

The Economics of Processing Cashew Products in Benue State, Nigeria

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Abstract— This study was on Economic of Cashew nut processing in Benue State, Nigeria. Simple random sampling technique was used to select one-hundred and twenty-five Respondents. Primary data were used, and collected using a structured questionnaire. Descriptive statistics such as frequency counts, percentages and mean scores were used; Gross margin analysis was used to analyze cost and returns while linear regression was used to analyse factors influencing cashew processing in the study area. Findings revealed that the mean age of the processors was about 33years, most (60.8%) were females, 49.6% were married and nearly all the respondents had formal education. The mean household size was 5 persons. Mean processing experience was 8 years. Research revealed that cashew processing is profitable in the study area. The cost of labour, cost of purchasing and cost of firewood were found to significantly influenced cashew processing in the study area. It was therefore recommended that government agencies and non-governmental organization should provide inputs resources needed by processors, processors should formed cooperative to access credit inputs, male folks were advised to participate in cashew nut processing as it profitable and processors should seek assistance from the government so as to enable them purchase processing machine.

Keywords— Analysis, Cashew, Economic and Processing.

I. INTRODUCTION

The cashew tree native of Brazil was introduced to Nigeria between 15th and 16th Century by the Portuguese explorers as noted by [1] cited by [2]. During the past decades, the production of cashew nuts in Nigeria has increased almost six-fold from 30,000 tonnes in 1990 to 176,000 in 2000 [3]. Prior to this, production was relatively static at 25000 tonnes over a period of 25 years from 1965. Nigeria of recent has recognized the potential economic value of cashew and has made a concerted effort to improve production of the crop.

Cashew known botanically as *Anacardium occidentale* L., is one of the commodities that has given Nigeria recognition worldwide. The average yield of nuts from a mature tree ranges from 7 – 11kg per annum. The tree is capable of living for between fifty and sixty years and produce nuts for about fifteen to twenty years[2].

Nigeria is the 4th largest producer and produces 220,000 tonnes of the 2.1 million tones world production in 2017. Nigeria farmers earned \$404 million from the export of the cash crop in 2017 and between 2015 and 2017; they earned \$813.05 in foreign exchange from the exportation of cashew [4].

Cashew processing is a very competitive but also a potentially lucrative activity that can and should be exploited by more processors [3]. Processing of cashew nut as noted by them ensure that the kernels are of high value luxury commodity.

The major objective of processing is to remove the valuable cashew kernel from the shell with as little damage as possible as whole kernel command a higher price than the broken pieces.

Cashew processing is a series of unit operations essential to make available, the edible nut. Variations in processing methodology between different manufacturers are attributed to differences in cashew, availability of equipment-type, human resource and fuel source. In Nigeria, most cashew processing units are at rural level. After 1960, unit operations such as roasting, shell liquid extraction and shelling have been mechanized. However, most other processing steps remain as tedious as manual operations [5].

The various processing operations of Cashew are seemed to be performed manually by experienced semi-skilled workers. This is still the case in Benue state, which is one of the producing states in Nigeria. Since the 1960s, various

mechanized cashew pieces of equipment have been developed and are available in several countries [6]. The processes that have been mechanized are roasting, cashewnut shell liquid extraction and shelling. For the most part, the cleaning of raw materials and sizing and kernel grading have remained labour intensive manual operations. There are significant differences in investment requirements, labour skills, health requirements and levels of efficiency between the manual technology and the medium to large-scale mechanical and semi mechanical operations [6]. In general the processing system involves lower investment and variable costs and achieves far greater efficiency in terms of kernel materials yield and the proportion of whole kernels extracted. However this system requires large numbers of experienced workers who work at unhealthy levels of exposure to some hazard [6]. The mechanized systems are more vulnerable to breakdown due to shortage of spare parts require large volumes of nuts for efficient operation and operate well below manufacturer specifications when strict grading and sizing activities are not in place prior to shelling [7] in [6].

