A Scoping Study on the

Palm Oil Value Chain in Rivers and Imo States, Nigeria

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List of Acronyms

ADP	Agricultural Development Programme
ATED	Appropriate Technology Enabled Development
BMO	Business Management Organization
CAC	Corporate Affairs Commission
CBN	Central Bank of Nigeria
CBE	Cocoa Butter Equivalent
CIRAD	Agricultural Research for Development
CPKO	Crude Palm Kernel Oil
CPO	Crude Palm Oil
DFID	Department for International Development
EFB	Empty Fruit Bunches
ETL	ECOWAS Trade Liberation
FAO	Food and Agriculture Organization of the United Nations
FCMB	First City Monument Bank
FFA	Free Fatty Acid
FFB	Fresh Fruit Bunches
FGD	Focus Group Discussion
GDP	Gross Domestic Product
INRAB	Integrated Management of Natural Resources & Agricultural Development
NAFDAC	National Agency for Drugs Administration and Control
NDA	Niger Delta Area
NDDC	Niger Delta Development Commission
NGN	Nigerian Naira
NGO	Non-Governmental Organization
NIFOR	Nigerian Institute for Oil Palm Research
NLC	Nigerian Labour Congress

OER	Oil Extraction Rate
OPGAN	Oil Palm Growers Association of Nigeria
PIND	Foundation for Partnership Initiative in the Niger Delta
PKC	Palm Kernel Cake
PKO	Palm Kernel Oil
POS	Palm Oil Sludge
QC	Quality Control
RBDO	Refined Bleached Deodorized Oil
RDPKO	Refined Deodorized Palm Kernel Oil
RSPO	Roundtable on Sustainable Palm Oil
SON	Standards Organization of Nigeria
SPO	Special Palm Oil
SSPE	Small-Scale Processing Equipment
TPO	Technical Palm Oil
UNIDO	United Nations industrial Development Organization
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
VEOPAN	Vegetable and Edible Oil Producers of Nigeria
VOPAN	Vegetable Oils Producers Association of Nigeria

Glossary

Crude Palm Kernel Oil: A light yellow crude oil, extracted from the palm kernels, containing mainly lauric acid.

Facilitator/Facilitation: An action or individual (or group of individuals) that temporarily works to develop more inclusive, dynamic, and differentiated markets without becoming a part of the markets.

Food Security: Food security exists when all people, at all times, have physical and economic access to sufficiently safe and nutritious food that meets their dietary needs and food preferences for an active and healthy lifestyle.

Market: A set of arrangements by which buyers and sellers are in contact to exchange goods or services; the interaction of demand and supply.

Market System: The multi-player, multi-function arrangement comprising three main sets of functions (core, rules and supporting) undertaken by different players (private sector, government, representative organizations, civil society, etc) through which exchange takes place, develops, adapts and grows. A construct through which both conventionally defined markets and basic services can be viewed.

Olein: Also referred to as Palm Olein is the light yellow edible oil obtained from the fractionation of Refined Bleached and Deodorized Palm Oil, which is separated in two fractions by partial crystallization. The liquid fraction is called Palm Olein.

Out-growers: A group of farmers supported with seedlings and other inputs (out-growers‟ scheme is usually initiated mainly by government or sometimes by other non-state stakeholders) to encourage the cultivation of oil palm as increase production of oil palm products.

Special Palm Oil (SPO): Premium grade palm oil with less than 5% free fatty acid (FFA) content, extracted from the mesocarp of palm fruits.

Stearin: Also referred to as Palm Stearin is the solid fraction obtained from the fractionation of Refined Bleached and Deodorized Palm Oil. It is mainly used by the food industry.

Technical Palm Oil (TPO): Palm oil with greater than 5% free fatty acid (FFA)

Transaction Costs: The costs associated with the basic process of exchange including costs concerned with searching, screening, negotiating, contracting, monitoring and enforcing transactions.

Upgrading: In order to respond effectively to market opportunities, upgrading is the process by which business owners innovate to add value to products or services and to make production and marketing processes more efficient.

Value Addition: The enhancement added to a product or service by a company before the product is offered to customers.

Value Chain Governance: The relationships among the buyers, sellers, service providers and regulatory institutions that operate within or influence the range of activities required to bring a product or service from inception to its end use.

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Executive Summary

The Foundation for Partnership Initiatives in the Niger Delta (PIND) aims to create innovative and dynamic partnerships in the nine states of the Niger Delta region in Nigeria. PIND is proudly supported by Chevron which has endowed the foundation with a funding over a five year period from 2010 to 2014. PIND selected the Palm Oil Value Chain as one of the three major agricultural streams within its Economic Development programme in the Niger Delta over the next several years. A detailed assessment of the Palm Oil Value Chain was commissioned in 2011. It identified and recommended the Palm Oil Value Chain as an opportunity that met PIND's objective of enabling development that would improve the living standard of many poor communities in the Niger Delta.

The overall objective of the assessment was to have a deeper understanding and detailed scoping of Palm Oil Value Chain pilot interventions, focusing on market systems, and based on M4P principles. The assessment was undertaken from 12 June to 21 July 2012. The assessment team comprised of the Deputy Economic Development Center Manager of PIND and an M4P Specialist, Mr. James Elekwachi, two consultants, Dr. Samuel O. Fadare who is an Agricultural Economist, Dr. Oseni Owolarafe, an Agricultural Engineer, and PIND's ATED coordinator, engineer Andrew Adu. The Deputy Director of PIND, Mr. Sammy Daibo, the PIND EDC Manager Dr. Dara Akala and PIND advisors Bill Grant, Andy Sam and Sharif Islam helped the team by giving suggestions in shaping up the strategy, outlining criteria for partner selection and overall guidance on the initial set of activities.

The assessment followed several steps: compiling a secondary literature review, developing assessment tools, finalizing sampling plans, conducting field surveys, validating data and information, and finally compiling the findings in this report.

A principal part of this report is the second chapter that describes the overall findings on the market dynamics. In monetary value, total production of about 850,000 tonnes of palm oil with a retail price of N260,000 in 2011 contributed to about N221 billion to Nigeria's national economy. About 4 million people, 35% female, are engaged at various levels as input suppliers, primary processers, secondary processers and end users of both SPO and TPO.

The vegetable oil industry is capable of processing 900,000 tonnes of palm oil annually. However, due to the inadequate supply of the product, several of the palm oil refineries are operating at less than 25% of installed capacity. Consequently, the major end users of palm oil and its derivatives, which include industries producing soaps, biscuits, noodles, savory and milk, find it difficult to get regular supplies of palm oil derivatives locally. At the village level, small-scale processing dominates, usually producing low quality palm oil with a high level of Free Fatty Acids.

Most of the large scale oil palm estates were established by state governments and the privatization of these estate farms sometimes faces local discontent. The potential land available for Oil Palm development in Nigeria is estimated at 24 million hectares. From that area, about 2,300,000 hectares are under natural groves and 430,439.59 hectares are plantations. Only 11.4% of potential land available is covered. Of the total palm oil and palm kernel output, production from the natural groves and small holder plantations account for about 81 percent and 89 percent respectively while production from the large estates account for about 19 percent and 11 percent respectively. Therefore in Nigeria, palm oil production is still very much dominated by the small holder producers.

While many products emanate from the oil palm trees – palm oils, palm wine, wood products, the focus of this research is on the oil products and their direct by-products. Three dominant products are Technical Palm Oil (TPO), Special Palm Oil (SPO), and Palm Kernel Oil (PKO), with palm kernel cake and sludge as significant by-products that can be used in the feed industry. Findings from the study have shown that there is a market for mainly 3 major oil palm products in Nigeria: (1) TPO Palm Oil: Palm oil with free fatty acid between 5 - 30% is acceptable in the local market due to the varied requirement for Nigerian cuisine. The traditional market is served by small scale producers of palm oil which account for more than 81% of local production (688,500 tons). (2) High quality SPO: The minimum requirement for SPO is an FFA of less than 5%, which can be further refined to RBDO and other fractionated products such as olien and stearin. The present production by medium and large estate is estimated at 161,500 tonnes. (3) Palm Kernel Oil which has been growing in demand over the years for the industrial market. The present production in Nigeria is 200,000 tonnes.

Palm oil is extracted from fresh fruit bunches (ffb) by a mechanical process, where a mini-mill or medium processing mill is used in the study area. An average size ffb of Tenera weighs about 10-20kg and contains 1000-2000 fruits (Figure 5). The ffbs are harvested according to harvesting cycles, and are supposed to be delivered to the mills on the same day for production of SPO. The quality of crude palm oil is dependent on the care taken after harvesting, particularly on the handling of the ffbs.

A palm oil mill produces crude palm oil and kernels, as primary products and biomass as a secondary product. The capacity of mini-processing mills varies between 10- 20 tons ffbs/day in identified clusters. A typical automated mill has many operation units as shown in Figure 7. This comprises sterilization, stripping, digestion and pressing, clarification, purification, drying and storage. For the kernel line, there are steps such as nut/fibre separation, nut conditioning and cracking, cracked mixture separation, and kernel drying, storage. The dried kernels are often sold to palm kernel crushers for extraction of crude palm kernel oil.

Having consulted all stakeholders and some other secondary literature, the constraints in the palm oil industry have been identified according to value chain functions as follows:

Table 1: Constraints within the Niger Delta Palm Oil Value Chain.

Value Chain Functions	S/N	Constraints
End markets	1	High supply - demand gap of SPO for key end market users forcing end marketers to meet supply gap through importation
Secondary processing	2	Lack of working capital to meet raw materials supply needs and inability of the local primary processors to meet SPO supply requirements and standards resulting in the secondary processors operating below their installed capacity
Primary Processing	3	Unavailability of technology and equipment for processing SPO resulting in the millers not maximizing their resources
	4	Lack of awareness among the millers of the gains in SPO production and inadequate knowledge of the technology for SPO production
	5	Lack of finance for the purchase of improved processing equipment preventing millers from additional potential income from producing SPO
	6	Lack of information and linkages to end users and secondary processors of SPO, making the millers lose out on the opportunity to meet supply gap
	7	Lack of storage facility for the producers meant they cannot take advantage of seasonal variation in prices
Production	8	Shortage of FFB supply to large number of millers in Umuagwo and Elele clusters resulting to 4 months idle period of the mills

	9	Unavailability and high cost of hiring climbers leading to loss of about 50% of FFB available for processing
	10	Difficulty in getting highly improved seedlings other than NIFOR Tenera, and high cost of fertilizers and herbicides limit the farmers yield
	11	Inadequate safety and health environment endanger the health and safety of the operators and cause health hazards

Introduction

1.1 Background

The Foundation for Partnership Initiatives in the Niger Delta (PIND) has selected the Palm Oil Value Chain as one of three major agricultural streams within its Economic Development programme in the Niger delta over the next few years. A detailed assessment of the Palm Oil Value Chain was commissioned in 2011. It identified and recommended the Palm Oil Value Chain as an opportunity that met PIND's objective of enabling development that would improve the living standard of many poor communities in the Niger Delta.

The major conclusions on opportunity from the original Palm Oil value Chain study, upon which this scoping study now needs to concentrate, were:

- There is a major growth opportunity to increase production the SPO market with more refined and fractionated palm oils.
- There is a major opportunity for improved profitability for producers / processors in Channels 2 & 3 by increasing the average yields of oil per kg of fruit.

Economic growth and prosperity are central to long-term poverty alleviation for social and environmental sustainability. The oil palm industry represents one of the most effective avenues for poverty alleviation, food security and ensuring economic stability in Nigeria. Palm oil industry has the prospects of providing employment for millions of unskilled and semi-skilled people. As demonstrated in other economies with proper focus on production of commodities of large scale commercial values, improvement in the production of oil palm can effectively mitigate the poverty level in Nigeria and especially in the Niger Delta region (PIND, 2011). The Scoping Study was designed to include consideration of any Appropriate Technology Enabled Development (ATED) potential.

