PROCESSING AND MARKETING OF *Elaeise guineensis* (OIL PALM) IN NKANU WEST LOCAL GOVERNMENT AREA OF ENUGU STATE, NIGERIA

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ABSTRACT

The study was conducted to survey the marketing and processing of Elaeise guineensis (E. guineensis) in Nkanu West LGA of Enugu state, Nigeria. The five selected districts namely, Obuoffia, Umueze, Akegbe ugwu, Amodu and showed abundance of this Non-Timber Forest Products (NTFPs). Data were obtained with the aid of a structured and open-ended questionnaire administered among selected processors and marketers. This study was aimed at knowing the processing methods, marketing channels and profitability of E. guineensis. Results obtained indicated that 97.0% of the respondents for palm oil were females. 55.0% respondents for the product fall within the age group of 41-50 years. 62.0% of the respondents were married. 62.0% of the respondents fall within the household size of 6-10. About 51.0% of the respondents had no form of formal education. Processors and marketers were majorly farmers 61.0%. Results for years of experience indicated that majority 64.0% of the respondents had above 21 years of experience. Majority of the respondents 97.0% were involved in the processing of oil palm and use traditional method. 77.0% of the respondents produced more in medium quantity. Majority (70.0%) source their products from farm land and 64.0% of the respondents sold to consumers directly. Total revenue of oil palm per week indicated ₦22,750.00, gross profit margin indicated ₦18,500.00 while return on investment revealed 81.32% per week from the business which shows that, it is a profitable venture. This study recommends that, farmers should be educated and encouraged on the need to cut down and replace aging palm trees over (30 years) to increase productivity and output.

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INTRODUCTION

Non-timber forest products (NTFPs) are any product or service other than timber that is produced in forests (John *et al.,* 2013). Non-timber forest products (NTFPs) are useful foods, substances, materials and/or commodities obtained from forests other than timber. Harvest ranges from wild collection to farming. They typically include oils, game animals, fur-bearers, nuts, seeds, berries, mushrooms, sap, foliage, pollarding, medicinal plants, peats, mast, fuelwood, fish, insects, spices, forage etc (Alexander *et al*., 2011; Кириллович, 2020). *E. guinneensis* is a major source of oil for human food use and it is also secondary industrial use. It is an important part of local nutrition and a significant product of commercial importance. Palm oil is one of the major ingredients in up to 50% of all daily-used products, everything cosmetics, such as lipsticks, shampoo, and deodorants, to food ingredients, like margarine, chocolate, pastries, and baby food, including instant noodles, mentioned as either hydrogenated vegetable fats or plant fats. Palm oil (*E. guinneensis*) is considered as a versatile oil crop as palm oil trees are highly productive and have multiple uses in each different tree parts, from the fruits to the oil palm residues, including the ability to produce bio-energy or bio-fuels (Kaniapan, *et al.,* 2021). *E. guineensis* is the most cultivated from the genus Elaeis. Oil palm and

bush mango are said to have their origins from Africa and is assumed that specification took place there. The African oil palm produces two different kinds of oil namely; palm oil and palm kernel oil (Saleh and Liansitim, 2020). The pericarp consists of 3 layers; the exocarp (skin), mesocarp (outer pulp containing palm oil) and the endocarp (a hard shell enclosing the kernel or endosperm which contains the oil known as kernel oil) (Owoyele and Awolabi, 2014).

The palm oil is extracted from fleshy mesocarp of the fruit either by milling mechanically or by traditional method and this is mostly done by women. (Akinyele *et al.,* 2019). There are two distinct methods of extracting oil from the digested material. One system uses mechanical presses and is called the 'dry' method. The other called the 'wet' method uses hot water to leach out the oil. In the 'dry' method the objective of the extraction stage is to squeeze the oil out of a mixture of oil, moisture, fibre and nuts by applying mechanical pressure on the digested mash (Akinyele *et al.,* 2019).

The various parts of the trees have been used locally and traditionally for various medicinal purposes. Some of these uses have been proven scientifically. Palm oil is used for the treatment of different kinds of ailments due to its rich phyto-nutrients, catechins and polyphenol (Jaffri, *et al.,* 2011). The traditional theory about the uses of oil palm in many parts of Nigeria is that products from oil palm are antidotes that can be used in the treatment of gastrointestinal disorders and poisons (Owutuamor *et al.,* 2019).

