# Palm Oil Value Chain Strategy Brief

## Why We Work in this Value chain sector

## What does the Value chain sector look like?

Oil palm is an important crop whose products (oil and kernel) are used for food and non-food purposes and accounts for an annual average of 70%[1] of the Nigerian oil market. Consumption of palm oil in Nigeria increased from 1.2 million metric tonnes in 2010 to about 1.37[2] million metric tonnes (valued at about 406 billion naira) in 2012; whereas in-country production was approximately 878,000 metric tonnes. In the Niger delta region, smallholders produced an estimated 380,000 metric tonnes of palm oil for household consumption (valued at about 119 billion naira) and about 60,000 metric tonnes of palm oil for industrial use (valued at about 13 billion naira) in 2012. In the Niger Delta, the sector provides employment and the primary source of income for not less than 954,000 smallholder plantation owners, small holder processors, wholesalers and retailers. This comprises of about 498,000 men who are mainly involved in leasing of wild groves, small scale oil palm production and processing and 457,000 women who are mainly involved in processing and marketing.

In order to encourage local production of palm oil, the Federal Government of Nigeria has a 35% tariff on imported palm oil in place. Through the Agricultural Transformation Agenda and other State Government Schemes there are plans to expand oil palm production by providing improved seedlings to farmers to expand and or replant their ageing plantation.

Palm oil is a commodity which is in high demand in Nigeria based on its food and non-food uses, however there is a large shortfall in supply of 150,000–300,000[3] metric tonnes of domestic cooking oil (valued at about 70 billion naira) and over 400,000 metric tonnes of industrial grade palm oil (valued at about 80 billion naira) annually which is currently being bridged by imports despite the 35% tariff on imported palm oil. Eighty percent of in-country production comes from small scale producers and processors who use inefficient practices that result in low productivity and poor oil quality that does not meet industrial requirements, thus driving the importation of oil. Nonetheless, addressing the systemic constraints of the sector would create opportunities for the increased production of oil palm by smallholder plantation owners and palm oil sales by small scale processors and traders from the Niger Delta region.

### *Where do we focus and why do we focus here*

Over the period of 2009-2012 the Niger delta region accounted for more than half (54%) of hectares of area under oil palm cultivation and metric tonnes of palm oil produced for household consumption. However, commercial production of oil palm is still low as small/medium scale plantations accounted for a meager 17% of total area under production in the region while wild grove accounted for 77%.

[1] Report on Survey of Selected Agricultural Raw Materials in Nigeria on Oil Palm. Raw Materials Research and Development Council, 2004

[2] www.fas.usda.gov/.../output8_17_15_23.csv

[3] http://businessdayonline.com/2013/08/reactivating-nigerias-oil-palm-industry-2

In the past, the state governments of Edo, Delta, Rivers, Abia, Imo, Bayelsa, and Cross Rivers had established large scale oil palm plantation estates in certain Local Government Areas (LGAs) which spurred processing and production activities in some clusters. In Rivers, the location of the 16,000 hectare Rison palm plantation in Ubima and Elele, Ikwerre LGA spurred processing and production within the area. Similarly, in Ogbia, the presence of a 1,200 hectare Bayelsa Oil Palm estate spurred processing and production in the area. In Akwa Ibom, oil palm is found in all the 31 LGAs of the state. In Delta state, the highest concentration of oil palm occurs in Ethiope, Isoko, Ughelli, Ndokwa, Ika North- East, Ika -South, Burutu and Bomadi LGAs.

Within the region, there are thousands of mills ranging from the most common purely artisanal mills (women with dugout logs which are gradually being phased out due to availability of partly mechanised processing machines) to very few large industrial mills. Milling occurs close to the production zones and Table 1 shows the area under oil palm production in 2009. Akwa Ibom state has the highest concentration of mills as information gathered from the state revealed that there are about 150,000 small scale palm oil mills (95% of which were managed by women) and about 10,000 small/medium scale registered plantations owners (95% of which are owned by males). Traders from within the state and around the region—Port Harcourt, Aba, Umuahia and the western and northern parts of the country—purchase oil from Akwa Ibom due to the large volumes available there. The heavy activity of the sector in the state has resulted in a large number of actors performing supporting services, including, harvesters of oil palm bunches, over 500 fabricators of processing equipment, and a central agency in charge of registering small/medium holder plantations owners.

In Bayelsa state, most of the mills depend on the government plantation estate for the supply of Fresh Fruit Bunches (FFB), thus accounting for the low percentage of small/medium plantations in the state as shown in Table 1. Few of these mills have integrated backward into owning plantations in order to ensure continuous supply of FFB which is the most important input for mills.

In terms of ownership, the small scale oil palm plantations and processing mills are predominately owned and managed by men in Rivers and Delta states, while women are found in wholesaling and retailing functions. In Bayelsa, there is about a 50% split between male and female processors. There exist large scale oil palm processors in Elele, Rivers state while there are 2 large scale processors—Okomu Oil Palm and Presco— in Edo state with an average processing capacity of 60 tonnes of FFB. A list of identified producing areas in some of the states is attached as Appendix 1.

**Table 1: Oil palm production in Niger Delta in 2009**

| | **Area Under Oil Palm Production (Thousand Hectares)** | | | | | |
|---|---|---|---|---|---|---|
| | Wild Grove | Small/ Medium Scale Plantations | Large Estates | Total | % of Total area in ND | % of Small/Medium Scale Plantations in ND |
| Akwa Ibom | 240 | 32 | 3 | 275 | 19% | 12% |
| Imo | 107 | 68 | 3 | 178 | 12% | 25% |
| Delta | 60 | 14 | 6 | 80 | 6% | 5% |
| Cross River | 240 | 30 | 26 | 296 | 21% | 11% |
| Ondo | 85 | 10 | 16 | 111 | 8% | 4% |
| Edo | 50 | 25 | 28 | 103 | 7% | 9% |
| Abia | 150 | 30 | 5 | 184 | 13% | 11% |
| Rivers | 92 | 57 | 16 | 165 | 11% | 21% |

| | | | | | | |
|---|---|---|---|---|---|---|
| Bayelsa | 39 | 2 | 1 | 43 | 3% | 1% |
| **Total** | **1062** | **267** | **105** | **1435** | | |

**Source: Omoti (2009) in PIND Oil palm Value Chain Analysis[4]**

## Value chain profile

There are 2 main end markets that utilise palm oil— households and industrial consumers.

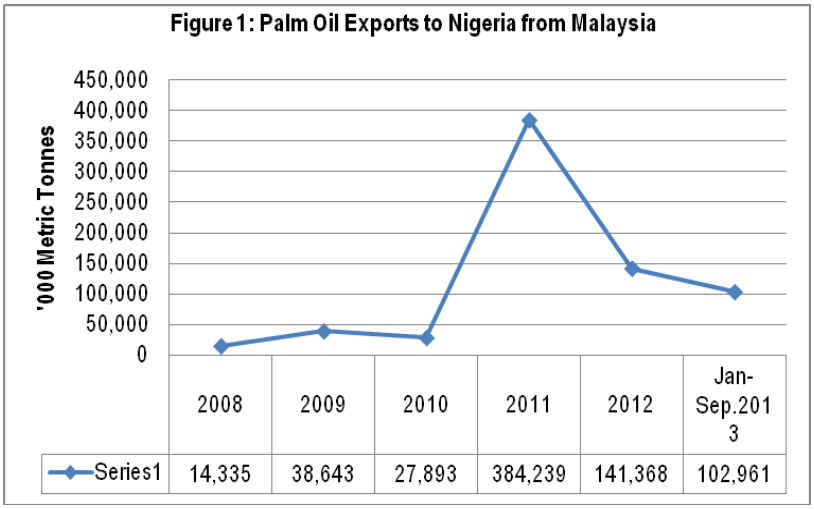
- Households (as well as hotels and restaurants) consume technical palm oil (which has a >5% free fatty acid content) as cooking oil. Technical palm oil (TPO) can also be used to manufacture low grade soap for household use. Technical palm oil accounts for 80% of all palm oil produced in Nigeria. An estimated 380,000 metric tonnes of the total 700,000 metric tonnes produced in the country comes from the Niger Delta. TPO is produced by small/medium scale processors within the region. TPO is not utilised at the industrial level due to its poor quality and more than 5% Free Fatty Acid (FFA) content.
- Industrial users consume crude palm oil (CPO which has <5% free fatty acid content) and its refined specialty products (further fractionation of crude palm oil produces olein, stearin and refined bleached deodorized oil). These products are used as intermediate/finished products by food and non-food firms in the production of vegetable oil, margarines, and seasoning for noodles and confectionery as well as personal care products such as soaps, skin moisturizers, and cosmetics. CPO and its refined products are produced by large integrated estates and secondary processors due to the high standards required in its production. In the region, there are 3 large-scale CPO producers: Okomu Oil Palm Plc and Presco in Edo State, and SIAT in Rivers state. In 2012, Okomu and Presco had combined production figures of about 60,000 metric tonnes (valued at about NGN13 billion). The average production of palm kernel oil in Nigeria is 305,000 metric tonnes of which the Niger Delta region accounts for about 164,000 mertic tonnes with an estimated market value of N9 billion.

TPO is produced and consumed within the region and also supplied to other parts of Nigeria due to claims that palm oil from the Niger Delta is of better quality than palm oil from other producing areas. In particular, the northern regions import huge volumes of palm oil from Rivers, Imo, and Akwa Ibom for their own local consumption as well as for onward export to countries like Niger and Chad. There are claims that about 18,000 metric tonnes of palm oil from Elele, Rivers state goes to the North during the peak season. The CPO produced in the region is also supplied to firms all round the country.

