

ECONOMIC FEASIBILITY OF SMALL INDUSTRIES OF CASHEW NUT PROCESSING IN THE STATE OF CEARA

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ABSTRACT

The objective of this study was to determine the financial feasibility and to verify the existence of scale economies of different sizes of small cashew nut processing industries. For this purpose, costs were identified and economic indicators such as internal rate of return, benefit-cost ratio and net present value were used. The existence of scale economies was verified. The results showed that a plant size with the daily processing capacity of 1,100kg represented a low average cost and small rate of idleness. It was also observed that small processing industries also bring social benefits by creating jobs opportunities and generating income.

Key words: Economic analysis, cashew nut, small units

1. Introduction

There is no doubt that agroindustry represents an excellent development strategy due to the importance that small industries have for the socioeconomic development of the country. These small units account for about 27,39% of the gross domestic product of the State of Ceara.

Agroindustry is of great importance for rural sector. It stimulates

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production and reduces raw material loss due to reduction in its transportation. Due to these reasons, small industries play an important role for regional development. In addition to creating employment opportunities, they also generate income for the sector. These factors become more important when we observe that small industries have a lower capital/labor ratio, use locally produced inputs, and employ low income groups. They also target their production to lower income population (Bar-El *et alii*, 1978). They represent an important segment of industry, commerce and service activities, responsible for creating jobs, salary, national products and high participation in the revenue received through ICMM in the primary sector. In addition, small industries also generate revenue in other ways (Almeida and Soares, 1996).

In case of small cashew nut processing units, quantitative gains in relation to large industries (traditional industry) were observed. For example, an increase in obtaining integral nuts from 50 to 85%, and an improvement in the quality of the products. These factors increase the competing conditions in international markets if others obstacles are removed (Almeida and Soares, 1996).

If these agricultural industries improve productive organization, technical management, administrative and financial situations, may become an alternative strategy for the competition in international markets, which requires competitive prices, quality of the product, and regular supply.

The contribution of cashew plantations could have been higher for the development of the State of Ceara if the quality of the Brazilian cashew nut was better. The product quality, in addition to a reduction in its demand, has a negative impact on its price. According to Paula Pessoa *et alii*, 1994 the Brazilian processing industry is basically inefficient. Approximately 40 to 45% of our cashew nuts are broken during processing, what reduces its price by 27% in relation to international price quotation of the product. For this reason, small industries are an option to reduce quality³ problems and provide opportunities to small processors.

Recently, the State of Ceara has stimulated the installation of small industries for cashew nut processing . The argument is that these units allow for a higher participation in national and international markets by improving the quality of the products and also increasing the use of raw material. Also, small industries may increase the income of small and medium farmers by aggregating value to the product, reducing loss in the processing, facilitating transport of the product and contributing to reduce poverty in the rural areas.

Presently, loan facilities exist for the installation of small industries. At this moment, the adequate size of the industry, based on the equipments available in the market, their installation and factor use, is unknown.

2. Objectives

The main objectives of the research are:

- a) To verify the presence of economies of scale associated to different processing industry sizes;
- b) To identify critical points responsible for economic inefficiency in the processing of cashew nuts;
- c) To compare the rate of return received in an investment in small cashew nut processing industries to the investments opportunities;
- d) To verify the influence of change in price of the product and input prices;
- e) To determine the number of jobs created by small cashew nut processing units.

3. Methodology

3.1. Data Sources

The data related to processing capacity, cost of equipments and

³The improvement in quality is mainly due to the manual removal of the shell which reduces the percentage of broken cashew nuts and the marks on them.

production parameters were obtained from institutions such as EMBRAPA – Brazilian Agriculture and Animal husbandry Research Institute, EPACE – Cearense Agriculture and Animal husbandry Research Institute, SINDICAJU – Union of cashew nuts industries of State of Ceara (1989), project firms and various other firms which sell machines and equipments for small industries installations. Also, data were obtained from IPLANCE – Planning Institute of the State of Ceará, and FIBGE – Foundation of the Brazilian Institute of Geography and Statistics. All monetary values used in this study are in Reais, of July, 1998.

3.2. Method of Analysis

Table and descriptive analysis were used to obtain some of the objectives such as: number of jobs created, identification of critical points responsible for economic inefficiency in cashew nuts processing.