Currently, palm oil is the world's largest edible oil (Khoushki *et al.,* 2015) and the main source of domestic or edible oil in Africa (Obahiagbon, 2012). It is widely used as cooking oil, a substitute for butter, a binding agent in cosmetics and as an ingredient in many processed foods. International trade in palm oil began at the turn of the nineteenth century, while that of palm kernels developed only after 1832 (Rival and Levang, 2014). Palm oil became the principal cargo for slave ships after abolition of the slave trade. The establishment of trade in palm oil from West Africa was mainly the result of the Industrial Revolution in Europe (Ayokhai *et al.,* 2016). As people in Europe began to take sanitation and hygiene seriously, demand for soap increased, resulting in the demand for vegetable oil suitable for soap manufacture and other technical uses. Tin plating required technical oil for which palm oil was found suitable (Akinyeye, 2011). In the early 1870s exports of palm oil from the Niger Delta were 25 000 to 30 000 tonnes per annum and by 1911 the British West African territories exported 87 000 tonnes (Yearwood, 2018).

In places like Nkanu West Local Government Area of Enugu state, Palm trees are used for land demarcation. The leaves of palm tree are used as fodder for goats. The spikes are used for lighting. A special type of wine called palm wine can be tapped from the tree by professional palm wine tappers (Fossi, 2020). The felled oil palm and bush mango trees are useful for firewood. Oil palm tree begins to produce fruits at 3 or 4 years after it has been planted. They can produce oil per unit of land area than most oil producing plants about nine times more than soy and 4.5 times more than rapeseed (Epling, 2020). Nigeria was considered as the leader in the world palm oil market (Egwuma *et al.,* 2016). The production of palm oil went beyond domestic consumption with the excess produce exported to world palm oil market. However, in the past decades, the country has become an importer of palm oil due to negligence of the sector. The uncontrolled destruction of some economic trees like *Elaeis guineensis* for the production of fuelwood is on the increase and this calls for an urgent arrest of the situation. This research will draw the attention of the general public on the hidden potentials of palm oil especially in the area. Although, species in the research area already has a lot of values to the local people, as this will suggest ways in which the local people can build their income through processing and marketing of these plant resources for their livelihood.

Because of the increasing population in Nigeria, palm fruit processing can lead to reduction in food wastage, enhance food security and improvement in livelihood of low income group of men and women in the area This research will also suggest ways in which tree planting can be initiated with the available resources in areas suitable for oil palm processing and marketing. The overall objective of this study is to examine the

processing and marketing of *Elaeise guineensis* (oil palm) in Nkanu West Local Government Area of Enugu State, Nigeria

MATERIALS AND METHODS
Study Area
This study was conducted in Nkanu West Local Government Area of Enugu state of Nigeria. Nkanu west local government area is situated in Enugu state, South-east geopolitical zone of Nigeria and has its headquarters in the town of Agbani. Its coordinates are latitude 6°18'N and longitude 7°33'E with a land expanse of about 225km^2. The towns and villages that make up Nkanu west LGA include Akpugo, Akegbe Ugwu, Ozalla, Umueze, Amuri, Obuoffia, Obe, and Amodu. The estimated population of Nkanu west LGA is put at 188,904 inhabitants with the majority of the area's populace constituted by members of the Igbo ethnic group (Nnam and Nmadu, 2020). The GDP of Enugu state on per capita basis is $879 (Onwujekwe *et al*., 2018).
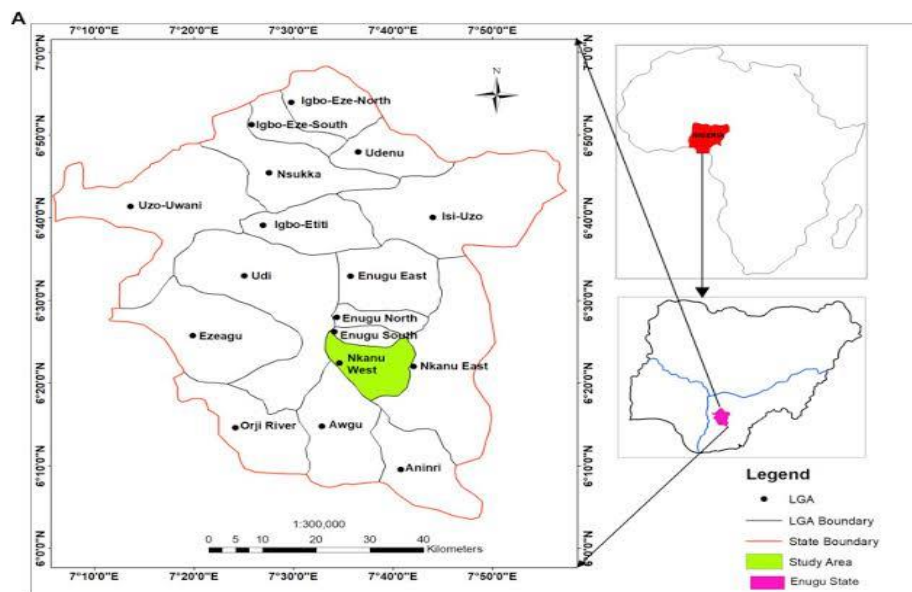

