

## **MARKETING COST AND VALUE CHAIN ANALYSIS OF OIL PALM FRUIT PROCESSING IN IMO STATE, NIGERIA**

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### **ABSTRACT**

*Evaluation of marketing cost and value addition to oil palm fruit processing and marketing in Imo State was carried out. Agricultural produce marketing channels are superfluous with intermediaries who have been opined to add no value. The study assessed the cost and return, established the net profit and values added along the marketing channel of oil palm fruit. Stratified, random and purposive sampling techniques were used in selecting 108 individual processors, 6 processing firms and 108 marketers. Three sets of questionnaire were administered, one to each set of respondents to generate data. Means, percentages, cost and return and regression analyses were employed in analyzing data. Results show a profitable business, simple marketing channels, value addition to product line by intermediaries, net profit of ₦39.90 for processors, and ₦81.80 for firms per 1000 FFB; wholesale and retail marketers made ₦39.20 and ₦41.50 per 1000 litres of oil respectively. Socio-economic characteristics had significant effect on net income of respondents, with gender, marital status, education and experience contributing significantly at 1% probability. The study recommended joint effort of private and public stakeholders, to provide improved facilities and policies, that will enhance oil palm fruit processing and marketing to reduce cost and increase net income.*

**Keywords:** Processing, value chain, intermediaries, utility value and change of ownership.

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### **INTRODUCTION**

Agricultural produce marketing encompasses all the activities involved in getting a farm produce ready to satisfy the taste of its consumers. Adekanye (1998) defined agricultural marketing as sum total of all business activities involved in the movement of agricultural commodities from farmers to places of consumption. Nwankwo (2010) added that it takes a number of marketing activities to actualize a marketing process.

The value chain of an agricultural product involves a number of marketing functions at different stages of the marketing channel. These functions often include processing, storing, transporting,

selling and transfer of ownership. Value chain costs include all expenses incurred along the different stages of the marketing channel as marketing functions are performed. The monetary value of agricultural produce increases as the product passes through different intermediaries who add one value or the other. This is measured from total sales less total input cost of performing the functions which add the values. The physical utility value addition involves changes to the desired form, storage until when needed, movement to places where needed, and selling to transfer ownership to satisfy the utility need of the consumer. Ahmed (2001) defined value chain as a structure of physical, economic and social transactions between individuals and organizations engaged in a raw material transformation into cherished end products. He further added that the value chain of an agricultural produce is the marketing channel along which values are added at different stages of the marketing process by intermediaries. However Mohammed (2007) submitted that the channel of agricultural produce marketing from producer to consumer often involves long chain of superfluous intermediaries without much value addition and that this reduces the marketing profit and marketing efficiency of produce.

Some constraints occur along the marketing channel. These reduce profitability and marketing efficiency. Some of them compound over time hence the need for continuous studies to update their solutions. Sango (2010) highlighted that value chain analysis examines the various activities of processing and marketing performed by intermediaries along the chain line, how they interact and add value to the product line. Value chain analysis facilitates the identification of constraints to oil palm industry growth and its competitiveness with other industries. It leads to understanding of the relationship and linkages among producers, buyers, suppliers and all market intermediaries (PIND, 2011).

Marketing is the activity of identifying and satisfying needs and wants of consumers. Kotler (1997) saw marketing as a social and managerial process by which individuals and groups of individuals obtain what they need through creating, offering and exchange of products of value. Agricultural marketing is a vital occupation in Imo State. Oil palm is an important tree crop in the State. Palm oil is the principal product of the oil palm industry (Nwankwo and Ibemere, 2013). Palm oil marketing is a major source of employment and income among the rural communities of Imo State. Ahmed (2001) informed that palm fruit processing provides direct and indirect employment among numerous people involved in the processing and marketing. Processing is an activity of agricultural produce marketing channel. Processing of oil palm fruit according to FAO (2005) is defined as a process by which palm fruit is transformed into palm oil and kernel through threshing or stripping, sterilization, milling and digesting, pressing and clarification. It transforms the low value palm fruit to value added palm oil. Oil palm fruit processing in the study area involves traditional methods encompassing little use of improved technologies, and the fairly largely mechanized processing which involves greater use of improved local technologies. Many individuals embark on the traditional method of processing

with little adoption of improved technologies, while the semi-mechanized processors make more use of improved local technologies. Jalam *et al.* (2002) suggested that oil palm fruit processors should embrace well integrated capital intensive, high volume and high rate extraction methods in their processing. Palm oil processing in rural Nigeria and Ghana are however not highly mechanized but is operated with only improved technology equipment locally manufactured (Ayodele, 2010). The situation is same in the study area.