To identify industry size with the highest yield and to verify scale economies, total cost and average cost concepts were used⁴. To determine the total cost for each of the processing units, fixed costs and variable costs were considered.

3.2.1. Economy of Scale-Identification

The economy of scale was identified in order to provide orientation in the decision making process related to investing in small cashew nuts processing units.

For a better understanding of economies of scale, it is important to discuss the concept of long run average cost, which is also known as the *envelope curve*. This curve is based on small segments of short run average cost curves, which a firm can adopt for a period of time. It represents a possible small average cost of producing different quantities of a product.

⁴ For more details, see Santos & Marion, 1996 and Teixeira & Gomes, 1994.

At certain level, a long run average cost decreases as the production level increases. This is called economy of scale. The inverse process is called diseconomy of scale.

3.2.2. Investment Analysis

A capital investment project productive action, of limited life-time, requires immobilization of future financial resources from production (Noronha and Duarte, 1995). This concept assumes the possibility of monetary quantification of product and inputs related to the project (Faro, 1972).

During the evaluation process, revenue and cost flows, which occur along a pre-determined period of time are considered. That information allows us to determine the investment rate of return.

Various criteria are used to perform this type of analysis. But the most used is based on the use of a set of prices at a given time period, generally obtained while elaborating the project.

To verify the economic feasibility, indicators such as cost-benefit ratio, net present value, and internal rate of return were calculated. In order to evaluate the risk magnitude related to the investment and provide information to decision makers, sensibility analysis was performed.

4. Results and Discussion

4.1. Determination of Economy of Scale

Five cashew nut units with processing daily capacity of 275, 550, 826, 1100 and 1376 kg were analysed. It was considered that these units function 8 hours/day and 264 days a year. The equipment is manufactured in the State and its use and maintenance are easy .

The size of these small industries is based on the unit with a processing capacity of 550kg/day, installed by EMBRAPA for training and experiment purposes. It is believed that the equipment of each

processing unit is not used in its full capacity, what might contribute to increase the cost of cashew nuts processing.

The annual cost related to each processing unit is given in Table 1. It may be observed that variable costs represents 82.75%, 89.94%, 97.7%, 93.36% and 93.62% of total cost of units with processing capacity of 275, 550, 836, 1100 and 1376 kg/day, respectively. It was also noted from the information presented in Table A1 (see appendix) that items such as labor, interest, and depreciation account for 39.77%, 24.32% and 16.30% of the fixed cost, respectively. On the other hand, raw material, temporary labor, taxes and social charges represent 54%, 18.37%, 11.35% and 6.6% of variable cost, respectively (Table A2).

Information provided in Table 1 shows that the average cost decreases as the size of the processing unit increases, attains a minimum value for processing unit of 1100 kg/day and the highest for the processing unit of 1376kg/day, indicating the presence of economy of scale up to 1100 kg/day. From this production level, Figure 1 shows a diseconomy of scale due to the use of large machines and equipments .

The processing unit with a daily operating capacity of 1100kg has the minimum average cost and may be considered the most efficient unit size⁵. For larger sizes, the costs are higher due to acquisition of new equipment to overcome the critical point in the processing segment. A non-utilization of full capacity leads to the idleness of whole processing system.

⁵ Naturally, the indication of this size is only based on the average cost related to different unit sizes analysed in this study.

Table 1 – Estimated annual cost for cashew nuts processing units with raw material operating capacity of 275, 550, 826, 1.100 and 1.376kg/day. (R\$ of July of 1998)

Size \ Cost	275kg/		550k/		826kg/		1,100kg/		1,376kg/	
	day	%	day	%	day	%	day	%	day	%
Fixed cost	13,217.40	17.25	13,560.87	10,06	13,919.33	7.21	16,803.36	6.64	20,375.57	6.38
Variable cost	63,438.91	82.75	121,291.65	89.94	179,330.17	92.79	236,445.23	93.36	299,242.32	93.62
Total cost	76,656.31	100.00	134,852.52	100.00	193,249.50	100.00	253,248.59	100.00	319,617.89	100.00
Average cost	5.12		4.50		4.30		4.20		4.30	