There is an estimated supply shortfall of 150,000 – 300,000[5] metric tons of TPO in Nigeria, which is currently being bridged by imports. There is evidence that about 80% of Benin exports (close to 390,000 metric tonnes of palm oil annually) comes to Nigeria based on the ECOWAS Common External Tariff which allows the importation into member countries at zero duty, provided the oil is produced within the ECOWAS region. For CPO, local palm oil production meets less than 50% of industrial users' needs (USDA, 2003) thereby requiring manufacturers to import oil despite the prohibitive 35% tariff. It was gathered that CPO requirement is in excess of 600,000 metric tonnes

[4] I. Thomas, E. Chika, S.O. Fadare, F. Abayomi and T. Canedo, Palm oil value chain analysis in the Niger Delta, Nigeria, Draft Report, PIND VCA Research Team Report, July 2011,
[5] http://businessdayonline.com/2013/08/reactivating-nigerias-oil-palm-industry-2

per annum in Nigeria. In 2012, analysts[6] estimated that the country imported 540,000 metric tonnes of crude palm oil. Data from the Malaysia Palm Oil Board (MPOB) also shows that palm oil exports to Nigeria has increased seven-fold from 2008 to 2013 to 100,000 metric tonnes, as shown in Figure 1, with the sharp rise between 2010 and 2011 due to the import tariff decreasing from 50% in 2005 to 35% in 2010.




Source: MPOB, 2013

Prices of TPO are subject to the oil palm crop's seasonality-during the peak fruiting season (January-April), there is a glut in supply and prices are low (about N160, 000 per ton at mill gate). During the lean fruiting season (May-December), there is a drop in supply and prices are high (about N275, 000 per ton at mill gate). The palm fruit needs to be processed relatively quickly into oil (within a week of harvesting), but oil can be stored for longer periods. Palm oil processors and traders tend to store palm oil during the peak season for sale in the lean season. A study[7] in Edo state indicates that about 44% of wholesalers surveyed practice storage of palm oil during the peak season.

In 2012, the average price of locally produced CPO, olein and RBDO was N214,000, about N240,000-N260,000, and N330,847 per ton, respectively. The price of Malaysian grade CPO/RBDO was about N142,400-N150,374 (FOB) per ton. Upon arrival in Nigeria, the imported palm oil becomes more expensive due to associated charges (detailed in Table 2) and transportation costs, thereby allowing local producers to charge a significant premium for their products. CPO from Nigeria is not exported as local production still does not meet domestic demand and local prices are not competitive compared to global prices. Figure 2 shows the price trend of local CPO which is declining due to downturn in global prices. A ton of cracked palm kernel is sold to secondary processors at about N70,000– N80,000 across the region.

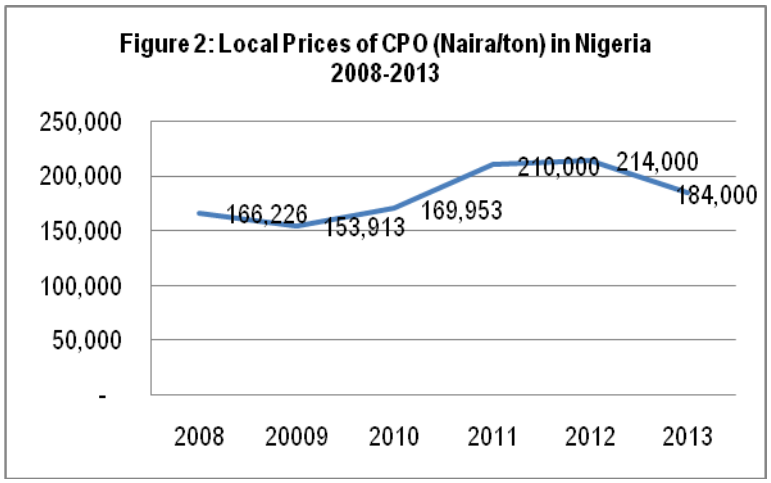
**Table 2: Costs of imported palm oil**

| **Charges on imported palm oil** | | **Cost ($)** | **Total cost ($)** |
|---|---|---|---|
| **FOB** | | **895** | |
| **CIF** | | **1000** | |
| **MFN tariffs** | 35% of the CIF | 350 | 1350 |
| **Import duty** | 7% of CIF | 70 | 1420 |
| **Surcharge** | 1% of FOB | 8.95 | 1429 |
| **CISS Fee*** | 0.5% of CIF | 5 | 1434 |
| **ECOWAS Charge** | 5% of CIF and all charges | 50 | 1484 |

6 http://www.mydailynewswatchng.com/2013/09/09/nigeria-imports-n218-7bn-palm-oil-2-yrs

7 http://www.uniben.edu/abstracts/women-case-palm-oil-marketing-edo-state-nigeria

| | | | |
|---|---|---|---|
| **VAT** | 2.50% of CIF | 25 | 1509 |




## Value Chain Structure

The palm oil sector entails oil palm production, processing, wholesaling and retailing to final consumers. In the region, the sector can broadly be categorised into two:

- smallholders producing technical palm oil and organised around: a) wild grove leasers who harvest FFB from the wild for sale or processing; b) small scale farmers cultivating less than 4 hectares; c) small/medium scale farmer/processors cultivating between 5-50 hectares and using semi-mechanised or improved mechanised mills; d) large scale farmer/processors cultivating more than 50 hectares and using improved mechanized mills.
- Large vertically integrated firms/estates producing crude palm oil, cultivating more than 10,000 hectares (in some cases through an out-grower scheme), using industrial processing mills and selling to industrial end users.

### *Oil Palm Production and Producers*

Oil palm production can be broadly categorised into 4 types: wild grove, small/medium scale plantations, large scale plantations and large estates.

**The wild grove** with its unimproved variety of oil palm is the most dominant accounting for about 77% of area under production in the region. The wild grove fruit is the Dura, with an extractable ratio of oil to bunch of 17-19% which is low when compared to the improved variety. The wild grove is communally owned and leased to individuals who trade in FFB and small scale processors who seek to ensure all year round continuous supply of FFB. In Ikwerre, Rivers state, it was gathered that women are the preferred recipients of grove leases as they are said to abide by the conditions of agreement better than men. Across the region, an estimated 168,980 people, comprising of 135,646 males and 33,334 females are involved in grove leasing arrangements. Leasers pay about N150,000—N300,000 per annum to village leaders to gain access to any wild palm within the community. Due to the relatively small number of small/medium plantations across the Niger delta, there is heavy dependence on wild groves for renting to harvest fruits for processing, especially by women. However, the yield on wild groves is low (an average of 2 tons of FFB per year/ha). A ton of

FFB from the wild grove is sold for about N6,000-N12,000 during peak season (January-April) and N9,000-N15, 000 during lean season (May-December).

**The small/medium scale plantations** are commercial plantations of improved variety (tenera) which has an extractable ratio of oil to bunch of 22-26%. Small-scale plantations are 0.5-4 hectares in size, with an average farm holding of 2 hectares with 140-150 trees/ha. Medium scale plantations range in size from 5-50ha. Due to land tenure conditions, farms are not always contiguous but scattered around. There are an estimated 42,776 persons involved in small/medium scale plantations, which comprises of 33,557 males who are mainly middle-aged and 9,219 females. Oil palm is often perceived to be a male crop so very few women establish plantations; rather widows inherit the plantations after the death of a spouse or female processors rent or acquire plantations in order to ensure a continuous supply of FFB. The bulk of FFBs from small holder plantations is largely processed by the farmers due to claims that they earn more income from the sale of oil and shell compared to the sale of FFB. However, the selling of FFB to traders, semi-mechanised mill owners and non mill owner processors still takes place. A ton of improved variety FFB is sold for about N12,000-N15, 000 during peak season and N16,800-N24, 000 during lean season in Delta and Rivers states. In Akwa Ibom, FFB is relatively cheaper due to use of family labour and more farmers' involvement; a ton of improved variety FFB is sold for about N9, 000- 13,000 during peak season and sold for about N13,000- N24,500 during lean season.

**The large integrated estates** cultivate not less than 10,000 hectares of oil palm with yields averaging 13 tons of FFB per hectare in 2012, which is low compared to similar estates in Asia with yields of 18-30 tons of FFB per hectare. The low yield is due to the age of the trees in these plantations, although most firms are at various stages of replanting. These estates primarily process FFB into CPO within 24-48hours in order to reduce the FFA content. The process flow is shown in Figure 3 (below).

Large integrated estates have milling capacities of 30-60 tons of CPO per day with an average oil extraction rate of 21-24%. Some of the firms go further into secondary processing to refine the CPO into olein, palm stearin and refined bleached deodorized oil. Generally, these firms are unable to meet the huge local demand requirement as they are not operating at full capacities—estimates of Presco's and Okomu's milling utilization level were 41.7%[8] and 66[9]% respectively— thus decreasing firm's profits. The non-optimal plant utilisation can be attributed to low yields of FFB, aged and over mature plantations, limited linkages with small holders characterised by insufficient and inconsistent supply of FFB from smallholders. The constraints with smallholder supplies include: smallholders not being aware of potential demand from large scale processors, unorganised nature of small holders, and unfavorable pricing and payment mechanisms[10].