The study evaluated the marketing costs and value chain addition to oil palm fruit processing and marketing in Imo State. It specifically assessed the socio-economic characteristics of processors and marketers, examined the sources of palm fruits, and technologies used in processing, and established the marketing activities carried out by intermediaries. It also established marketing activities and strategies of oil palm fruit processing and the marketing channels of the six processing firms. Cost and returns of processors and marketers were calculated. The utility and monetary values added at different stages of the marketing process were established. Constraints to palm fruit processing and palm oil marketing were indentified.

## **MATERIALS AND METHOD**

The study was carried out in Imo State, Nigeria. The State has twenty seven Local Government Areas (LGAs) and three agricultural zones. The zones are Orlu, Owerri and Okigwe Agricultural Zones. A list of three highest palm oil producing LGAs from each zone was obtained from the office of the Agricultural Development Programme (ADP), Owerri. These LGAs were used for the study. They include; Oru West, Isu and Ideato North for Orlu Zone; Ohaji/Egbema, Mbaitoli and Ngor Okpala foe Owerri Zone and Isiala Mbano, Ihitte Uboma and Onu Imo for Okigwe Zone. A list of fifteen individual oil palm fruit processors was also obtained from the ADP office, for each of the LGAs. This gave a sample frame of 135 processors. A presurvey questionnaire established that each of them processed an average of 1000 fresh fruit bunch per week. A random sampling of 12 respondents from each of the nine LGAs gave a sample size of 108 respondents. Data were collected on the cost and return of processing 1000 FFB. A sample size of 108 marketers was also obtained through the same procedure. A list of 6 processing firms was obtained from each zone, giving a total of 18 firms. Two (2) firms were randomly sampled from each zone to give 6 processing firms.

Three sets of questionnaire were used in data collection. One set was for individual processors, another for processing firms and the other for marketers. The questionnaire was administered by trained enumerators in each sampled LGA. Questionnaire to individual processors and marketers sought information on socio-economic characteristics, inputs used, costs and sources of input, output and marketing channels, and revenue realized. Questionnaire to processing firms, sought information on inputs and their sources, extent of mechanization, output and the marketing

channels, costs of input items, and revenue from output. Data collected were based on processing 1000 FFB (fresh fruit bunch) and marketing of 1000 litres of palm oil.

The analytical tools used include means, frequencies, percentages and cost and return analysis. Return on investment (ROI) and marketing efficiency were calculated. An ordinary least square multiple regression analysis was used to test the hypothesis that the socio-economic characteristics had no significant effect on the net income of processors and marketers. Four functional forms (Linear, Semi-log, Double log and Exponential) were tried and the model that gave the best fit was used for analysis. The regression model was stated as:

$$Y = f(X_1, X_2, X_3, X_4, X_5, e)$$

Where; Y = net income  
 X<sub>1</sub> = gender (male = 1, female = 2)  
 X<sub>2</sub> = marital status (married = 1, single = 0)  
 X<sub>3</sub> = age (no of years)  
 X<sub>4</sub> = number of years in school  
 X<sub>5</sub> = number of years in business  
 e = error term

## **RESULTS AND DISCUSSION**

### **Socio-economic characteristics of processors and marketers**

Table 1 shows the socio-economic characteristics of the respondent's-oil palm fruit processors and palm oil marketers. It shows that 63% of the processors were females and 37% were males, while 60% of the marketers were females and 40% were males. This shows that more females than males were involved in palm oil business in the study area. This agrees with the observation of Adamu *et al.* (2012) that women were more prominent in palm oil extraction activities in Afijio LGA of Oyo State, Nigeria. Ofosu-Budu and Sarpong (2013) reported that small scale palm oil processing and marketing were dominated by women working as groups or individuals in Ghana. Nwankwo (1990) observed that women performed up to 58.9% of traditional palm fruit processing activities, while Ugwuoke *et al.* (2004) reported that women were more highly involved in palm oil commercialization process than men.

The result also shows that 81.5% of processors and 84.3% of marketers were married, while 56.5% of processors and 64.8% of marketers were within the age of 41-50 years. These showed that they were in their middle age and are likely to contribute more effectively to family welfare and general economic growth. The mean age of the respondents was established as 43.25 years for processors and 42.15 years for marketers. This reveals that majority of the respondents were of middle age class who can perform palm oil extraction and marketing activities more

profitably. The result agrees with the findings of Sani *et al.* (2007) and Nurudeen (2012) who noted that farmers within 41-50 years are very active in business.

Table 1 show that 69.4% among the processors and 74.2% of marketers had secondary school education while 24.1% of processors and 13.9% of marketers had primary school education. A smaller proportion of respondents (6.5% of processors and 12.0% of marketers) had tertiary education. Educational attainment impacts positively on business as it enhances business skills. Nurudeen (2012) had reported that level of education enhances business skills. The average business experience of respondents was 21.45 years for processors and 21.56 years for marketers.

