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COMPARATIVE ECONOMICS OF CASHEW NUT KERNEL PROCESSING TECHNOLOGY IN BASTAR REGION OF INDIA

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Abstract

The paper has studied the economic viability of improved technology (Introduced under NAIP component-3) for extraction of cashew kernel from cashew nut in Bastar region of Chhattisgarh, India. Cost concept has been used to calculate economics of cashew kernel. The technology (Boiling, steaming, cutting, drying, and peeling) has been found viable over conventional practices (Traditional manual separation by stone or hammer) on account of higher recovery of 40 percent and cost reduction by 29.71 percent. Overall net profit per unit (One unit includes one boiler, one steamer, two cutter, one dryer, six peelers and cost of land, depreciation and interest on working capital) in the case of improved technology has been estimated to be Rs 7.32 lakh. Cost of production in machine extraction practices was 202.80 Rupees per kilogram of cashew in spite of traditionally practiced 288.56 Rupees per kilogram. The cost benefit ratio was found higher in machine extraction (1.57) as compare to traditionally practiced (0.169). The mechanical decortications and separation could not only save time and money, also reduced women drudgery (due to manual breaking by stone or hammer to separate kernel). The technology has been found suitable for promotion of entrepreneurship on the processing of cashew kernel from cashew nut in the production catchments which otherwise is not properly utilized.

Keywords: Cashew nut kernel, comparative economics, Bastar region, India.

Introduction

Agriculture is a dominant activity in the coastal economy of India, but it is poorly performed. Cashew has been traditionally grown in western and eastern coastal region of India. Besides, factors such as diverse regional typologies, extreme vulnerable poor physical infrastructure (Pre and post harvest) and socio-economic status. Non-traditional area, such as coastal region of some states viz., Karnataka, Gujarat, Maharashtra, Chhattisgarh, and Jharkhand and north eastern states are presently making head way in cashew cultivation as a horticultural crop. In Bastar region of Chhattisgarh, cashew cultivation has gained importance as a main crop in recent years. Over the years, its area under cultivation, production of raw nuts, processing capacity, export of cashew kernel and export earning is increasing steadily (Anon; 2010). The technology for cashew kernel

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commercialized by National Agricultural Innovation Project component–3 Shaheed Gundadhur College of Agriculture & Research Station, Jagdalpur, Bastar, Chhattisgarh was found superior to traditional practices (Breaking with stone or hammer and separation of kernel with hand).

2. Statement of the problem

In India, traditional processing of cashew is through manual roasting then breaking with stone to separate kernel is a tedious, time consuming and unhygienic process, which result in very low yield and poor quality of cashew kernel. In this backdrop, National Agricultural Innovation Project (Component-3), Shaheed Gundadhoor College of Agriculture & Research Station, IGKV Jagdalpur, studies comparative picture of two processing technologies or practices of cashew kernel.

2.1 Scope of the study: The main objective of research study was employment and income generation through primary processing and value addition. Under this objective, machine extraction of cashew kernel was transfer to project domain area during 2009-2010 and one unit has been established at research station, IGKV, Jagdalpur.

3. Research Methodology

The present study was purposively conducted in Jagdalpur block of Bastar district of Chhattisgarh, India. Major areas of cashew nut plantation were identified and comparison of extraction techniques was demonstrated. The information /data on different aspects collected through Participatory Rural Appraisal (PRA) and family survey were analyzed. The field survey was carried out during 2010 with the help of a structured scheduled for adopters and non-adopters (Practicing manual roasting and stone method n=5). The cost economics was worked out for improved technology as well as manual practices. Estimation of economics surplus generated by technology requires data on technological and economical parameters. The data pertaining to cost economics (Breaking of nut to separate kernel), cost of technology (Research and extension cost) were collected from the established entrepreneurs in this business using well structured schedules.