Source: Study results

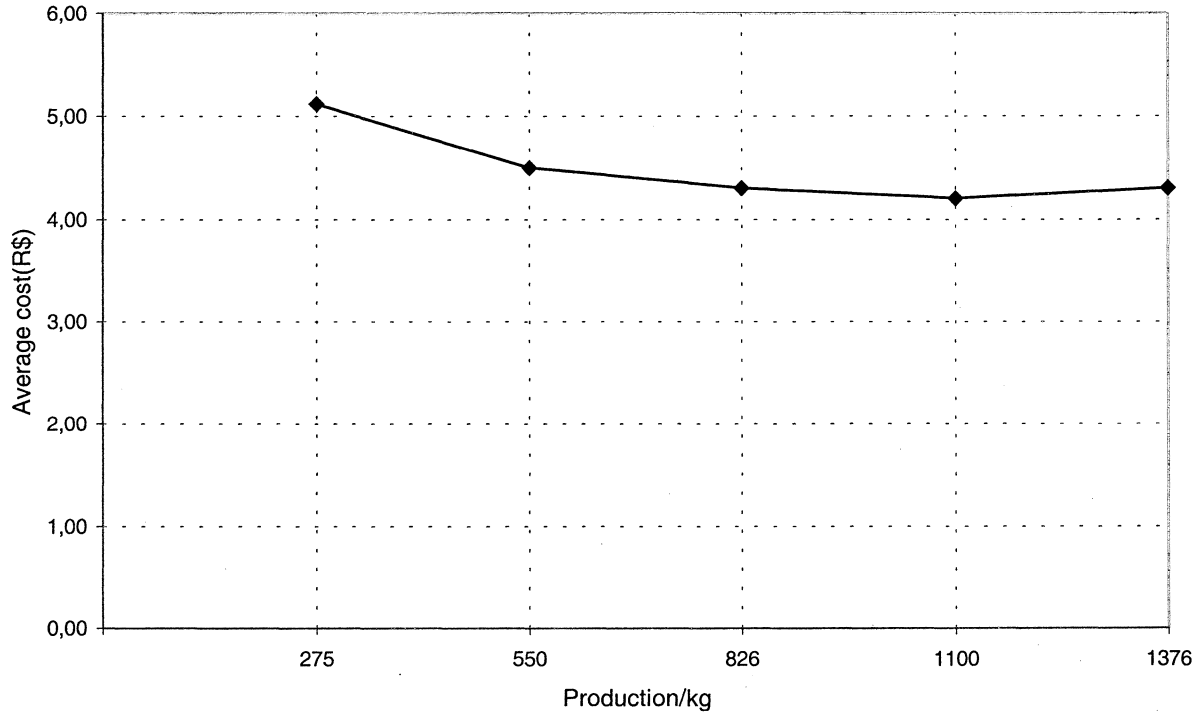


Figure 1 – Average cost curve of cashew nut processing units with different operating capacity.

4.2. Critical Points Influencing Different Unit Size Viability

The data presented in Tables 2 to 6 show the idleness of equipments used in each processing unit. For units with operating capacity of 275 kg/day, we can observe that they represent the idleness of equipments varying from 37.48% to 94.75%. To make this unit function at full capacity, stewing (estufa GLP⁶) is a limiting factor. It is observed that for the units analysed in this study, the number of stoves determine the processing capacity of each unit and follow the cutting step.

It is noted that the fourth unit size (1100 kg/day) represents a low rate of equipment idleness which varies between 79.02% and 8.58% in all processing steps. This is the only unit size which presents only two bottlenecks, in other words, it represents a situation in which two equipments are used with full capacity. This size could have been more efficient if idleness related to a large part of its equipments is reduced. This means that if an adjustment in equipment is made according to the size of the processing unit, a reduction in cost may result due to full utilization of the plant equipment. The fifth option represents an increase in idleness of the equipment⁷. It is observed that an increase in unit capacity does not necessarily reduce the idleness processing cost.

Another factor which worry business people is labor costs. In this study, the number of employees increased 266.66% from lowest to highest capacity units. The cost of social charges is relatively high. The cost of hiring labor (approximately 30% of total cost) is another limiting factor of this activity. The high labor cost led to the outsourcing of some of the processing segments.