### **Sources of palm fruits to processors**

Eighty six individual processors (76.3%) reported that most of the palm fruits they processed were purchased fresh fruits bunch (FFB), while fifty four respondents (48.9%) obtained most of the fruits from their personal farms- wild palm grooves and palm plantations. The rest of their fruits came from other sources (Table 2). Only eighteen respondents (16.67%) reported that most of their fruits came from leasing palm estates. Some respondents obtained fruits from various sources.

The source of fresh fruit bunches (FFB) for the six sampled processing firms are shown in Table 3. All the firms (100%) obtained some of their FFB by purchases. Four firms (66.7%) obtained fruits from their farms - palm grooves and palm plantations, while three firms or 50% obtained from leased palm grooves and plantations.

Table 4 reveals the extent of palm fruit processing activities mechanized by the sampled processing firms. It shows that two out of the seven listed operations of palm fruit processing were not mechanized by any firm. These were bunch reception and nut recovery. Fruit digestion and fruit pressing were mechanized by all firms, showing 100% mechanization of the two activities. The table shows the rate at which each firm mechanized the processing operations. Three firms recorded higher mechanization rate of 57.1% than others, while two firms mechanized only 42.9% of the operations. The least mechanizing firm, Clifford and Sons Enterprise mechanized only two operations, 28.6% mechanization rate. Out of the seven listed operations only five were mechanized, showing a general mechanization rate of 71.4%.

### **Functions of intermediaries along the marketing chain**

A number of intermediaries were found along the oil palm fruit marketing chain (Table 5). In some cases they performed similar functions. The intermediaries found along the oil palm fruit marketing chain in the study area include processors, wholesalers and retail marketers. It shows

that all the 108 processors or 100% transformed oil palm fruit into palm oil thereby contributing to form utility to meet consumer`s preference. Ninety eight (98) processors or 90.7% in addition stored some palm oil for sale on later days thereby contributing to time utility. About 88% of processors carried their palm oil to markets or to places where they were required by consumers. The table shows that all respondents – processors and marketers engaged in price negotiation and sales for the purposes of actualizing change of ownership. All marketers were involved in the functions of storage, distribution, negotiation for purchase and sale of oil, while all processors were only involved in processing, storing, negotiation and sale of oil. It was observed that wholesale marketers and retailers performed identical functions, though their scales of operations may differ.

### **Sales of palm oil by processors**

Individual processors sold some quantities of oil directly to different channel members. Some quantities were sold immediately at the farm gate while others were sold after storage. Table 6 shows buyers of palm oil from individual processors at the farm gate. It shows that 106 processors or 98.1% sold to retailers, while 78 processors or 72.2% sold directly to consumers, and 66 processors or 61.1% sold to wholesalers. Seventy eight processors had direct or simple marketing channel by selling directly to consumers. The sales to retailers and wholesalers may develop into more complex marketing channels.

Figure 1 shows the marketing channels of individual processors. Some sold part of their oil directly to consumers, some to retailers and others to wholesalers. The retailers who bought directly from producers sold to consumers. The wholesalers who bought from producers sold part of their oil to retailers, who then sold to consumers. Part of their oil was sold directly to consumers.

The six processing firms developed different marketing channels. Fig.2 shows the different channels through which they sold their palm oil. The firms sold to consumers, retailers and wholesalers. Some wholesalers sold to other wholesalers as well as retailers, some wholesalers sold only to retailers who in turn sold to consumers. Some wholesalers who were bulking large quantities of oil bought from producing firms, other wholesalers and from retailers, and then sold to consumers, some of whom may be industrial users.

It is observed that the products of the firms were not involved in long marketing channels. All marketing intermediaries added both utility value and monetary value along the oil palm fruit marketing value chain. They therefore did not have superfluous intermediaries. The result disagrees with the findings of Mohammed (2007) that the channel of agricultural produce marketing involves a long chain of intermediaries without much value addition.

### **Cost and return of processing 1000ffb by individual oil palm processors**

The average cost and return of processing 1000 fresh fruit bunch (FFB) which is approximately 6.5tonnes by the individual processors is presented on Table7. The table shows that the total revenue was estimated as ₦288,603, while the total cost was estimated as ₦248,700. This gave a net income of ₦39,903 per 1000FFB. With this net income, the return on investment (ROI) was established as ₦ 0.16 per ₦1.00.