Cashew nut processing allows for the development of an important by-product, which can increase its added value. The liquid inside the shell represents 15 percent of the gross weight and has some attractive possible medicinal and industrial uses. CNSL is one of the few natural resins that is highly heat resistant and is used in braking systems and in paint manufacture [6]. It contains a compound known as *anacardium* which is used to treat dermatological disorders. The main markets for cashew nut shell liquid (CNSL) are the United States, the European Union (mainly the Kingdom), Japan and the Republic of Korea. Together these account for over ninety percent of world trade, most of which is supplied by India and Brazil. The cashew nut fruit consists of a peduncle and a seed. The peduncle, often called the false fruit, is pear shaped yellow or red in colour and made up of a soft juicy pulp. The seed which develops below the peduncle is kidney shaped and resembles a large bean. Internally, the seed contains the kernel or cashew nut of commerce surrounded by an oily liquid called cashew nut shell liquid. (CNSL) which is not a triglyceride and contains a high proportion of phenol compounds find its use in industry as a raw material for brake lining compounds as waterproofing agent, a preservative and in the manufacturing of paint and plastics [6]. The kernel contains 47% oil. The main market of cashew nut is as a high value edible nut. The cashew nut shell liquid Cashew apples can also be made into drinks, wines and pickles. Due to the high value of cashew nuts even

small pieces find a market in confectionery products [8] in [6].

A lot of studies have been carried out on cashew's production and marketing. For instance, [2] worked on analysis of cashew nut marketing in Kwara state, Nigeria; [9] worked on information delivery and its effects on cashew production in Oyo state, Nigeria; [6] worked on Economic analysis of cashew nut marketing among produce buyers in Ogbomoso metropolis of Oyo state, Nigeria. However to the best of the researcher knowledge, there is little or no work on Economics of processing cashew products, this is the gap the study is intended to fill.

II. MATERIALS AND METHODS

The study was conducted in Gwer local government area of Benue state, Nigeria. Gwer local government which derives its name from Gwer River was created in 1976 out of Makurdi local government with its headquarters at Aliade. It is bordered by Makurdi in the North-East, Gboko in the East, Konshisha in the Southeast, Obi and Oju in the South, Otukpo in the Southwest; and Gwer West in the West. The local government has 14 council wards. Naturally, Gwer local government is endowed with mineral resources which can be effectively tapped by investors.

A multistage sampling technique was used in the selection of the respondents.

Firstly, five (5) council wards namely, Akpach'ayi, Mbaikyaan, Ikyonov, Gbemacha and Mbabur were purposefully selected from the study area based on Cashew processing activities; the second stage involved the selection of one community each from the five council wards by means of simple random sampling. The third stage involved the selection of 25 respondents each from the five communities to make total of 125 respondents for the study.

Data for the study were collected from primary source. The data were generated through the use of well-structured questionnaire designed to illicit information from the respondents.

The data obtained were analyzed using descriptive statistics like frequency distribution, percentage, mean and inferential statistics like multiple regression analysis, also gross margin analysis to determine the profitability of the enterprise.

Model Specification.

Implicitly, the model is as specified below

$$Y = f(\text{CP, CL, CF, CFP, U})$$

In explicit form

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + U$$

Where Y= Quantity of Cashew processed (Kg)

X_1 =Cost of purchasing cashew in naira (CP)

X_2 = Cost of labour for processing activities in naira (CL)

X_3 = Cost of fire wood in processing cashew in naira (CF)

X_4 = Cost of hiring frying pan in naira (CFP)

U= Error term

β_0 = constant

β_s = Coefficients.

It is expected that the explanatory variables will have inverse relation with the processing of cashew.

III. RESULTS AND DISCUSSION

Socio-Economic Characteristics of the Respondents in the Study Area.

Results of socio-economic characteristic of the respondents are presented in Table 1. The result shows that 60.8% of the respondents in the study area were female while 39.2% were male. This implies that more females are involved in cashew processing. This result disagrees with that of [2] findings, who found that 81% of cashew nut processors and marketers were male. [10] noted female's dominance in cashew production in Tanzania. The result of age revealed that the mean age of the respondents was 33.42 years implying that processors are in their productive and youthful age and this could lead to increase in processing of cashew nut in the study area. Specifically, 56.0% of the respondents were between 18-30 years; 24.8% of the respondents were between 31-40 years; 4.0% of the respondents were between 41-50 years, 3.2% were between 51-60 years, while 12.0% were within 61-65 years. This result agrees with that of [11] who reported mean age of 31 for cashew nut farmers in Enugu North, Nigeria. The result revealed that 49.6% of the respondents were married, 46.4% of the respondents were single and 1.6% was divorced, while 2.0% were widowed. This result is in line with that of [2] and [10] this implies that majority of the respondents were married, this is expected because married people are supposed to provide daily meal to their children.