Figure 1: Map of the study area

Enugu's climate is humid and this humidity is at its highest between March and November with a daily precipitation of about 0.04 inches of liquid, though the chance of wet days varies significantly for the whole year and the mean daily temperature is 26.7 °C (80.1 °F). As in the rest of West Africa, the rainy season and dry season are the only weather periods that recurs in Enugu. The average annual rainfall in Enugu is around 2,000 millimeters, which arrives intermittently and becomes very heavy during the rainy season. Other weather conditions affecting the city include Harmattan, a dusty trade wind lasting a few weeks of December and January. (Amadi *et al*., 2019) Like the rest of Nigeria, Enugu is hot all year round. (Agu *et al.,* 2020). In Nkanu west local government area of Enugu state, the soil present is gravely silt and this is very good for agriculture. Forest trees found in the area include *Anarcadium occidentalis* (cashew tree), *Mangifera indica* (mango tree),

Annona muricata (soursop), *Voacanga africana* (oval tree), *Cocos nucifera* (coconut tree), *parkia biglobosa* (locust bean tree), oak tree, Velvet tamarind etc. The people of Nkanu West are mostly farmers (Onyeabor, 2019).

Sampling Design
The targeted population of this study is the oil palm processors and marketers. A reconnaissance survey was conducted in Nkanu west local government area to identify where the processors and marketers of palm oil are concentrated. A multistage sampling technique was adopted for this study. On the first stage, 5 districts were purposively selected. On the second stage, two (2) villages were randomly selected from each district, while on the third stage, twenty (20) respondents were randomly selected from each districts area, which gave a total sample size of 100 respondents.

A well-structured questionnaire was administered and retrieved. Data were collected through the use of structured questionnaire and oral interview schedule especially with respondents who are not literate enough to complete the questionnaires. Data were collected on Socio-economic characteristics which include tribe, age, marital, status, house- hold size, educational level, primary/secondary occupation, years of experience. Information on the inputs and outputs of *Elaeis guineensis* processing and marketing were also collected. Data collected were subjected to descriptive and inferential statistics. Profit margin was used to achieve the profitability of the respondents.

GM = TR – TVC ………1

$ROR = \frac{GM}{TR} \times 100$……2

Gross profit margin is a company's gross profit divided by total revenue expressed in percentage. Companies uses gross margin to measure how the product cost relate to their revenue.

Gross profit margin (%) = gross profit ÷ total sales revenue (TR) × 100

are important human attributes that play an important role in the processing and marketing of oil palm seeds.