### **Cost and return of processing 1000ffb by each processing firm.**

Table 8 shows the average cost and return of processing 1000FFB by each of the six processing firms. The total revenue was calculated as ₦325,593, while the total cost was calculated as ₦243,800. This gave a net profit of ₦81,793 per 1000FFB (Table 8). The ROI was calculated as ₦0.34 per ₦ 1.00. The analysis shows that processing firms had higher net profit of ₦81,793 than the individual processors who had ₦39,903 on the 1000 processed FFB. This gave a profit margin of ₦41,390 to the firms.

### **Cost and return of palm oil marketing**

Two groups of marketers were identified along the marketing channels of palm oil in the study area. They are wholesale and retail marketers. They were assessed based on marketing 1000 litres of palm oil each (Table 9). The table shows average total revenue of ₦190, 000 for wholesalers and ₦200, 000 for retailers. The 1000 litres of oil cost wholesalers ₦140, 000 at ₦140 per litre, while the cost of the same volume of oil to retailers was ₦150, 000 at ₦150 per litre. Other variable cost items brought the average total variable cost for wholesalers to ₦148, 600 and that of retailers to ₦156, 850. The total fixed cost for wholesalers was ₦2, 200, while that of retailers was ₦1,650. These brought the total marketing cost of wholesalers to ₦150, 800 and that of retailers to ₦158, 500. Their net revenues were ₦39, 200 and ₦41,500 respectively. Marketing efficiency of wholesalers was calculated as 79.4%, while that of retailers was 79.3%. The implication is that cost of marketing took 79.4% of total revenue of wholesalers and 79.3% of the retailers. Retailers therefore had a profit margin of ₦2,300 higher than wholesalers per 1000 litres of oil marketed.

### **Effects of socio-economic characteristics of respondents on net returns**

Regression analysis was applied to assess if the socio-economic characteristics of respondents had significant effect on their net income. Four functional forms of the regression model were tried to assess the effects. Table 10 shows the results of the regression model on individual processor's net income. Semi-log model was considered to have the best fit, and was used for analysis. Though linear log model had higher  $R^2$  (0.551) and higher F-ratio (25.013) than semi-log model which has  $R^2$  of 0.441 and F-ratio of 16.103, yet semi log model was preferred for

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analysis because it had four independent variables which made significant contributions to net income, while linear log model had two.

Gender ( $X_1$ ) made positive and significant contribution to net income in favour of females. The contribution was statistically significant at 1% level of probability. The result agrees with the findings of Adamu *et al.* (2012) who observed that women were more prominent in palm oil extraction activities than men. The situation may be attributed to the fact that women are more disposed to the more mild tasks of traditional palm oil extraction in their traditional homes than men who take to other more tasking jobs, even away from their traditional homes for more remuneration.

Marital status ( $X_2$ ) had positive and significant contribution to net income. This was at 1% level of probability. The situation may be attributed to the fact that married respondents get assistance from their spouses. The assistance helps them to carry out operations more timely and effectively. Age ( $X_3$ ) made significant and positive contribution to net income at 1% probability. The contribution may be attributed to the fact that the average age of the processors was 43.25 years. According to Nurudeen (2012) farmers within 41-50 years are very active in business. Education ( $X_4$ ) also made positive and significant contribution at 1% probability. This is because according to *a priori* expectation education impacts positively on business performance. Nurudeen (2012) also observed that education enhances business skills.

Experience ( $X_5$ ) was found to have made positive but no significant contribution to net income. The non-significance of its contribution may stem from the fact that most respondents were middle aged, as indicated by the mean age, and may not have acquired long experience to influence net income significantly. The F-ratio which determines the overall significance of a regression model was significant at 1% level of probability. This led to the rejection of the null hypothesis that socio-economic characteristics of the respondents had no significant effect on net income. The alternative was therefore accepted.

Table 11 shows the results of the four functional forms of the regression model tried to assess the effects of socio-economic characteristics of palm oil marketers on their net income. It shows that double -log form has two independent variables which made significant contributions to net income, while only one variable made significant contribution in other models. It shows that while exponential-log has  $R^2$ , 0.577 and F-ratio 27.773 double - log has  $R^2$  of 0.572 and F-ratio 27.264 and was chosen as having the best fit for analysis. This is because double-log form has two variables making significant contributions to net income while exponential- log form has only one.

Gender ( $X_1$ ), marital status ( $X_2$ ) and age ( $X_3$ ) made negative, but no significant contributions to net income. Education ( $X_4$ ) and experience ( $X_5$ ) made positive and significant contributions to



net income at 1% probability. Education contributed according to *a priori* expectation because it enhances business skills. This is in line with Nurudeen's finding in 2012. Experience has positive effect according to *a priori* expectation. Experience in a particular business enhances performance, output and income in that business.

The F-ratio was significant at 1% probability for individual processors and marketers leading to the rejection of the null hypotheses that the socio-economic characteristics of respondents had no significant effect on their net income.