The oil palm, a very versatile crop and nature's gift to the tropics has from the colonial times played a significant role in the socio-economic development of Nigeria. In 2010, Malaysia and Indonesia produced 87% of the world's supply, eclipsing the next largest producer, Thailand, at 3%. Nigeria, until the 1960s was the largest producer of palm oil, now is only 2% of the world's supply. Although Nigeria is currently the 4th largest producer of the commodity, the bulk of its oil palm still comes from the groves or small holder plantations rather than the industrial plantations.

Nigeria is thought to have less than 600,000ha of cultivated plantations distributed among the small holders and industrial estates. Production from these systems cannot match those from the over 4.9 million ha of cultivated small, medium and large estate holdings in Malaysia or from the over 7.5 million ha from Indonesia, both of which account for nearly 90% of global production of the commodity. The potential land available for Oil Palm development in Nigeria is estimated to be 24 million hectares (Omoti, 2004).

There is a forecast that with decreasing available land for expansion of the industry in these Asian countries, Africa will provide the next hub of the investments in the industry. In this regard, all stakeholders including financial institutions in the value chain need to act in concert to position Nigeria for emerging opportunities in the sector. Cognizance must be taken over the environmental concerns regarding the conversion of rain forest into palm oil plantations and PIND should use its influence to ensure that any new plantation development is conducted in an environmentally sound and sustainable manner.

1.2 Objectives

The general objective of the study is to identify clusters in Rivers and Imo States that are best suited to M4P based pilot interventions in the Niger Delta. The specific objectives are to:

- Profile a selection of communities within those clusters and identify the nature of their market exclusion or inequality
- Define how a well planned and executed palm oil intervention could contribute to realistic poverty reduction for each cluster
- Complete a detailed scoping study of the Palm Oil Value Chain within selected clusters

1.3 Research Methodology

The field assessment was undertaken from 12 June to 21 July 2012. The assessment team comprised of the Deputy Economic Development Center Manager of PIND and an M4P Specialist, Mr. James Elekwachi, two consultants, Dr. Samuel O. Fadare who is an Agricultural Economist, Dr. Oseni Owolarafe, an Agricultural Engineer as well as PIND's ATED coordinator, Engineer Andrew Adu. The assessment was conducted in several steps. The short descriptions of these steps are as follows:

Review of Secondary Literature

The team reviewed a number of secondary literatures including the report on Palm Oil Value Chain Analysis in the Niger Delta of Nigeria conducted by PIND in July 2011, previous oil palm sector analyses conducted by UNIDO consultant Dr. U. Omoti and various reports on palm oil scoping studies in Nigeria, Malaysia, Ghana and Indonesia.

Assessment Tool Development

A question guide for different levels of actors in the end markets sector and key informant question guide was developed. A separate fact sheet structure was also developed for obtaining figures and financial data. These tools were reviewed among the assessment team and with the management of PIND. The finalized question guide and other survey instruments are provided in Annex 2.

Sample Size Determination

The study team first analyzed the various value chain functions in the palm oil sector including the end-users of SPO, retailers and wholesalers of TPO, secondary processors, primary processors and producers. The team also identified service providers to the sector ranging from fabricators of processing equipment to financial service providers. The investigations also focused on large estates, the palm oil research institute and government ministries of agriculture. Based on the analyses of these actors and service providers, the respondents were randomly selected. Details of the respondents and their value chain functions are in annex 3 of this report. This led to 45 one-on-one interview and 6 group interviews.

In-depth Interview

The study was conducted in the two Niger Delta States selected for the initiative. The first, Imo State is comprised of 27 local government areas and has an estimated population of 4.8 million, out of which 26.1% are unemployed with a 50.5% poverty incidence. Rivers State has 23 local government areas with a population of 5.2 million out of which 25.5% are unemployed with a 50.4% poverty incidence (NBS, 2012). The assessment team conducted one-on-one in-depth interviews using the question guide with different levels of actors in different states of Nigeria – Lagos; Ibadan in Oyo; Benin, Okomu-Udo & Obaretin in Edo; Onitsha in Anambra; Owerri, Umuagwo, Ikeduru & Oguta in Imo and Elele, Port-Harcourt & Etche in Rivers. The team also discussed with different associations, related government associations

and some knowledgeable individuals as key informants. The total number of people interviewed with their contact details is provided in Annex 3.

Table 2: Companies Visited According to Value Chain Functions.

S/N	Value Chain Functions	Company / Group Visited
1.	End Market/ Consumer	Honeywell Noodles, Lagos; Indomie Noodles, Lagos
2.	Secondary processing	Sudit Oil, Ibadan; Golden Oil, Onitsha; Envoy Oil, Onitsha; E.O Amobi, Onitsha; Camela Oil, Owerri; Presco Oil, Benin
3.	Retailing of TPO	Oyigbo Market, Lagos
4.	Wholesale & aggregation	Oil Beach, Lagos; Borokiri, P/H
5.	Processing	Presco Oil, Benin; Okomu Oil, Benin; Imo Palm, Owerri; Umuagwo cluster; Ikuduru cluster; Oguta cluster; Elele cluster; Akpoku Etche cluster; Abua central cluster
6.	Production	Presco Oil, Benin; Okomu Oil, Benin; Rison Palm, PH; Imo Palm, Owerri; NIFOR; Umuagwo cluster; Ikeduru cluster; Oguta cluster; Elele cluster; Apoku Etche cluster; Abua central cluster
7.	Input supply	NIFOR, Benin (Tenera); Presco Oil, Benin (IRHO Tissue culture); Okomu Oil, Benin (Okomu-Sucfino); Imo Palm, Owerri (Costa Rica)
8.	Supporting Services	FCMB (Financial); Diamond Bank; Hytech Engineering, Owerri –fabricator; Basicon Engineering, Owerri –fabricator; Vico Engineering, Owerri –fabricator; Mathew Engineering Coy, Elele –fabricator; Etche Engineering Coy, Elele –fabricator; Ere Int'l Fabricator, Aba–fabricator; Integrated System Ltd, PH–fabricator; Happy welder, Aba–fabricator; J.J. Co., Aba–fabricator
9.	Business Environment	Commissioner of Agriculture, Owerri –POLICY; RSSDA
10	Business Membership Organization	Oil Palm Growers Association of Nigeria; Vegetable Oil Producers Association of Nigeria

Group Discussion

In some instances, the assessment team discussed about issues related to palm oil sector with a number of actors at the same time to sample their opinions. Some group interviews were conducted with producer groups while some others were done with marketing players, both wholesalers and retailers.

Validation Workshop

Following the analyses of the findings and completion of an initial draft report, the study team conducted a validation workshop on August 28, 2012 in Owerri with about 45 participants in attendance. The essence was to find out missing information, validate findings from the scoping study and foster linkages among the actors. The participants included representatives from end-users such as VOPAN and OPGAN, smallholder producers/processors, large estate representatives, marketing players and researchers from NIFOR.

Final Report Preparation

Based on the findings from the field assessment, team discussion with management and results from the validation workshop, this final report was prepared.

Study team with representatives of Abua central cluster in Rivers State.

Study team with representatives of Apoku Etche cluster in Rivers State.

1.4 Limitations to Study

In carrying out the palm oil scoping study some constraints and limitations were experienced. They included the following:

- The terms of reference for the scoping study were too wide although very relevant.
- To do justice to the terms of reference and to cover most of the areas outlined in it, the team had to use the allotted number of days for the first phase to accomplish tasks specified in phase two. The team attempted to achieve this by working longer hours and combining analysis of findings with the field investigations.
- The assessment was more qualitative than quantitative in nature, which emphasizes more on understanding the market system than focusing on numbers like ratio of sample size and population.

Overview of the Palm Oil Sector in Nigeria

This chapter discusses the findings of the assessment. Therefore, this section can be referred to as a knowledge bank for understanding the dynamics of the palm oil sector in Nigeria.

2.1 Palm Oil Contribution to GDP

Palm oil, palm kernel oil, and their many derivatives continue to contribute significantly to the global production and exports of oils and fats which have been on the increase over the last two-three decades. The international consumer market spans the globe, and as Table 3 below shows, China, the EU countries and India are the major importers of palm oil. Indonesia and Malaysia are lead exports.

Table 3: Palm oil production, export, import, and consumption (for food and non-food purposes) in 2010/11. (All figures are million tones).

Production:	47.9 (Indonesia 23.6, Malaysia 18.2, Thailand 1.3, Nigeria 0.85, Columbia 0.8, other 3.2)
Exports:	36.8 (Indonesia 16.4, Malaysia 16.3, other 4.1)
Imports:	35.6 (India 6.7, China 5.7, EU-27 4.9, Pakistan 2.1, Bangladesh 1.0, USA 1.0, other 14.2)
Consumption:	47.1 (India 7.1, Indonesia 6.7, China 5.8, EU-27 5.0, Malaysia 3.4, Pakistan 2.0, Nigeria 1.2, Thailand 1.0, USA 1.0, Bangladesh 1.0, other 12.9)

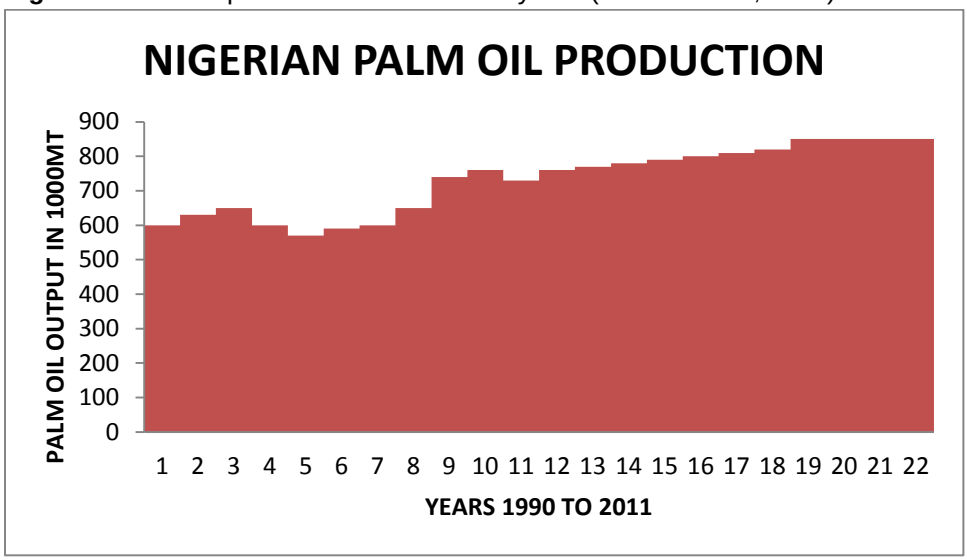
Source from Lipidlibrary, 2012

The growing output and export is attributable to increasing global population, economic development in countries like China and India, increasing per capita consumption of oils and fats generally, and the growing global demand for vegetable oils as alternative sources of cleaner and renewable energy particularly in Europe, Canada and the USA where they are used as biodiesel.

Agriculture and agro-industry remain vital to Nigeria's drive towards its slated development goals as outlined in the Vision 20:2020. Agriculture contributed approximately 30% to GDP in 2010 and was one of the driving forces behind the economic growth experienced by the country. More recently, the sector contributed 43.6% to GDP in the third quarter of 2011. In addition, the importance of agriculture to the Nigerian economy can be seen by the fact that it employs approximately 70% of the population. This is mostly related to the processing of raw products and thus presents a good potential for value addition and the growth of agro-industries (unido.org: Nigeria Country Programme, 2011).