RESULTS AND DISCUSSION
Socio-Economic Characteristics of Respondents
Socio-economic characteristics of respondents

Table 1: Socio-Economic Characteristics of the Respondents

Factor	Frequency	Percentage
Gender		
Male	3	3.0
Female	97	97.0
Age		
20-30	4	4.0
31-40	23	23.0
41-50	55	55.0
51-60	15	15.0
61-70	3	3.0
Marital status		
Married	62	62.0
Single	4	4.0
Widow/widower	34	34.0
Household size		
1-5	27	27.0
6-10	62	62.0
11-15	11	11.0
Education		
Primary	30	30.0
Secondary	16	16.0
Tertiary	3	3.0
No Basic Education	51	51.0
Primary occupation		
Civil servant	15	15.0
Business man/woman	22	22.0
Farmer	61	61.0
Applicant	3	2.0
Secondary occupation		
Palm oil business	66	66.0
Tailoring	3	3.0
Farming	25	25.0
Teaching	6	6.0
Total	**100**	**100**

The results (Table 1) revealed that, 94.7% were women who were directly involved in both the processing and marketing of *Elaeise guineensis* (palm oil), only 5.3% were men involved in the harvesting and marketing especially. And this is in agreement with the findings of Ayinde *et al*. (2012) and Olarewaju *et al*. (2020) who reported that the major processors of palm oil were the females. The results showed that, the age group of the respondents (55.0%) falls within the age group of 41-50 years. Age is a factor that determine the years of an individual's as young or old, age composition among individuals especially family head has influence on decision making in any enterprise. This is in agreement with the findings of Sunday *et al.* (2022) who reported that the mean age of the respondents falls within 44 years. About 62% of the respondents were married, while only 4% were single. This is because married people worked hard in order to meet up with the demand of the family members, this agrees with the findings of Onu *et al*. (2021) who stated that, most of their respondents were married in their research "Characteristics of small-scale palm oil production enterprise in Anambra State". The results showed that 62% of the respondents had household size of 6 – 10 persons, although 11% had 11 – 15 persons. These findings could mean that there was readily available family labour thereby reducing the cost of hired labour in their business. And this agrees with the findings of

Ofoka and Nwalieji (2019) in their research, 'Technological Capabilities of Mill Operators in Palm Oil Processing Enterprise in Anambra State'. The results showed that, greater proportion 51.0% of these processors had no form of formal education whatsoever. The implication of those that had no formal education in palm oil business is that, it would be difficult for them to adopt modern techniques, innovation or new ideas in their business, this has agreed with the findings of Senchi and Yakubu (2014) who indicated that, most of their respondents had no basic education in the research "Assessment of Processors and Marketers of Sheabutter (*Vitellaria paradoxa*) in Zuru LGA, Kebbi State, Nigeria". Although the remaining respondents had one form of formal education or another. Majority of these processors were farmers because according to them the marketing of these NTFPs has become an alternative source of income and food for many farm families. Majority of palm oil processors and marketers (61.0% and 66.0) had farming as their primary and secondary occupations. This means that majority of the respondents were practicing agro-forestry system in the area. Also, the inhabitants are engaged in trading and other industrial activities e.g. fabrication of agro-equipment and artisanal workmanships, processing of palm fruits and kernels (Nwalieji and Ojike, 2018).