## **CONCLUSION**

It is concluded that oil palm fruit processing and marketing is profitable in the study area. Superfluous intermediaries were not identified. Each intermediary added utility and monetary value to the value chain. Individual processors had net profit of ₦39, 900, while processing firms had net profit of ₦81,793 per 1000FFB processed, while wholesalers and retailers had net profit of ₦39, 200 and ₦41,500 respectively per 1000FFB of palm oil marketed. The paper recommends joint effort of private and public stakeholders to provide improved facilities and policies to enhance oil palm fruit processing and palm oil marketing to reduce cost and increase net income.

## REFERENCES

- Adamu, C.O., Apata, O.M. and R.A. Oyeyinka (2012). Processors awareness and utilization of improved palm oil production technology in Oyo State, Nigeria. *Journal of Rural Sociology*, 13:1-6.
- Adekanye, T.O. (1998) "Marketing" *Readings in Agricultural marketing* (ed) T.O. Adekanye Longman Nigeria, P1.
- Ahmed, S.A. (2001). "Agriculture and food security in Nigeria", A paper presented at a forum on Agriculture and Food Security Council Chambers, Minna, Niger State, 10<sup>th</sup> – 12<sup>th</sup> February 2001.
- Ayodele, T.A. (2010) "Analysis of palm oil and economic development in Nigeria and Ghana" *Recommendation for the World Bank's 2020 Palm Oil Strategy*, Pp 35-44.
- Brown, E. and M.F. Jacobson (2009). Sustainability of smallholder palm oil production in Indonesia. *International Journal of Agriculture, Food, Environment and Extension*, 4(1): 46-49.
- F.A.O. (2005) *Global Forest Resources Analysis Update*. FAO Rome Agricultural Series No. 36.
- Jalam, B.S., Ariffion, D. and K.W. Chain (2000) "Malaysia Contributions to improving the value and use of palm oil through modern technologies". *Burotrop Bulletin*, No 19, P25.
- Kotler, P. (1997) *Marketing Management: Analysis, planning, implementation and Control*. Prince Hall International, New Jersey p.9.
- Mohammed, J. (2007) "Problems and issues in marketing: Agriculture Marketing Development in Ethiopia". *International Livestock Institute Report*, Pp 34-67.
- Nurudeen, A.J. (2012) Economic and social characteristics of registered poultry egg producers in Ilurin, Kwara State, Nigeria. *Russian Journal of Agricultural and Social-Economic Sciences*, 11(11):20-24.
- Nwankwo, O.O. (2010) "Gross margin analysis of mechanized processing of selected industrial cassava products in Southeast Nigeria". Unpublished Ph.D. Thesis, Imo State University Owerri, Nigeria.
- Nwankwo, O.O. and I.A. Ibernere, (2013). Analysis of the efficiency of hydraulic hand press and motorized press methods of palm oil extraction in Ohaji/Egbema LGA of Imo State, Nigeria. *International Journal of Applied Research and Technology*, 2(4): 18-25.
- Ofosu-Budu, K. and D. Sarpong (2013) "Oil palm industry growth in Africa: a value chain and smallholders study for Ghana" *Rebuilding West Africa's Food Potential* (ed) A. Elbehri FAO/FAD.
- Partnership Initiative in the Niger Delta (PIND) (2011). A report on palm oil value chain analysis in the Niger Delta.

- Sanogo, I. (2010). "Market value chain analysis of food commodity" *World Bank Food Program and Food Security*, 2:34.
- Sani, R. M., Musa, S.A., Darieji, M.I. , Yakasai, M.T. and O. Ayodele (2007). Cost and return analysis in poultry production in Bauchi and Gombe Metropolis Area, *Continental Journal of Agricultural Economics*, 1:14-19.
- Ugwuoke, F.O., Odurukwe, S.N. and I.C. Oguamanam (2004). Roles of impacts of oil palm commercialization on intra-house dynamics in Imo State, Nigeria. *Journal of Technology Education in Nigeria*,9(2): 14-24

