

Assessment of the Determinants of Volume of Palm Oil Output in Ovia North East Local Government Area of Edo State, Nigeria

A.B. Mohammed

Department of Agricultural Economics, Ahmadu Bello University, Zaria, Nigeria

ABSTRACT: This study assessed the volume of palm oil output in Ovia North-East Local Government Area of Edo State, Nigeria. Efforts were made to examine the socio economic characteristics of palm oil producers, identify the determinants of the volume of palm oil produced as well as the constraints to palm oil production in the study area. A two stage sampling technique was used in selecting the respondents. Seventy-one respondents were randomly selected from 4 villages. Data were generated by the use of structured questionnaire during 2014/2015 production season. Descriptive statistics and Ordinary Least Square (OLS) regression were used in analysing the data. Results revealed male dominance (95.77%) in palm oil production in the study area and majority (70.42%) use local method of processing. Estimate on the determinants of the volume of palm oil output in the study area showed that the coefficient of age, method of processing, educational level, household size, price of palm fruit and cost of labour significantly affect the volume of palm oil output. Inadequate capital (100%), inadequate processing machine (94.37%) and high cost of processing (85.92%), were the major problems associated with palm oil production in the study area. It is therefore recommended that modern method of palm oil processing should be used and the necessary training and skills needed for palm oil processing should be acquired by the processors.

Keywords: *palm oil, determinants, processing, ordinary least square, Edo State*

Introduction

Oil palm (*Elaeis guineensis*) originated from West Africa, where evidence of its use as a staple food crop dates as far back as 5,000 years (Cornelius, 2002). It is the main source of vegetable oil consumed in the world in the form of palmoil (mesocarp oil) and kernel oil (seed oil) (United State Department of Agriculture, 2009). Palm oil is the edible vegetable oil derived from the fruit of oil palm tree and has been an important ingredient in the diet of many Nigerians. Palm oil is the world's largest source of edible oil, accounting for 38.5 million tonnes or 25% of the global edible oil and fat production. (Malaysian Palm Oil Council MPOC, 2007).

Today palm oil is one of the world's leading agricultural commodities. Over the past few years, production of palm oil has outgrown that of soybean oil, which was previously the most produced edible oil (USDA, 2009). The biggest producers of palm oil are Indonesia and Malaysia, which together produce around 83% of the world's total production and 89% of the world's exports (Brown and Jacobson, 2005). The remaining share is produced by such countries as Thailand, Nigeria and Colombia. Before 1965, Nigeria was the world's leading producer and exporter of palm oil, and has since 1974 ceased to contribute to the export trade in the commodity, largely due to increased domestic demand/consumption

that have not kept pace with the production (Omoti, 2004). During the past decade, Nigeria has become a net importer of palm oil (Olagunju, 2008). While in the early 1960's, Nigeria's palm oil production accounted for 43% of the world's production, currently, the country accounts for about 1.7% of the global palm oil production. Also, Nigeria is now ranked fifth in the global crude palm oil production in the world (Nnorom, 2012), an enterprise that Nigeria once dominated.

The palm oil industry constitutes a significant sector of the Nigerian economy, providing employment for a large section of the country (Azam *et al.*, 2003). After leading the world in the 1960s and 1970s in palm and other vegetable oil production, Nigeria now depends on countries like Malaysia, to bridge the huge gap between demand and supply of vegetable oil in the country.

The decline in palm oil export from Nigeria was due to poor quality of oil produced, absence of plantation development in a substantial scale and the use of inefficient innovative methods (FAOSTAT, 2010). The inability of meeting local demand in palm oil production was a clear indication that the fortunes of the palm oil sub-sector have declined significantly (FAOSTAT, 2010). Palm oil is an essential multipurpose raw material for both food and non-food industries (Armstrong, 1998). Palm oil such as cooking; Similar to coconut oil, palm oil is resistant to heat compared to other vegetable oils, its stability also makes it easy to store at room temperature for many months. Palm oil is used as an ingredient in soups and sauces, or as flavouring in certain dishes. Palm oil has a superior nutrient profile that makes it useful for supplementation, personal care and household products. It is added to soaps and

detergents, cosmetics, and other household products (Corley and Tinker, 2003, Embrandiri *et al.*, 2011). Due to its nutrient-dense profile, palm oil is beneficial for skin health and is added to a number of skin care products.

In Nigeria 80% of production comes from dispersed smallholders who harvest semi-wild plants and use manual processing techniques (Kei *et al.*, 1997). Several million smallholders are spread over an estimated area ranging from 1.65 million hectares to 2.4 million hectares and to a maximum of 3 million hectares (Partnership Initiative in the Niger Delta, 2011). Nevertheless, their production capability is still limited considering their method of processing and the various factors affecting their production.

This study therefore examined the socio economic characteristic of palm oil producers; identified the determinants of the volume of palm oil output as well as the constraints to palm oil production in the study area.