Furthermore, the result shows that 64.0% of the respondent's attained primary education, 22.4% of the respondent's attained secondary education, while 13.6% of the respondents have tertiary education. This implies that, the respondents are knowledgeable and will be open to adopt new technology and innovations. This is in consonance with the findings of [11]. They reported high literacy level for

cashew nut farmers. [12] Have noted that the educational profile of the farmer decides the relative exposure of the farmer to latest technologies. The result on years of experience as shown in table 1 reveals that the mean processing experience was 8 years which shows that processors had considerable years of experience which is an advantage towards production and adoption of technologies. Specifically, 56.0% of the respondents had 1-5 years of processing experience, 24.8% of the respondents had 11-25 years of processing experience. This agrees with [12] and [11] who reported that more experienced processors are knowledgeable and more likely to adopt new techniques.

The result on household size revealed that respondent had a mean household size of 6 persons; specifically 66.4% have 1-5 household size, 27.2% have household size of 6-10, 2.4% have household size of 11-15, while 4.0% of the respondents have household size of 16-25. The result is in line with [2] findings, who reported that majority of cashew nut processors and marketers in Kwara State has relatively large household size. This result implies that majority of the households had large number of members which is an indication of availability of labour for cashew processing. The results on major occupation revealed that majority of the respondents (78.4%) have cashew processing as their major occupation while 21.6% have other occupation other than cashew processing. The result on ownership of cashew farm indicate that majority of the respondent (93.9%) have cashew farm; while 44.8% do buy cashew nut from other source with about 52.6% ownership from inheritance, 5.6% purchased, 6.0% from husband's farm, 4.0% from leasing and 36.6% from other means, also about 8.0% of the respondents that buy cashew nut from outside do buy from agricultural developments programme, 8.0% from market, 84.0% from farmers.

The result also, revealed that about 91.2% of the respondent do hire machine for processing, while about 8.8% have machines of their own.

The result on sources of cashew nut revealed that majority (84%) of the respondent sourced their nut from farmers, 8% of the respondents got their nut from markets, while 8% of them sourced the nuts from Agricultural Development Projects (ADP). The analysis on ownership of processing machine shows that 91.2% of the respondents hired machines for processing activities, while only 8.8% of the respondents have processing machine of their own.

Table1: Distribution of Respondents according to their Socio-Economic Characteristic in the Study area n=125

Variables	Frequency	Percentage	Mean
Sex			
Male	49	39.2	
Female	76	60.8	
Age (Years)			
18-30	70	56	
31-40	31	24.8	33
41-50	5	4	
51-60	4	3.2	
61 and Above	15	12	
Marital Status			
Single	58	46.4	
Married	62	49.6	
Divorced	2	1.6	
Widowed	3	2	
Processing Experience (Years)			
1-5	75	59	
11-15	31	24.5	8
21-25	5	4	
31-35	14	11.2	
Educational Status			
Primary	80	64	
Secondary	28	22.4	9
Tertiary	17	13.6	
Household size			
1-5	83	66.4	
6-10	34	27.2	6
11-15	3	2.4	
21-25	5	4	
Ownership of Processing Machine			
Owned	11	8.8	
Hired	114	91.2	

Source: Field survey, 2019

Costs and Returns Analysis in Cashew Processing**Total Variable Cost**

This consists of cost of purchasing cashew nut, cost of labour, cost of firewood and cost of frying pan. The result shows that in the study area, the average costs of purchasing 20kg of cashew nut was ₦4435=20, the average cost of labour for processing 20kg of cashew nut was ₦3377=68,

also the average cost of firewood for processing 20kg was ₦606.80, while the average cost of hiring frying pan for 20kg of cashew nut was ₦3812.40. As revealed from the study the total variable costs for processing 20kg of cashew nut was ₦12,182.08

Total Revenue

The average total revenue from the processing of 20kg of cashew nuts was ₦95,733.60.00. The results show that the minimum and maximum revenue were ₦600.00 and ₦1000000.00 respectively.