The Nigerian production data of palm oil from 1990 to 2011 according to FAO are stated in the graph below. The 850,000 tonnes production figure last year will contribute N221 billion to national economy with a retail price of N260,000 per tone.

Figure 1: Palm oil production in the last 22 years (Source: FAO, 2011).



The prices of most of Nigeria's agricultural export commodities were higher in 2010 when compared to the previous year. The overall index computed in U$ dollar terms, stood at 727.7 (1990=100), representing an increase of 26.9% over the level in 2009. Cocoa and Palm oil recorded the highest prices increases of 46.9% and 31.4%, respectively over the levels in 2009 (CBN Annual Report, 2010).

2.2 Capacity Utilization in the Sector

Palm oil is the first primary product that is processed in the value chain. In Nigeria, the processing of palm oil has been dominated by traditional, semi-mechanized processing equipment and there are a limited number of automated processors in the country, especially among the functional large estates.

The vegetable oil industry is capable of processing 900,000 tonnes of palm oil annually. However, due to the inadequate supply of the product, several of the palm oil refineries are operating at less than 25% of installed capacity. Consequently, the major end users of palm oil and its derivatives which include industries producing soaps, biscuits, noodles, savory and milk, find it difficult to get regular supplies of palm oil derivatives locally. At the village level, small-scale processing dominates, usually producing low quality palm oil with a high level of Free Fatty Acids. Most of the large scale oil palm estates were established by state governments and the privatization of these estate farms often faces local discontent. The potential land available for oil palm development in Nigeria is estimated to be 24 million hectares (Omoti, 2004). From that area, about 2,300,000 ha are under natural groves and 430,439.59 hectares are plantations, totaling 11.4% of potential land available that is already covered.

2.3 Palm Oil Sector Profile

Palm oil is edible plant oil which is derived from the fruits of palm trees. The oil is extracted from the pulp of the fruit. From its seed is also derived a secondary oil known as palm kernel oil. Palm oil is naturally reddish in colour because it contains a high amount of beta-carotene. Both oils have some draw backs as they are two of the few highly saturated vegetable fats. Palm oil is a common cooking ingredient in

Nigeria and has increasing use in the commercial food industry in Nigeria and other parts of the world. During processing there is no waste due to the fact that all byproducts of the process are utilized.

Nigeria produces an estimated 750,000-850,000 tonnes of palm oil and about 150,000-200,000 tonnes of palm kernel oil annually. These figures provide an estimated combined total production of 900,000-1,050,000 tonnes of palm oil and palm kernel oil annually.

Of the total palm oil and palm kernel output, production from the natural groves and small holder plantations account for about 81 percent and 89 percent respectively while production from the large estates account for about 19 percent and 11 percent respectively. Therefore in Nigeria, palm oil production is still very much dominated by the small holder producers.

Palm Oil Sector Profile

- GDP contribution of N221 billion
- 4 million people engaged
- 38% female involvement
- End users of refined SPO concentrate in Lagos
- Only research Institute located in Benin City
- Imported SPO gaining market share as well as cushion supply-demand gap being cheaper but of lower quality

Despite the tremendous potential for improving commercial viability and regaining export competitiveness, the Nigerian oil palm industry continues to be plagued by a poor plantation culture that inhibits the inclusion of widely dispersed small-scale producers who contribute about 80% of total production.

2.4 Defining the Market

From data available to the President of Oil Palm Grower Association of Nigeria (OPGAN), about 200,000 people are employed in the palm oil sector in Imo state alone. The producer group of actors account for over 35% of all the actors in the finished crude palm oil which translates to about 70,000 smallholder farmers and plantation owners. While 20,000 are processors and/or millers, no less than 100,000 are in marketing of palm oil either as wholesalers or retailers with their agents. The remaining 30,000 constitute the labour force for plantation maintenance, including the harvesting of ffb and logistics services. The wholesalers and retailers with their allies constitute 50% of players in the value chain in Imo state dictates the price of the crude palm oil which is also influenced by demand-supply gap. This group receives the highest average rate of returns for investment in the sector.

2.4.1 Market Share by Producer Groups

The ‘extent of market‘ or ‘size of market‘ refers not to a geographic area or large population but purchasing power, ‘the capacity to absorb a large annual output of goods’. The supply of TPO, SPO and PKO to the end consumers or end-users is carried out through local and foreign sources. The local source is characterized by three main actors namely; palm oil dealers, secondary processors and large automated processing plants. There are also three main groups of end-users:

- Household consumers of TPO,
- Commercial users of TPO and
- Industrial users of SPO, SPO value added products & PKO.

The visit to the end marketers in Lagos State brought to the fore the demand supply gap of SPO and SPO value added products in the randomly sampled noodles producer companies. The summary is contained in Table 4 as follows:

Table 4: Demand Supply Gap for SPO Value Added Products in Randomly Sampled End Markets.

S/N	FINDINGS / DATA	HONEYWELL SUPERFINE FOODS LIMITED	DUFIL PRIMA FOODS PLC
1.	Major suppliers of RBDO	Golden Oil, Presco & Sudit	Sudit (dedicated one plant to Dufils)
2.	Average monthly requirement of RBDO	350 tonnes	4,000 tonnes
3.	Importation of SPO (see the next Table 3 for SPO acceptable properties)	No	Yes. Malaysian SPO is about $900 which is equivalent to N144,000 while SPO from Okomu Palm Oil Plc is N220, 000 per tonne.
3.	Acquisition cost of RBDO	N260, 000 to N270, 000 / tonne	The same
4.	Quality of RBDO	Moisture - 0.1% max Acid value - 0.4% max Peroxide value - 4% max	The same
5.	Challenges encountered in getting RBDO	-Congealing of product during rainy season -Control of product in transit so that the driver will not tamper with the quantity -Price fluctuation	The same
6.	Strategic plan	-Automation of production system -Backward integration	- Involving in mechanized Oil palm plantation of not less than 100,000ha.

The acceptable physical and chemical properties of any SPO are shown in the table below:

Table 5: Acceptable SPO Physical and Chemical Proprieties.

S/N	DESCRIPTION OF PROPERTIES	ACCEPTABLE LEVEL
PHYSICAL		
a.	Colour	Reddish or Orangish
b.	Form/Appearance	Liquid
c.	Aroma/Odour	No rancid smell
d.	Foreign matter	Nil
CHEMICAL		
a.	Moisture content % (max)	1.00
b.	Free fatty acid % (max)	5.00
c.	Peroxide value (meg/kg)	1.50
d.	Iodine value	50.00 – 55.00

The demand for RBDO by functional noodles companies is estimated at 8,500 tonnes per month which is equivalent to 102,000 tonnes annually. Since the conversion ratio of SPO to RBDO is 10:9, therefore, 113,333 tonnes of SPO is needed annually by noodle producing companies alone.

2.5 Organization of the Sector

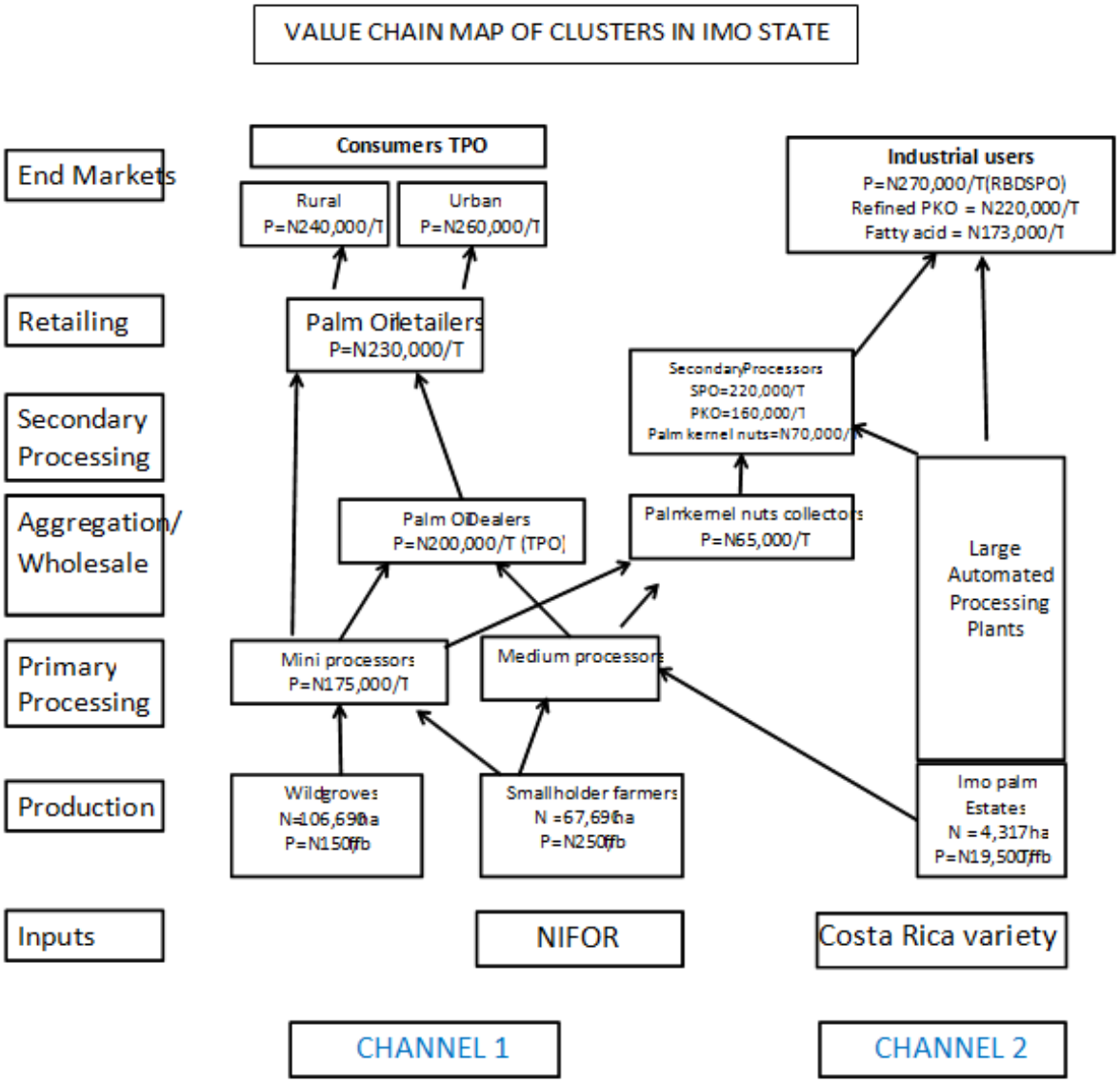
While palm oil production and processing is confined to states in Nigeria's South its consumption cuts across all regions and income strata. The oil palm value chain in Imo and Rivers States is based almost entirely on small scale businesses; small nurseries, smallholder farmers supplying small scale mills with

