# DETERMINANTS OF ADOPTION OF IMPROVED PALM OIL PROCESSING TECHNOLOGY AMONG LITERATE WOMEN PALM OIL PROCESSORS IN IKPOBA – OKHA LOCAL GOVERNMENT AREA, EDO STATE, NIGERIA.

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***ABSTRACT***
*The study determinants of adoption of improved palm oil processing technology among literate women palm oil processors was conducted in Kpoba – Okha Local Government Area of Edo State, Nigeria. Specifically the study sought to determine the socio-economic characteristics; identify the reasons for adopting improved technology, determine the cost and return from palm oil processing and constraints to increased palm oil production in the study area. Multistage random sampling technique was used to select the respondents that were use for the study. The sample size used for the study was forty (40). Data used for the study was collected using primary source that involved the use of structured questionnaire that was administered to the respondents. Information obtained was coded and analyzed using quantitative and qualitative techniques. The result of the study established that the processors were well experienced in the processing enterprise, sourced for financed through personal savings and were low income earners. It also established that literate women palm oil processors in the study area adopted the improved palm oil processing technology because it is faster, produces higher output with better quality product and less stress. The result further established that palm oil processing was profitable analysis with a positive return on investment. The major constraints to increased palm oil processing as established by the study were irregular supply of FFB, market uncertainty, high cost of transportation, inadequate finance among others. Arising from the findings of the study, the following recommendations were made. Literate women palm oil processors in the study area should form cooperative society to enjoy the benefit of economics of scale. Government and agricultural policy planners should pay emphasis on developing agricultural and agribusiness plans that will encourage investment in palm oil production and processing. The state government should provide enabling conditions that will encourage and favour investment in palm oil processing and processing technology. Enlightenment campaign on the profitability of palm processing should be carried out. Government – private sector participation investment in providing and making available improved palm oil processing technology was also recommended. Government private sector participation in providing credits, finance and inputs to palm oil processors was recommended too. It hoped that if these recommendations are taken, it will have a multiplier effect(s) on the economy.*
***Keywords:*** *Adoption, processing, technology, literate, fresh fruit bunch (FFB), women processors and determinants*

## INTRODUCTION

Silvia (2018) defined literacy as the capability of an individual to recognize, comprehend, construe, make, converse and work out by means of printed and written sources of varying context. The author further opined that literacy involves a variety of learning aimed at developing knowledge and potentials that will aid in participating in the activities of the community and the society at large.

Illiteracy has been documented as one of the major challenges to agricultural production, productivity and development in Nigeria. Okpachu *et al* (2014) opined that illiteracy has a negative multiplier effects in agricultural production in Nigeria. They further added that the literacy level of the farmers often affect their level of production, output and adoption of new technologies. Apata, (2010) and Ilevbaoje (2004) reported that literacy is an essential ingredient that will enable farmers to imbibe innovative information and technology generated from research institutes that will enhance their productivity and ability to cope in farming environments.

Nigeria agricultural production activities are predominantly carried out by small – holder farmers who are mostly found in rural communities. Evidence has shown that agricultural production activities in Nigeria are not gender bias. Kaine and Ume (2019), Kaine (2018), Okolo *et al* (2015), Chukwu and Nwaiwu (2012) and Ibekwu (2008), observed that women are actively involved in agricultural production in Nigeria. Abiola and Omabugau (2001) reported that women participate actively in agricultural activities. The authors however reported that even though women are actively involved in agricultural activities, their involvement is not commensurate to that of the men. On the other hand, Uzeakor and Umeh (2018) in their study in South – East Nigeria observed that the activities of women in agricultural production, processing and marketing have greatly increased.

Oil palm (Elaeis Guineensis) is believed to be one of the most important economic tree crops with varying versatile parts that are very useful domestically and

industrially. Food and Agricultural Organization (FAO) (2002) traced the origin of the crop to the Tropical Rain Forest region of West Africa where Nigeria is situated. The crop was reported to be mostly produced in South – Western and Eastern regions of Nigeria where the climatic and environmental conditions are favourable for its production (Yinusa, 2015). To obtain palm oil, fresh fruit bunches (FFB) are processed either traditionally (manually), mechanically (modern) or a combination of both.

Agricultural production and processing requires that raw product be transformed or converted into a new state or form that will make it more acceptable to the consumer as it will be perceived as something new or a new product. This process tends to provide time, place, form and possession utility (Kaine 2018). Arene and Nwaigbo (2004) reported that some agricultural produce like oil palm cannot be utilized or consumed without being processed. The authors added that processing increases the consumption of farm produce resulting to large sales of products in commercial quantities. Processing decreases or reduces post harvest losses in quantity and quality of farm produce, improve the shelf life, taste and quality of farm produce and provide utility to the consumer. FAO (2000) observed that most losses experienced in agricultural production often occur at time of harvest, handling and storage. It is certain that women are involved in agricultural production and processing. It is also certain that women are involved in palm oil processing. It was not certain that literate women involved in palm oil processing in the study area were making profit. Similarly, what necessitated the adoption of improved palm oil processing technology among literate women palm oil processors in Ikpobo – Okha Local Government Area, Edo State, Nigeria was not also certain. It is against this background that the study was conducted to: determine the socio-economic characteristics; identify the reasons for adopting improved technology, determine the cost and return from palm oil processing and constraints to increased palm oil processing in the study area.

