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Economic Analysis of Cashew Nut Processing in India

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Abstract

Cashew (*Anacardium occidentale*) tree grows widely in warm and humid climatic regions of the world. India is leading producer and processor of cashew nuts. Cashew nut processing has undergone lot of developments from traditional to modern processing. Survey was done in various cashew nut processing units in different parts of West Bengal, and a case study is presented regarding economic analysis of a local small scale cashew nut processing plant of 100 kg capacity. Based on the observations, economic analysis of cashew nut processing plant showed that, if the plant be operated with full capacity and efficiency then there would be profit of ₹ 1329.07 per day, excluding all expenses. This is quite profitable, but the profit margin could be increased more by plant mechanization and modernization. Processing capacity could be increased with significant reduction in labour requirement and processing time by modernizing the processing plants.

Keywords: Cashew Nut Processing, Survey, Economic Analysis, Profit Earned

Introduction

Cashew (*Anacardium occidentale*) nuts belonging to Sumac Family are the stone fruits of the cashew tree, which originated in Brazil (TIS, 2013). Cashew is cultivated mainly in tropical regions where climate is warm and humid (Indurani *et al.* 2007). Cashew trees are widely grown in 32 different countries (Ramesh 2009).

Table 1: Global cashew nut production (2011)

Country	Production (metric tonnes)	Yield (metric tonnes/hectares)
Vietnam	1272000	3.84
Nigeria	813,023	2.46
India	674600	0.71
Brazil	230785	0.30
Guinea-Bissau	128684	0.58
Indonesia	122100	0.21
Philippines	133388	4.73
Benin	70000	0.28

Source: FAO, 2013

Table 1 shows annual cashew nut production in world's leading cashew producing countries. As per the latest statistics available, Vietnam is the largest cashew nut producer followed by Nigeria and India. India, with a glorious history in cashew trade, is an important global exporter of cashew nuts holding 60% of global cashew market.

Processing of cashew nut can be defined as the recovery of the kernel i.e., edible meat portion from raw nuts. Steps for cashew nut processing are conditioning, roasting, shelling, drying, peeling, grading and packing (Gayathri Industries, 2014 and Ali and Judge *et al*. 2001).

Due to decline of value realization, there is a decline in Indian cashew export in international market since 2005. India is no longer the only cashew nut exporter as Vietnam and Brazil have emerged as stiff competitors to the Indian cashew industry (Padmanaban 2010). Lack of balance between demand and supply chain causes sudden fluctuation in cashew price resulting in huge loss to the Indian cashew suppliers (Sundaram 2007). Inspite of so many shortcomings, global demand for Indian cashew is still quite large due to qualitative edge over many other countries (CRN India 2013).

In view of the above, an effort has been made in this paper is to make an economic analysis of cashew nut processing plants under Indian condition.

Table 2: Processing unit information

Processing Unit Information	
Life of equipment, yrs	10.00
Annual working days	250.00
Working hours per day	8.00
Annual Interest %	10.00

No. of labours	30.00
Service and maintenance %	5.00
Salvage value %	10.00
Capacity of plant, kg/day	100.00
Capacity of plant, kg/yr	25000.00
Shelling capacity, kg/ yr	25000.00
Peeling capacity, kg/ yr	8500.00
Finished kernel wt (8%), kg/ yr	7820.00
Cashew shell, kg/ yr	16500.00
Whole kernel (60%), kg	4692.00
Split kernel (20%), kg	1564.00
Whole kernel (20%), kg	1564.00
Value of 1 $, in INR (₹)	59.50
Cashew shells required for roasting, kg/day	90.00
Calorific value of cashew shell, kcal/ kg	4890.00
Calorific value of fire wood, kcal/ kg	3500.00
1 kg cashew shell equivalent to wood, kg	1.40

Table 3: Price of items

Costing	₹	$
Labour cost, ₹/day	140.00	2.35
Building rent per month	750.00	12.61
Packaging cost, ₹/ kg.	0.10	0.00
Raw cashew nut cost, ₹/ kg	90.00	1.51
Sale price of whole kernel, ₹/ kg	500.00	8.40
Sale price of split kernel, ₹/ kg	450.00	7.56
Sale price of Broken kernel, ₹/ kg	350.00	5.88
Cost of fire wood, ₹/ kg	5	0.08
Equipments : Roaster and dryer, ₹	150000.00	2521.01

Methodology

Field visits were conducted in different cashew nut processing units located at Jhargram, Contai and Guptomani regions of West Bengal, in India. It was found that processing unit was more or less similar with manual operations and its processing capacity is low. Complete process was studied and economic analysis was done. Processing involved roasting of cashew nuts in a rotating drum roaster and shelling the roasted nuts manually with the help of a

bamboo piece. After shelling the kernels were conditioned by hot air drying in a tray drier for 5-6 hours which was followed by manual peeling. Peeled cashew kernels were graded and packed in polythene bags, sealed and sold in local markets. Economic analysis of the system was done on the basis of the process/economic parameter as shown in Tables 2 and 3. These data were collected during the visit in different cashew processing units.