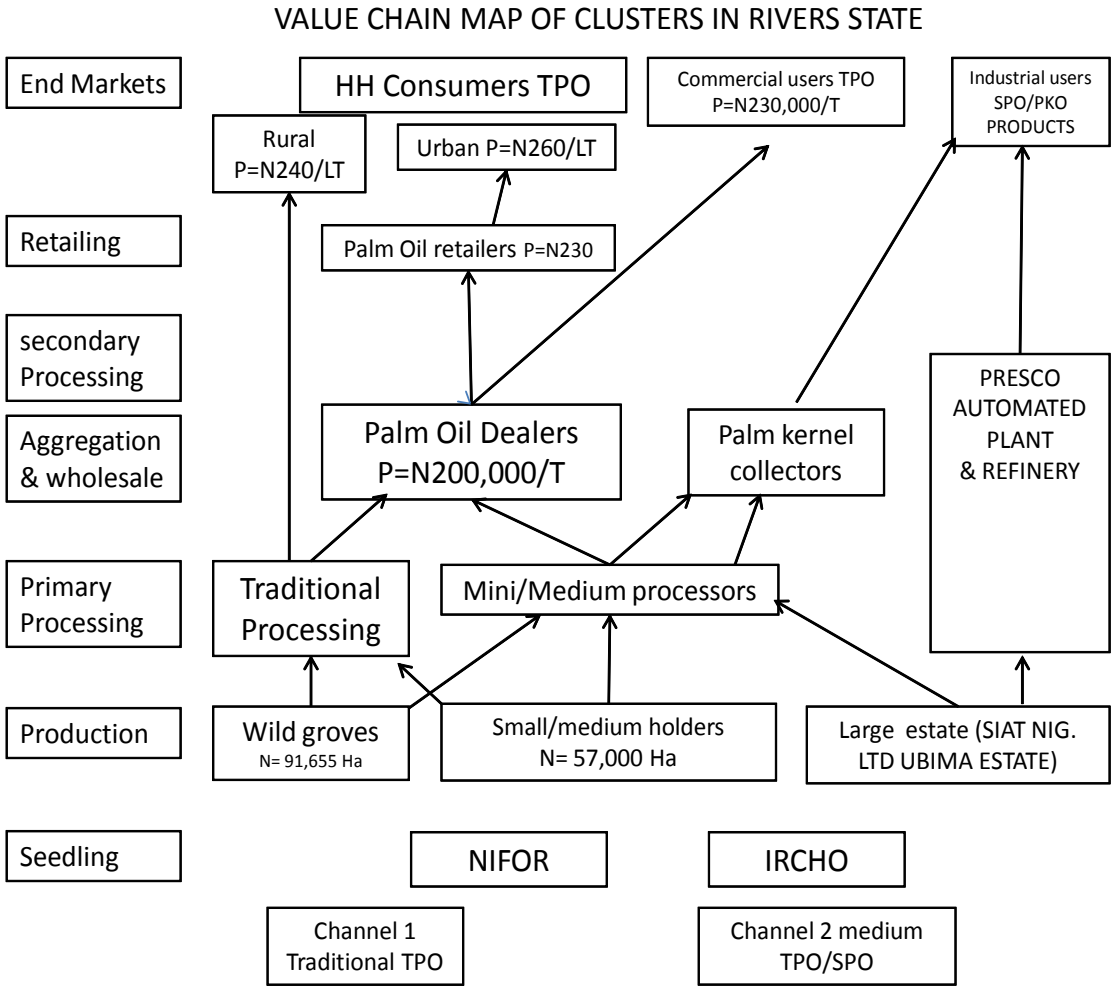
individuals providing the distribution linkages and small ancillary businesses supporting the value chain as fabricators and input suppliers (PIND, 2011).

2.5.1 Structure of the Value Chain

Value Chain Analysis is a tool that facilitates investigation of business activities in terms of new value-adding opportunities in relation to existing values with regards to sourcing of factors of inputs, production, processing and delivery of the finished product (Eme, 2008). The PIND report analyzed the palm oil value chain. The Palm Oil value chain was analyzed using a qualitative approach and complimented with a quantitative study which involves mapping the pattern of value-added distribution along the chain; measuring profitability, productivity and production capacity; and comparing the performance of a firm, value chain, or value chain actor against its competitors. The actors are defined per their functions and described after the value chain map.

Figure 2: Value chain maps.





Input Suppliers

Dura is the common wild palm found all over Nigeria. The fruit has a thick shell and a large kernel. It gives a low amount of palm oil and begins to yield 6 to 7 years after planting. Tenera has a thin shell and a small kernel. It produces a high quantity of palm oil. It bears commercial fruit 3.5 to 5 years after planting. This type is grown in the new plantations. Quality attributes of oil palm planting materials and performance of improved materials in farmers' fields is shown below in Table 6.

Table 6: Quality Attributes of Oil Palm Planting Materials.

Attributes	**Un-improved**	**NIFOR Tenera hybrid**
Maturity/time of fruiting (years) (Commercial)	5 – 7 years	3.5 - 5 years
Yield (FFB) Yr 1	3 - 5	15 - 18
Oil yield ha-1	0.5	3 – 3.5

The demand supply gap of spouted nuts and oil palm seedlings are gradually becoming a thing of the past with the rehabilitation of germinators in the Breeding Division of NIFOR coupled with the supply of

two new electricity generators by the Hon. Minister of Agriculture and Rural Development. The Minister ordered 9 million sprouted nuts. The unit is working to achieve this with the production of 300,000 sprouted nuts per batch from a germinator. The nursery unit of NIFOR is in top gear of activity with the establishment of 20,000 pre-nursery seedlings every week. The support services to this unit are nursery poly bags producing companies and fertilizer producer/supply companies. Despite the staff strength of 74 the head of the unit mentioned that the only constraint in the unit is manpower, the workforce the team sees has been over bloated.

A visit to Okomu Oil Palm Company Plc revealed that some large estate plantations are producing sprouted nuts and seedlings without recourse to NIFOR. Okomu Oil Palm Company Plc possesses its own germinator with capacity of 90,000 – 150,000 sprouted nuts per batch. Okomu claimed that their variety has a higher yielding clone with better results than NIFOR Tenera. According to the Managing Director of Okomu, a large intensive nursery has been developed to grow these sprouted nuts before transplanting to replace aging plantation in the estate. The MD is willing to partner with PIND in the planned intervention for the supply of high yielding variety to the pilot clusters.

Likewise Presco Plc, since its establishment in 1991, has remained committed to achieving high quality standards in its processing and improved yield of oil palm. As its modest contribution towards achieving higher yield per hectare, Siat s.a. (the parent company of Presco) in March 2007, signed a Research Support Agreement for high quality oil palm seed selection in Africa with INRAB and CIRAD. The objective of the agreement is to set up an experimental block in Presco. Consequently a new clone has been tested which will be yielding 20 tonnes per hectare. According to Mr. Uday Pilani, the Presco Country Director, any intending intervention by PIND at smallholder farmers/processors level should start with cluster formation, followed by sensitization for the cluster to establish palm plantations with high yielding clones and Presco will be willing to share their new clone with such cluster(s) as its new variety has 25% extraction rate.

Producers

Palm oil is the vegetable oil produced in largest amount having pushed soybean oil into second place in 2004/05. Palm is generally the cheapest commodity vegetable oil and also the cheapest oil to produce and to refine. By reason of its availability and (relatively) low cost, it is an important component of the increasing intake of oils and fats in the developing world. Without the large volume of exported palm oil from Malaysia and Indonesia, there would be a major problem in meeting world demand for vegetable oil. The Tenera variety (a hybrid of Dura and Pisifera) is now generally cultivated. The plant is grown in a nursery for 12-18 months before it is planted in the field where it bears fruit 30 months later and has an economic life of 20-30 years. A mature tree produces 10-15 bunches a year and costs N150 per bunch. These are 10-20 kg in weight and have 1000-2000 fruitlets. Each 10g fruitlet has a kernel (3-8%), which is the source of palm kernel oil. When pressed, the fruitlets give palm oil with an oil extraction rate of ~20% under modern technology. A normal plantation will yield 4t of palm oil/ha/year under good agronomic practices. The best plantations have yields of 7-8 tonnes palm oil/hectare and there is evidence that some are even higher (Lipids library, 2012).

The interaction of the study team with Dr. G.D. Hafer, the MD of Okomu Oil Palm Company Plc afforded the team the opportunity to understand the company's operational performance. The total palm tree plantation in 2011 was 10,080ha, with mature area totaling 8,857ha. The remainder consisted of immature palm, (898ha). Total FFB production for 2011 was 145,334 tonnes which represented an average FFB tonnage of 17 t/ha. This tonnage is the highest yield recorded on the plantation in nearly 25 years and its indicative of management's continued focus on replanting with new clones, strict fertilization regimes and ongoing input management control measures. The oil mill processed 30,538 tonnes of SPO called crude palm oil (CPO) and oil extraction rates averaged 21.01% for 2011 while the CPO prices for

2011 averaged N217,088 per tone (Annual report & accounts, 2011). The present sales price of CPO (SPO) is N220,000 per tone.

In a similar vein the team visited Presco Plc which is a fully integrated agro-industrial establishment with an oil palm plantation, palm oil mill, palm kernel crushing plant and vegetable oil refining plant. The company had recently acquired Rison palm in Rivers State and is planning to acquire a large plantation in Obiora in Imo State. The land area of the company is 70,000ha of which 28,000ha is under oil palm cultivation and 25,000ha are mature. A total of 60,000 tonnes SPO was produced in 2011 which was not enough to meet the demand of the refinery plant. According to PRESCO News, in May, 2011, the 2010 sales of RBDO, Olien and Stearin were 9,273 tonnes, 5,569 tonnes and 1,532 tonnes respectively.

Total area under oil palm cultivation in the intervention pilot states of Imo & Rivers is estimated to be 342,746 hectares, which includes wild groves of very low palm density. Hence, pilot states can be said to account for 23.9% of the Niger Delta Area oil palm area. Of the total 342,746 hectares, only 144,401 hectares (42%) constitute organized plantings of oil palm (of which 124,690 hectares are said to be owned by medium/small farmers while 19,710 hectares are of large estate plantation), the rest being wild groves (58%).

Table 7: Area Under Palm Oil in the Different Production Systems in the Pilot States.

S/N	State	Wild Groves	Medium & Small Holders	Estate Plantation
1.	RIVERS	91,655	57,000	16,300
2.	IMO	106,690	67,690	3,410
	TOTAL	**198,345**	**124,690**	**19,710**

Source: Omoti, 2009 & Field Data

Roche Agric – Imo Palm Plantation.

Wild groves at Ikeduru, Imo state.

Primary Processors

Many of the commercially oriented processors who are developing their own farms have bought small/medium modern process machinery, with a capacity of 20tonnes/day of FFB and can reach an extraction rate of 17%. Although there are peaks and troughs, harvesting occurs all the year round producing a continuous supply of oil. The fruit bunches and fruitlets cannot be stored and extraction must be carried out as soon as possible after picking. At Imo state three clusters of processors are identified along the following factors as summarized in Table 7a:

Table 7a: Factors Differentiating Three Clusters of Imo State Processors.

	FACTORS	CLUSTERS		
		Umuagwo-Ohaji	Ezoirsu-Oguta	Mbaitoli/Ikeduru
1	Large number of farmers and processors	200 producers/millers	101 producers/millers	6 millers/farmers
2	Mill category	-Mini-automated: 1% -Small scale mill: 99%	-Small scale mill: 100%	-Mini-automated: 0.5% -Small scale mill: 99.5%
3	LGA	Ohaji/Egbema	Oguta	Ikeduru
4	Focal location	Umuagwo	Eziorsu	Ikembra, Amaimo, & Inyishi, Awo-Mbieri
5	Organized BMO	Recently organized	Organized and registered	NA
6	Capacity of Mill	Average of 20 tonnes ffb/day/mill	Average of 10tonnes ffb /day/mill	Average of 5tonnes ffb /day/mill
7	Products	TPO and Palm Kernel nut	TPO and Palm Kernel nut	TPO and Palm Kernel Nut
8	Sources of ffb	Imopalm, Risonpalm, leased farms and wild groves	Individual farms and wild groves	Imopalm, Individual farms and wild groves
9	Potential for jobs Income growth	Medium Medium	Medium High	Medium Medium
10	Poverty reduction relevance	Changing from TPO to SPO production with the introduction of mini-automated mill	Changing from TPO to SPO production with the introduction of Semi-automated mill	Changing from TPO to SPO production with the introduction of Semi-automated mill
11	Nature of market – Economic exclusion	Credit facility not accessible and land tenure system limits expansion	Credit facility not accessible land tenure system limits expansion	Credit facility not accessible land tenure system limits expansion

Profitability Analysis of Mini Processing Technology – Umuagwo Cluster as a Case Study

Umuagwo Ohaji is a well-known community in Ohaji-Egbema LGA of Imo state. It is the commercial center for palm oil production in the State. According to the President of Oil Palm Growers Association of Nigeria, the LGA accounts for 40% of the total palm oil production and about 200,000 people are directly or indirectly involved and earning their living from palm oil business in the State. Umuagwo cluster alone accounts for about half of total production from Ohaji-Egbema LGA that is, 20% of State production. The cluster was purposively grouped according to communities making up the cluster and these are Umuezewere, Umuelu, Umuguma and Umuduku. 18 millers were randomly sampled across the aforementioned communities. The result of findings along variables investigated is summarized in the table below.