## METHODOLOGY

This study was carried out in Ikpoba-Okha Local Government Area, Edo State, Nigeria. Ikpoba Okha is one of the Local Government Areas in Edo State, Nigeria with headquarter in Idogbo town. It has an area of 862km$^2$ and a population of 371,106 at the 2006 census. The Local government area falls under the rainforest vegetation zone with a mean rainfall of 1800mm per annum. The inhabitants of the both Local Government Areas are notable for farming. Multi stage random sampling technique was used to select respondents used for this study. First stage involved the selection of communities. Four (4) communities were randomly selected and used for the study. The second stage involved the selection of the women palm oil processors. Fifteen (15) women palm oil processors were randomly selected from each of the four communities that were randomly selected. The third stage involved the selection of literate women palm oil processors. Ten (10) literate women were randomly selected out of the fifteen (15) women that were randomly selected from each of the four communities giving a total of forty (40) respondents that were used for the study. Data used for the study were collected through primary sources using structured questionnaire that were distributed to the respondents. Information collected was coded and analyzed using qualitative and quantitative techniques. Descriptive statistics such frequency distribution, means and tables were used to determine the socio-economic characteristics; identify the reasons for adopting improved technology and constraints to increased palm oil processing. Net profit margin analysis was used to capture the cost and return as well as return on investment (ROI) from palm oil processing in the study area.

### Model Specification

### Determination of Net Profit Margin and Profitability

Profitability of literate women palm oil processors in the study area was determined using the gross margin analysis. Gross Margin (GM) was obtained by finding the difference between total revenue (TR) and Total Variable Cost (TVC). The value of net revenue (profit) margin was obtained by calculating the difference between Gross Margin and depreciation (Kaine, 2018). Gross Margin and net profit is expressed:

GM = TR - TVC
TC = TVC + TFC
NPM = GM – Depreciation
Where
GM = Gross Margin
TR = Total Revenue (₦)
VC = Variable Cost (₦)
NPM = Net Profit Margin

### Return on investment (ROI)

Return on investment was used in this study as a proxy of profitability. This was obtained by determining the ratio of net profit and divided by the total cost of processing and multiplied by 100. The return on investment expressed revenue as total investment (Kaine 2018 and Nwaobiala and Kaine 2016).The return on investment was derived using the equation:

$$\text{Return on Investment (ROI)} = \frac{\text{Net profit (revenue) per annum}}{\text{Total Cost incurred per annum}} x \frac{100}{1}$$

## RESULTS AND DISCUSSION

### Socio-economic characteristics

The study, determinants of adoption of improved palm oil processing technology among literate women palm oil processors was conducted in Ikpobo – Okha Local Government area of Edo State, Nigeria. The socio-economic characteristics considered and studied in this work were discussed and presented in Table 1. The result of the age of the female literate processors in the study area studied indicated that majority: fifteen (15) (37.50%) of the processors were within the age bracket of 40 – 49 with a mean age of 40 years. A detailed analysis of the age of the processors indicated that nine (9) (22.50%) were within the age bracket of 30 – 39, six (6) (15%) and ten (10) (25.00%) were within the age brackets of 50 – 59 and 60 and above respectively. The age range indicated that the processors were in their economic and active age as was also indicated by a mean age of 40 years. It has been documented that farmers within the economic and active age were more receptive to imbibe new agricultural technology and have the energy to do work (Kaine, 2018 and Kaine and Chukwuma, 2017).
Analysis of the marital status revealed that seventeen (17) (42.50%) were married, thirteen (13) (32.50) were single, six (6) (15.00%) were divourced and four (4) were widows. A further analysis of the household size indicated that the mean household size was six (6) persons. A detailed analysis of the household size showed that nineteen (19) (47.50%) had a household size of less than four (4) and nine (9) (22.50%) were within the household size range of 5 – 10. The result also showed that nine (9) (22.50%) of the processors had a household size range of 11 – 15 while three (3) (7.50%) had a household size of 16 and above.

A further analysis of the processing experience studied as indicated in Table 1 revealed that processors were well experienced with mean processing years of eight (8) years. The result further indicated that majorzity twenty (20) (50.00%) had a processing experience of 5 – 10 years. A detailed analysis showed that, six (6) (15.00%) of the processors had less than 4 years processing experience, eleven (11) (27.50%) had 11 – 15 years experience while three (3) (7.50%) had 16 – 20 years processing experience. The result indicated that literate women palm oil processors in the study area were well experienced.