Table 2: Years of Experience of the Respondents

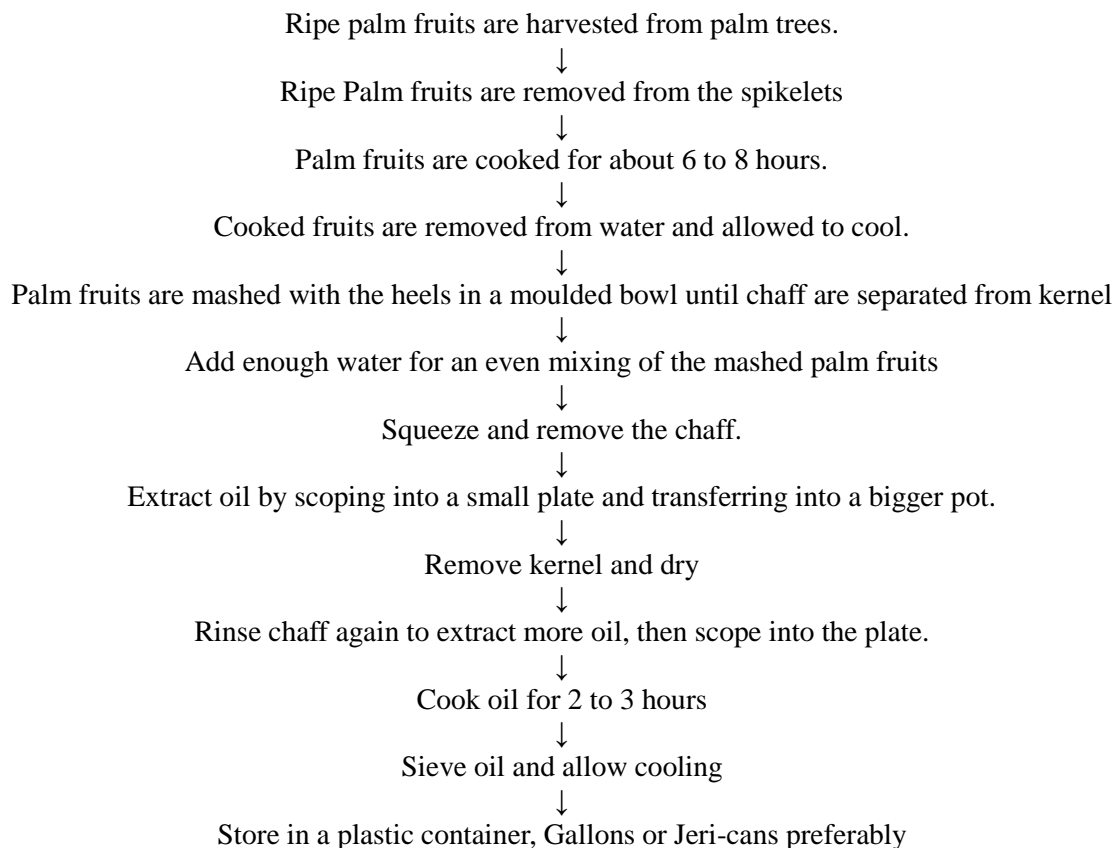| Years of experience	Frequency	Percentage
1-5	3	3.0
6-10	4	4.0
11-15	9	9.0
16-20	20	20.0
>21	64	64.0
Total	**100**	**100**

Years of processing experience which was seen to be high among the respondents with the majority 64.0% of palm oil processors and marketers having above >21 years of experience. Only about 3.0% respondents recorded 1-5years of experience as beginners. This is because the number of years is usually seen as how much of a professional the individual has become in the processing and

marketing of NTFPs. This is in agreement with the findings of Idiaye *et al*. (2022) in their research "Profit efficiency of palm oil processing in Osun state, Nigeria". This is also in line with Arowolo and Oladejo (2020) in their research who reported that, many of the respondents (54.5%) had been in honey business for 6 - 15 years.

Table 3: Involvement of Respondents Using Traditional Method to Process Palm Oil

Processing	Frequency	Percentage
Yes	97	97.0
No	3	3.0
Traditional Method		
Yes	97	97.0
No	3	3.0
Total	**100**	**100**

Traditional stages of Processing Palm Oil are outlined below:

Ripe palm fruits are harvested from palm trees.
↓
Ripe Palm fruits are removed from the spikelets
↓
Palm fruits are cooked for about 6 to 8 hours.
↓
Cooked fruits are removed from water and allowed to cool.
↓
Palm fruits are mashed with the heels in a moulded bowl until chaff are separated from kernel
↓
Add enough water for an even mixing of the mashed palm fruits
↓
Squeeze and remove the chaff.
↓
Extract oil by scoping into a small plate and transferring into a bigger pot.
↓
Remove kernel and dry
↓
Rinse chaff again to extract more oil, then scope into the plate.
↓
Cook oil for 2 to 3 hours
↓
Sieve oil and allow cooling
↓
Store in a plastic container, Gallons or Jeri-cans preferably

According to the respondents involved in the processing of palm fruits, it was gathered that a lot of people venture into the processing for a number of reasons such as the important uses of the processed products, the income that comes with marketing etc. Majority of the respondents (97.0%) were involved in palm oil processing using traditional method, only about 3.0% of the respondents were not involved in the processing. Some of the reasons given by the respondents for not being involved are that, the processing which is the local method is very tedious, labour intensive and if care is not taken, you might not get as much oil that will equal the unprocessed products, especially in the case where you have to purchase the product before processing it. Also the processing which is done the local/manual way is very tedious especially in the case of palm oil processing. This has agreed with Akinyele *et al.*, (2019) who observed that, there are two distinct methods of extracting oil from the digested material. One system uses mechanical presses and is called the 'dry' method. The other called the 'wet' method uses hot water to leach out the oil.