Table 7b: Variables and Findings for Oil Palm Millers in Umuagwo Ohaji Cluster.

S/N	Variables	Findings	Remarks
1	Age of the millers	67% are in age of 50 years and above 11% are in age bracket of 40-49years 22% are in age bracket of 30-39years	
2	Gender distribution	89% are male 11 % are female	
3	Education of millers	89% were holders of WASC	

		11 % had post-secondary qualification	
4	Finance	83% accessed their capital outlay from personal savings 11% accessed loan from association 6% from micro-finance bank	
5	Sources of ffbs	61% from owned plantation 56% from Imo Palm Plantation 22% from leased farms 22% from neighboring market	Multiple responses
6	Cost of equipment procurement for small-scale mill	Ranges from N426,200 to N615,000	
7	Landing cost of 10tonnes of ffbs	Ranges from N190,000 to N200,000 with average cost of N195,000	N19,500.00/tone ffbs
8	Processing cost for ffbs	N30,305 per 10tonnes	N3,030.50/tone ffbs
9	Palm oil output from 10tonnes ffbs	Ranges from 84 to 92 jerry can of 20kg each with average of 88 jerry cans (1.7tons)	8.8 jerry cans (0.6tonnes) /tone ffbs
10	Mill gate price of Palm oil	N3,500/Jerry can. Therefore, revenue from 8.8 jerry cans =N30,800.00	N175/liter Palm oil
11	Palm kernel nuts from 10tonnes ffbs	22 drums. Each drum after cracking produces 26kg kernel.	57.2kg kernel /tones ffbs

Summary based on 10 tone ffbs:

Total Variable Cost (TVC)	= N225,305 (ffbs cost and processing)
Revenue from Palm Oil	= N308,000
Revenue from Palm kernel nuts	= N17,600
Total Revenue (TR)	= N325,600
Gross Margins	= TR-TVC =N100,295

Observation

In order to increase the revenue earnings of the participants by 20% in the study area, the cluster could be assisted through linkages with fabricators to acquire additional processing equipment to shift to SPO production. Also participants should be more committed to small-scale palm oil producers' cooperatives to make them more easily accessible to facilitate business linkages with secondary processors (buyers) and financial institutions. In Rivers state three clusters of processors were identified along the following factors as summarized in Table 7c:

Table 7c: Variables and Findings for Oil Palm Millers in Rivers State Cluster.

	FACTORS	CLUSTERS		
		ABUA CENTRAL	APOKU ETCHE	Obuoma Cooperative Society, Elele
1	Large number of farmers and processors	7	15	420
2	Mill category	Traditional method	Mini-processing	Mini/medium processing
3	LGA	Abua/Odual	Etche	Ikwerre
4	Focal location	Emighan, Oniebema, Odaga and Otari.	7 communities of Apoku clan	Elele, Umuodiga, Egbeda & Ubimini
5	Organized BMO	Organized but not	Organized but not	Organized and

		registered	registered	registered in 2006
6	Capacity of Mill	Average of 0.5 tonnes ffb/day/mill	Average of 5tonnes ffb /day/mill	Average of 10tonnes ffb /day/mill
7	Products	TPO and Palm Kernel	TPO and Palm Kernel nut	TPO and Palm Kernel
8	Sources of ffb	Individual farms & wild groves	Individual farms	Personal plantation & Risonpalm
9	Potential for jobs Income growth	High	High	Very high
10	Poverty realistic reduction objective	Changing from TPO to SPO production with the introduction of modern mill	Changing from TPO to SPO production with the introduction of Semi-automated mill	Changing from TPO to SPO production with the introduction of mini-automated mill
11	Nature of market – Economic exclusion	Credit facility not accessible	Credit facility not accessible	Credit facility not accessible

Economic Analysis of Mini Processing Technology – Elele Cluster as a Case Study

Elele cluster communities cut across two Local Government Areas of Rivers state, Ikwerre and Emohua; which formed the commercial centre for palm oil production in the state. Ikwerre LGA accounts for 26% of total groves in the state of 3,520,000 oil palm ha, which is nearly 23,466ha according to NTCDU & Rivers State Ministry of Agriculture Survey (1999). Emohua LGA likewise has 4,367ha of wild groves. These wild groves account for 60% of FFBs source to millers in this cluster. Ikwerre LGA is also the host to Risonpalm limited (now SIAT Group) the largest single Oil Palm holding in Africa having 16,000ha in Ubima & Elele out of the total estate of 16,300ha. Elele cluster alone accounts for about half of total production from Ikwerre Emohua LGAs that is, 40% of state production.

This study was conducted in Ikwerre and Emohua Local Government Areas of Rivers State to determine the economic analysis of small-scale palm oil processing in the study area between 20th -22nd August, 2012. The cluster was grouped according to 11 communities making up the cluster but millers from only 6 communities were available for sampling. Forty-four (44) millers were randomly sampled as described in Table 8 below:

Table 8: Randomly Sampled Millers in Elele Cluster Communities.

S/N	Purposive sampled communities of Elele cluster	Millers randomly sampled	LGA	Remarks
1.	Elele	11	Ikwerre	
2.	Omudioga	6	Ikwerre	
3.	Egbeda	3	Emohua	
4.	Ubumini	-		
5.	Omerelu	-		
6.	Ubima	-		
7.	Elele-Alimini	14	Emohua	
8.	Ndele	-		
9.	Rumuji	-		
10.	Obele	8	Emohua	
11.	Iba	2	Emohua	
	TOTAL	44		

The results of the findings based on the selected variables are summarized in Table 9 below:

Table 9: Variables and Findings for Oil Palm Millers in Elele Cluster Communities.

S/N	Variables	Findings	Remarks
1	Age of the millers	34% are in age of 50 years and above 34% are in age bracket of 40-49years 25% are in age bracket of 30-39years 7% are in age bracket of 30-39years	
2	Gender distribution	75% are male 25 % are female	
3	Education of millers	98% were holders of WASC 2 % had post-secondary qualification	
4	Finance	100% gotten their capital outlay from personal savings / Relatives	
5	Sources of ffbs	70% from different farmers 64% from leased farms 27% from neighboring market 18% from owned plantation	Multiple responses

Summary based on I0 tonnes ffbs:

Total Variable Cost (TVC)	= N234,750.00 (ffbs cost and processing)
Revenue from Palm Oil	= N262,500.00
Revenue from Palm kernel	= N33,750.00
Total Revenue (TR)	= N296,250.00
Gross Margins	= TR-TVC =N61,500.00
Gross Margins per 1 Tonne ffbs	=**N6,150.00**

Table 10: Results of Situational Analysis for Rivers and Imo States.

VARIABLES	CLUSTERS	
	UMUAGWO-OHAJI	ELELE
PROCESSING ACTIVITIES OF 10 TONNES FFB: Quartering Filtering/separating Knocking-out of fruitlets i.e. stripping Loading into 5 drums Boiling Milling - Operators	₦ 3,500 ₦ 2,500 ₦ 2,000 ₦ 1,200 ₦ 4,000 ₦ 17,600	₦ 5,000 ₦ 4,000 ₦ 2,000 ₦ 2,500 ₦ 2,500 ₦ 18,750
Total processing cost for Mill owner Total processing cost for Customers	₦ 30,800 ₦ 48,400	₦ 34,750 ₦ 53,500

PRODUCT PRICES: 80Kg Kernel 1 ton Kernel at mill 1 ton Kernel supply price at veg. oil 1 ton Kernel nut 20 lt kegs or jerry cans (T P O) 1 ton of T P O	 ₦ 4,800 ₦ 65,000 ₦ 70,000 ₦ 30,000 ₦ 3,000 - 3,500 ₦ 150,000 - 175,000	 ₦ 4,500 ₦ 56,250 ₦ 65,000 ₦ 29,160 ₦ 3,000 – 4,000 ₦ 150,000 – 200,000
Extraction Rate from 10T ffb: T P O (Tenera) TPO (Dura) Kernel	88 jerry cans or 1,760 kg = **17.6%** 44 jerry cans or 880 = **9%** 600kg = **6%**	75 jerry cans or 1500 kg = **15%** 50 jerry cans or 1000kg = **10%** 600kg = **6%**
Processing cost a lorry load of palm kernel nuts: -Operator -Miller - Loader -Separator Total processing cost Output of kernel from lorry load nuts Therefore, processing cost per 1T kernel	 N.A	 ₦3,500 ₦3,500 ₦3,500 ₦3,500 ₦ 14,000 1,440kg ₦ 9,722
Landing cost of 10 Tonnes ffb (Tenera) Landing cost 10 Tonnes ffb (Dura)	₦ 200,000 ₦ 165,000	₦ 200,000 ₦ 165,000
Harvesting and haulage cost per bunch	-	₦ 100 - 150
Average employment per miller	22 persons (Youth & Women)	11 persons(Youths & Women)
Gender distribution	89% are male 11 % are female	75% are male 25 % are female

To increase the revenue earnings of the participants by 20% in the study area, the cluster could be assisted through linkages with fabricators to acquire additional processing equipment for shifting to SPO production.

Unlike Roche Agric-Imo Palm plantation, the Risonpalm, Ubima estate taken over by SIAT Nig Ltd (Presco) has not started processing ffb into SPO because the large scale processing plant is faulty and not economical to repair. According to Presco MD, ffbs are evacuated on a daily basis from Ubima to Presco, Obaretin estate, Edo state for processing into SPO. Hence, there is currently no processing of SPO in Rivers state. At Abua central cluster in Rivers state the traditional processing method is applied where feet are used to digest boiled fruitlets inside a carved log looking like canoe. In addition to extracting a low amount of oil, this approach is a potential health hazard and creates a significant amount of waste.

Figure 3: A carved log at Abua Central in Rivers where traditional digestion takes place using feet.

Secondary Processors

Secondary processors who are in dire need of SPO also are demonstrating interest in partnering with the smallholders group and are ready to buy as much SPO that the pilot clusters can produce provided quality requirements are met. Golden Oil Industry Ltd. is at the fore front for this request. The company is currently producing at just 30% of the capacity of its processing machinery due to the scarcity of SPO coupled with their policy of non- importation of SPO. Envoy Oil Industry Ltd. and E.O Amobi Group Industry both at Onitsha are also in need of SPO and PKO. Envoy is getting an average of 1,320 tonnes SPO per month enabling the company to operate at 40% installed capacity while EA Amobi Group Industry, with a 50 tonnes PKO installed capacity per day, is averaging 10 off-days per month due to the lack of this raw material. Golden Oil and Envoy oil have integrated plants for production of refined PKO from palm kernel nuts and therefore are open to any supplier with a minimum quantity of 5 tonnes of palm kernel nuts, excluding shells and uncracked palm kernel. Groups of producers/processors with a minimum of 30 tonnes SPO can also supply to any of the two companies as long as moisture content and FFA percent levels are acceptable.