MATERIALS AND METHODS

Study Area

The study was carried out in Ovia North East area of Edo State. It is one of the eighteen (18) Local Government Areas in Edo State. The area is located between latitude of 6.34°N and longitude of 5.63°E of the Greenwich meridian. It has an area of 2,301 km² and a projected population of 195,675 as at 2016. The area falls within the tropical region which is characterised by two distinct seasons. The wet season begins from April to October while the dry season is between November to March. The annual rainfall is about 250mm while relative humidity is 70%. The average mean

temperature is less than 28°C (Chinyem, 2013). Majority of the people in the study area are small and large scale farmers. Crops cultivated in the study area include cassava, maize, banana, plantain, vegetable and oil palm.

Sampling Procedure and Sampling Size

Twenty-four villages out of one hundred and eighteen villages are known for palm oil production in the study area out of which 4 villages viz; Ugbogiobo, Evboneka, Azuwa, and Iyowa were purposively selected because of their proximity to NIFOR and for easy access. List of active palm oil producers were elicited out of which 20% palm oil producers were randomly selected bringing the sample size to 80. However only data from 71 respondents were found useful for analysis. Primary sources of information were used in eliciting data for this study. Data generated were analysed using descriptive statistics and Ordinary least square (OLS) regression analysis.

Ordinary Least Square Regression Analysis

Ordinary least square regression analysis was used to analyse the determinants of the volume of palm oil produced in the study area.

The implicit and explicit forms of the model are expressed as follow respectively: $Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, u)$

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 X_{6i} + \beta_7 X_{7i} + U$$

Palm oil output for this study is defined as the volume of palm oil in litres

Where

Y = Volume of palm oil (lit)

X_1 = Age (years)

X_2 = Method of processing (local method =1, modern method = 0)

X_3 = Educational level (years)

X_4 = Household size (in number)

X_5 = Extension contact (number of contact)

X_6 = Price of palm fruit (₦)

X_7 = Cost of labour (₦)

The independent variables hypothesized to determine the volume of palm oil produced in the study area were as follow:

Age (X_1); this variable was measured in years. It is expected have a positive effect on the volume of palm oil produced.

Method of processing (X_2); this variable was measured as dummy it is expected to have a positive or negative effect on the volume of palm oil produced.

Educational level (X_3); this variable was measured in years. It is expected to have a positive effect on the volume of palm oil produced.

Household size (X_4); this variable was measured in numbers of persons. It may have a positive effect on the volume of palm oil produced.

Extension contact (X_5); this variable was measured in numbers of visits. It is expected to have a positive effect on the volume of palm oil produced.

Price of palm fruit (X_6); this variable was measured in Naira (₦). It is expected to have a negative effect on the volume of palm oil produced

Cost of labour (X_7); this variable was measured in Naira (₦). It is expected to have a negative effect on the volume of palm oil produced

Results and Discussion

The socio-economic characteristics of the respondents in the study area are shown in Table 1. The results show that 63.4% of the respondents are within the modal age range of 41-60 years with a mean age of 42 years. This is an indication that the respondents involved in palm oil production in the study area were mostly middle aged and were within the active productive work force. Ahmed (2001), reported that as age of a producer increases, experience and productivity also increases. Majority about (95.77%) of the respondents were males while (4.23%) are females. Olagunju (2008) in his study on the economics of palm oil processing in South Western Nigeria also asserted that men dominated the processing industry.

Agwu (2006) observed that females are less involved in oil palm production because of the nature of processing which involved

more human labour in the study area. Most (70%) of the respondents were married, with a mean household size of 4 persons.

Majority (93%) of the palm oil producers were literate and possessed diversified formal education. Levels that range from primary to tertiary school education and this could have a positive effect on output.

Analysis of processing experience reveals that most (64.8%) of the respondent had over 21 years of processing experience with a mean processing experience of 31 years. This means that palm oil processing is not a new venture in the study area. Majority (84.5%) of the respondents had no extension contact while (15.5%) had contact with extension agents. This implies that their knowledge on new processing innovations will be limited in the study area. Most (70.4%) of the respondents used local methods of palm oil processing in the study area.