Net gains by processing : $K = TVP – (FC + VC)$

where,

K = Net gains by processing.
TVP = Total value of product.
FC = Annual fixed cost.
VC= Annual variable cost including raw material.

4. Results and Discussion

Earlier Kerala was the leading state in cashew area, production and productivity in the India. Now Andhra Pradesh has the largest area, while Maharashtra ranks first in production and productivity in India. Chhattisgarh is a very potential state for expansion of cashew, especially in the Baster region where about 50,000 hectares of area can be bought under cashew. The soil of Chhattisgarh region is well suited for cashew cultivation (Table-1).

Table 1. Area production and productivity of cashew 2009.

S.No.	Particular	Area (ha)	Production (tons)	Productivity (kg/ha)
1.	Kerala	70,000	75,000	900
2.	Karnataka	1,07,000	60,000	720
3.	Goa	55,000	30,000	700
4.	Maharashtra	1,70,000	2,25,000	1,500
5.	Tamil nadu	1,31,000	68,000	710
6.	Andhra Pradesh	1,82,000	1,12,000	920
7.	Orissa	1,37,000	95,000	865
8.	West Bengal	11,000	11,000	1,000
9.	Gujrat	6,000	4,000	700
10.	Chhattisgath	11500.00	98000.00	850
11.	NE states	5,000	3,500	750
12.	Others	8,000	3,000	460
	Total (India)	893000	695000	900

Source: Kaju Smarika (2011) Shaheed Gundadhur College of Agriculture & Research Station, Jagdalpur Bastar Chhattisgarh

Cost economics of cashew kernel

The technology consisting of breaking of cashew nut by using cashew processing machine with breaking efficiency of 6.5 kg nut per hour against manual crushing of 3-4 kg nut per hour. Kernel separation is started from boiling steaming of nut to 30 minuts then, after drying (6-8 hours) in open air, cutting of nut shell and got cashew kernel with testa (Thin pinkest shell). This kernel is further dried up to 5 % moisture (in dryer 60^0C 6-8 hour) then testa from kernel were easily removed and then fine clean and shiny cashew kernel are obtained.

A comparison of cost economics in Table 3 showed that the fixed cost per unit (60 kg capacity of boiler) was higher in the case of improved technology but variable cost particularly on boiler steamer cutter and dryer of cashew nut and

separation of kernel had reduced by 94.87 percent and 80.0 percent, respectively, for processing of equivalent raw material. The manual breaking of cashew nut and separation of kernel was found time consuming and tedious and had women drudgery as women are conventionally engaged in these operations. From 100 quintal of cashew nut, the recovery of kernel was found to be good quality 28 quintal under improved technology and bad quality 20 quintal in the traditional practice (Table 2). The net profit per unit (One unit includes one boiler, one steamer, two cutter, one dryer, six peelers and cost of land, depreciation and interest on working capital) of improved technology was estimated as Rs. 7.32 lakh per annum. Overall mechanical decorticator and kernel separation had led to reduction in cost by 29.71 percent over the conventional practices.

Table 2. Benefits of improved technology over conventional practices of processing the cashew karnel.

Sl.No.	Particular	Improved Technology	Conventional practices
1	Boiling steaming/Roasting (kg/hour)	By 60 kg capacity of boiler steamer 120 (+/- 5)	By wood coal straw 40 (+/- 5)
2	Cutting/Stone decortications of Nut (Decortications capacity of Nut kg/hour)	By cutter hand or foot operated 6.5 (+/- 0.5)	By stone or hammer manually 2.5 (+/- 0.5)
3	Kernel separation/Peeling (Separation capacity (kg/hour)	By Pin 4.5 (+/- 0.5)	By hand 1.5 (+/- 0.5)
4	Drying (kg/hour)	By 60 kg capacity dryer 10.5 (+/- 1.5)	By sand roasting 4.5 (+/- 0.5)
5	Quality of extracted kernel	White and unbroken	Turbid and high broken
6	Broken percentage of kernel	25	90

It was observed that total fixed cost of one unit (One unit includes one boiler, one steamer, two cutter, one dryer, six peelers, and cost of land, depreciation and interest on working capital) of extraction machine was 1.84 lakh, whereas traditional practice cost was Rs. 19,150. Variable cost includes raw material, repair and maintanence, fule, labour charge and miscellaneous was observed high in case of traditional practices (Rs. 5.80 lakh) as compared to machine extraction (Rs. 5.43 lakh).

