2.67
III	Variable cost		
1.	Cost of cashew shell	1724800	84.48
2.	Labour charges	75460	3.69
3.	Electricity charges	12600	0.62
4.	Maintenance cost	1800	0.08
5.	Interest on working capital @ 9.5 per cent	172392.7	8.44
	Total variable cost	1987052.7	97.32
	Total cost	2041677.7	100
IV	Returns		
	Sale of CNSL	2304960	95.53
	Value of shell waste	107800	4.47
	Total return	2412760	100
	Net Income/year	371082.3	
	Cost of production /kg of oil	9.30	
	Benefit cost ratio (BCR)	1.14	
	Internal rate of return (IRR)	41.38	

The grade W320, an important export quality, formed 34.90 per cent followed by W240 (14.8 %), W180 (11.19) per cent SW, (7.28 %) and SSW (3.02 %). Although there were several other grades depending upon the counts of wholes in lb. weight, the percentage recovery obtained in other grades was very nominal.

The total sale proceeds from the sale of cashew kernels, shells and testa were found to be Rs.5347.53 and the profit per quintal of raw nuts processed worked out to Rs. 563.43 in steaming method, whereas in drum roasting method the total sale proceeds was 4693.62 and the profit per quintal of raw nut was 76.99. Thus it is concluded that the steam processor realized better returns than drum roasting method due to the adoption of latest technology in the process of steaming.

Cashew nut shell liquid :

The cost and returns of the CNSL producing industries for the kiln method and expeller method are presented in Table 4 and 5.

The Table 4 reveals that the overall costs incurred for CNSL extraction by kiln method was Rs. 507167.2. The fixed cost includes interest on construction of kiln (Rs. 4025) and rental value of land (Rs. 3000). Variable cost constituted the highest share in the total cost of the kiln method with 98.61 per cent, of which cost of cashew shell constituted 81.48 per cent followed by labour charges (4.44 %). The sale of CNSL contributed 83.85 per cent and the remaining 16.14 per cent was accounted by value of shell waste. The cost of production of CNSL was found to be Rs.7.68/kg of oil and the BCR and IRR of kiln method were 1.15 and 47.40 per cent

The Table 5 shows that the total cost incurred for CNSL extraction by expeller method was 2041677.7. The variable cost includes cashew shell costs, labour charges and fuel charges, maintenance charges and electricity charges (Rs. 1987052.7). This method gave an income of Rs.2412760 *i.e.*, Rs. 2304960 from CNSL sale and Rs. 107800 from waste of cashew shell. The sale of CNSL contributed 95.53 per cent and the remaining 4.47 per cent was accounted by value of shell waste. The cost of production of CNSL was found to be Rs.9.30/kg of oil and the BCR and IRR of expeller method were 1.14 and 41.38 per cent.

Conclusion :

The study concluded that the overall cost of production of kernels was high in steaming than drum roasting method. The cost of raw materials was the major component in the total cost of production of kernels in steaming method and drum roasting methods. The study indicated that the steam processing method realized better returns than drum roasting method due to the adoption of latest technology in the cashew processing methods in India. Further, the study revealed that the cost of production per kg of oil in kiln method of extraction was Rs. 7.68 and the expeller method of extraction was Rs. 9.30. The study concluded that both methods of CNSL extraction were found to be highly profitable of which expeller method needs huge investment. The solutions to the problems confronting cashew nut processing lies in intensifying research in order to develop cost – effective, eco- friendly technology to boost efficiency and productivity and to reduce costs of processing.

LITERATURE CITED

- John, K.C. (2002).** Cashew: Cashing in on Exports. *Economic & Political Weekly*, **37**(32): 3324 –33 25.
- Mandel, R.C. (1997).** *Cashew production and processing technology*. Agro – Botanica, BIKANER, INDIA, 141–156pp .
- Nayar, K.G. (2000).** *Constraints on growth-cashew*. The Hindu Survey of Indian Agriculture, pp.-115-116.
- Pillai, C.K.S. (2001).** *Cashew nut shell liquid: New Applications*. World Cashew Congress-Souvenir, International Convention centre, Organised by the Export Promotion Council of India, pp.23 – 25.
- Singh, H.P. and Balasubramanian, P.P. (2001).** *Cashew production and trade –A Global Perspective*”, Indian Cashew Industry, Directorate of Cashewnut and Cocoa Development, Kochi, pp.1-16.