**Figure 3: Flow of oil palm processing at Large Integrated Estates. [11]**

[8] http://www.cslstockbrokers.com/csl/images/stories/downloads/tweets/Market%20Report%2017%20June%202013.pdf
[9] Calculated from Okomu Annual Report 2012
[10] farmers would prefer to process FFB in anticipation of increased income from sale of oil, kernel and shell while for farmers that sell FFB prefer to sell to small scale processors who pay cash at point of purchase rather than firms whose payment system takes 2-4 weeks to pay.
[11] http://ivanemmoy.files.wordpress.com/2012/08/flow-of-process1.jpg


## *Oil Palm Primary Processing and Processors*

In the region, oil palm undergoes first level processing in mills ranging from the most common traditional artisanal (women with dugout logs which are gradually going out of operation) to very few industrial mills. Oil palm is processed mainly by small scale processors (capacities of 1.2 – 6 tons of FFB per day) who in turn sell to wholesalers/oil merchants. The processing technologies adopted by these processors can be categorised as: traditional, semi-traditional, semi-mechanised, improved mechanised processing mills.

**Traditional mills:** this used to be the most common type of mills in the region but very little oil. Now virtually out of existence, these mills are highly dependent on human strength and operated manually using mortar and pestle to crush cooked fruits, immersion of oil fruits in water and scooping of oil from dugout logs. Extraction rates are very low, with oil yield rates below 3%.

**Semi-traditional mills** are modified forms of the traditional mills; however the point of departure is the introduction of an engine operated digester to crush fruits. Less than 5% of mill in the Niger Delta are semi-traditional and the majority process the wild fruit variety. These mills process an average of 1 ton of FFB per day with oil extraction rates of 2-5%. Semi-traditional mills are largely found in some parts of Okpe, Ethiope East and West, Abraka LGAs of Delta State and are owned by men.

**Semi–mechanized mills are** the most common in the region; accounting for about 90% of mills. These are characterised by use of i) locally fabricated engine operated digester with separate hand operated hydraulic press (D/SHOHP) or ii) digester with separate hand operated screw press (D/SHOCP), with the latter being more common. In Delta and Rivers, 90% of these mills are owned and managed by men. The low participation of women in Delta and Rivers states is due to social norms that claim that women do not handle machines and that manual presses are not "female friendly" (since a great deal of muscle power is required to press and they have to hire a male operator, thereby losing authority) and lack of finance to purchase the processing equipments. In Bayelsa, about 60% of the mills are managed by women while in Akwa Ibom 95% of the mills are managed by women as in these states social norms dictate that agro-processing should be done by women.

In most cases, the mills are owned by individuals who process FFB and offer processing services to about 2-10 non-mill owner processors for a fee per barrel of fruit during the peak season. These

mills process wild and improved FFB varieties, although processors are aware of increased oil output from the latter. Due to the difficulty of stripping the fruit off the bunch when it is fresh, farmers using these mills let the fruits rot a little so that they can be removed easier, but raising the FFA beyond 5%.In addition there is loss of fruit that still does not get stripped off the bunch (as much as 10-20%) even when it is a week old. In some quarters, it is believed that the longer the bunch ferments, the better the quality of oil. However, this practice increases the FFA content of oil, thereby making it unsuitable for industrial use. An average 1- 6 tons of FFB is processed per day with oil extraction rates of 2-6% for the wild variety and 8-10% for the improved variety. Table 3 shows the results of extraction rates from a sample of mills visited during the course of fieldwork for this study.

The labour requirement per milling operation is about 8-9 persons during peak season (of which half are women who are involved in sieving of fruits, loading of fruits into drums and fibre nut separation) and about 3-4 persons during rainy season when milling capacity is usually low due to low yield and high cost of FFB. The processed oil is sold to wholesalers and agents of oil merchants. A ton of palm oil is sold for about N150,000—N175,000 during peak season and about N250,000—N275,000 during lean season.

**Table 3: Extraction rates in different mills in Niger Delta (liter of palm oil/per kg of FFB)**

| | | Locations | Season | Wild variety of FFB | Improved variety of FFB |
|---|---|---|---|---|---|
| **Semi-traditional mills** | Engine operated digester | Okpe - Delta State | Peak | 4.8% | |
| | | | Lean | 2.4% | |
| **Semi-mechanized mills** | Engine operated digester with separate hand operated hydraulic press (D/SHOHP) and digester with separate hand operated screw press (D/SHOCP) | Umuagwo-Imo State | Peak | 7% | 10% |
| | | | Lean | 2.6% | 8.6% |
| | | Oria-Delta | Peak | | 8% |
| | | Erho-Delta | Lean | | 8.6% |
| | | Ogbia - Bayelsa | Peak | | 9% |
| | | | Lean | | 8% |
| | | Etche -Rivers | Peak | 6% | |
| | | | Lean | 2% | |
| **Improved mechanized mills** | Digester screw press | Irrua-Edo | Peak | | 15% |
| | | | Lean | | 13% |

Source: calculated from data gathered for MADE Oil Palm VC fieldwork (December 2013)

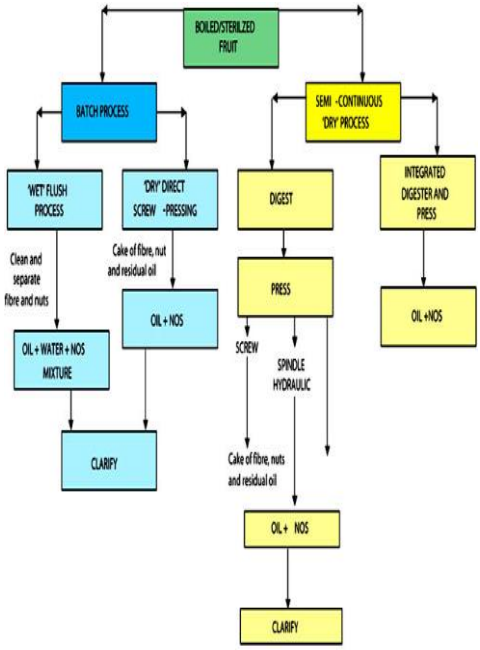
**Improved mechanised mills–** There are few improved mechanised mills in the region. These mills are characterised by a motorised combined digester screw press, which was developed by the Nigerian Institute for Oil Palm Research (NIFOR) in order to improve the efficiency and capacity of processing FFB by small scale processors. Medium-large scale farmers who process FFB from their farms most often own these mills. These mills are capable of processing 1.5 tonne of FFB per hour and about 12 tonnes per day. The equipment in these mills comprises of a stripper, fruit screen, sterilizer and a clarifier. These mills have oil extraction rates of 13-18% for improved variety. On average, the labour requirement per milling operation is 4-6 persons during peak periods. The processed oil is sold to wholesalers and agents of oil merchants. A ton of palm oil is sold for about N160,000—N200,000 during peak season and about N240,000 during lean season.

Figure 4 shows the schematic flow of the milling process used by the traditional/semi-traditional and improved mechanised mills. The difference between the 2 broad categories of mills is the level of mechanisation of each of the operational units, the interconnectedness of the operational units, and

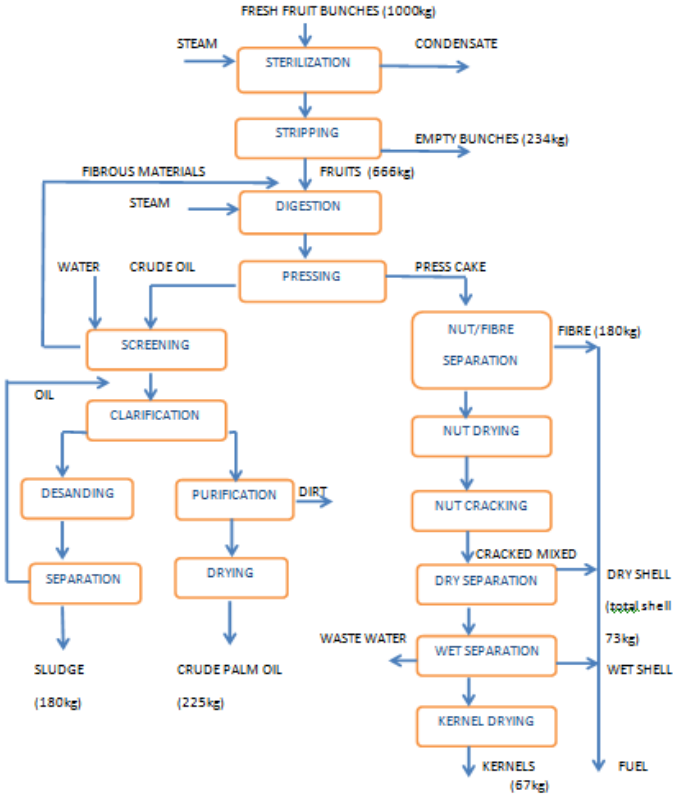
the quality of final product. In figure 4a, freshly harvested FFBs are quartered and left for days to soften before manual stripping of fruits occurs with fruit yield of about 550kg, whereas in improved mills as shown in fig. 4b, these FFBs are sterilised in steam boilers before they are stripped mechanically on either the same day of the harvest or the next day, with a fruit yield of about 660kg. Thus, the improved method yields about 10-20% increase in available fruit from using the sterilizer and stripper combination. It is estimated that traditional methods on average yield about 4%-10% crude palm oil to FFB compared to 16% - 23% achieved by industrial and intermediate scale technologies[12]. This means that 80% of the oil that could potentially be recovered is never recovered and therefore goes to waste.