Economic Analysis

Economic data analysis was done according to Henderson and Perry (1966). For convenience, total cost per unit was broken down into fixed cost and operating cost.

Fixed cost: These costs were those that were usually not directly related to the amount of use. It is the cost regarding business expenses that are not dependent on the level of goods or services produced by the business. This includes Depreciation, Investment interest, Housing rent, Taxes and Insurances, shown in Eqn.1.

Fixed cost = (Depreciation + Annual interest + Service and Maintenance + Building charge)--Eqn. 1.

Depreciation may be defined as the decrease in value of a piece of property during a period of time. The decrease is considered from the standpoint of amounts to be set aside each year in order to recover the cost of the unit at the end of its useful life. This decrease, which is usually determined on yearly basis, is charged to the products produced. Most commonly adopted method of determining annual depreciation charge is the straight line method. In this method, the term salvages value the junk or resale value at the end of the useful life of the machine. Depreciation charge per year is shown in Eqn.2.

Depreciation = (Cost new – Salvage value)/ Total expected life -- Eqn. 2.

Depreciation value is dependent on the life expectancy of the machine. Studies had been conducted to determine the life of industrial or agricultural equipments, but those studies holds true for standard conditions. Various factors cause the actual life to be shorter than estimated or expected life. Systematic maintenance and repairs can prolong the usefulness of the machine.

Annual interest on investment is charged against thee piece of equipment as an initial or guaranteed return to owners and investors, such as bond, stock, or mortgage holders with a contract rate of interest on the investment. When management is the owner and the piece of the equipment is not mortgaged or otherwise encumbered, interest is still charged to the unit as minimum or guaranteed return to the owner. If unit cannot return more than would be received if the money invested were loaned at the current rate of interest, then its use is questionable.

Service and maintenance would include lubrication, wear out part replacement, repair, cleaning etc. of the machinery. These charges should be estimated accurately, since they are related directly on the basis of the production.

Building cost is advisable to be included in fixed annual charge, since building is the necessity for protecting the equipment and product. It is advisable to calculate the building cost on the basis of available floor space area. This cost also depends on location and facilities available with the building.

Operational cost: Operating costs are the expenses which are related to the operation of a device, component, and piece of equipment or facility. These costs are those that are directly related to the use, which include fuel and labour cost, as shown in Eqn.3.

Operational cost = (Fuel cost + Labour cost) -- Eqn. 3.

Fuel cost is the cost involved in purchase of the fuel wood for roasting purpose. For cashew nut processing, the oil rich shells that are obtained after shelling the cashew is used as fuel source along with fire wood, which reduces the fuel cost.

Labour cost applies to operations and usually be made on a daily or hourly basis. Labour allocation is important job, which would have effect in the efficiency of the processing plant.

Annual total cost: This cost is the total cost which is obtained after combining annual fixed cost with annual operational cost, as shown in Eqn. 4.

Annual total cost = (Annual fixed cost + Annual operational cost) -- Eqn. 4.

Annual expenditure: This cost includes the cost of raw material (i.e. raw cashew nut), annual fixed cost, annual operational cost and final product packaging cost, as shown in Eqn. 5.

Annual expenditure = (Raw material cost + Annual fixed cost + Annual operational Cost +

Packaging cost) -- Eqn. 5.

Annual income: Income generated in cashew processing plant is by selling cashew kernels, which are graded in different categories. The price of cashew kernel depends on these grading categories, i.e. whole, split and broken are the primary categories which set the price of the final processed product. One whole kernel when gets broken, its price gets reduced to some extent, so it the primary aim of every processor to extract kernel from the nut without damaging the kernel in least possible time.

Profit gained: Profit earned is determined by subtracting expenditure from the income. The target of every business unit should be that under no condition should the profit value come in negative, which would establish the fact that the unit is running under loss, , as shown in Eqn. 6.

Profit = (Income – Expenditure) -- Eqn. 6.

Results and Discussion

Fixed cost

Fixed cost was determined from Eqn. 1 and depreciation value was calculated from Eqn. 2. This cost, as shown in Table 4, does not change as a function of the activity of a business, within the relevant period.