Camela vegetable oil is the only company in Owerri with installed plants for refined PKO and SPO. Their main raw material since inception is palm kernel nut and SPO. The company imports from Malaysia because the new plant requires 100 tonnes of SPO per day to operate at commercial level. The implication is that Camela requires a minimum of 30,000 tonnes SPO per year to operate at a commercial level. Envoy Oil has a supply gap of 15,840 tonnes while Golden Oil has a gap of 37,200 tonnes of SPO to operate at a commercial level. Hence, the secondary processors around the pilot state require about 85,040 tonnes of SPO which is above 50% of current national production.

Like other sectors, the palm oil sector has great potential for growth because of its increasing use as a substitute for other oils and fats hence the need to support and upgrade the various capacities in the production and processing, especially in smallholder groups which benefit all stakeholders.

Markets/Buyers

TPO marketing is concerned with all stages of operation that aid movement of the produce to the final consumer. This includes: assemblage, storage, transportation, grading and financing. The major markets patronized by TPO merchants are Ihiala in Anambra State, Umuagwo in Imo state and Elele, Borokiri, and Mile 1 & Mile 3 in Rivers state. There are wholesale and retail types in both rural and urban centers in the two states. Generally, TPO is transported by merchants from the supply markets in the two states to the demand regions of Northern Nigeria, especially Abuja, Zaria and Kano; as well as Lagos. Lagos

receives most of the palm oil shipped from the supply regions for household and commercial consumption (TPO); and small quantities for industrial use (SPO) from Roche Agric-Imo Palm plantation.

Trends in the Value Chain Map in Imo State

- Traditional processing technology for TPO production (Channel 1) is being replaced by mini processing technology.
- A new category of farmers and processors (including retirees, young businessmen, etc.) investing in mini processing mills is emerging.
- Mini processing mills at Umuagwo cluster are shrinking due to a shortage of ffbs formerly obtained from Imo palm and Rison palm. Only skeletal and unofficial sales have occurred there since November, 2011.
- The Integrated Large Scale Technology SPO (Channel 2), comprised of one estate and processing plant formerly stagnant, shows indications of growth since Roche Agric has taken management of the estate (Ada palm).

Trends in Value Chain Maps in Rivers State

- Rison palm used to process ffb into SPO are currently evacuating ffbs from Ubima to Presco, Obaretin estate, Edo state for processing.
- Due to a faulty plant, no processing of SPO in Rivers state currently exists.
- The small-scale millers in Elele are shrinking due to a shortage of ffbs formerly received from Risonpalm whose management has changed into SIAT Nig Ltd, Ubima Estate. The sales of ffbs to millers stopped in January, 2012.

2.5.2 Availability of Finance

Efforts by the government to diversify the economy through deliberate favorable economic policy incentives for several preferred sectors may not be achieved due to poor credit facilities to these sectors (Businessday News, June 17 2012). This is coming on the heels of a recent report by Renaissance Capital, which showed a sectoral distribution of banking sector loan allocation to agriculture and manufacturing getting a paltry 2% and 10%, respectively, as against what is obtainable in other emerging markets like Ghana and Kenya. In Ghana, agriculture gets as much as 30% and manufacturing gets 28%; in Kenya, agriculture gets 22%, while manufacturing gets 18%.

In order not to underscore the importance of credit facilities in the proposed intervention, the scoping study team visited First City Monument Bank (FCMB) management at the corporate head office. This is because the bank expressed interest in promoting and investing in the oil palm industry. It organized a stakeholder's workshop in Benin City in October 2011. The team informed the Bank of the effort by PIND to develop three agricultural commodities including Palm Oil, Cassava and Aquaculture.

Responding Mr. Kudzai of Agricultural Business Finance Department of FCMB said that FCMB had to firm up concrete policies to finance the agricultural sector of the economy with a special interest in Cocoa, Oil palm, Cassava, Maize, Rice, Soybeans as well as Livestock. He said there is an urgent need to change the orientation of Nigerian farmers from seeing farming as a hobby to adopting a commercial orientation towards farming. He was of the opinion that sustainability can only be ensured in any intervention when Nigerian farmers engage farming as a profitable venture and become willing to engage in the competitiveness of the market.

He revealed that FCMB had started financing agriculture through Off-takers. The Off-takers in turn provide credit to farmers in-kind through the supply of inputs, especially in the South-West geopolitical

zone. The Bank also releases the credit facility to the Off-takers, not by cash, but by paying directly to suppliers of inputs. He defined Off-takers as persons with processing ability.

Finally, since the team noticed the willingness of the bank to invest in the development of the sector, the following proposed steps of action are itemized as follows:

- Identify potential clusters in Rivers and Imo States and rank them on the potential for job and income growth
- Prepare a report and share with FCMB. FCMB can use the report as a guide in further assessment.
- The chosen pilot clusters should be registered with CAC.

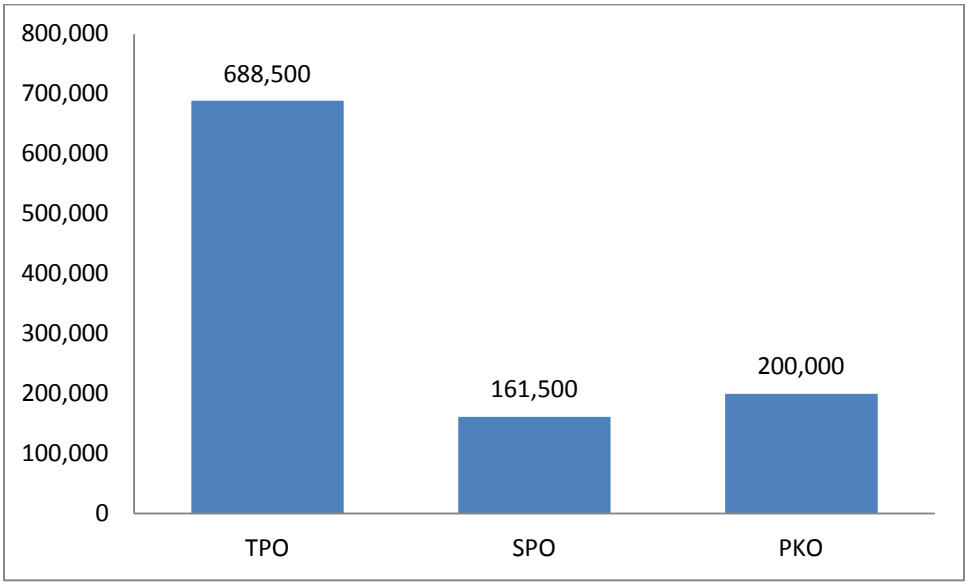
The goal of these actions would be the building of processing capacity of the sector with robust a production base.

2.6 Products

While many products emanate from the oil palm trees – palm oils, palm wine, wood products, the focus of this research is on the oil products and their direct by-products. Three dominant products are Technical Palm Oil (TPO), Special Palm Oil (SPO), and Palm Kernel Oil (PKO), with palm kernel cake and sludge as significant by-products that can be put into the feed industry. Findings from the study have shown that there is a market for mainly 3 major oil palm products in Nigeria:

- 1.) TPO palm oil: Palm oil with free fatty acid between 5 - 30% is acceptable in the local market due to the varied requirement for Nigerian cuisine. The traditional market is served by small scale producers of palm oil which account for more than 81% of local production (688,500 tons).
- 2.) High quality SPO: The minimum requirement for SPO is an FFA of less than 5%, which can be further refined to RBDO and other fractionated products such as olien and stearin. The present production by medium and large estate is put as 161,500 tonnes.
- 3.) Palm Kernel Oil which has been growing in demand over the years for the industrial market: The Nigeria present production is put at 200, 000 tonnes.

Figure 4: Distribution of production data of oils from Oil Palm in 2011 (Source: Scoping study).



During the scoping study, the team discovered that free fatty acid (FFA) which is used as a quality parameter has categories - inherent FFA and induced FFA. The attaining of less than 5% FFA by smallholder farmers/processors is a herculean task due to the level of hydrolysis needed after harvesting prior to processing. The group indicated that based upon available technology at their disposal, water hydrolysis still takes place which builds up FFA. Possible solutions to the issues associated with FFA are summarized below:

- Clustering of smallholder farmers/processors
- Facilitating installation of appropriate SSPE for the cluster
- Guaranteeing of appropriate pricing for the industrial needed SPO
- Training and enlightenment for the cluster participants to know that palm oil quality starts from the plantation.

The team also discovered that a good palm oil has 50:50 fractionation proportions of palm olein and stearin. Olein has a close resemblance to palm kernel oil; red palm olein is more stable than kernel oil. The ideal output of RBDO from 100gm of SPO with 2% FFA is 90%. At a commercial level the Golden Oil Industry Ltd. revealed that the ideal extraction rate of SPO with about 5% FFA to RDBSPO is 92%.

During the situation analysis with secondary processors especially Golden Oil, Envoy Oil, EA Group Industry and Camela Vegetable Oil, the use of palm kernel nuts as one of the key raw materials was confirmed for the production of PKO & PK cake. The PKO is thereafter refined into RDPKO and Fatty acid.

2.6.1 Additional Products

Apart from palm oil, palm kernel and palm kernel oil which are the main products of the oil palm, the tree and the processing wastes generated when the fruits are processed to obtain palm oil and palm kernel have several uses. The sludge is used in making traditional soaps and fertilizer and the PK cake is used widely as an input into the feed industry and for fertilizer. The processing wastes include: empty bunch refuse, fibre, shell, sludge and mill effluent which constitutes about 74% – 76% of the total mass of the oil products. The majority of this waste is dried and burned as fuel for processing.

2.7 Production Process, Machinery, Tools and Equipment

2.7.1 Production Process

Palm oil is extracted from fresh fruit bunches (ffb) by a mechanical process, where a mini-mill or medium processing mill is used. An average size ffb of Tenera weighs about 10-20kg and contains 1000-2000 of fruit (Figure 5). The ffbs are harvested according to harvesting cycles, and are supposed to be delivered to the mills on the same day for production of SPO. The quality of crude palm oil is dependent on the care taken after harvesting, particularly on the handling of the ffbs.

Figure 5: Quartered fresh fruit bunches waiting for processing at palm oil mill.

A palm oil mill produces crude palm oil and kernels, as primary products and biomass as a secondary product. The capacity of mini-processing mills varies between 10- 20 tons ffbs/day in identified clusters. A typical automated mill has many operational units as shown in Figure 6. This comprises sterilization, stripping, digestion and pressing, clarification, purification, drying and storage. For the kernel line, there are steps such as nut/fibre separation, nut conditioning and cracking, cracked mixture separation, and kernel drying, and storage. The dried kernels are often sold to palm kernel crushers for extraction of crude palm kernel oil. In some integrated plants, kernel crushing facilities exist side by side at the same complex.