⁶ Liquid Gas obtained from Petroleum.

⁷ Tables 2, 3, 4, 5 and 6 offers information about idleness of equipments of each unit size, it perhaps is mainly responsible for higher processing cost.

Table 2 – Average cost, processing capacity and idleness of equipments used in processing unit with daily operating capacity of 275kg of cashew nuts.

Specification	Quantity	Total Value	Processing ¹ Capacity	Idleness
	Unit	(R\$)		%
. Classifier/ weigher/ bagging	1	1,130.00	370.8	84.71
. Cooking vessel	1	3,252.00	247.2	77.08
. Manual cutting machine	2	1,320.00	90.64	37.48
. Stove GLP	1	1,000.00	56.67	0.00
. Moisturizer	1	450.00	1,080	94.75
. Peeler	1	280.00	300	81.11
. Fryer	1	320.00	450	87.41
. Centrifuging machine for oil extraction	1	1,450.00	700	91.90
TOTAL	9	9,202.00		

Source: Research data.

¹ Refer to the amount of cashew nuts that equipments can process in 8 hours..

Table 3 – Average cost, processing capacity and idleness of equipments used in processing unit with daily operating capacity of 550kg of cashew nuts.

Description	Quantity	Total Value	Processing ¹ Capacity	Idleness
	Unit	(R\$)		%
. Classifier/ weigher/ bagging	1	1,130.00	370.8	69.41
. Cooking vessel	1	3,252.00	247.2	54.13
. Manual cutting machine	3	1,980.00	135.96	16.59
. Stove GLP	2	2,000.00	113.34	0.00
. Moisturizer	1	450.00	1,080	89.50
. Peeler	1	280.00	300	62.20
. Fryer	1	320.00	450	74.80
. Centrifuging machine for oil extraction	1	1,450.00	700	83.80
TOTAL	11	10,862.00		

Source: Research data.

¹ Refer to the amount of cashew nuts that equipments can process in 8 hours..

Table 4 – Average cost, processing capacity and idleness of equipments used in processing unit with daily operating capacity of 826kg of cashew nuts.

Description	Quantity	Total Value	Processing ¹ Capacity	Idleness
	Unit	(R\$)		%
. Classifier/ weigher/ bagging	1	1,130.00	370.80	54.13
. Cooking vessel	1	3,252.00	247.20	31.19
. Manual cutting machine	4	2,640.00	181.28	6.17
. Stove GLP	3	3,000.00	170.1	0.00
. Moisturizer	1	450.00	1,080	84.25
. Peeler	1	280.00	300	43.3
. Fryer	1	320.00	450	62.20
. Centrifuging machine for oil extraction	1	1,450.00	700	75.70
TOTAL	13	12,522.00		

Source: Research data.

¹ Refer to the amount of cashew nuts that equipments can process in 8 hours..

Table 5 – Average cost, processing capacity and idleness of equipments used in processing unit with daily operating capacity of 1.100kg of cashew nuts.

Description	Quantity	Total Value	Processing ¹ Capacity	Idleness
	Unit	(R\$)		%
. Classifier/ weigher/ bagging	1	1,130.00	370.80	38.88
. Cooking vessel	1	3,252.00	247.20	8.58
. Manual cutting machine	5	3,300.00	226.60	0.00
. Stove GLP	4	4,000.00	226.60	0.00
. Moisturizer	1	450.00	1,080	79.02
. Peeeler	1	280.00	300	24.46
. Fryer	1	320.00	450	49.64
. Centrifuging machine for oil extraction	1	1,450.00	700	67.63
TOTAL	15	14,182.00		

Source: Research data.

¹ Refer to the amount of cashew nuts that equipments can process in 8 hours..

Table 6 – Average cost, processing capacity and idleness of equipments used in processing unit with daily operating capacity of 1.376kg of cashew nuts.

Description	Quantity	Total Value	Processing ¹ Capacity	Idleness
	Unit	(R\$)		%
. Classifier/ weigher/ bagging	1	1,130.00	370.8	23.54
. Cooking vessel	2	6,504.00	494.4	42.66
. Manual cutting machine	7	4,620.00	317.24	10.64
. Stove GLP	5	5,000.00	283.5	0.00
. Moisturizer	1	450.00	1,080	73.75
. Peeler	1	280.00	300	0.00
. Fryer	1	320.00	450	37.00
. Centrifuging machine for oil extraction	1	1,450.00	700	59.51
TOTAL	9	19,754.00		

Source: Research data.