## APPENDIX

**Table 1: Socio-economic characteristics of oil palm fruit processors and palm oil marketers**

Socio-economic characteristics	Processors		Marketers	
	Frequency	Percentage	Frequency	Percentage
<b>Gender</b>				
Male	40	37.0	43	40
Female	68	63.0	65	60
<b>Total</b>	<b>108</b>	<b>100</b>	<b>108</b>	<b>100</b>
<b>Marital Status</b>				
Single	2	1.9	12	11.1
Married	88	81.5	91	84.2
Divorced	5	4.6	3	2.8
Widowed	13	12.0	2	1.9
<b>Total</b>	<b>108</b>	<b>100</b>	<b>108</b>	<b>100</b>
<b>Age (Years)</b>				
21-30	2	1.9	6	5.6
31-40	40	37.0	26	24.1
41-50	61	56.5	70	64.8
51-60	5	4.6	6	5.6
<b>Total</b>	<b>108</b>	<b>100</b>	<b>108</b>	<b>100</b>
<b>Mean</b>	<b>43.25</b>		<b>42.15</b>	
<b>Level of Education (Years)</b>				
Primary Education	26	24.1	15	13.9
Secondary Education	75	69.4	80	74.2
Tertiary Education	7	6.5	13	12.0
<b>Total</b>	<b>108</b>	<b>100</b>	<b>108</b>	<b>100</b>
<b>Business Experience (Years)</b>				
1-10	10	9.3	6	5.5
11-20	20	18.5	16	14.8
21-30	48	44.4	56	51.9
31-40	30	27.8	30	27.8
<b>Total</b>	<b>108</b>	<b>100</b>	<b>108</b>	<b>100</b>
<b>Mean</b>	<b>21.45</b>			

Source: Field Survey, 2017

**Table 2: Sources of palm fruits to individual processors**

Sources	Frequency	Percentage (%)*	Rank
Purchase from market	86	76.3	1 <sup>st</sup>
Personal farm	54	48.9	2 <sup>nd</sup>
Leasing	18	16.7	3 <sup>rd</sup>

Source: Field survey, 2017

\*Multiple responses recorded

**Table 3: Sources of palm fruits to processing firms**

Processor firms	Purchase	Personal farm	Leasing
Ojike Mill	✓	✓	X
Keleson Enterprises	✓	X	✓
James Oil Mill	✓	✓	✓
Okoro and Sons Enterprise	✓	X	X
Ejike Mil	✓	✓	✓
Clifford and Sons Enterprises	✓	✓	✓
Total	6	4	3
% of Respondents	100	66.7	50

✓ : Source of Palm fruit

Source: Field survey, 2017

**Table 4: Extent of oil palm fruit processing activities mechanized by the sampled firms**

Activities	Ojike mill	Keelson	James	Okoro	Ejike	Clifford	Mechanized
	Enterpris	Oil	and	Sons Ent	Mill	and sons	firms
	e	Mill	Sons Ent	Ent	Ent	Ent	
Bunch reception	X	X	X	X	X	X	-
Bunch threshing	✓	✓	✓	X	✓	X	4
Fruit boiling	✓	X	✓	X	✓	X	3
Fruit digestion	✓	✓	✓	✓	✓	✓	6
Fruit pressing	✓	✓	✓	✓	✓	✓	6
Nut recovery	X	X	X	X	X	X	-
Oil clarification	X	X	X	✓	X	X	2
No mechanized	4	3	4	3	4	2	
% mechanized	51.1	42.9	57.1	42.9	57.1	28.6	
Total no of activities	7						
Total no mechanized	5						
Gen mechanization rate	71.4%						

✓ : activities mechanized; X: activities not mechanized

Source: Field survey, 2017

**Table 5: Marketing functions carried out by intermediaries**

<b>Intermediaries</b>	<b>Functions carried out</b>	<b>F</b>	<b>%</b>	<b>Utility added</b>
<b>Processors</b>	Processing	108	100	Form
	Storage	98	90.7	Time
	Distribution	95	88	Place
	Negotiation and sales	108	100	Change of ownership
<b>Marketers</b> (Wholesalers & retailers)	Storage	108	100	Time
	Distribution	108	100	Place
	Negotiation for purchases and sales	108	100	Change of ownership

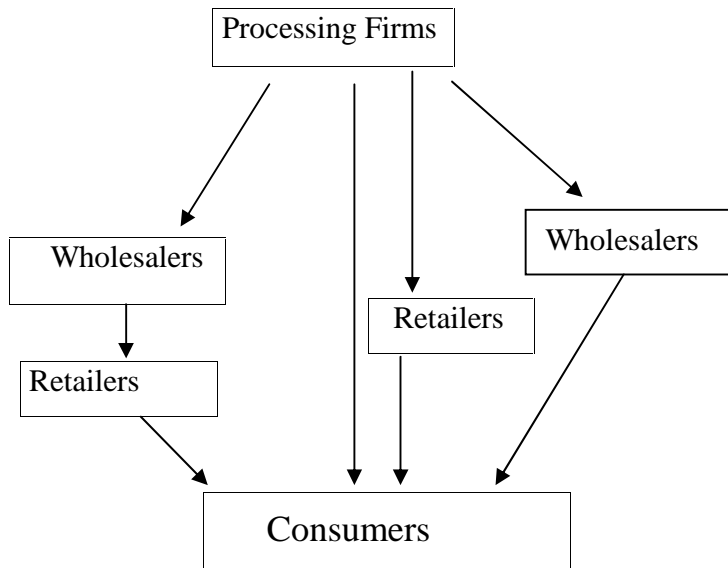
Source: Field survey, 2017

**Table 6: Palm oil sales at the farm gate by individual processors**

<b>Seller</b>	<b>Buyers</b>	<b>Frequency</b>	<b>Percentage*</b>
Processor	Retailers	106	98.1
Processor	Consumers	78	72.2
Processor	Wholesalers	66	61.1