**Figure 4: Schematic flow of traditional and improved oil palm processing methods**

**4a. Traditional/Semi Traditional processing Methods**




**4b. Improved processing Methods**




## *Oil Palm Secondary Processing and Processors*

These firms/refineries further refine CPO into olein, palm stearin and refined bleached deodorized oil which is sold to individual consumers (olein) and industrial users (all products). Nationally, there are more than 6 refineries but most are situated outside the region. These refineries require not less than 1,000 tons of CPO every month. They get supplies from local large scale mills but not in sufficient quantities. Secondary processors in Nigeria are capable of refining 900,000 tons of CPO annually but operate at less than 25% of installed capacity (PIND, 2012) due to limited supply of CPO. A probable but untapped source of palm oil could be the processed oil from small scale processors, however the quality of oil from this source is poor (i.e. oil has a high FFA and moisture content) which increases the cost of refining. While many of the secondary processors are interested

[12] http://www.wacapol.com/general-content/processing-method

in buying from small scale processors (even TPO), small scale processors are not aware of secondary processor's quality requirements and limited linkages exist between the two.

### *Wholesaling and Aggregators*

After primary processing, the bulk of the technical palm oil is purchased by wholesalers (mainly women) and licensed buying agents (mainly men) of palm oil merchants who supply to domestic and industrial users. Some wholesalers also purchase from village markets and regional markets. It was gathered that some merchants pre-finance processors' purchase of equipment in exchange for oil in Akwa Ibom. The estimated number of wholesalers is 26,658 of which 60% are females. The agents purchase in 200 litre drums while wholesalers buy in 20-25 litre kegs.

On average, wholesalers sell 600 litres of palm oil on a weekly basis with sales of about N108,400 during peak season and about N168,000 during lean season. Some wholesalers also aggregate palm kernels by buying from mills and processors for onward sale to secondary processors who refine it further into palm kernel oil and cake. Millers and individual processors indicated that profit margins are low on palm oil and that the sale of kernel yields additional income. A ton of cracked kernel is purchased at N55,000–N65,000 and sold for about N70,000–N80,000 to secondary processors.

### *Retailing and Retailers*

Retailers perform the final sale to consumers and are found in open markets, neighbourhood stores and kiosks in front of houses. The estimated number of retailers is 133,290 of which 90% are females. They usually buy an average of 40-80 litres of palm oil from wholesalers for sale on a weekly basis with sales of about N14,400 during the dry season and about N19,800 during rainy season. They sell in smaller sizes of 75 and 150 centiliters and 4 liters. The volume of palm oil purchased by a retailer depends on the funds available, the rate of sale in their respective localities and the availability of stock in the market.

### *Performance and Profitability of Farmers and Processors*

The wild grove business model is centered mainly on lease and harvest of wild oil palms by semi traditional/ semi-mechanised processors. Leasers pay about N150,000—N300,000 per annum to village leaders to gain access to any wild palm within the community. Due to the relatively small number of small/medium plantations across the Niger delta, there is heavy dependence on wild groves for renting to harvest fruits for processing, especially by women. However, the yield on wild groves is low (an average of 2 tons of FFB per year/ha).

A gang of people carries out the harvesting. Young male climbers, who are increasingly scarce, climb the tall palms to harvest FFB at the rate of N40-N50/FFB and drop them to the ground. Women then carry harvested FFB to central standpoint at the rate of N20 per FFB. The average height of a wild palm tree is not less than 20-35ft thus making harvesting difficult. Labour for harvesting is the only marginal cost component of this business model as leasers do not invest in any form of good agricultural management practices due to the temporary nature of lease. An average of 2 tons of FFB per ha per year is realised by the wild grove leaser which yields about N3900; an average of N1950 per ton of FFB in gross profit.

Small scale commercial plantations are typically 0.5-4 hectares on which improved varieties of oil palm are cultivated, managed and harvested for processing or sold to traders and non-mill owner processors (with the former being more common). Lands for planting are either inherited or purchased although land tenure conditions restrict acquisition in some places. The farmers largely depend on hired manual labour for land preparation, routine field management practices and harvesting as tractor services are not readily available. Harvesting is done by young male climbers and FFBs are carried to assembling points by women.

In Akwa Ibom, the CPDS scheme supplies free seedlings to plantation owners, whereas in other states many of these farmers purchase improved seedlings from NIFOR and agriculture–related

government agencies at about N150-N250 per seedling. Nonetheless, NIFOR's distant location and inconsistent supply from these agencies forces farmers to obtain seedlings from private nursery operators. At point of purchase, there is no assurance on the quality of seedlings. In some cases farmers received low-yielding variety seedlings, a fact which is only discovered in the third year. This has resulted in farmers adopting a risk-averse attitude towards expansion and purchase of seedlings (including those certified by NIFOR).

The ADP extension schemes in the various states advise farmers on good agricultural management practices-weeding/slashing, pruning, fertiliser and agro-chemical application in order to obtain good yield. The recommended rounds of weeding/slashing are 3 per annum and valued at about N16,000 per hectare while the recommended application of fertiliser is about 6-8 bags per annum which is valued at N48,000 per hectare. In reality, farmers weed twice per annum at about N10,000 per hectare while some plant food crops in with the oil palm. Many of the farmers apply inorganic fertiliser once in two years while some substitute with organic fertiliser. All of these are cost reduction strategies, which result in low annual yields of about 2-8 tons per hectare and low returns (compared to recommended annual yields of 15-25 tonnes) thus not incentivising farmers to expand production.

Table 4 shows that a small scale farmer realises about N35,000 per hectare in gross profit which translates to average of N3542 per ton of FFB. The commercial plantations yield an extra income of N21,100 over the wild grove business model.

**Table 4:** Cost and Returns for 1 ton of FFB from Wild Grove (1ha) and Small Scale Plantation (1ha) /year

| Cost and Returns for operating a Wild Grove (1ha) /year | | | | Cost and Returns for operating Small Scale Plantation (1ha) /year - Current | | | Cost and Returns for operating Small Scale Plantation (1ha) /year - recommended | | |
|---|---|---|---|---|---|---|---|---|---|
| **Cost (Naira)** | | | | | | | | | |
| | **Quantity** | **Price** | **Total** | **Quantity** | **Price** | **Total** | **Quantity** | **Price** | **Total** |
| Weeding (rounds) | | | | 2 | 5000 | 10000 | 3 | 5000 | 15000 |
| Fertilizer application (50kg bags) | | | | 4 | 6000 | 24000 | 8 | 6000 | 48000 |
| Pruning (charge per tree) | | | | 140 | 100 | 14000 | 140 | 100 | 14000 |
| Harvesting (charge per FFB) | 130 | 50 | 6500 | 455 | 50 | 22750 | 975 | 50 | 48750 |
| Assembling (charge per FFB) | 130 | 20 | 2600 | 455 | 20 | 9100 | 975 | 20 | 19500 |
| **Total Cost** | | | **9100** | | | **79850** | | | **145250** |
| **Revenue (Naira)** | | | | | | | | | |
| | Quantity | Price | Total | Quantity | Price | Total | Quantity | Price | Total |
| Yield in mt/ha | 2 | | | 7 | | | 15 | | |
| FFB | 130 | 100 | 13000 | 455 | 230 | 104650 | 975 | 230 | 224250 |
| **Total Revenue** | | | **13000** | | | **104650** | | | **224250** |
| **Gross Profit** | | | **3900** | | | **24800** | | | **79000** |

In Akwa Ibom, about 90% of the small scale plantation farmers take home the bulk of the FFB for processing due to claims that they earn more money from the sale of oil, kernel and shell after processing. In Delta and Rivers, many farmers also process, but rely on their own labour as opposed to that of wives and relatives.

A comparison of Tables 4 and 7 shows about a 33% increase in gross margin of a ton of FFB processed (N4719) compared to sale of a ton of FFB (N3542). This results in lower quantity of FFB available for sale especially during the lean season, thus a non plantation owner processor depends on about 4-5 farmers within their vicinity to get FFB supplies and also go to neighbouring communities and states to obtain FFB. The shortage of improved FFB supply is further compounded as small/medium plantations in the region account for only 18% of area under production.

The different ownership models within the semi-mechanized mills include: a) Mill owners who buy FFB for processing; b) Mill owners who lease wild groves or invest in small/medium scale plantations c) Non mill owner processor who cultivate small/medium scale plantations or buy FFB and process at mills for a fee. Mill owners offer fee-based processing services to non mill processors. It was

gathered that about 5-10 processors use mill services per day during the peak season, thus an additional earning of N400 for use of mill's equipment per ton of FFB processed. The set up of these mills entails the owner purchasing processing equipment and then a gang of labourers come around to offer fee- based services for mill owners and users of mills. The range of services and prices of these services is presented in Table 5. Averages of 1-6 tons of FFB are processed daily during the peak season.

**Table 5: Range of services offered at semi-mechanized mills**

| Activities | Performed by | Charge per ton of FFB (Naira) |
|---|---|---|
| Quartering | Male | 390 |
| Filtering | Female | 300 |
| Cooking | Male/Female | 200 |
| Digesting and pressing | Male | 400 |
| Separating of fibre from kernel | Female | 300 |

At the semi mechanised mills, the FFB are quartered and left to soften for 3-4 days in order for the fruits to ferment and come off the bunch easily. This method of quartering before stripping results in loss of fruits (about 20%) while the fermentation process increases the FFA content of the oil which could have been avoided if the FFB was processed within 24-48 hours after harvest. This reduces the potential supply of oil from small holder mills to secondary processors as it would take extra refining at an increased cost to take it to a quality which would be of commercial use. The stripped FFB are filtered and boiled for about 3-4 hours in cooking drums after which the cooked fruits are loaded into the digesting machine to be crushed and transferred to the screw press for hired labour to squeeze out oil.

