ECONOMICS OF PALM OIL PROCESSING IN OSUN STATE, NIGERIA

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Abstract

This study was designed to analysis of the economics of palm oil processing in Osun State, Nigeria. The study estimated the costs and returns, analyzed the determinants of palm oil processing and identified the constraints to palm oil production in Osun State. A four-stage sampling technique was used to collect data for this study from 200 palm oil processors. Descriptive statistics, costs and returns analysis and regression analysis were used to analyze the data. The study revealed that, most processors were women who utilize traditional method of processing. They rely heavily on contract farming as their source of credit and utilize hired labour. The major determinants of palm oil production in the study area are quantity of palm fruit, labour and water. They accounted for about 98% of the variation in the quantity of palm oil produced. The net returns to palm oil processing was estimated at N13,516.7 per month. The major problems encountered by the palm oil processors are inadequate extension services and credit facilities, among other constraints. The study recommends that inputs such as good quality water be made available to the processors. Palm oil processors should also be encouraged to form associations e.g. cooperative societies. Thereby helping one another whenever labour is inadequate.

Keywords: Oil Palm, Processing, Nigeria, Agriculture

Introduction

Oil palm *Elaiesguineensis* is of the family *Palmae* with about 228 *genera* and over 3000 species. It originated from Guinea in Africa. Oil palm can be cultivated or found in the wild. The three major oil palm

seeds in Nigeria are: 'Dura', 'Tenera' and 'Pisifera'. Tenera is the most common in in Nigeria. It has thin skin and produces higher oil per seed than other varieties. (Baker 1989).Oil palm, is a common tropical tree crop with important economic values. It is the most important and common source of vegetable oil and high yielding compared to other oil-bearing plants and it is a common ingredient used in animal feed research. According to Komolafe *et al.*, (1990) the leaves of oil palm are used for making roofing materials and brooms, for sweeping. The thicker leaf stalks and main trucks are also used for constructing village hut wallsand supporting frames in buildings while the bark of the palm frond can be woven into baskets.. The empty fruit bunch, which is the shell fibre that remain after oil extraction are used as a source of fuel and for mulching (Soyebo *et al.*, 2005).

Palm oil and palm kernel oil are the two main sources of oil that can be obtained from the palm fruit. Palm oil is extracted from the flesh mesocarp of the fruit which contains 45-55% oil, which varies in colour, from light yellow to orange red. Palm oil is used for making soaps, candles and margarine. The other oil type obtained from the palm kernel endosperm is colourless. It is used for making ice cream. It is also an important ingredient in confectionaries. The importance of palm oil in Nigeria cannot be over emphasized. Palm oil is used by majority of households in this country because it is relatively cheap in comparison to other vegetable oil. (Fetuga *et al.*, 1975).

The industrial production of the oil is not able to meet all needs hence additional amounts are produced by traditional methods in rural areas (Omoti, 2003). Osun state is perceived to be an agriculture dependentstate or area and most of the local government areas in the state engage in palm oil processing. Over the years, Nigeria's palm oil production has been confronted with the problem of inefficiencies. In 1965, Nigeria used to be the largest producer and exporter of palm oil in the World. However, there is a wide gap between the supply and demand of palm oil presently because of increase in the use of palm oil and increase in population (Food Agricultural Organization FAO, 2002). This gap may however continue for as long as there is little investment in palm oil processing due to lack of knowledge of the

profitability potentials of the enterprise.

The traditional processing methods of oil palm are relatively slow and as a result, a considerable amount of fresh fruit bunch (FFB) is left unharvested on the tree because the method cannot cope with the rate of palm bunch ripening especially during the peak season. The fruits available are not properly processed due to the poor production techniques and there is therefore a wide variation in palm oil output among the processors which may be due to the inefficiency and other constraints associated with their processing activities. Several studies (Nwauwa, 2012; Tiku and Sinonya, 2011) has been carried out on oil palm production and marketing, but none has focused on the oil palm processing sector of Osun State.. Hence the study intends to fill this gap by proffering solutions to the following research questions: What is the cost and returns to palm oil processing in the study area? What are the factors affecting palm oil processing in the study area?
The main objective of this study is to evaluate the economics of palm oil processing in Osun State, Nigeria. The specific objectives are to determine the cost and returns to palm oil processing in the study area and identify the factors affecting palm oil processing in the study area.