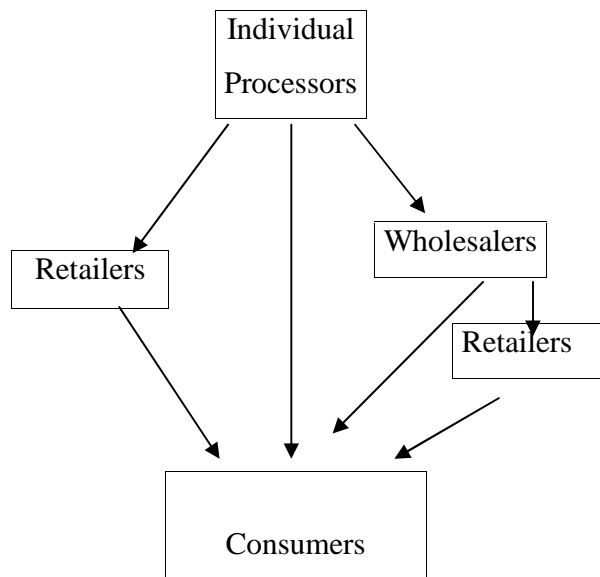
\*Multiple Responses recorded

Source: Field survey, 2017



**Figure 2: Marketing channels of processing firms**

Source: Field Survey, 2017



**Fig.1: Marketing channels of individual processors**

Source: Field Survey, 2017

**Table 7: Average profitability of processing 1000 fresh fruit bunch by individual processors**

Items	Quantity	Revenue/cost (₦)	Amount (₦)
<b>Revenue</b>			
Palm oil @ ₦135/litre	2021 litres	272,835	
Palm kernel nut @ ₦35.04/kg	450kg	15,768	
<b>Total Revenue (TR)</b>			<b>288,603</b>
<b>Cost</b>			
<b>Variable cost</b>			
Fresh fruit bunch @ ₦125/FFB	1000 FFB	125,000	
Transportation		70,000	
Knocking out fruits		3,000	
Loading of fruits		2,500	
Boiling		5,000	
Milling and oil extraction		9,000	
Packaging and storage		8,000	
Miscellaneous		1,200	
<b>Total Variable Cost (TVC)</b>			<b>223,700</b>
<b>Fixed Cost</b>			
Processing machine*	10,000		
Vessels and others *	5,000		
Rent	10,000		
<b>Total Fixed Cost (TFC)</b>			<b>25,000</b>
Total cost (TC) = (TVC + FC)			<b>248,700</b>
Net profit (NP) = (TR - TC)			<b>39,903</b>
Return on Investment (NP/TC)			<b>0.16</b>

Source: Field survey 2017

\*Depreciation (using straight line method)



**Table 8: Average profitability of processing 1000 fresh fruit bunch by each processing firm**

Items of revenue/ cost	Quantity	Revenue/cost (₦)	Amount (₦)
<b>Revenue</b>			
Palm oil @ ₦135/litre	2295 litres	309,825	309,825
Palm kernel nut @ ₦35.04/kg	450kg	15,768	15,768
<b>Total revenue (TR)</b>			<b>325,593</b>
<b>Cost</b>			
<b>Variable cost (VC)</b>			
1000fb at ₦125/ffb		125,000	
Transportation		70,000	
Knocking out fruits		3,000	
Loading		2,000	
Boiling, milling and oil extraction		10,800	
Packaging and storage		10,000	
Miscellaneous		3,000	
<b>Total VC</b>			<b>223,800</b>
<b>Fixed Cost</b>			
Processing machine		12,000	
Vessels and others		2,000	
Rent		6,000	
<b>Total Fixed Cost</b>			<b>20,000</b>
Total cost (TC) = (TVC + FC)			<b>243,800</b>
Net profit (NP) = (TR - TC)			<b>81,793</b>
Return on investment = (NP/TC)			<b>0.34</b>

Source: Field survey 2017

\*Depreciation (using straight line method)