Table 4: Fixed costs

Annual Fixed Cost	₹	$
Depreciation, ₹	13500.00	226.89
Annual interest, yearly, ₹	7500.00	126.05
Service and maintenance, ₹	7500.00	126.05
Building charge, ₹	9000.00	151.26
Total, ₹/ yr	37500.00	630.25

Table 5: Operational cost

Annual fuel requirement	kg	
Amount of shell available, kg/ yr	16500.00	
Equivalent wt. of wood, kg/ yr	23052.86	
Amount of shell requirement, kg/ day	90.00	
Annual shell requirement, kg/ yr	22500.00	
Amount of cashew shell shortage, kg/ yr	6000.00	
Wood required to fulfil the shortage, kg/ yr	8382.86	
Annual fuel cost	**₹**	**$**
Cost of wood, ₹/yr	41914.29	704.44
Annual cost of wood if shell not be used, ₹/ kg	115264.29	1937.21
Total fuel cost saved, ₹/ yr	73350.00	1232.77
Labour charge per year		
Single labour charge, ₹/yr	35000.00	588.24
Total Labour cost, ₹/ yr	1050000.00	17647.06

Operational cost

Cashew processing plants of study were manually operated and as fuel source, cashew shells were used. With the shortage of cashew shells, wood is used instead of cashew shells. Wages paid to labours, in return of doing work, may be on daily basis. In the processing plant, 30 labours can be employed to complete the work. Operational cost was determined by Eqn. 3. Annual expenditure for fuel requirement maintaining those labours is shown in Table 5.

Annual total cost

Total cost was calculated by summing up fixed cost, operational cost and labour cost, as shown in Eqn. 4. Operational cost was only the fuel cost as no other cost was involved during the processing operation beside labour charges, which is already included. This is shown in Table 6.

Table 6: Annual total cost

Labour charge per year	₹	$
Annual fixed cost, ₹	37500.00	630.25
Total fuel cost SAVED, ₹/ yr	73350.00	1232.77
Total Labour cost, ₹/ yr	1050000.00	17647.06
Total cost, ₹/ yr	1014150.00	17044.54

Total expenditure per year

Total expenditure on processing was obtained by summing up raw cashew nut cost, Annual total processing cost and packaging cost as shown in Eqn. 5. Expenditure on manual method of processing was determined as shown in Table 7.

Table 7: Annual expenditure

Annual Expenditure	₹	$
Total, ₹/year	1014150.00	17044.54
Raw cashew nut cost, ₹	2250000.00	37815.13
Packaging charge, ₹	782.00	13.14
Total, ₹/year	3264932.00	54872.81

Table 8: Annual income generated

Income	₹	$
Whole kernel, ₹/year	2346000.00	39428.57
Split, ₹/ year	703800.00	11828.57
Broken, ₹/year	547400.00	9200.00
Total, ₹/ year	3597200.00	60457.14

Income generated in manual process

Money earned by selling finished cashew nuts is the income generated. It was observed that out of 1 kg kernel obtained, 600 g was whole, 200 g was split and 200 g was broken. Based on

this observation income generation from the process was obtained as shown in Table 8.

Table 9: Profit gained

Profit, ₹/ yr	₹	$
Annual Fixed Cost	37500.00	630.25
Fuel cost saved	73350.00	1232.77
Labour charge	1050000.00	17647.06
Raw cashew nut cost, ₹	2250000.00	37815.13
Packaging charge, ₹	782.00	13.14
Total cost	3264932.00	54872.81
Income	3597200.00	60457.14
Profit (₹/ yr)	332268.00	5584.34

Total profit gained

Profit was calculated from Eqn. 6 as shown in Table 9. There is a profit of ₹ 1329.07 (i.e. $24.16) per day or yearly profit of ₹ 332268.00 (i.e. $ 6041.24) of cashew nut being processed.

Conclusion

Cashew nut is a cash crop that grows well in Indian tropical climate. Indian cashew processors have travelled a long way from traditional to modern cashew nut processing. Survey was done conducted in different cashew nut processing units in West Bengal (INDIA). From obtained survey data economic analysis of cashew nut processing plant of 100 kg capacity, operating in ideal Indian condition was calculated. It was found that if the plant be operated with full capacity and efficiency then there would be profit of ₹ 1329.07 per day, excluding all expenses. This is quite profitable, but the profit margin could be increased by plant mechanization and modernization. Processing time and efficiency could be increased more without compromising the quality of the final edible cashew kernels.

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