Gross Margin

Table 2; revealed that the gross margin for processing 20kg of cashew nut in the study area was ₦ 83,516.90. The minimum and maximum gross margin in the study was ₦-

4603.00 and ₦983,465.00 respectively. The minimum value of -4603.00 implies that some processors were processing at a loss. Since the average total revenue of ₦83516.90 is higher than the total variable cost of ₦12,182.08, cashew processing is profitable in the study area. This is in line with the findings of [13] that cashew nut processing is profitable in India.

Table.2: Costs and Returns in Cashew Processing in the Study Area

Variables	Min	Max	Mean	Std Deviation
Cost of Purchasing (₦)	500.00	15,000.00	4435.20	3679.75
Cost of Labour(₦)	00	20,000.00	3327.68	4005.99
Cost of fire wood (₦)	50.00	5,000.00	606.80	944.04
Cost of hiring frying pan(₦)	00	17,500.00	3812.40	4258.91
Total Variable cost(₦)	1404.00	35,000.00	12,182.08	8299.40
Total Revenue (₦)	600.00	1,000,000.00	95,733.60	199457.00
Gross Margin (₦)	-4603.00	983465.00	83,516.90	195870.00

Source: Field survey, 2019

Factors Influencing Cashew Processing in the Study Area

The result of factors influencing cashew processing enterprise is shown in table 4, the coefficient of multiple (R^2) is 0.507; indicating that 50.7% of the factors influencing cashew processing is explained by cost of purchasing, cost of labour and cost of fire wood. The result shows that F statistic (24.481) is positive and significant at 1% level indicating the goodness of fit for the model and overall significance of variables used in the model. The result shows that cost of purchasing, cost of labour and cost of fire wood were statistically significant and variables that influence cashew nut processing. [2] Have noted that the cost of purchasing and labour influence the marketing of cashew nut.

Specifically, the coefficient of cost of purchasing is positive and significant at 1%. Level implying that

purchasing cost and processing are directly related. The more the purchasing cost the more cashew nuts is being processed. This is not unlikely because the processors will prefer to process the nut at a higher cost to gain more profit.

From the results the coefficient of labour is negative and significant at 1% implying that cost of labour and processing are in inverse relation. The more the cost of labour, the less cashew nut processed and vice versa. Probably, as the cost of labour increases, the processors might make use of family labour to reduce the cost.

Results from table 3, shows that cost of firewood and processing have direct relationship and the coefficient is significant at 1% level.

Table.3: Regression analysis of factors influencing cashew processing in the study area.

Variables	Coefficient	Std. Error	T-Stat	Sign. Level
Constant	4553.042	126.40	3.598	0.000***
Cost of Purchasing	1.341	0.231	5.805	0.000***
Cost of Labour	-0.479	0.183	-2.612	0.010***
Cost of Firewood	6.077	0.810	7.502	0.000***
Cost Frying Pan	-0.249	0.200	-1.245	0.216
F-Value	24.481			
R^2	0.507			
R^{-2}	0.486			

Source: Field, survey 2019, *** indicates coefficient significant at 1% level.

The coefficients of cost purchasing (1.431), cost of labour (0.479) and cost of firewood (6.077) were significant at 1% level. This implies that an increase in unit of cost of purchasing, cost of labour and cost of fire wood will affect cashew processing by 1.431, 0.479 and 6.077 respectively. However the coefficient of cost of frying pan, and cost of processing were not significant and therefore do not significantly influence cashew processing in the study area.

IV. CONCLUSION AND RECOMMENDATION

The study was on economics of cashew processing in Gwer East Local Government Area of Benue State, Nigeria. The study found that majority of the processors was female in their productive age, married, considerable education level, and vast years of experience. From the results of costs and returns of cashew processing, the enterprise is profitable in the study area due to the positive values of the average gross margin.

The study also revealed certain factors that influenced cashew processing in the study area to be cost of purchasing, cost of fire wood and cost of labour. These have coefficients that were found to be significant in cashew processing in the study area.

The study recommends the provision of inputs facilities needed by processors by Government agencies and non-governmental organizations so as to reduce the cost incurred in processing of cashew in order to increase the profitability of cashew processing in the study area.

Processors and other individuals should come together to form cooperatives that will enable them access credit from banks and other financial institutions that will help in efficient production. Processors of cashew nut should seek for more improved production practices so as to improve their level of production to obtain even higher profits. Male folks are also encouraged to be involved in the business since it is profitable.

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