**Table 9: Profitability analysis of marketing 1000 litres of palm oil by intermediaries**

Revenue/ cost items	Quantity	Wholesalers (₦)	Retailers (₦)
<b>Revenue</b>			
Palm oil	1000 litres	190,000 @₦190/litre	200,000 @₦200/litre
<b>Cost</b>			
<b>Variable cost</b>			
Palm oil	1000 litres	140,000 @₦140/litre	150,000 @₦150/litre
Transportation		3,500	3,800

Storage/preservation	3,100	2,050
Telephone calls	1,000	300
Feeding	500	300
Miscellaneous	500	400
<b>TVC</b>	<b>148,600</b>	<b>156,850</b>
<b>Fixed cost</b>		
Rent	500	400
Interest	700	400
Depreciation of Vessels and containers	1000	850
<b>TFC</b>	<b>2,200</b>	<b>1,650</b>
Total marketing cost (TMC) = (TVC + FC)	<b>150,800</b>	<b>158,500</b>
Net profit (NP) = (Rev - TMC)	<b>39,200</b>	<b>41,500</b>
Marketing Efficiency (ME) = (TMC/Rev) x 100%	79.4	79.3

Source: Field survey data, 2017.

**Table 10: Regression results of the effect of socio-economic characteristics of individual oil palm fruit processor on net returns**

Variables	Linear (t-ratio)	Semi-log (t-ratio)	Double-log (t-ratio)	Exponential (t-ratio)
Constant	1030.229 (1.386)	-9619.118 (-3.549) <sup>xxx</sup>	5.709 (6.588) <sup>xxx</sup>	7.623 (28.561) <sup>xxx</sup>
Gender (X <sub>1</sub> )	2034.145 (10.357) <sup>xxx</sup>	3490.868 (6.450) <sup>xxx</sup>	1.378 (7.964) <sup>xxx</sup>	0.579 (8.207) <sup>xxx</sup>
Marital status (X <sub>2</sub> )	1086.583 (4.669) <sup>xxx</sup>	1845.163 (2.887) <sup>xxx</sup>	1.108 (5.421) <sup>xxx</sup>	0.459 (5.495) <sup>xxx</sup>
Age (X <sub>3</sub> )	11.735 (0.825)	1403.251 (2.011) <sup>xxx</sup>	0.012 (0.055)	-0.002 (-0.392)
Education (X <sub>4</sub> )	38.625 (1.169)	1282.843 (4.421) <sup>xxx</sup>	0.088 (0.951)	0.005 (0.396)
Experience (X <sub>5</sub> )	7.997 (0.747)	29.383 (0.175)	-0.053 (-0.981)	-0.004 (-0.953)
R <sup>2</sup>	0.551	0.441	0.471	0.471
R <sup>-2</sup>	0.529	0.414	0.445	0.446
F-ratio	25.013 <sup>xxx</sup>	16.103 <sup>xxx</sup>	18.144 <sup>xxx</sup>	18.200 <sup>xxx</sup>

Source: Computed from field survey data, 2017

\*\*\* = significant at 1%

**Table 11: Regression results of the effect of Socio-economic characteristics of palm oil marketers on their net income**

<b>Variables `</b>	<b>Linear (t-ratio)</b>	<b>Semi-log (t-ratio)</b>	<b>Double-log (t-ratio)</b>	<b>Exponential (t-ratio)</b>
Constant	-433.378 (-0.058)	11773.767 (0.491)	7.877 (7.242) <sup>xxx</sup>	8.689 (12.400) <sup>xxx</sup>
Gender (X <sub>1</sub> )	-4730.659 (-1.348)	-11213.258 (-1.232)	-0.412 (-0.999)	-0.211 (-1.281)
Marital status (X <sub>2</sub> )	1843.136 (0.508)	2270.004 (-0.240)	-0.220 (-0.513)	0.023 (0.138)
Age (X <sub>3</sub> )	-200.510 (-1.374)	-8474.660 (-1.515)	-0.304 (-1.197)	-0.008 (-1.292)
Education (X <sub>4</sub> )	2835.140 (7.462) <sup>xxx</sup>	22277.333 (7.012) <sup>xxx</sup>	1.413 (9.809) <sup>xxx</sup>	0.172 (9.869) <sup>xxx</sup>
Experience (X <sub>5</sub> )	186.027 (1.309)	1818.808 (1.006)	0.171 (2.085) <sup>xxx</sup>	0.007 (1.099)
R <sup>2</sup>	0.453	0.414	0.572	0.577
R <sup>-2</sup>	0.426	0.385	0.551	0.556
F-ratio	16.896 <sup>xxx</sup>	14.402 <sup>xxx</sup>	27.264 <sup>xxx</sup>	27.773 <sup>xxx</sup>

\*\*\*= significant at 1%

Source: Computed from field survey data, 2017