¹ Refer to the amount of cashew nuts that equipments can process in 8 hours..

4.3. Investment analysis

Economic indicators such as benefit-cost ratio (B/C), net present value (NPV) at different discount rates, and internal rate of return (IRR), for each processing unit analysed in this study, are presented in Table 7⁸.

For each processing unit, a benefit/cost ratio (B/C), net present value (NPV) were calculated for different discount rates. The internal rate of return (IRR) for each option was also determined. The results presented in Table 7 indicated a B/C ratio higher than one and positive net present values for all discount rates considered in the analysis, suggesting that all the processing units have economic viability.

4.4. Sensibility Analysis

The results show that processing units with daily operating capacity of 275 kg and 1376kg are more influenced with the changes made in items affecting revenue and costs of production units. The results also indicate that processing unit with operating capacity of 1100kg/day represents better economic indicators for all simulations made in the study (Table 8).

4.5. Determination of Number of Jobs Created by Small Units

The data presented in Table 9 reveals that the implantation of these small units will create employment opportunities of 9, 14, 19, 24 and 32 persons offered by these processing units. According to Leite (1994), for each direct job created, 14 indirect employments are offered. In this way, total number of jobs created by these small units are 135, 210, 285, 360 and 480, respectively. It was also observed from Table 9, that large units analysed require less investment for each employment offered.

⁸The period of 10 years for analysis is considered. The average price received by cashew nuts processor during the last years was used. The revenue was adjusted to the value of July of 1998.

Table 7 – Benefit/Cost Ratio (B/C), Net Present Value (NPL), at different discount rates, and Internal Rate of Return (IRR) for different size of processing units.

Discount Rate (%)	275kg/day		550kg/day		826kg/day		1.100kg/day		1.376kg/day	
	B/C	NPV	B/C	NPV	B/C	NPV	B/C	NPV	B/C	NPV
6	1.1344	81.7752	1.2421	256.9037	1.3366	512.833	1.3647	723.1221	1.14517	428.4998
8	1.1162	65.2564	1.2274	222.0124	1.3231	452.4074	1.3522	641.0493	1.13643	369.2019
10	1.0982	51.1669	1.2128	192.0446	1.3098	400.3305	1.3397	570.4323	1.1277	318.3189
12	1.0805	39.0851	1.1983	166.1706	1.2965	355.2186	1.3272	509.1133	1.1190	274.4270
14	1.0631	28.6712	1.1840	143.7187	1.2832	315.9467	1.3148	455.6825	1.1103	236.3733
16	1.0461	19.6495	1.1698	124.141	1.2701	281.595	1.3024	408.9042	1.1017	203.2195
18	1.02936	11.7954	1.1558	106.9882	1.2570	251.4081	1.2902	367.7619	1.0931	174.1974
Internal Rate of Return (%)	21.6123		42.7049		64.7076		75.2160		41.1207	

Source: Study results.

Table 8 – Sensibility analysis of economic indicators, considering discount rate of 10%, for processing units with daily operating capacity of 275, 550, 826, 1100 e 1376kg.

Specificacion	275kg/day			550kg/day			826kg/day		
	B/C	NPV	TIR	B/C	NPV	TIR	B/C	NPV	TIR
Revenue and cost constant	1.0982	51.1669	21.6123	1.2128	192.0446	42.7049	1.3098	400.3305	64.7076
10% decrease in revenue and cost constant	0.9884	-6.0209	8.5859	1.0915	82.6143	24.5679	1.1788	231.0853	42.3347
Revenue constant and 10% increase in cost	1.0121	6.8517	11.5834	1.1137	111.8829	29.2753	1.2010	283.3565	49.0102
Revenue constant and 20% increase in cost	-0.9385	-37.4634	1.1379	1.1296	31.5611	15.5385	1.1090	166.3822	33.1610
10% decrease in revenue and 10% increase in cost	0.9109	-50.3361	<0.001	1.002415	2.3727	10.4297	1.0809	114.1113	26.2628