Table 4: Scale of Producing Palm Oil

Factor	Frequency	Percentage
Small	13	13.0
Medium	77	77.0
Large	10	10.0
Total	**100**	**100**

One of the main reasons why people startup businesses are to ensure they get more than they started the business with. A sign of growth and expansion is that the scale of measurement increases as time goes on. The scale could either be small, medium or large. The result shows that majority 77.0% of the respondents for palm oil produced in medium scale. Only about 10.0% of the respondents produced in large scale.

Table 5: Marketing Channels of Palm Oil

Factors	Frequency	Percentage
Consumption		
Yes/Everyday	100	100.0
No		
Marketer		
Yes	100	100.0
No	0	0.0
Trees available in farms		
Yes	96	96.0
No	4	4.0
Number of trees		
1-5	2	2.0
6-10	6	6.0
11-15	12	12.0
16-20	10	10.0
>21	67	67.0
None	3	3.0
Product sources		
Farmland	70	70.0
Forest	21	21.0
Market	9	9.0
Major customers		
Consumers	64	64.0
Retailers	18	18.0
Wholesalers	11	11.0
Agents/Middle men	2	2.0
Total	**100**	**100**

Consumption of NTFPs has become a household aid for so many rural dwellers especially for their numerous health benefits and uses. A hundred percent of the respondents (100.0%) agreed they consume palm oil almost every day. This could be attributed to the health benefits of the product. The results revealed that, 100% of the respondents engaged in the marketing of oil palm. 96% has trees available in their farm lands, while 67% has over 21 trees in their farm. This could be attributed that, the farmland is playing an active role in the supply and marketing than any other channels in the study area.
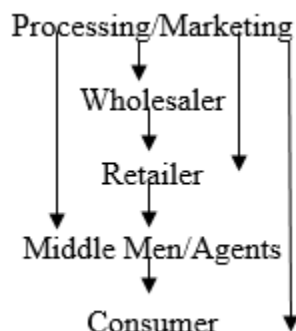
Figure 1: Distribution Channels of oil palm in Nkanu LGA, Enugu State

Marketing channels is simply a distribution method of products or commodities in which a company or individuals can transfer their goods from one person to another through different mediums. These channels could either be wholesalers, retailers or directly to the individual consumers. Most of the respondents (70%) obtained their oil palm from their farm lands, while 64% sold to consumers directly (Table 5).

Table 6: Forms of oil palm being sold by the respondents

Variable	Frequency	Percentage
Palm oil only	73	73.0
Palm kernel	4	4.0
Palm fruits	3	4.0
Combination	20	20.0
Total	**100**	**100**

The results show that majority of the respondents 73.0% sell palm oil only, the lowest percentages was 3.0% of the respondents who sell palm fruits in the area.

This showed that, 100% of the respondents are involved in the marketing of palm products as this generates income for their livelihood (Table 6).

Table 7: Measurement Items used by the respondents

Measures	Frequency	Percentage
Bottle	82	82.0
Gallon	10	10.0
Jerican	8	8.0
Total	**100**	**100**

The measurement of these products is what tells the amount processed per season. Some of the processors measure and sell using either gallons, tin cups etc. Majority 82.0% of the palm oil processors measured using bottles, only about 8.0% made use of jeri-cans as a form of measure. The implication in the bottle as a measure is that, it will aid the vulnerable people in the area to access or purchase the oil for home use (Table 7).

Table 8: Respondents selling Price for Palm Oil

Price of palm oil (₦)/Measure	Frequency	Percentage
Bottle (500-1000)	82	82.0
Gallon (4000-10,000)	10	10.0
Jeri-can (11,000-30,000)	8	8.0
Total	**100**	**100**

The results show that, majority of the respondents 82.0% sold their palm oil products in bottles between ₦500 – ₦1,000 only, the lowest percentages was 8.0% of the

respondents who sold their palm oils in jeri-cans between the cost of ₦11,000 - ₦30,000area. The bottle as the smallest

measure will be easily purchased by the rural poor for their home consumption.