The few improved mills are owned by medium/large scale plantation farmers who process 6-8 tons of FFB per day during the peak season with about 2-3 permanent staff operating the delicate equipment. The sterilisers (with advantages of lesser time required to steam, less firewood and water) uses steam to sterilise FFB for about 1 hour before stripping, thus making the fruits easy to remove and reversing the loss of fruits experienced in semi-mechanised mills. The steamed fruits are transferred to the motorised digester screw press and the pressed oil is then clarified.

The type of FFB variety processed and the type of processing technology utilised determines the level of profitability of the business- the better the FFB variety, the higher the extraction rates of the processing equipment, the higher the gross profit obtainable. Table 6 shows the cost and returns for processing 1 ton of Wild variety FFB at semi-traditional and semi-mechanised mills during peak period. For the same amount of input, processing at the semi traditional mill yields about N37.5 in gross profit which is lower than N3926 for processing in the semi–mechanized mill. Nonetheless, these profits are still low when compared with use of the improved variety FFB. A switch from processing of wild variety FFB to improved variety at a semi- mechanized mill yields additional 38 liters of oil which translates to additional revenue of about N6000 which represents a 50% increase in revenue from sale of palm oil.

Table 7 shows that processing of the improved variety of FFB at the improved mechanised mill yields additional 52 liters of oil which translates to additional revenue of about N8320 or N10400 (for clarified oil which is of better quality) which represents not less than 46% increase in revenue from sale of palm oil. The improved mechanised mills represent less than 5% of mills in the Niger delta region due to low level of awareness about the improved processing equipment and claims that the cost of acquiring the equipment is high. This claim of high cost is further reinforced as most processors are not aware of the value proposition of using such equipment, as the cost could be recouped within a year.

**Table 6: Cost and Returns for processing 1 Ton of Wild variety FFB at Semi-Traditional/Semi-Mechanised mills during peak period (January-April)**

| | Cost and Returns for Processing 1 Ton of Wild variety FFB at Semi-Traditional mill | | | | Cost and Returns for Processing 1 Ton of Wild variety FFB at Semi-Mechanized mill | | |
|---|---|---|---|---|---|---|---|
| Cost (Naira) | | | | | | | |
| | **Quantity** | **Price** | **Total** | | **Quantity** | **Price** | **Total** |
| FFB | 65 | 100 | 6500 | | 65 | 100 | 6500 |
| Processing | | | 7058 | | | | 6574 |
| Total Cost | | | 13558 | | | | 13024 |
| Revenue (Naira) | | | | | | | |
| | **Quantity** | **Price** | **Total** | | **Quantity** | **Price** | **Total** |
| Palm Oil (Ltrs) | **53** | 160 | 8480 | | **75** | 160 | 12000 |
| Cracked Kernel (kg) | 93 | 55 | 5115 | | | | 5000 |
| Shell | | | | | | | |
| Total Revenue | | | 13595 | | | | 17000 |
| **Gross Profit** | | | **37.5** | | | | **3926** |
| **Mill set up cost** | **Estimated at N250,250** | | | | **Estimated at N522,000** | | |

**Table 7: Cost and Returns for processing 1 Ton of Improved variety FFB at Semi-Mechanised/Improved Mechanised mills during peak period (January-April)**

| | Cost and Returns for Processing 1 Ton of Improved variety FFB at Semi-Mechanized mill | | | | Cost and Returns for Processing 1 Ton of Improved variety FFB at Improved Mechanized mill with screw press | | | | Cost and Returns for Processing 1 Ton of Improved variety FFB at Improved Mechanized mill with full component of equipment | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cost (Naira) | | | | | | | | | | | |
| | **Quantity** | **Price** | **Total** | | **Quantity** | **Price** | **Total** | | **Quantity** | **Price** | **Total** |
| FFB | 65 | 230 | 14,950 | | 65 | 230 | 14,950 | | 65 | 230 | 14,950 |
| Processing | | | 1602 | | | | 2,897 | | | | 3397 |
| Labor | | | 2,110 | | | | 1,270 | | | | 2,770 |
| Rent | | | 400 | | | | | | | | |
| **Total Cost** | | | **19,062** | | | | **19,117** | | | | **21,117** |
| Revenue (Naira) | | | | | | | | | | | |
| | **Quantity** | **Price** | **Total** | | **Quantity** | **Price** | **Total** | | **Quantity** | **Price** | **Total** |
| Palm Oil (Ltrs) | **113** | 160 | 18080 | | **165** | 160 | 26400 | | **165** | 200 | 33000 |
| Cracked Kernel (cups) | 130 | 40 | 5200 | | | | 5200 | | | | 5200 |
| Shell | | | 500 | | | | | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Revenue | | | 23780 | | | | **31600** | | | | **38200** |
| **Gross Profit** | | | **4719** | | | | **12483** | | | | **17083** |
| **Mill set up cost** | **Estimated at N522,000** | | | | **Estimated at N1. 2 -1.5 million** | | | | **Estimated at N1.8-2.7 million** | | |

## *Supporting services*

**Input suppliers: Improved seeds and fertilizer–** Farmers and processors are aware that the improved tenera hybrid yields more oil than the wild variety, as such, the demand for tenera FFB is increasing. Plantation owners obtain seedlings from NIFOR, state government agencies/schemes and private nurseries. Nonetheless, there are complaints about supply of improved seedlings. In particular, inconsistent supply from the government schemes and the uncertainty of the quality of seeds from private nursery operators. This makes farmers averse to investing in small plantations as it would take about 3-4 years before they discover the genuineness of seeds purchased. The large estates have also complained about the poor quality of the seedlings from NIFOR (there are claims that the dura content is very high, thus yielding less oil) and are going outside Nigeria to purchase seeds for replanting. Fertiliser is required by farmers in order to improve on bunch yields. However, farmers do not have ready access to fertiliser, including that subsidized under government schemes.

**Fabricators of processing equipment-** The digester and screw presses used by semi-mechanised mills are fabricated locally by welders and fabricators in oil palm production clusters. There is one particular cluster of fabricators based in Aba (Abia State). This equipment is relatively affordable (about N500,000) but has low extraction rate which results in the loss of more than 50% of the oil content. The improved mechanised press with higher extraction rates was developed over 10-15 years ago; however the design of the technology has not been adopted by local fabricators. As such, NIFOR has been producing the equipment for some processors. NIFOR has priced the equipment (a full line including sterilizer, stripper and clarifier) at about N2.7 million thereby excluding most small scale processors who could not afford it. The supply from NIFOR has also been limited due to high cost of production, inefficient production operations, and late delivery time of order (there are claims that it takes 6-12 months for NIFOR to deliver the equipment which can be made in 6 weeks).

Sponsored trainings by government/donor agencies had provided opportunities for some fabricators to be trained by NIFOR on manufacturing the improved presses. These fabricators are producing at a cheaper cost, as detailed in table 9, and have also gone ahead to modify the presses. Their adaptations have reduced the sludge content and also reduced the high volume of water required by the clarifier, which had been 2 major drawbacks of the NIFOR developed press. One of these fabricators in the Niger delta region had indicated that he delivers the SSPE within 6 weeks of order and most of the orders he got were from outside the Niger Delta region. There is low level of demand for improved presses by small scale processors as they and many of the local fabricators providing them with processing equipment are largely unaware of the improved presses. The trained fabricators that can make improved presses had only made them based on order (due to some small scale processors view that equipment is expensive) and have not actively promoted the value of using the improved presses, as well as not understanding the specification/needs of the small scale processors in order to adapt the improved press to suit such needs.

| **Table 9: Comparative prices of SSPE from NIFOR and Local Fabricators** | | |
|---|---|---|
| **Components of SSPE** | **NIFOR's Prices(Naira)** | **Local Fabricator's Prices (Naira)** |

| | | |
|---|---|---|
| Fruit screen | 108,750 | 100,000 |
| Sterilizer | 668,285 | 500,000 |
| Stripper | | 150,000 |
| Digester Screw press | 702,555 | 550,000- 800,000 |
| Clarifier | 814,625 | 500,000 |
| Nut Cracker | | 75,000 |
| Installation Cost | 20% of Equipment | 5-20% of Equipment |
| Delivery period | 6-12 months | 4- 6 weeks |

**Financial services–** farmers and processors largely depend on own funds/cooperatives as well advances from oil merchants to meet working capital requirements. The commercial bank lending schemes are still not favorable for small scale agro-allied enterprises due to the short term of loans, and the mandatory request for collateral which many farmers do not have. On the other hand, farmers and processors do not keep enterprise records, which could be used to determine the credit worthiness of the business and is a requirement for loans from the banks.

**Harvesting Labour-** As the oil palm tree matures, it grows tall, especially the wild groves, thus making harvesting of FFB difficult. Farmers or leasers of wild grove usually contract a gang of male youths to harvest FFB. The cost of harvesting ranges from N30-N100 per FFB, thus contributing to the high cost of FFB. Harvesters usually make use of climbing rope, and produce an output of 70 FFB per harvester per day or Malaysia knife (knife on a long pole), which produces an output of 280 FFB per harvester per day. The latter is easier, but cannot reach the taller trees and can damage the fruit; however the climbing rope is preferred because it does not destroy the nuts. The youths from Akwa Ibom are famed for harvesting but the Akwa Ibom state government's education programme is making the youths go back to their state, thus creating limited supplies of harvesters. In order to increase the harvesting efficiencies, PIND is promoting the uptake of the adjustable harvester, which is intended to increase the number of FFB harvested and reduce harvesting time, however the awareness level among harvesters is still low.