Research methodology
Study Area
This study was carried out in Osun State. Osun state is an inland state in South-Western Nigeria headquartered at Osogbo. It is home to several of Nigeria's most famous landmarks, including the campus of Obafemi Awolowo University, Nigeria's pre-eminent institution of higher learning. Osun State, known as the state of the living spring occupies a land mass of approximately 8,602 square kilometers. The state is bounded on the west by Oyo State, Ondo and Ekiti in the east, Kwara State in the north and Ogun State in the south. Osun state was carved from the old Oyo State on the 27th August 1991 and with a population of 2,551,522.

The people are mostly farmers, producing food crops as yam, maize, cassava, beans and cocoyam. The cash crops grown include tobacco and palm produce. Almost every local government area in Osun State

produce some quantity of palm oil but some local governments like Ayedaade, Isokan, Ife South and Ife North produce large quantity of it.

Sampling Procedure and Sample Size

A four-stage sampling technique was used for this study. The first stage was a purposive selection of two ecological zones which were Iwo and Ife zones because these zone are the major ones that produce palm oil in large quantity compared to other four zones in the study area. The second stage was random selection of two local government areas in each of the zones which sums up to be four local government areas: Ayedaade, Isokan, Ife South and Ife North. The third stage was random selection of 2 villages in each local government which sums up to be eight villages including Akanle, Odeomu, Apomu, Ikoyi, Ologiri, Olode, Amosun and Edunabon. The fourth stage was random selection of 25 palm oil processors in each of the eight selected villages which sums up to be 200 palm oil processors.

Primary data were used in this study. The survey was an interview schedule. Data were collected at palm oil processing sites and processors' houses by random administration of questionnaire to 200 respondents in the study area. Secondary data were also used in the study; and information was sourced from literatures, journals, books, etc.

Method of Analysis

The data were analyzed by the use of descriptive statistics as frequency, average, Likert-type Scale and percentages. Cost and returns analysis was used to determine the cost and returns to palm oil processing in the study area. This will allow for comparison of profitability of production. In determining the cost and returns of the enterprise(s), Average Total variable Cost and Average Total Revenue were used.

Average Total Variable Cost = ATVC (in Naira)
Average Total Revenue = ATR (in Naira)
Gross Margin (in Naira) = Average Total Revenue (ATR) Average Total Variable Cost (ATVC)
Total revenue includes the returns from palm oil and all other bi-

products.

ATVC includes costs of variable inputs such as costs of palm fruit, water, firewood, labour and costs of other variable inputs.

To determine the factors affecting palm oil processing, ordinary least square regression model was used. Linear equation was used to identify the factors affecting palm oil processing in the study area as used in a study by Kolawole, Williams and Awujola, 2010. The empirical model used for this analysis is given as follows:

$$Y = \beta o + \beta_i X_i + U_i$$

Where: Y = Quantity of palm oil extracted (in litres), β_0 = the intercept of the regression line, β_i = the slope of the regression line, X_1 = Quantity of palm fruit processed (Kg), X_2 = Labour spent on processing (man-day), X_3 = Quantity of water (litres), X4 = Quantity of fire wood (Kg) X_5 = Quantity of fuel (litres), and U_i = Disturbance term.

RESULTS AND DISCUSSION

SOCIO-ECONOMIC CHARACTERISTICS OF RESPONDENT

Socio-economic characteristics of the respondents are as presented in Table 1.

Table 1: Socio-Economic Characteristics of Palm Oil Processors

VARIABLES	FREQUENCY	PERCENTAGES
GENDER		
Male	17	8.5
Female	183	91.5
Total	200	100.0
AGE GROUP		
21-30	4	2.0
31-40	49	24.5
41-50	100	50.0
51-60	38	19.0
>60	9	4.5
Total	200	100.0
EDUCATIONAL STATUS		
Tertiary education	1	0.5
Secondary education	28	14.0
Primary education	101	50.5
Adult education	12	6.0
No formal education	5	29.0
Total	200	100.0
MARITAL STATUS		
Married	191	95.5
Widowed	9	4.5
Total	200	100.0
HOUSEHOLD SIZE		
<5	40	20.0
5-10	160	80.0
Total	200	100.0
RELIGION		
Islam	74	37.0
Christianity	126	63.0
Total	200	100.0

Source: Field survey, 2010.