Cost of production in machine extraction practices was 202.80 Rupees per kilogram of cashew in spite of traditionally practiced 288.56 Rupees per kilogram. The cost benefit ratio was found higher in machine extraction (1.57) as compared to traditional practiced (0.169) Table 4.

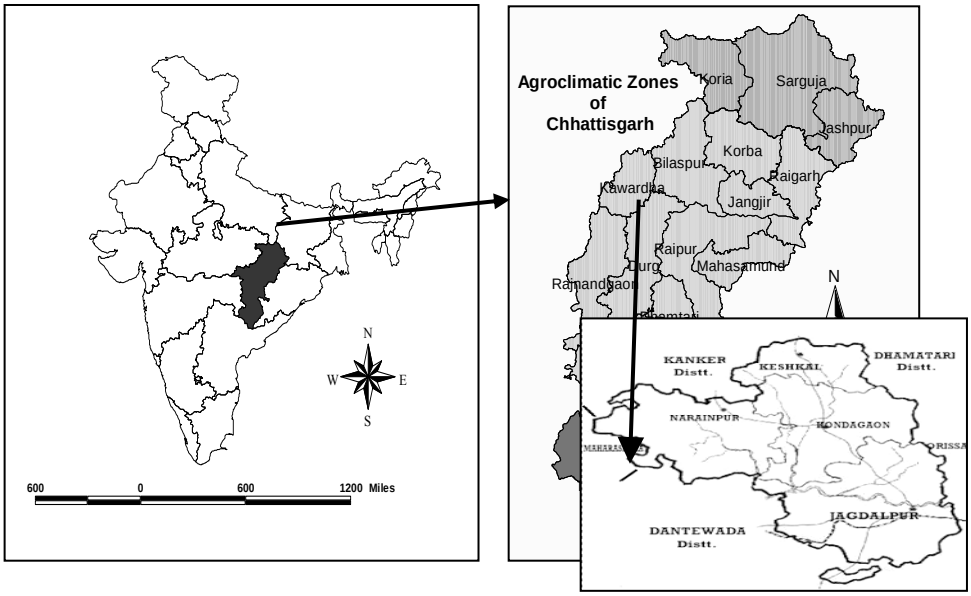
Table 3. Comparative cost of improved technology vis-a-vis conventional technology for extraction of cashew kernel: Bastar region, 2009.

Sl.No.	Cost / Benefit	Improved Technology (Boiling steaming cutting, drying, peeling, and packing)			Conventional practices (Roasting with coal or wood and stone/hammer breaking)		
A	**Total Fixed Cost**						
i	(Boiler steamer cutter dryer and installation charge in Rs.)			1,50,000.00			10,000.00
ii	Cost of land and bulding (On rent basis in Rs.)			7,200.00			7,200.00
iii	Depreciation on main machinery @ 10% per annum after deduction of salvage value (Rs.)			12,500.00			950.00
iv	Interest on fixed capital @10 % per annum (Rs.)			15,000.00			1000.00
	Sub Total (i+ii+iii+iv)			**1,84,700.00**			**19,150.00**
B	Variable Cost	Qty (qt)	Price (Rs/kg)	Total	Qty (qt)	Price (Rs/kg)	Total
v	Cost of raw material	100	50	5,00000	100	50	5,00000
vi	Repair & Maintanence (Rs. / year)	-	-	5000	-	-	500
vii	Fuel & electricity charge (Rs.)	3000 Unit	@ 3.50 Rs/ unit	10500	1000 Unit	@ 3.50 Rs/ unit	3500
		Qty	Wage (Rs/unit)	Total	Qty	Wage (Rs/unit)	Total
viii	Labour charge Boiling, Steaming and cutting	10000	0.11	11000	10000	2.11	21100
ix	Peeling and packing	3200	2.67	8544	3200	13.40	42880
x	Miscellaneous			8000			12500
	Sub Total (v+vi+vii+viii+ix+x)			**5,43,044.00**	**5,80,480.00**		