### *Government and Donor Initiatives*

**Agricultural Transformation Agenda-** Under the agricultural transformation agenda (ATA), the federal government seeks to promote oil palm as a substitute to imported vegetable oil. The ATA intervention seeks to distribute 9 million improved variety seedlings to farmers, demonstrate fertility management practices among cooperative smallholder farmers, introduce motorised harvesters to replace manual climbing of oil palm trees, promote use of improved presses among smallholder cooperative farmers and processors and supply of 100 motorised harvesters and 100 small scale processing equipment (SSPE) to smallholder cooperative groups through funding by First Bank.

Additional facets of the agenda include NIFOR supplying improved seeds to state governments and private entities. For example, Ministry of Agriculture in Rivers state has received 109,520 seeds which are being raised into seedlings for onward distribution to farmers, while the Bayelsa Oil Palm Company received 80,000 seeds (but due to lack of funds to raise them the seeds have rotted). As well as the Growth Enhancement Support Scheme which is providing 50 improved oil palm seedlings, 2 bags of fertilisers at the cost of N6500 to registered farmers to enhance production.

**UNIDO Oil Palm-** seeks to establish $4.6 million oil palm pilot centres in Ondo and Akwa Ibom States to boost palm oil production in the country. Emphasis has been laid on value addition with focus on small scale palm oil processing enterprises. The project will be focusing its interventions on: improving the technological and skills inputs in palm oil processing through technology transfer; developing capacity for the sustainable development and supply of fresh palm fruit bunches; improving market access and competitiveness for palm oil produced in the region.

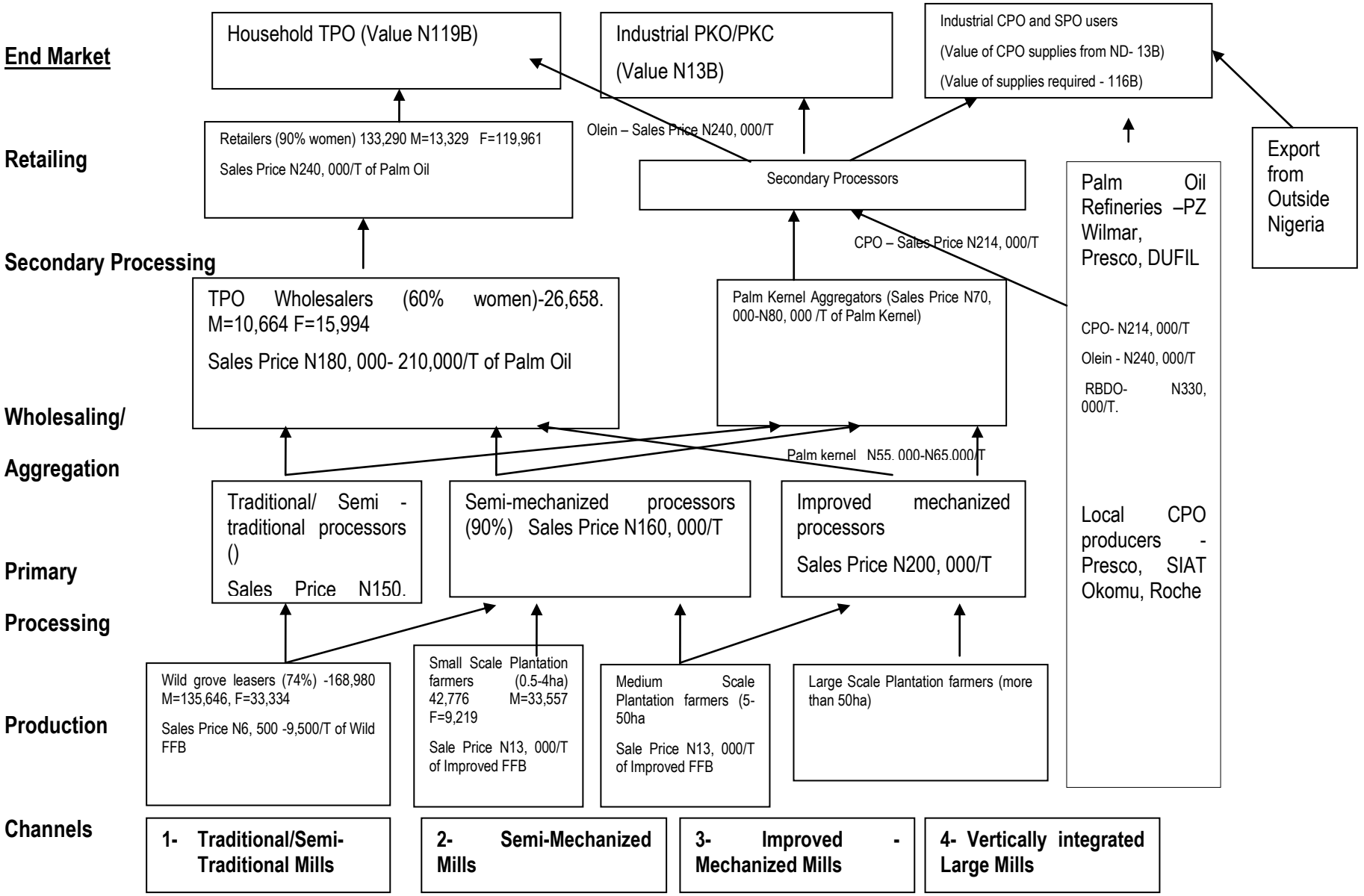
**FADAMA III**-the third phase of the World Bank's assisted National FADAMA project has agro-processing as a project priority. The programme's participants are organised into similar interest groups called Fadama User Groups (FUGs), which further form Fadama Community Associations (FCAs) at the local government level. Under the programme's pilot productive asset acquisition component, the project facilitates the acquisition of productive assets by individuals or Fadama User Groups (FUGs) by providing matching grants to Fadama User. The project provides a 70% matching grant to enable FUGs to purchase semi-mechanised mill equipment.

**Akwa Ibom State Community Plantation Development Scheme (CPDS)**–the initiative seeks to promote cultivation of oil palm plantations among small holders with land but no funds for inputs through free provision of seedlings, fertilizers and agrochemicals.

## Gender dynamics and the Role of Women in the Value Chain

Women are found in all functions along the oil palm value chain; most women dominate the marketing and processing segments rather than production segments. In production, women lease wild grove in order to sell FFB to processors. Women also function as FFB gatherers who move FFB from base of tree to an assemble point in wild groves and plantations; each woman is paid N20 per bunch or N1000 per day in some cases. The introduction of semi-mechanized processing equipment had transformed what used to be a female dominated, low margin, high level of effort function, into a male dominated function in other states apart from Akwa Ibom. Men had the wherewithal to invest in machines, which yielded more output in less time, thus pushing out the female dominated traditional processing. In semi-mechanized processing, 50% of the labour requirements are female dominated- filtering of fruits, loading of fruits into drums, separating of fibre from pressed fruits (they use a manual comb) and cracking of kernels using manual methods. In clusters like Elele and Emohua in Rivers state, few women own mills; in Ogbia in Bayelsa, there is a fair gender balance in ownership of mills as opposed to Oria/Erho in Delta state where there are no female processors. Rather, women buy FFBs or loose fruits to process at mills for a fee.

As a form of income generating activity within their homes, women in Delta and Akwa Ibom states produce low grade soap from 2 main ingredients- palm oil from the improved variety and caustic soda. The low grade soap manufacturing is said to be produced by women only. These soaps are used for bathing, washing of clothes and plates and are sold in houses, kiosks and open markets. They are cheaper than conventional soaps (sold for N50 while price of conventional soaps starts from N100) and initial set up cost is between N10, 000-N15, 000.


End Market
Household TPO (Value N119B)
Industrial PKO/PKC
(Value N13B)
Industrial CPO and SPO users
(Value of CPO supplies from ND- 13B)
(Value of supplies required - 116B)
Retailing
Retailers (90% women) 133,290 M=13,329 F=119,961
Sales Price N240, 000/T of Palm Oil
Olein – Sales Price N240, 000/T
Secondary Processors
Export from Outside Nigeria
Secondary Processing
CPO – Sales Price N214, 000/T
Palm Oil Refineries –PZ Wilmar, Presco, DUFIL
CPO- N214, 000/T
Olein - N240, 000/T
RBDO- N330, 000/T.
TPO Wholesalers (60% women)-26,658. M=10,664 F=15,994
Sales Price N180, 000- 210,000/T of Palm Oil
Palm Kernel Aggregators (Sales Price N70, 000-N80, 000 /T of Palm Kernel)
Wholesaling/
Aggregation
Palm kernel N55. 000-N65.000/T
Traditional/ Semi - traditional processors ()
Sales Price N150.
Semi-mechanized processors (90%) Sales Price N160, 000/T
Improved mechanized processors
Sales Price N200, 000/T
Local CPO producers - Presco, SIAT Okomu, Roche
Primary
Processing
Wild grove leasers (74%) -168,980 M=135,646, F=33,334
Sales Price N6, 500 -9,500/T of Wild FFB
Small Scale Plantation farmers (0.5-4ha) 42,776 M=33,557 F=9,219
Sale Price N13, 000/T of Improved FFB
Medium Scale Plantation farmers (5-50ha
Sale Price N13, 000/T of Improved FFB
Large Scale Plantation farmers (more than 50ha)
Production
Channels
1- Traditional/Semi-Traditional Mills
2- Semi-Mechanized Mills
3- Improved - Mechanized Mills
4- Vertically integrated Large Mills