Table 8 - continue

<u>Specificacion</u>	1.100kg/day			1.376kg/day		
	B/C	NPV	TIR	B/C	NPV	TIR
Revenue and cost constant	1.3397	570.4323	75.2160	1.1277	318.3189	41.12075
10% decrease in revenue and cost constant	1.2057	345.4691	50.2983	1.0149	37.2260	13.8237
Revenue constant and 10% increase in cost	1.2275	417.0523	57.964	1.0316	86.3220	18.6117
Revenue constant and 20% increase in cost	1.1327	263.6867	40.6006	0.9507	-145.6751	< 0.001
10% decrease in revenue and 10% increase in cost	1.1048	192.0962	32.7599	0.9285	<0.001	- 194.7708

Source: Study results.

Table 9 – Number of jobs created by cashew nut processing units.

Daily Processing Capacity	Direct Jobs	Indirect Jobs	Jobs	Investment/ Total Jobs (R\$)	Investment/ Direct Jobs
275 kg	09	126	135	574	8.617
550 kg	14	196	210	475	7.131
826 kg	19	266	285	429	6.141
1.100 kg	24	336	360	404	6.061
1.376 kg	32	448	480	359	5.395

Source: Research data.

5. Conclusions

Items such as labor, taxes and social duty are main components of variable cost for all processing units. This means that public policy should provide support to small and medium size entrepreneurs, specially for obtaining circulating capital (to buy raw material, stock maintenance) and labor employment.

There is the economy of scale in cashew nuts processing up to a certain unit size. According to results, a processing unit of less idle capacity of equipment has lower average processing costs.

Investment analysis indicators for all processing units are higher than the opportunity cost of capital. However, a processing unit with daily capacity of 1100kg shows a B/C ratio, a higher net present value and internal rate of return in relation to other processing sizes considered in this study. Through simulation analysis, it was observed that unit sizes of 275kg/day and 1376kg/day are more sensitive to cost and revenue variations. The equipment adjustment is important for economic viability of a processing unit. Other three processing units showed higher stability in relation to yield.

Cashew nuts processing units bring social benefits by generating

direct job opportunities and also in producing raw material, equipment production and sales to other related sectors.

The State of Ceara can be conditions to be more aggressive in the cashew nuts market if a collective effort involving institutions related to research, extension and technical assistance, and the private sector is made. For this purpose, government incentives have provided technical assistance to cashew producers and increase in credit to overcome difficulties related to production and agricultural productivity of the cashew tree.

Cashew nuts processed by these small units have better quality when compared to those processed by traditional large industries. They increase the quantity of whole cashew nuts, reduce marks, and present light colour of cashew nuts. In this way, the quality of the product is increased, a better use of equipment and raw material is made, and also provides opportunity to small producer to enter the market.

We hope that the results of this study provide information to equipment manufacturers, showing the importance of improving productivity in the cashew nuts processing by reducing the size of processors. Also, we expect that these results may be important for entrepreneurs to select a more efficient unit size and consequently, quantity of capital required to invest in this activity.

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Apêndix

Table A.1 – Fixed cost of cashew nuts processing unit with daily operating capacity of 275, 550, 826, 1100 and 1376 kg of raw material.

Fixed Cost	275kg/day	550kg/day	826kg/day	1,100kg/day	1,376kg/day
Labor	5,200.00	5,200.00	5,200.00	6,933.33	8,666.66
Social duties	1,872.00	1,872.00	1,872.00	2,495.88	3,119.99
Depreciation	2,057.91	2,231.31	2,421.91	2,675.71	3,295.31
Insurance	258.06	292.40	311.46	336.84	398.80
Interest on investment	3,421.06	3,532.38	3,654.75	3,817.69	4,215.47
Maintenance	136.52	153.86	172.92	198.30	260.26
Other fixed cost	271.85	278.92	286.29	345.61	419.08
Total	13,217.40	13,560.87	13,919.33	16,803.36	20,375.57

Source: Research data.

Table A.2 – Variable cost of cashew nuts processing units with daily operating capacity of 275, 550, 826, 1100 and 1376 kg of raw material.