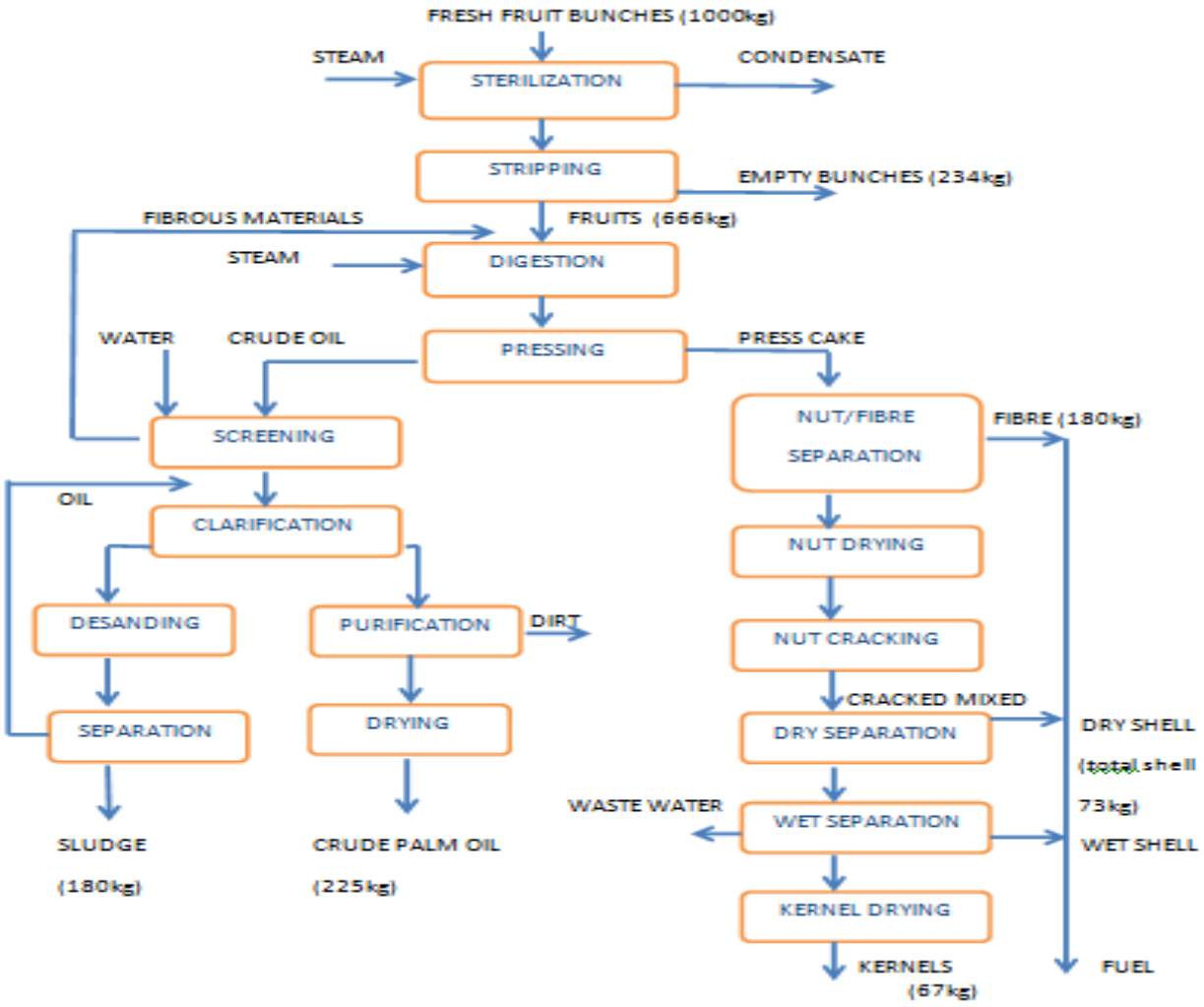


Figure 6. Flow chart for the palm oil process (Sivasothy, 2000).

This flow chart is for production of SPO provided the ffb arrives at the mill within 24 hours of harvesting. This scenario though is not found in all clusters visited and surveyed. The situation analysis revealed that in the cases of the clusters surveyed there was no stripping and clarification in the flow chart and that the palm kernel flow line is conspicuously missing but manually done by women. Since ffb is processed an average of 6 days after harvesting the only crude palm oil output is TPO, but the miller still called it high grade palm oil.

This was the case in most of the small scale mills visited including 80% of the mills in Umuagwo cluster, 100% mills in the Ngor Okpala cluster and 86% of the scanned mills in Ikeduru cluster. All the components of the medium mills are present in the small-scale mills but in disjointed form which increases the labour requirement for their operation. The findings from the field show that 3 persons are the active participants in the medium mill during operation while 6 persons are in the small-scale mill. Since ffb is processed on average 7 days after processing the only crude palm oil output is TPO. The millers however assumed it was SPO and thereby only referred to the 2nd pressed output palm oil as TPO.

Therefore, upgrading and up-scaling are required in the two categories of mills so that full flow chart of palm oil processing will be achieved leading to the production of much needed SPO.

Figure 7: Small-scale mills at Umuagwo cluster, Imo State.

2.7.2 Processing Equipment and Operation

As part of the scoping study, the team visited NIFOR and examined all sections of the institute. The observations made at the Engineering Division are highlighted below:

- NIFOR has three different versions of the small scale processing equipment (SSPE) tagged NIFOR small, medium and large, respectively. The latest technology adopted which is regarded as “NIFOR large” consists of a machine with operations described as follows:
- The palm fruit screen removes the calyx and other fibre materials from the fruit;
- A sterilizer of 500kg of fruit capacity capable of sterilizing whole or quartered bunches sterilizes the fruit to soften the mesocarp for easy digestion and oil extraction;
- A bunch/quarter stripper strips fruit from sterilized bunch/quarters or fresh quarters;
- A digester screw press of 1.5ton/hr capacity of fresh fruit bunch (FFB) digests the sterilized fruit and extracts the oil;
- A clarifier of with a capacity 1.5 ton/hr of FFB clarifies the oil to remove sludge and water;
- An oil storage tank stores the clarified oil;
- A nut fibre separator of 1.5 ton.hr of FFB separates the nut from fibre after extracting the oil;
- A sludge-fibre-shell bracketing machine condenses the mixture of sludge, fibre and shell as briquette for producing fuel material for firing sterilizer and clarifier.

Empty fruit bunches or quarters are used for mulching in oil palm plantation particularly for the small palms; they are also used for making ash for the soap industry. A scientific report stated that the quality of oil from the processed moderately and fairly ripe bunches are as follows:

Table 11: Quotations for NIFOR Small Scale Processing Equipment.

	Equipment	NIFOR Large	NIFOR Medium	NIFOR Mini
1.	Component /Unit	i. Two large sterilizer	i. Two medium sterilizer	ironed medium sterilizer
		ii. One rotary fruit	ii. One rotary	ii. One rotary

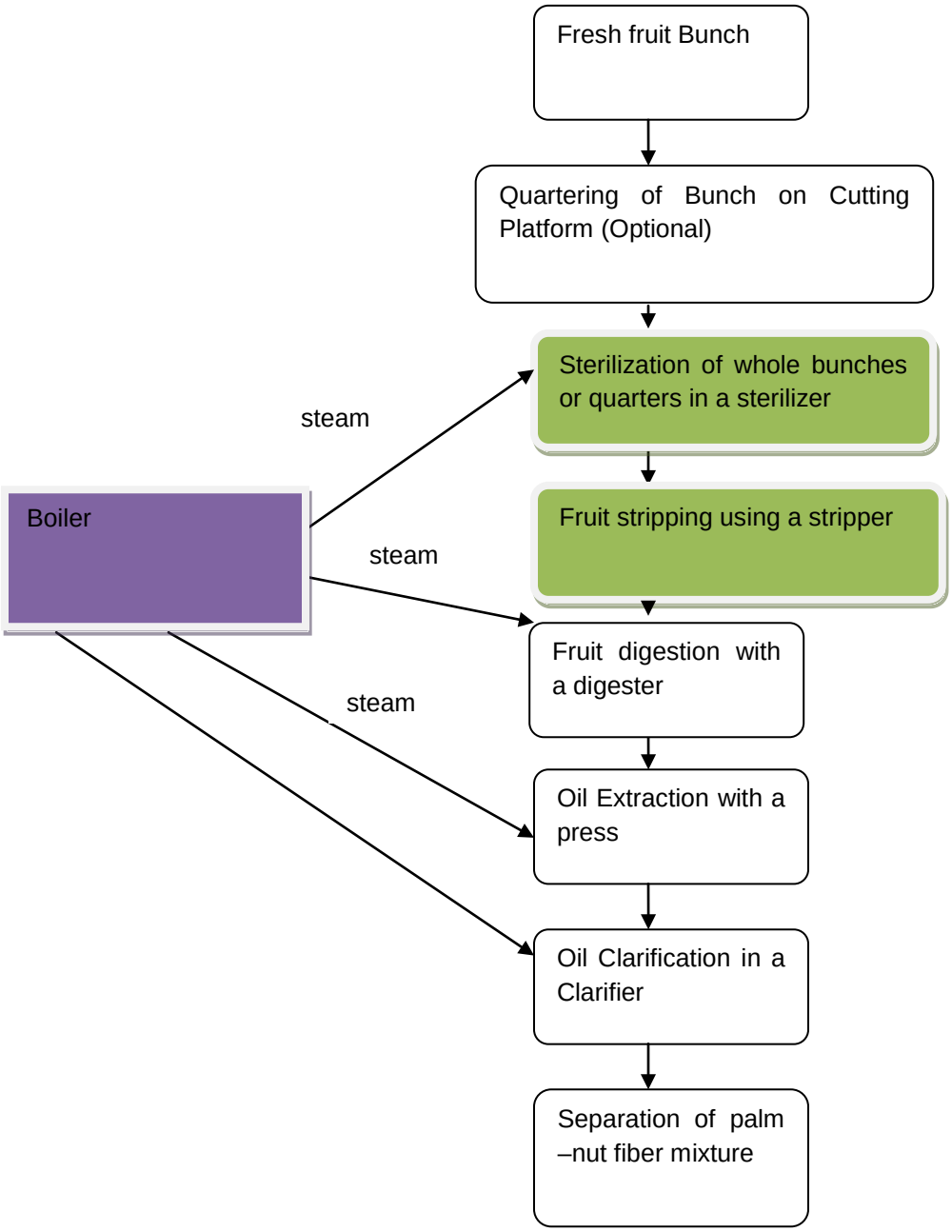
		screen	fruit screen	fruit screen
		iii. One digester screw press	iii. One digester screw press	iii. One horizontal digester
		iv. One large clarifier	iv. One Medium clarifier	iv. One pillar press
		v. Four chimney extension	Three chimney extension	v. One mini clarifier
2.	Price	₦2,962,500.00	₦1,910,866.00	₦995,139.00
3.	Capacity	5 tonffb/hr	1.0 tonffb/hr	0.25 tonffb/hr
4	Farm Size	50-100 ha	20-50 ha	Less than 20 ha
5	Accessories	i.8 hp diesel engine or 6.5 kW electric motor about(N150,000.00)	Same as NIFOR large	Same as NIFOR large
		ii. Foundation railings and other installation accessories (N97,000.00)		
6.	Completion time	16 weeks	12 weeks	7 weeks
7.	Man power requirement	9	7	7

Table 11a: Numerical Assessment of the Fabricators.

Fabricator	Location	Skill and knowledge of fabrication work	Knowledge and skill of processing machines	Prev work	W/shop	Tech Educ.	No. of personnel	Financial Capability	Timeliness of job delivery	Proximity	Acceptability	Potential for Upgrading of machine	Interest in M4P	Total (60)
NIFOR	Benin City	5	5	4	5	5	5	4	2	1	0	5	4	45
Hytech	Owerri	4	3	3	2	5	2	4	2	5	2	3	3	38
Basicon	Owerri	5	5	4	4	5	4	3	4	5	4	5	4	52
Vico	Owerri	4	4	4	3	4	3	4	3	5	5	5	4	48
Mathew	Elele PH	2	2	1	1	1	1	1	1	5	4	1	1	21
Eche (Dennis) Co.	Elele PH	3	3	2	2	1	2	2	2	5	2	2	2	28
Happy welder	Aba	2	2	1	1	1	1	1	1	3	1	1	0	15
J.J. Co.	Aba	2	2	1	1	2	1	1	1	3	1	1	0	16
Ere Beloved Int. Fab.	Aba	5	5	3.5	3	5	4	4	2	3	3	5	4	46.5
Integrated System	P/H	3	3	3	3	4	3	3	2	4	3	3	3	37

It is evident therefore that Basicon will be most suitable as a fabricator for processors in Owerri, followed by Vico while Erebeloved (Prince) will be the best for processors in Rivers State. The likes of Prince can also be sought in Aba for future purposes.