### Major Channels

- **Channel 1 - Traditional/Semi-traditional mills:** This channel is dependent on the wild grove harvest and manual processing methods. It has no barriers to entry and low costs to start up. The channel is gradually shrinking due to popularity and relatively affordability of semi-mechanised processing equipment.
- **Channel 2- Semi-mechanized mills:** Accounts for huge numbers of mills in the region due to less drudgery and the relative affordability of the most common processing equipment (digester and separate hand operated screw press) which allows many actors to set up processing units across the region.
- **Channel 3 - Improved mechanized mills:** This channel is characterised by use of improved mechanised processing equipment with increased extraction rate of about 36% above the semi-mechanised processing equipment (increased yield from 11% to 15% per ton of FFB). There are few mills in the region due to relative low awareness of the equipment and the value to be derived from its use as well as higher cost requirement than semi-mechanized mills.
- **Channel 4 - Vertically integrated large mills:** Demand for industrial use of palm oil is increasing due to demand from various foods and non-food firms in Nigeria. The specified requirement of industrial palm oil means that very few firms are involved. These firms are vertically integrated with fully automated processing plants and sell in big volumes to end user firms. These mills yield above 20% per ton of tenera FFB.

## Sector dynamics and driving forces

### *Sector Dynamics*

The palm oil sector is changing steadily in the Niger Delta. Some of the key changes include:

- **Forward integration by small scale plantation farmers into processing**- In a bid to maximise earnings, more farmers are getting involved in processing FFB which yields an estimated gross margin of N4700 per ton rather than sell FFB which yields an estimated gross margin of N3542 per ton.
- **Gradual disappearance of traditional processing and replacement with the semi mechanized processing-** The availability of and relative affordability of the digester and screw presses is enabling traditional processors to switch to the semi-mechanised processing.
- **Acquisition of government plantations-** In a bid to ensure adequate supply of FFB to sustain processing capacities, large integrated mills are partnering with state governments in Niger Delta by leasing/acquiring government owned large plantation estates. SIAT has leased the 16,000 hectare Rison palm estate in Rivers state, PZ Wilmar has plans to acquire up to 100,000 hectares in Cross River State but is currently developing 30,000 hectares of oil palm plantation outside of Calabar, Roche has acquired Ada Palm in Imo state. Conversely, these partnerships are reducing the supplies of improved tenera FFB to small scale mills clustered around the non-operational government estates that were largely dependent on free and purchased supplies from them. As such, in order to survive, these mills would require supplies from the few small/medium scale plantation farms around them or other production clusters within the state, therefore increasing demand for improved tenera FFB.

- **Expansion of processing capacities of large integrated mills-** The large shortfall in supply of over 400,000 metric tonnes of CPO is being bridged by imports; the addition of the 35% tariff and other transactional costs makes importation expensive. The locally produced CPO is cheaper, thus the large integrated mills are increasing their processing capacities- Okomu Oil is expanding operations by increasing processing capacities from 30 to 60 ton FFB to CPO per hour while Presco is currently in the process of adding 200 metric tons per day of refining/fractioning plant, bringing total refining to 310 metric tons per day.

- **Emergence of new large integrated mill and establishment of new palm oil refineries** - The domestic requirement of olein (vegetable oil) in Nigeria for 2013/2014[13] was estimated to be 2.04 million metric tons (an estimated value of 1.6 billion dollars[14]) and expected to grow at 1.7 percent per annum. The reason stated above as well as catering to firm's palm oil based needs has led to PZ Wilmar and DUFIL integrating backward by establishing new palm oil refineries to process CPO into refined oil in Lagos. PZ Wilmar is set to invest $640 million in the development of oil palm in Nigeria over a 10 year period, and has completed a $60 million ultra-modern palm oil refinery (of 1000 tonnes/day capacity) in Ikorodu area of Lagos, the biggest of its kind in West Africa. De United Foods Industries Limited (DUFIL), makers of Indomie brand of noodles and pioneers in the noodles market in Nigeria, has also invested about $30 million in a new palm oil plant (of 500 tonnes/day capacity) in the country. DUFIL plans to source for crude palm oil locally, but it anticipates to import CPO from the Far East to complement due to the view that the local supply might be insufficient to ensure full capacity utilisation of the plant.
- **Replanting of old plantations by large integrated mills** – The large integrated mills' plantations are old, thus leading to declining productivity of these farms. Presco, Okomu, SIAT, PZ Wilmar have all embarked on planting and replanting of new and existing plantations.
- **Increasing role of RSPO for the large integrated oil mills**- The Roundtable on Sustainable Palm Oil (RSPO) was established in 2004 with the objective of promoting the growth and use of sustainable oil palm products through credible global standards and engagement of stakeholders. The RSPO has developed sustainability principles and criteria and a certification system for growers, millers, processors and other stakeholders along the supply chain to promote the production, procurement and use of sustainable palm oil. It was gathered that the all the large integrated oil mills in Nigeria have signed up to the RSPO, there has been awareness creation on the principles and criteria major palm oil producers in Nigeria are keen to start the RSPO certification process which would lead to the producers integrating stringent criteria for sustainable production and affecting the requirement and standards of current or potential small holder supply schemes.

The channels 2 and 4 have been growing. Within the technical palm oil, semi-mechanised mills are growing due to demand for red palm oil, however, industrial palm oil channel is growing faster due to increased consumption of processed foods made with palm oil and higher consumption in the industrial sector driven by capacity expansion from producers of toiletries such as soaps and moisturisers and edible oil.

[13]http://www.fas.usda.gov/psdonline/psdReport.aspx?hidReportRetrievalName=Table+06%3a+Major+Vegetable+Oils%3a+World+Supply+and+Distribution+%28Country+View%29++++++++++++++++++++++++&hidReportRetrievalID=705&hidReportRetrievalTemplateID=8

[14]The average 6 months price of Palm Kernel oil is $833.33. http://nigeria.opendataforafrica.org/WBCPD2013Sep/world-bank-commodity-price-data-pink-sheet-september-2013

# Driving Forces and Points of Leverage

## *Driving Forces*

Three main forces have been driving these changes.

- **Increasing demand for household TPO and Industrial CPO**- the general demand for cooking oil and the relative increase in disposable income among middle and high income earners is driving more consumption of palm oil based products.
- **Availability and ease of production and relative affordability of semi-mechanised processing equipment-** The technology of the digester and screw presses are simple to fabricate, thus a lot of local fabricators are manufacturing them in the different processing clusters across the region. These equipment are relatively affordable (about N300, 000) and user friendly**.**
- **Import Tariff –** the 35% tariff on imported CPO makes it very expensive to purchase, incentivizing the large refining companies to invest in new mills and rehabilitating old, obsolete plantations. Based on this and growing demand, end user firms are integrating backwards into palm oil production.

## *Points of Leverage*

- **Secondary processors-**require not less than 1,000 tons of CPO every month.
- **Large scale processors**-processes average of 60 tons of FFB per day and requires large supplies of FFB.
- **Akwa Ibom state cluster-**there are about 10,000 small/medium scale registered plantations owners and about 150,000 small scale palm oil mills in the state.
- **NIFOR-**main research institution providing oil palm seedlings and training local fabricators on development of improved presses
- **Local fabricators-**providing agro-processing equipment to farmers and processors
- **All Farmers Association of Nigeria (AFAN)-**association of oil palm farmers and processors in the different states of the Niger-delta region.
- **National Palm Produce Association of Nigeria-**association of oil palm farmers and processors in the different states of the Niger-delta region.

The actors who can potentially leverage impacts within the VC, include:

- Secondary processors- require CPO, can get from network of primary millers who are aware of their specification
- Local fabricators – providing agro- processing equipment to farmers and processors
- Large scale integrated mills- need to increase their supply of FFB from small scale farmers
- Large scale manufacturers of improved processing machines– provide on time and right quality and train local fabricators to undertake repairs and maintenance of machines

## Constraints Analysis

**Availability of appropriate technologies:**

- Fabricators have not taken up the manufacturing of more appropriate processing equipment
- Limited availability of reliable new planting material
- Non- utilization of mechanical harvesters

**Value chain linkages and relationships:**

- Limited linkages between farmers and vertically integrated mills
- Limited linkages between small/medium scale improved mills to the secondary processors
- Limited linkages between NIFOR and researchers to the equipment fabricators

**Flow of information on markets, technologies:**

- Weak flow of information on markets
- Weak flow of information on availability of technologies and their value propositions
- Weak flow of information on agricultural practices.

**Production practices lead to low yields:**

- Weak application of good agricultural practices for weeding, pruning, applying fertilizer, herbicides, etc
- Improper harvesting of fruit (how to identify when the bunch is ripe)

**Access to additional supporting services:**

- Lack of access to credit for small-holder farmers and processors limiting the purchase of improved equipment and upgrading of the plantations.

The priority constraints which MADE will seek to address are (i) low extraction rates of oil (ii) lack of access to improved processing mills by small scale process and (iii) limited linkages between small scale plantation owners and large scale integrated mills. The rationale for addressing this prioritising these constraints is articulated below.