Variable Cost	275kg/day	550kg/day	826kg/day	1.100kg/day	1376kg/day
Raw material	32,670.00	65,340.00	98,128.80	130,680.00	163,468.00
Labor	13,866.64	22,533.29	31,199.94	39,866.59	51,199.90
Social duty	4,991.99	8,111.98	11,231.98	14,351.97	18,719.96
Office material	250.00	392.00	550.95	704.40	719.92
Cleaning material	310.00	607.00	913.67	1,216.40	1,368.09
Vegetable oil	717.60	1,435.20	2,156.40	2,870.40	3,592.80
Water	178.20	265.68	369.50	472.16	615.85
Electricity	61.43	88.94	118.65	157.81	184.47
Packing material 200gr	675.00	1,350.00	2,020.50	2,695.00	3,370.50
Packing material 1000gr	342.00	675.00	1,012.50	1,350.00	1,687.50
Boxes	356.40	593.10	891.45	1,188.00	1,485.00
Taxes	5,563.48	13,639.50	21,562.16	28,714.75	37,715.51
Freight charges	907.57	1,815.00	2,724.24	3,630.00	4,356.00
Gas (butano)	1,944.00	3,348.00	4,680.00	6,480.00	8,100.00
Other variable cost	604,60	1,096,96	1,589,43	2,067,75	2,658,02
Total	63,438,91	121,291,65	179,330,17	236,445,23	299,242,32

Source: Research data.

Table A.3 – Flow of benefits and costs of cashew nuts processing unit of operating capacity of 275kg/
day of raw material

(Value of R\$ 1.000.00 of july of 1998)

Specification	Project Year											
	0	1	2	3	4	5	6	7	8	9	10	
A – BENEFITS	-	89.73	89.73	89.73	89.73	89.73	89.73	89.73	89.73	89.73	89.73	142.97
- Production	-	89.73	89.73	89.73	89.73	89.73	89.73	89.73	89.73	89.73	89.73	89.73
- Desinvestment ⁽¹⁾	-	-	-	-	-	-	-	-	-	-	-	53.24
B – COSTS	77.56	71.78	71.78	71.78	71.78	75.31	71.78	71.78	71.78	71.78	71.78	71.64
- Investment	57.02	-	-	-	-	-	-	-	-	-	-	-
- Reinvestment	-	-	-	-	-	-	-	-	-	-	-	-
- Financial imobilization	20.54	-	-	-	-	-	-	-	-	-	-	-
Operational cost	-	71.78	71.78	71.78	71.78	75.31	71.78	71.78	71.78	71.78	71.78	71.64
Net Flow (A - B)	-77.56	17.95	17.95	17.95	17.95	14.42	17.95	17.95	17.95	17.95	17.95	71.33

Source: Research data.

⁽¹⁾The sum of desinvestment on land and civil construction was estimated on the basis of residual value and financial imobilization.

Table A.4 - Flow of benefits and costs of cashew nut processing unit of operating capacity of 550kg/day of raw material. (Value of R\$ 1.000.00 of july of 1998)

Specification	Project Year											
	0	1	2	3	4	5	6	7	8	9	10	
A – BENEFITS	-	179.47	179.47	179.47	179.47	179.47	179.47	179.47	179.47	179.47	179.47	253.14
- Production	-	179.47	179.47	179.47	179.47	179.47	179.47	179.47	179.47	179.47	179.47	179.47
- Desinvestment ⁽¹⁾	-	-	-	-	-	-	-	-	-	-	-	73.67
B – COSTS	99.84	130.25	130.25	130.25	130.25	133.71	130.25	130.25	130.25	130.25	130.25	130.09
- Investment	58.87	-	-	-	-	-	-	-	-	-	-	-
- Reinvestment	-	-	-	-	-	-	-	-	-	-	-	-
- Financial imobilization	40.97	-	-	-	-	-	-	-	-	-	-	-
Operational cost	-	130.25	130.25	130.25	130.25	133.71	130.25	130.25	130.25	130.25	130.25	130.09
Net Flow (A - B)	- 99.84	49.22	49.22	49.22	49.22	45.76	49.22	49.22	49.22	49.22	49.22	123.05

Source: Research data.

⁽¹⁾The sum of desinvestment on land and civil construction was estimated on the basis of residual value and financial imobilization.