Table 4. Profitability analysis of improved vis-a-vis conventional technology for extraction of cashew karnel: Bastar region, 2009.

C	Total Cost (Fixed+ Variable)			7,27,744.00		5,99,630.00	
D	Returns	Qty (qt)	Price (Rs/Kg)	Total	Qty (qt)	Price (Rs/kg)	Total
xi	Final product cashew kernel	28	500	14,00,000	20	300	6,00,000
xii	By product (Nut cell & testa)	60	10	60,000	75	10	75,000
	Total Return			14,60,000			6,75,000
	Profit (D-C)			**7,32,256**			**75,370**
	Unit Cost of Production (Rs / Kg)			202.80			288.56
	B-C Ratio			**1.57**			**0.169**
	Reduction in unit cost of production from conventional method			29.71 %			

Fig. 1. Map of study area



Impact and feedback of entrepreneurs

The opinion of the respondent was as certain and rated on the scale of 1.5 (Highly disagreed to highly agreed) to know whether the technology was acceptable, sustainable, and environment friendly. It is evident from Table 5 that

the improved technology was highly acceptable as it helped in reduction of women drudgery, had lower health hazard (Pressed fingers and nails during manual breaking) and was labour friendly (No back pain) with overall mean score of 5.0. The study by Dixit *et al.* (2010) revealed that improved processing technology resulted in reduction of women stress in their workload.

Table 5. Opinion of the entrepreneur regarding acceptability and sustainability of improved technology.

S.No	Indicators	Mean Score
A	**Social acceptability**	
I	Labour friendly	5.0
Ii	Reduction in women drudgery	5.0
Iii	Reduction in health hazard	5.0
Iv	Increase in consumer demand	4.0
B	**Sustainability**	
	Livelihood assets	
i	Human capital	
Ii	Improved technical knowledge	4.0
Iii	availability	4.0
C	**Green technology**	
i	By product utilization	5.0
Ii	Less noise	5.0
iii	Environmentally compatible	5.0

Note: highly neither agreed (5), slightly agreed (4), highly agreed nor disagreed (3), slightly disagree (2), highly disagreed (1).

The sustainability of technology was rated in terms of enhancement of livelihood assets (Pandey and Mrwthyunjaya, 2004; Walker *et al.*, 2008) As far the improvement in human capital was concerned, the respondents only slightly agreed that their technical skill had improved. The results further revealed that the technology provided superior quality product was environmentally safe and contributed toward maintaining hygienic conditions. The technology may be considered as green technology, through other requirement for green technology is yet to be studied.

Conclusion

It was found that variable cost (Raw material, repair & maintanence, fuel, labour charge and miscellaneous) was high in case of traditional practices (Rs. 5.80 lakh) as compared to machine extraction (Rs. 5.43 lakh). Cost of production

in machine extraction practices was 202.80 Rupees per kilogram of cashew in spite of traditionally practiced 288.56 Rupees per kilogram. The cost benefit ratio was found higher in machine extraction (1.57) as compared to traditional practice (0.169). None of the selected parameters for social acceptability and sustainability has been rated below 4.0 suggesting that the entrepreneurs are satisfied from the performance are satisfied from the performance of the improved technology. It can be concluded that the technology is technically feasible, economically viable, environmentally compatible and social acceptable and has implications for entrepreneurship development in production and consumption of cashew nut.

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