- By addressing the low extraction rates of oil (from lack of access to improved processing machines by small scale processors) and limited linkages between small scale plantation owners and large scale integrated mills, the profitability of producing palm oil will increase, leading to greater demand for fruit, incentivizing farmers to address some of the other constraints to increase fruit production.
- Lack of access to improved processing machines by small scale processors- in the short term, the increased access and use of improved processing machines would a) provide more TPO for wholesalers/oil merchants, b) with more oil available, some processors would start identifying new markets, thus possible joint marketing of palm oil with better quality by functional processors' associations to secondary processors, both results would increase the demand for FFB from small scale plantation farmers and incentivise farmers to supply more FFB through effective harvesting methods and improvement in productivity of existing plantations.
- Limited linkages between small scale plantation owners and large scale integrated mills- a better, transparent and guaranteed offer of pricing and payment above prevailing rates for processed oil palm products would incentivise supply of FFB by small scale plantation

farmers to large scale mills, thus incentivising small scale processors to offer higher prices for FFB and maximise output and earnings through use of improved processing machines.

## MADE's Vision and Strategy

Vision for Growth for Small Scale production- By increasing productivity of farmers and processors in the Niger Delta region towards world's standards will lead to increased profitability to the small businesses, driving more substantial investments by small scale plantations to meet demands for household and industrial palm oil and increase income for farmers.

### *What are the broad strategies to achieve that vision?*

- Improved processing efficiency of small scale processors
- Enhanced linkages between small holder producers/processors and large scale processors

## Synergies with other programmes

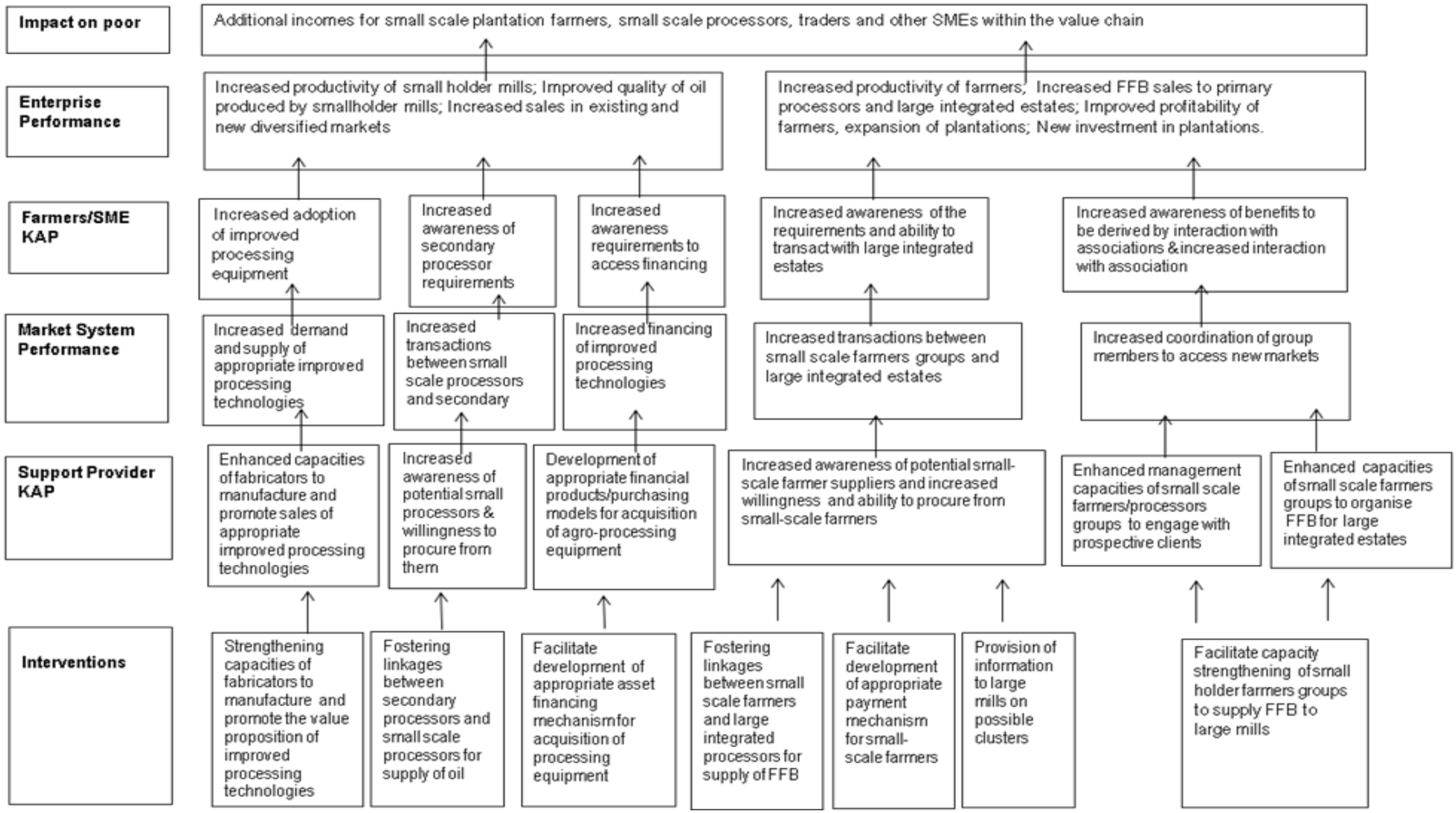
Palm oil is one of the priority sectors for PIND and has started market intervention activities such as facilitating the creation of awareness and demonstration of the improved processing models, linkages between NIFOR and fabricators and processors, association development, and links to secondary processors in Imo State. MADE would partner with PIND to ensure replication and scale up in other states within the region.

- MADE will work with the UNIDO operation to make sure that efforts with linking fabricators with potential purchasers of improved presses will not be getting crowded out by them giving free resources to the fabricators.
- MADE would work with ATA on its programme of free distribution of oil palm seedlings to transform into development of quality nurseries that are producing certified seedlings for small scale plantation farmers on a commercial basis in conjunction with the large plantations like PZ Wilmar
- MADE would advocate for the FADAMA project to adopt long lasting commercial solutions to agro processing constraints rather than short term measures of providing more than half of funds required for purchasing assets.

## Theory of Change and Sector Logic

There is high demand for palm oil in Nigeria; however supply is insufficient due to low extraction rates (5-10%) from current processing technologies adopted by small holders leading to 50% loss of extractable oil. This result in low earnings to millers and low prices offered for FFB. The use of improved processing equipment would increase oil extraction by more than 35% from the same quantity of input currently being used, thus increasing earnings. This increased profitability will create the incentive to process more FFB, thus driving increased demand and leading to higher prices for current supplies of FFB; which would incentivize small scale plantation farmers to improve productivity of existing palm, plant new palm and generate more income.

## Sector Logic



# Potential Interventions

In order to achieve MADE's articulated vision for growth, the following two main strategies will be employed:

### Improving extraction efficiency of small scale primary processors

In order to improve the extraction efficiency of small-scale processors, MADE will facilitate:

- The introduction of the improved mechanized mills, accompanied by awareness creation and demonstration of value of improved processing technologies and practices to small scale processors. The supply of mills will be provided by local fabricators and will use secondary processors as a point of leverage to stimulate their uptake.
- Strengthening marketing capabilities of fabricators for prompt supply of functional improved processing technologies.
- Appropriate asset financing mechanism for acquisition of processing equipment and strengthening the business planning and management skills of processors by financial institutions.
- Linkages between secondary processors and small scale processors and provision of information on oil based on secondary processors' requirements.

### Enhancing linkages between small holder producers/processors and large processors

In order to improve the enhance linkages between small-holder plantation farmers and large mills, MADE will facilitate:

- Facilitating linkages between industrial processors and farmers in clusters, providing assistance and information to aid the design of a transparent pricing and payment mechanism for supply of FFB by smallholder farmers;
- Technical assistance to small holder farmers to upgrade their capability to meet large processor demands, including responding to the Roundtable on Sustainable Palm Oil criteria for supplying industrial mills; and
- Strengthening and organizing capacities of small holder groups to supply FFB to large mills.

The primary activity will focus on the introduction and marketing of the improved processing machinery, laid out in more detail in the annexed intervention justification.

# Annex 1: Oil Palm/ Palm oil Producing Areas in Niger Delta

| States | Oil palm/palm oil producing areas in Niger Delta |
|---|---|
| Akwa Ibom | All 31 LGAs but especially in Abak, Eket, Uruan, Ukanafun, Etim-Ekpo, Essien-Udim, Ikot Ekpene, Etinan, Ikot-Abasi, Nsit Atai, Nsit-Ubium, Nsit Ibom, Ika, Orukanam, Ibesikpo-Asuta, |
| Imo | |
| Delta | Ethiope West, Okpe,Ethiope East Uvwie, Ughelli North, Udu, Ughelli South, Aniocha North,Ika South Ika North East,Aniocha South Oshimili North,Oshimili South Ukwuani, Ndokwa West Ndokwa East, Isoko South, Isoko North |
| Cross River | |
| Ondo | |
| Edo | |
| Abia | |
| Rivers | Ahoada*, Etche*, Oyigbo, Ikwerre*, Emohua*, Onelga, Ogoni, Etche,Khana, Gokana,Abua-Odua |
| Bayelsa | All 8 LGAs but especially in Ogbia*, Yenagoa Sagbama, Kolokuma/Opokuma |
| Total | |
| **Nigeria** | |
| Percentage of production from Niger Delta | Symbol*=Presence of government oil palm estates, |