Results obtained show that 91.5% of the processors are females while only 8.5% are males. There are more females involved in palm oil processing in the study area. This may be due to the fact that, fetching of water, fetching of firewood, cooking of fruits and boiling are traditional activities of women. The males they do not work directly in the oil palm processing enterprises, but help in harvesting and pounding of fresh palm fruits.

The productivity level in an economy is determined by the age distribution. Hence, the higher the number of old ages in an economy, the lower the productivity. Table 1 also shows that the age of respondents ranges between 21 years and over 60 years. The modal age group falls within 41-50, which constitutes 50% of the respondents and the mean age is 43years with a standard deviation of 8. The age distribution among farmers in the study agrees with Ekong (2003) and Solomon (1994) which confirmed that Nigerian farmers are within the age bracket of 40-60 years. Also, Most of the women in this age range are still very agile in handling palm oil processing activities.

A farmer's level of education is expected to influence his ability to adopt agricultural innovations and make decision on various aspect of farming. According Asiabaka (2002), education is a means of facilitating farmers' comprehension of new farm practices. Therefore, education has an effecton the overall behavior of individuals since knowledge is normally acquired through education. Since 50.5% of the respondents have primary education while 29.0% do not have any formal education. It is implied that the level of education may have affected positively the way the enterprise is being managed in the study area.

Palm oil production is a source of income for the processors in the study area. Table 2 presents the distribution of the respondents according to the status of palm oil as a source of income, their sources of credit and processing methods adopted in processing.

Table 2: Distribution of Palm oil Processors According to Sources of Income

VARIABLES	FREQUENCY	PERCENTAGES
Status of Palm oil processing as source of income		
Main occupation	80	40.0
Minor occupation	120	60.0
Total	200	100.0
Other Primary Sources of Income		
Salaried job	1	0.5
Trading	98	48.5
Carpentry		2.5
Tailoring	16	7.9
Total	120	59.4
Monthly Income from other Primary Sources	35	17.4
₦2000- ₦4000	63	31.2
₦4001- ₦6000	20	9.9
₦6001- ₦8000	2	1.0
₦8001- ₦10000	120	59.5
Total		
Credit Source	1	0.5
ADP	8	4.0
Friends	8	4.0
Local money lenders	183	91.5
Contract farming	200	100.0
Total		
Processing Method	150	75.0
Manual method	50	25.0
Improved method	200	100.0
Total		

Source: Field survey, 2010.

Majority of respondents (60%) engage in some other occupations like trading while 40% take palm oil processing as their main occupation. The income from other primary sources apart from palm oil processing was estimated at an average of N5,408 per month with standard

deviation of N1,524.

Their source of credit is majorly through a contract agreementwhereby the processors will collect money for processing from the palm oil marketers and consumers who will exchange the processed palm oil for cash. In addition, 91.5% of the processors (183 processors) have this as their source of credit and the remaining 8.5% have local money lenders and friends as their source of credit. The costs and returns to palm oil processing per cycle are as presented in Table 3.

Table 3: Analysis of Cost and Returns

ITEMS	QUANTITIES	AMOUNT (₦)
Revenue Items		
Palm oil	136.47litres	40601.5
Palm kernel	249.06Kg	13419.45
Palm fruit shaft	66.55Kg	2687.25
Average total revenue (ATR)		56708.2
Variable Items		
Palm fruit	1313.63Kg	26191.5
Water	77.47litres	1810.55
Labour	2873.75man-day	12305.5
Firewood	3914.93Kg	2757.25
Fuel	1.69litres	126.70
Average total variable cost (ATVC)		43,191.5
Gross Margin(ATR – ATVC)		13,516.7

Source: Field survey, 2010.

From Table 3, the average variable cost was N43,191.5/cycle. The variable costs include the costs of palm fruits, firewood, water, labour and fuel. The average total revenue N56,708.20/cycle is got from the average price of palm oil, palm kernel and palm fruit shaft. The net returns or net profit of N13,516.7 per cycle calculated as average total revenue minus average total variable cost indicates the profitability of operations. A production cycle is usually a month. Results of regression analysis is shown on Table 4.