Table1: Distribution of oil palm producers according to their socio-economic characteristics

Variable	Frequency	Percentage (%)	Mean N= 71
Age (years)			
1 - 20	3	4.23	
21 – 40	10	14.08	42
41 – 60	45	63.38	
61 and above	13	18.31	
Sex			
Male	68	95.77	
Female	3	4.23	
Marital Status			
Single	12	16.90	
Married	50	70.42	
Divorced	8	11.27	
Widow/widower	1	1.41	
Family Size (number)			
1 – 5	36	50.70	
6 – 10	30	42.25	4
11 and above	5	7.04	
Educational level (years)			

Non formal	5	7.04	
Primary	11	15.49	
Secondary	35	49.30	
Tertiary	20	28.17	
Processing experience (years)			
1 – 20	25	35.21	
21 – 40	35	49.30	31
41 and above	11	15.49	
Extension contact (number)			
Yes	11	15.49	
No	60	84.51	
Labour used			
Family labour	40	56.34	
Hired labour	11	15.49	
Both	20	28.17	
Method of processing			
Local method	50	70.42	
Modern method	4	5.63	
Both	17	23.94	

The Determinants of the volume of Palm oil produced in the Study Area

Table 2 presents the determinants of the volume of palm oil produced in the study area. Result revealed that Age of the respondents, method of processing, educational level, household size, cost of palm fruits and cost of labour had significant effect on the volume of palm oil processed. The coefficient of determination (R^2) of 0.921 implies that the independent variables explain 92% of the variability of volume of palm oil produced in the study area. Age, household size, price of palm fruit and cost of labour have positive coefficient and are statistically significant at 1% level ($P < 0.001$). The positive coefficient of age implies that increase in age increases the volume of palm oil produced and this might probably be because the respondents are still in their active age of production. The positive coefficient of household size implies that household size increases the volume of palm oil produced. As expected household size implies availability of labour thus increase in the volume of palm oil produced, *ceteris paribus*. The positive

coefficient of price of palm fruit implies increases in cost of palm fruit increases the volume of palm oil produced. This is in contrast to *a priori* expectation but in line with the finding of Chigozirim and Chibuzo (2015) where price of oil palm results to corresponding increasing in the supply of palm oil in their study. The increase in cost of palm fruit might be because of its high grade as such producing more oil. Positive coefficient of cost of labour implies that as cost of labour increases, the volume of palm oil produced also increase. This finding is not in line with a priori expectation. This could be as a result of increase in the numbers of hands hired thus increasing the volume of palm oil produced. This finding is in agreement with the findings of Norhidaya *et al*, (2017). They found out that increase in labour employment rate will boost the production of crude palm oil in Malaysia. On the other hand, method of processing and educational level has negative coefficient and statistically significant at 1% level. The negative coefficient of educational level implies increase in educational level decreases volume of palm oil processed. This result might be because most of the

respondents in the study area used local method of processing and education might not be a factor. More so palm oil processing is not their primary occupation in the study

area. The negative coefficient of method of processing implies increase in the use of local processing method decrease the volume of palm oil produced.

Table 2: Result of the Ordinary least square regression analysis of palm oil production in the study area

Variables	Coefficients	Standard error	t-value
Constant	0.149	0.058	2.55
Age (X ₁)	0.189	0.044	4.29***
Processing Method (X ₂)	-0.2134	0.0217	-9.83 ***
Educational level (X ₃)	-0.1280.3	0.0152.2	-8.41 ***
Household size (X ₄)	0.125	0.017	7.35***
Extension contact (X ₅)	-0.123	0.775	-1.60
price of palm fruit (X ₆)	0.11734	0.01504	7.80***
Cost of labour (x ₇)	0.56321	0.2851	1.97***

*** = Significant at 1% levels

R² = 0.921

Table 3 shows the constraints of palm oil production in the study area. Results reveal that palm oil production encounter some problems such as inadequate income (100%), inadequate availability of processing machine (94.37%), cost of processing (85.92%), high cost of labour

(69.01%), inappropriate knowledge of processing (61.97%), inadequate supply of power (57.75%), length of time of processing (53.52%) and dirty nature of the process (46.48%) as ranked by the palm oil producers in the study area.

Table 3: Constraints Palm Oil Production in the Study Area

Constraints	Frequency	Percentage (%) *	Rank
Inadequate capital	71	100	1
Inadequate availability of processing machine	67	94.37	2
High cost of processing	61	85.92	3
Inadequate and high labour cost	49	69.01	4
Inappropriate knowledge of processing	44	61.97	5
Inadequate power supply	41	57.75	6
Processing time	38	53.52	7
Dirty nature of the process	33	46.48	8

* Multiple responses

Conclusion and Recommendations

Palm oil production in the study area was dominated legima. Most are in their active and productive age. They majorly use local method of processing. Results also show the negative effect of the method of processing on the volume of palm oil produced. Inadequate capital, inadequate processing machine and high cost of processing were the major constraints to volume of palm oil produced. It is therefore recommended that modern method of palm oil processing should be encouraged in the area and this can be achieved through the provision of incentives such as loans at minimal interest rate to procure small scale processing equipment by government and non-governmental agencies. This would go a long way in reducing cost of processing and shortage /high cost of labour thus increase in the volume of palm oil produced. First-hand knowledge/information on the appropriate processing techniques should be disseminated by extension agents in the study area. This would not only solve the problem of inappropriate knowledge of processing but would in turn help reduce processing time.

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