The result of the sources of finance as indicated in Table 1 showed that twenty – eight (28) (70%) sourced their finance for processing enterprise through personal savings. The result also showed that seven (7) (17.50%) sourced their finance from cooperative, four (4) (10.00%) sourced their finance by obtaining loan while one (1) (2.50%) derived assistance from friends and relatives. Sources of fresh fruit bunch (FFB) were studied and result presented in Table 1. The result showed that majority: twenty (20) (50.00%) sourced their FFB from haired farms. A detailed analysis of the sources of FFB showed that nine (9) (22.50%) obtained their FFB used for processing from their personal farms, four (4) 10.00%) purchased FFB at farm gate, two (2) (5.00%) sourced FFB outside the Local Government Area while five (5) (12.50%) sourced FFB within the Local Government Area. The income level of the processors studied revealed that the processors had a mean income of ₦111,249.7 ($317.90). A detailed analysis of the income level indicated that six (6) (25.00%) had an income range of less than ₦50,000. 00 ($142.90) - ₦ 99,999.00 ($285.71), fifteen (15) (37.50%) had an income range of ₦100, 000.00 ($285.71) – ₦149, 999.00 ($428.60), three (3) (12.50%) had income range of ₦150,000.00 ($248.60) – ₦151,999.00 ($434.30) while sixteen (16) (40.00%) had income level greater than ₦200, 000.00 ($571.43). The income indicated that literate women processors in the study area were low income earners.

**Table 1: Socioeconomic characteristics of palm oil processors (n = 40)**

| Variables | Frequency | Percentage (%) | Mean |
|---|---|---|---|
| **Age range** | | | |
| 30 – 39 | 09 | 22.50 | 40.13 |
| 40 – 49 | 15 | 37.50 | |
| 50 – 59 | 06 | 15.00 | |
| >60 | 10 | 25.00 | |
| **Marital status** | | | |
| Single | 13 | 32.50 | |
| Married | 17 | 42.50 | |
| Divorced | 06 | 15.00 | |
| Widow | 04 | 10.00 | |
| **Household size** | | | |
| < 4 | 19 | 47.50 | |
| 5 – 10 | 09 | 22.50 | 6.20 |
| 11 – 15 | 09 | 22.50 | |
| 16 and above | 03 | 7.50 | |
| **Processing experience** | | | |
| < 4 | 06 | 15.00 | |
| 5 – 8 | 20 | 50.00 | 7.80 |
| 9 – 13 | 11 | 27.50 | |
| 14 – 18 | 03 | 7.50 | |
| **Source of finance** | | | |
| Personal savings | 28 | 70.00 | |
| Cooperative | 07 | 17.50 | |
| Loan | 04 | 10.00 | |
| AFFR | 01 | 2.50 | |
| **Source of FFB** | | | |
| Personal farm | 09 | 22.50 | |
| Hired farm | 20 | 50.00 | |
| Farm gate | 04 | 10.00 | |
| Purchased outside LGA | 02 | 5.00 | |
| Purchased within LGA | 05 | 12.50 | |
| **Income Level** | | | |
| <50,000 – 99,999 | 06 | 25.00 | |
| 100,000 – 149,999 | 15 | 37.50 | |
| 150,000 – 199,999 | 03 | 12.50 | |
| >200,000 | 16 | 40.00 | ₦111,249.70 |

**Source:** Field survey, 2018.
***AFFR:** Assistance from friends and relatives. ***FFB:** Fresh fruit bunch.***LGA:** Local Government Area.

**Adoption of improved technology**

Reasons for adopting improved technology were studied and the result presented in Table 2. Result of the analysis indicated that multiple responses were obtained. The result revealed that majority: twenty – five (25) (62.50%) of the respondents adopted improved palm oil processing technology because it is faster. A detailed analysis of the reason for adopting the improved technology showed that seventeen (17) (42.50%) reported that improved technology resulted to higher output, twelve (12) (30.00%) indicated that improved palm oil processing technology produced better quality product, eight (8) (20.00%) adopted the improved technology due to the availability, seventeen (17) (42.50%) indicated that stress associated with the improved technology was lesser while three (3) (7.50%) indicated that the improved technology produced quality palm oil with better taste.