Table 4: Analysis of Linear Regression of Determinants of Palm oil Processing.

Model	Unstandardized coefficients		Standardized coefficients		
	Beta(B_0)	Standard error	Beta (B_1)	t-value	Significance
Constant Y	-11.788	3.855		-3.058	0.003
X_1 (Quantity of palm fruit)	0.088	0.004	0.865	20.105	0.000
X_2 (Labour)	0.306	0.069	0.078	4.418	0.000
X_3 (Quantity of water)	7.102	1.660	0.103	4.279	0.000
X_4 (Quantity of fire wood)	-0.001	0.001	-0.340	-1.639	0.103
X_5 (Quantity of fuel)	0.000	0.001	0.007	0.269	0.788

Source: Field survey, 2010.

*Indicates values significant at 1%
R^2 - Coefficient of determination
The F-value is 1546.34.

As shown in Table 4, quantity of palm fruit (X_1), labour (X_2) and water (X_3) were statistically significant at 1%. These variables were positively related to the quantity of palm oil extracted (in litres). This implies that when there is an increase in the quantities of these variables, there will be an increase in the quantity of palm oil

extracted. As the quantity of palm fruit increases, the quantity of oil extracted also increases. This is however logical, because the higher the supply of the raw fruit, the higher the quantity of processed oil. Also, as the supply of labour and water involved in the extraction process increase, the quantity of oil extracted increases. The R^2 value of 0.975, this implies that the independent variables explain at least 98% of the variability in quantity of palm oil extracted is explained by the explanatory variables.

Using the linear form; $Y = \beta_0 + \beta_1 X_1 + U_i$, the linear equation for palm oil is given as:

$$Y = -11.788 + 0.088X_1 + 0.306X_2 + 7.102X_3 \ 0.001X_4 + 0.000X_5$$

The constraints limiting the production of palm oil in the study area are presented in the Table 5.

Table 5: Constraints to Palm Oil Processing

Constraints	Average index	Rank
Inadequate fruits	1.02 (Not severe)	7th
Inadequate labour	1.75 (Less severe)	3rd
Inadequate pit	1.38 (Not severe)	7th
Inadequate water	2.07 (Less severe)	3rd
Inadequate credit	2.87 (Severe)	2nd
Production technique	1.06 (Not severe)	7th
Losses	1.80 (Less severe)	3rd
Low production price	2.35 (Less severe)	3rd
Marketing problem	1.32 (Not severe)	7th
Inadequte Extension services	4.00(Very severe)	1st

Key: 1= Not severe, 2= Less severe, 3= Severe and 4= Very severe.

Table 5 revealed that the major problem faced by the palm oil processors in the study area is inadequate extension services and credit facilities. Most of the processors depend on their customers to obtain credit for production. In fact, in the study area, none of the processors had access to any form of incentive as means of obtaining initial capital. Source of capital is basically a contract agreement between the processors and the marketers or consumers..This limits production and can result in the wastage of palm fruit since the processors depend mainly on the amount of money given during the agreement.

Conclusion and Recommendations

The study shows that palm oil processing is an income generating venture. Its production is affected majorly by quantity of palm fruits available, labour and water inputs. There is however a number of constraints limiting the production of palm oil in the area; the most important of which is inadequate access to extension services. Based on the findings of this study, for the productivity of palm oil processing to increase, the following suggestions are recommended:

Government should provide extension services for the people in the study area order to educate the palm oil processors about innovation adoption of improved production techniques or better still, the palm oil processors form cooperative and contribute to fund the service of extension agents. Inputs such as water should be made available to these processors. Government should establish small and medium scale credit facilities such as Micro-finance banks in the study area and loan should be given to farmers at affordable interest rate. This will solve their problem of inadequate credit and will also solve the problem of water and labour inadequacy. The palm oil processors should have a way of coming together as cooperative society so as to help one another in supplying the needed inputs and increase productivity. When these problems are addressed, more fruits would be processed with adequate quantity of water and labour input, thereby increasing productivity.

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