Table A.5 - Flow of benefits and costs of cashew nuts processing unit of operating capacity of 826 kg/day of raw material.

(Value of R\$ 1.000.00 of July of 1998)

Specification	Project Year											
	0	1	2	3	4	5	6	7	8	9	10	
A – BENEFITS	-	269.53	269.53	269.53	269.53	269.53	269.53	269.53	269.53	269.53	269.53	363.70
- Production	-	269.53	269.53	269.53	269.53	269.53	269.53	269.53	269.53	269.53	269.53	269.53
- Desinvestment ⁽¹⁾	-	-	-	-	-	-	-	-	-	-	-	94.17
B – COSTS	122.38	190.03	190.03	190.03	190.03	193.57	190.03	190.03	190.03	190.03	190.03	189.86
- Investment	60.91											
- Reinvestment	-	-	-	-	-	-	-	-	-	-	-	-
- Financial imobilization	61.47	-	-	-	-	-	-	-	-	-	-	-
Operational cost	-	190.03	190.03	190.03	190.03	193.57	190.03	190.03	190.03	190.03	190.03	189.86
Net Flow (A - B)	-122.38	79.50	79.50	79.50	79.50	76.03	79.50	79.50	79.50	79.50	79.50	173.84

Source: Research data.

⁽¹⁾The sum of desinvestment on land and civil construction was estimated on the basis of residual value and financial imobilization.

Table A.6 - Flow of benefits and costs of cashew nuts processing unit of operating capacity of 1100 kg/day of raw material.

(Value of R\$ 1.000.00 of July of 1998)

Specification	Project Year											
	0	1	2	3	4	5	6	7	8	9	10	
A – BENEFITS	-	358.93	358.93	358.93	358.93	358.93	358.93	358.93	358.93	358.93	358.93	473.47
- Production	-	358.93	358.93	358.93	358.93	358.93	358.93	358.93	358.93	358.93	358.93	358.93
- Desinvestment ⁽¹⁾	-	-	-	-	-	-	-	-	-	-	-	114.54
B – COSTS	145.47	249.27	249.27	249.27	249.27	252.73	249.27	249.27	249.27	249.27	249.27	249.07
- Investment	63.63	-	-	-	-	-	-	-	-	-	-	-
- Reinvestment	-	-	-	-	-	-	-	-	-	-	-	-
- Financial immobilization	81.84	-	-	-	-	-	-	-	-	-	-	-
Operational cost	-	249.27	249.27	249.27	249.27	252.73	249.27	249.27	249.27	249.27	249.27	249.07
Net Flow (A - B)	-145.47	109.66	109.66	109.66	109.66	106.20	109.66	109.66	109.66	109.66	109.66	224.40

Source: Research data.

⁽¹⁾The sum of desinvestment on land and civil construction was estimated on the basis of residual value and financial immobilization.

Table A.7 - Flow of benefits and costs of cashew nut processing unit of operating capacity of 1376 kg/day of raw material.

(Value of R\$ 1.000.00 of July of 1998)

Specification	Project Year											
	0	1	2	3	4	5	6	7	8	9	10	
A – BENEFITS	-	448.99	448.99	448.99	448.99	448.99	448.99	448.99	448.99	448.99	448.99	584.07
- Production	-	448.99	448.99	448.99	448.99	448.99	448.99	448.99	448.99	448.99	448.99	448.99
- Desinvestment ⁽¹⁾	-	-	-	-	-	-	-	-	-	-	-	135.08
B – COSTS	172.64	316.37	316.37	316.37	316.37	319.83	316.37	316.37	316.37	316.37	316.37	316.11
- Investment	70.26	-	-	-	-	-	-	-	-	-	-	-
- Reinvestment	-	-	-	-	-	-	-	-	-	-	-	-
- Financial imobilization	102.38	-	-	-	-	-	-	-	-	-	-	-
Operational cost	-	316.37	316.37	316.37	316.37	319.83	316.37	316.37	316.37	316.37	316.37	316.11
Net Flow (A - B)	-172.64	132.62	132.62	132.62	132.62	129.16	132.62	132.62	132.62	132.62	132.62	267.96

Source: Research data.

⁽¹⁾The sum of desinvestment on land and civil construction was estimated on the basis of residual value and financial imobilization.