Table 9: Daily Income Generation by the respondents

Do you generate income?	Frequency	Percentage
Yes	100	100
No	0	0.0
Daily income		
₦500-₦2000	16	16.0
₦2000-₦4000	11	11.0
₦4000-₦6000	69	69.0
>₦6000	3	3.0
Total	**100**	**100**

The results revealed that, 100% of the respondents generate income from the marketing of oil palm in the area. Majority of them (69.0%) made ₦4,000 - ₦6,000 per day, while only 3.0% of the respondents made above ₦6000. This implied a very good

contribution of the business to household economy as the processing and marketing activities are concentrated during both seasons. Though, much is done in the dry season when the farming activities are over thereby reducing poverty in the area.

Table 10: Average Cost and Return of Palm Oil Processing and Marketers per week

	Cost Items	Amounts (₦)	Percentage
A	**Total Variable Cost**		
	Cost of harvesting	1250.00	29.4
	Cost of transportation	1000.00	23.5
	Cost of labour	1250.00	29.4
	Other expenditure	750.00	17.6
B	**Total Variable Cost (TVC)**	**4,250.00**	**100**
	Total Revenue (TR)	22,750.00	
C	Gross Profit Margin (TR -- TVC)	18,500.00	
	Return On Investment (Profit/TR X 100)	81.32%	

The findings in table (10) indicated that processing/marketing (harvesting and labour) among the variable cost items (₦1,250.00) had the highest contribution (29.4%) to the cost of the product being processed and marketing in the area. The results also revealed that transportation cost (₦1,000.00) had contributed second highest (23.5%). The total variable cost (TVC) incurred in the oil palm business was ₦4,250.00, the total revenue indicated ₦22,750.00 while the net profit earned in the marketing of oil palm was ₦18,500.00 per week. This disagrees with the

work of Okidim *et al.,* (2019) who stated that, their total revenue (TR) was ₦953,760.00 in their research findings, "Palm oil marketing and financing in Oyigbo local government area of Rivers state". The results therefore indicated that, oil palm business is a profitable and has great potentials for increasing the income of rural people of Nkanu West Local Government Area. This finding also disagreed with that of Ibrahim *et al*, (2010) who recorded ₦34,722.73 per week profit higher than ₦18,500.00 in their sheabutter research at Minna, Niger state (Table 10).

Table 11: Problems Encountered in the Course of Processing and Marketing of Palm Oil

Category	*Frequency	Percentage
High rate of deforestation	7	4.8
Lack of capital	10	6.8
Seasonal variation	12	8.2
Time consuming and labor intensive	42	28.6
Storage	20	13.6
Transportation	23	15.6
Price fluctuation	25	17.0
Weather	8	5.4
Total	**147**	**100**

Multiple responses

The results revealed time consuming and labour intensive (28.6%) as the most important constraint in the processing and marketing of oil palm business. This is due to the old traditional method used in the processing of oil palm in the area. This finding has agreed with that of Okidim *et al*., 2019 who stated lack of processing facilities with mean of 3.12 as the most crucial problem in their research "Palm oil marketing and financing in Oyigbo local government area of Rivers state". Other constraints include price fluctuation, transportation cost and the lowest was high rate of deforestation in the area with 17%, 15.6% and 4.8% respectively (Table 11).

CONCLUSION AND RECOMMENDATIONS
Results gathered from this research indicated that, majority of respondents that engaged in this business mostly women, married with medium household size. Most of them have experience for over twenty-one years in the business and the usefulness of palm oil products by rural households on a daily basis cannot be ignored. Health benefits attached to the consumption of these NTFPs are numerous. The result indicates that majority of processors and marketers are generating income in the business. It therefore showed that, oil palm business is a profitable venture. Harvesting cost, labour intensive and transportation cost were some of the major constraints found in the oil palm business.

Based on the findings, Government should encourage the transformation of oil palm industries through incentives such as acquisition of land and establishment of oil palm plantations in the area. Farmers should be educated and encouraged on the need to cut down and replace aging palm trees over thirty (30 years) to increase productivity and output.

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