**Table 2: Reasons for adopting improved technology**

| Variables | Frequency | Percentage (%) |
|---|---|---|
| Faster | 25 | 62.50 |
| Higher output | 17 | 42.50 |
| Better quality product | 12 | 30.00 |
| Availability | 08 | 20.00 |
| Lesser stress | 17 | 42.50 |
| Quality with better taste | 03 | 7.50 |
| | ** | ** |

**Source:** Computed from Field Survey, 2018.
** Multiple responses

**Cost and Return Analysis**

To determine the profitability of adoption of improved palm oil processing technology among literate women in the study area, the cost items, average annual production (FFB) and income were estimated using gross margin analysis. The values of fixed cost items were determined using the straight line method of depreciation. The result of the study as presented in Table 3 indicated that average annual total revenue was ₦5,015,400.00 ($14,329.71) with a total cost of production (₦2,449,824.64) ($6,999.50). A detailed analysis of the result showed that total variable cost item was ₦2,448,040.00 ($6,994.4) representing 99.00% of the total cost of production. The result of the gross margin as indicated in the Table 3 was ₦2,570,360.00 ($7343.90). Further analysis of the net profit showed a positive net profit value of ₦2,565,575.36 ($7330.22). The result of the return on investment was also positive with a value of 1.00. This implied that for every one hundred naira (₦100.00) ($0.29) invested in palm oil processing in the study area, there was a return of one naira (₦1.00) ($0.003). This also implied that the adoption of improved palm oil processing technology among literate women processors in the study area was profitable.

**Table 3: Profitability analysis of Palm Oil processing technologies**

| Variables | Value (₦) |
|---|---|
| Revenue | 5,015,400.00 |
| Processing labour cost | 340,600.00 |
| FFB cost | 1,983,800.00 |
| Cost of water | 120,640.00 |
| Total Variable cost (TVC) | 2,448,040.00 |
| Depreciated Cost | 4,784.64 |
| Total Cost (TC) | 2,449,824.64 |
| Gross Margin (GM) | 2,570,360.00 |
| Net Profit (NP) | 2,565,575.36 |
| Return on Investment (ROI) | 1.00 |

**Source:** Computed from Field Survey, 2018.
*FFB = Fresh Fruit Bunch

**Constraints to increased palm oil processing**

Literate women palm oil processors in the study area were confronted with a number of problems which tended to reduce output. The major constraints to increased palm oil processing in the study area were presented in Table 5. The analysis of the result indicated that twenty (20) (50.00%) of the processors reported that irregular supply of FFB was one of the major constraints to increased palm oil processing in the study, thirty – three (33) (82.50%) reported market uncertainty as one of the constraints, twenty (20) (50.00%) reported high cost of transportation as one of the major constraint and twenty – seven (27) (67.50%) showed that poor road net work was one of the major constraints. A further analysis of the result revealed that high labour cost as indicated by twenty – four (24) (60.00%) was one of the constraints to increased palm oil production in the study area. Inadequate finance (34) (85.00%) and production complexity (17) (42.50%) were also reported as constraints to increased palm oil production in the study area.

**Table 5: Constraints to increased palm oil processing**

| Variables | Frequency | Percentage (%) |
|---|---|---|
| Irregular supply of FFB | 20 | 50.00 |
| Market uncertainty | 33 | 82.50 |
| High cost of transportation | 20 | 50.00 |
| Poor road network | 27 | 67.50 |
| High labour cost | 24 | 60.00 |
| Inadequate finance | 34 | 85.50 |
| Production complexity | 17 | 42.50 |
| | ** | ** |

**Source:** Computed from Field Survey, 2018.
** Multiple responses

## CONCLUSION AND RECOMMENDATION

The study examined determinants of adoption of improved palm oil processing technology among literate women palm oil processors in Ikpobo – Okha Local Government Area, State Nigeria. The study established that palm oil processors in the study area were in their economic and age, majority were married and household size was large. It also established that the processors were well experienced in the processing enterprise, sourced for financed through personal savings and low income earners. The study further established that literate women palm oil processors in the study area adopted the improved palm oil processing technology because it is faster, produces higher output with better quality product and less stress. The profitability analysis and the return on investment established too that palm oil processing enterprise is profitable. Among the major constraints to increased palm oil processing as established by the study include: irregular supply of FFB, market uncertainty, high cost of transportation, inadequate finance among others. The result of the study established that literate women processors in the study area were low income earners who financed their processing enterprise through personal savings. The recommendation therefore was that literate women palm oil processors in the study area should imbibe the concept of cooperatization and enjoy the benefits of economics of scale. Since the study established that palm oil processing among literate women processors in the study area was profitable, it was recommended that government and agricultural policy planners should pay emphasis on developing agricultural and agribusiness plans that will encourage investment in palm oil production and processing. It was also recommended that the state government should provide enabling conditions that will encourage and favoure investment in palm oil processing and processing technology. It was also recommended that enlightenment campaign on the profitability of palm processing should be carried out. Government – private sector participation investment in providing and making available improved palm oil processing technology was also recommended Government – private sector participation in providing credits, finance and inputs to palm oil processors was recommended too. It hoped that if these recommendations are taken, it will have a multiplier effect(s) on the economy.

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