Figure 8: SPO production flow chart.



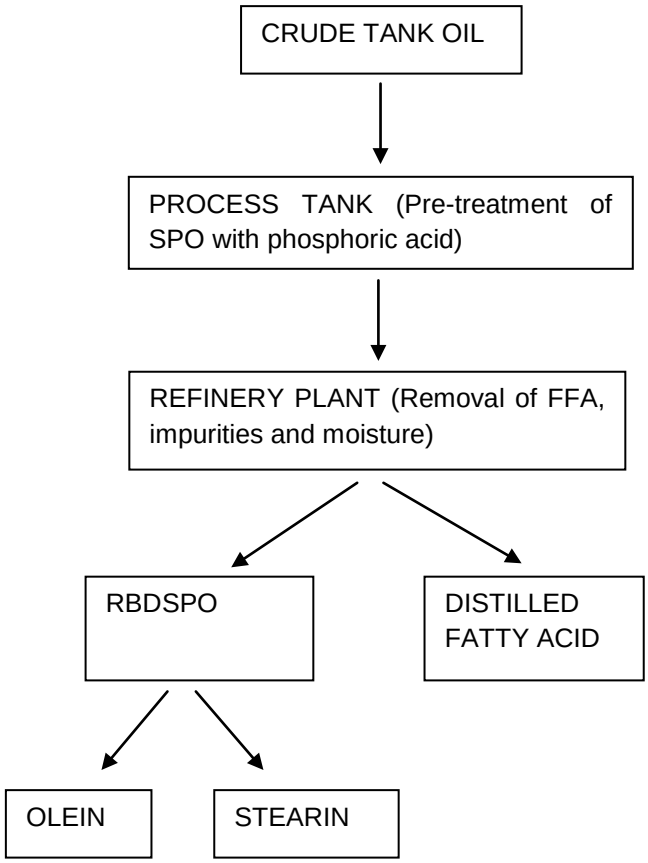
2.8 Income and Value Addition

The oil is generally refined, bleached, and deodorized (RBD oil) and much of it is fractionated to create palm olein and palm stearin which extends the oil's usefulness and value. Palm oil is widely used in the food industry. Palm olein is used as a frying oil and palm stearin as hardstock in the production of spreads and cooking fats. A mid-fraction also produced during fractionation is used as a cocoa butter

equivalent (CBE). Palm oil is being used increasingly for non-food purposes. In 2000/01 when production was 24.3 million tonnes, 3.5 million tonnes (15%) were used for industrial purposes. Ten years later in 2010/11 those figures rose to 47.9 and 12.1 million tonnes (25%). If or when palm biodiesel becomes a widely traded commodity, the proportion used for industrial purposes will rise further. Palm oil is a source of valuable minor components, particularly carotenes (especially α- and β-carotene) and tocols (especially the tocotrienols) (Lipids library, 2012).

The team's visit to Golden Oil Industry Ltd. provided an opportunity to observe the procedure of value addition as the supplied SPO is received by the company.

Figure 9: Secondary processing of SPO to its derivatives.



2.8.1 Palm Oil Price Progression in Nigeria

The value addition of TPO and SPO along with technology of production and sources of ffb is contained in Table 11 below:

Table 12: Value Addition of TPO and SPO with Production Technology and FFB Sources.

		Value addition
RBD Bulk	N270,000/Tonne	8%
SPO (Secondary Processors)	N250,000/Tonne	4%
SPO Wholesale	N240,000/Tonne	14%
SPO Bulk	N210,000/Tonne	17%
SPO at the mill	N180,000	50%
FFB at mill	6 tonnes ffbs Tenera needed to produce a tonne of TPO at N20,000 per tonne. Improved processing with extraction rate of 17%. Hence, N120,000	
	Medium scale processing mill	

		Value addition		Value addition
TPO Retail	N260,000/Tonne	13%	N260,000/Tonne	13%
TPO Wholesale	N230,000/Tonne	5%	N230,000/Tonne	5%
TPO Bulk	N200,000/Tonne	18%	N200,000/Tonne	18%
TPO at the mill	N175,000/Tonne	5%	N175,000/Tonne	46%
FFB at mill	11.1tonnes ffbs Dura needed to produce a tonne of TPO at N15,000 per tonne. Traditional processing with 9% extraction rate. Hence, N166,500		6 tonnes ffbs Tenera needed to produce a tonne of TPO at N20,000 per tonne. Improved processing with extraction rate of 17%. Hence, N120,000	
	Traditional processing		Mini processing mill	

It can be seen from the table that value addition from traditional processing mills ranges from 5% to 18% for different actors from Dura ffb. Most of the actors add value in the range of 11.5%. This is including their cost of operation and does not represent the profit that they make. For mini processing mills using Tenera ffb, value addition ranges from 5% to 46% for different actors as indicated in the table above. Most of the actors add value in the range of 25%. This includes their cost of operations and does not represent the profit that they make. In the case of medium processing mills for SPO, the value addition ranges from 4% to 50% for different actors and most of the actors add value in the range of 27%.

2.9 Growth Potential and Opportunity

The Nigerian oil palm industry produces both low and high quality palm and palm kernel oil. Together these account for 74 percent of total vegetable oil consumption in the country. The burgeoning domestic market requires an annual importation of about 300,000 – 500,000 metric tonnes to meet the shortfall in supply. About 20 percent of the oil produced is considered to be of high quality and passes 17 quality tests that make it exportable. Nevertheless, the domestic market prefers the 'tangy taste' of locally produced oil, which contains a high amount of free fatty acids (FFAs) and has high iron content.

According to Mr. Udai Dvibedy, Golden Oil Industry Ltd. Managing Director, Nigeria imported 1,000,000 tonnes of SPO and its derivatives in 2011 as a result of the significant gap between demand and supply. This shows a 100% increase in importation compared to previous years (2008 -2010). This opportunity is driving the proposed interventions being planned for pilot clusters in Imo and Rivers States.

2.10 Trade Association and BMOs

2.10.1 Association of Palm Oil Dealers & Sellers (APOD), White Sand Market, Otto, Lagos

Palm Oil demand is primarily driven by the household consumers who prefer the technical palm oil (TPO) because of its flavor profile, but it is complemented by an increasing demand for the special palm oil (SPO) to meet the needs of industrial processors. The association's depot is approved by the government as a Palm Oil focus point in Lagos. A focus group discussion was conducted with representatives of the association during the scoping study. Following are summaries of key information:

- The supplies of Palm Oil to the depot are mostly from Akwa-Ibom, Imo, Anambra, Ebonyi, Delta, Edo and Ondo States of Nigeria. Supplies are also received from Ghana.
- The frequency of supply from the aforementioned states is twice a week especially from August to December.
- Any dealer bringing Palm Oil to the depot must be registered with the association and the person will be screened before the oil consignment.
- The association has a governance structure that usually comes out through election. The constitution of the group specified three years tenure for all elected posts though there is possibility of a 2nd term.
- The main source of funding of the association is a levy on every drum of Palm Oil brought into the depot which is set at N400. The money is shared by the shop owner, labour for off-loading, and the rest for the management of the association.
- There is no restriction to the quantity a dealer can supply to the depot and hence a 'quota system' does not apply.
- The price of Palm Oil in the depot is between N38,000 and N40,000 per drum while 25lt keg attracts N4,500 only. Sales per month from the depot average 1,000 drums while quality verification is carried out by taste and observation.
- The major customers that usually visit the depot are owners of restaurants, fast foods outlets and retailers. In the 1990s PZ, Lever brothers and Dealers from Ghana were patronizing the depot but this is no longer the case.
- Within the executive committee there is task force that handles grievance issues.
- There are a number of activities or benefits within the association that encourage team spirit and peaceful co-existence such as training opportunities for members being organized by

SON and NAFDAC, welfare packages for members at the end of the year and social ceremonies.

- Membership strength is about 200, comprised of 140 males and 60 females. A new member is expected to pay N30,000 in registration fees and also bring drinks to the association.
- The association has registered with the Federal Ministry of Trade and Commerce, CAC, Lagos State Ministry of Chieftaincy Affairs as well with PODA under NLC.

2.10.2 Elepo-Lo-Lere Association, Oyingbo Market, Lagos

The Elepo-lo-lere Association is an umbrella body of all retailers in the market. Their primary product is Technical Palm Oil (TPO). These retailers sell and showcase palm oil products for consumers to purchase and oversee marketing information and pricing for palm oil among members. The main forces driving the increased demand for TPO palm oil in Nigeria includes the increasing household consumption of palm oil due to increased income, changing consumption patterns that allow for purchasing more fast food, and an increasing demand from the primary food processing industry. The executives of the association were interviewed to gather information relevant for this scoping study. The following key points were taken from the interviews:

- Suppliers of their product are from Calabar, Osun and Ondo States.
- They have a membership of 50 individuals, 45 women and 5 men. N200 is a compulsory fee payable during the meeting day used to run the association. In addition, there are 'esusu' group contributions depending on individual capability. Each member pays a daily levy of N20 to local government officials. Charges of N1,500 are made for purchasing meeting venues, paid every meeting day. Admission of new members is N10,000 and 1 packet of biscuits.
- The acquisition cost for 25lt keg is N5,000 while a drum of TPO is sold at the price of N40,000. The association sells an average of 70 kegs daily.
- There are existing dialogue mechanisms and /or grievance management processes within the group through the executive officers referred to as 'Police".
- If any customers report purchasing adulterated oil from members of the group and it is ascertained, the consignment will be seized and the customer will get a refund.
- The activities within the group that encourage team spirit and peaceful co-existence are price stability, credit to members in proportion to their contribution and social responsibility to members during one ceremony or the other.
- Palm oil is very important as an income generator for women in Nigeria as confirmed by this association in which 90% of members are women.

2.10.3 Oil Palm Growers Association of Nigeria (OPGA)

This is the umbrella body of smallholder farmers and processors in the oil palm producing belt comprised of 24 states in Nigeria. The President of the group, Igwe Hilary E. Uche received the team to their headquarters office at Small holder Unit, Old ADC Office, Nekede road, Opposite Zoo, Owerri. He said due to the recognition the Federal Government has accorded the group, he is included as member of the Oil Palm Transformation Committee set up by the Hon. Minister of Agriculture and Rural Development. The group has successfully organized all oil palm farmers in all the producing states under the state coordinator. Each state also has LG or cluster coordinators with the names of members written along with their farm locations.

In addition, the group has successfully conducted a survey of all palm trees, plantations, and wild groves and their utilization level during harvesting time. It was discovered that 50% of ffb was wasted in the bush and rots away because of the lack of labour to harvest the ripe ffb and the traditional method that is used. They insist their main challenge lies with the acquisition of "Adjustable Harvesters" which come in two versions, one 8-15 feet and the other 16-20 feet. From the market survey, each Adjustable Harvester will cost about N500,000. According to the President, the availability of the harvesters will solve major problems confronting the sector in producing SPO because this will ensure timely harvest of adequate ffbs. He also revealed that about 4 million Nigerians are involved in palm oil business nationwide along the value chain functions and about 200,000 of them are in Imo state.

OPGA is partnering with a London based firm entitled "International Trade and Financial Investment" for the production of oil seeds in Nigeria. The Imo State government has expressed interest in the arrangement and is providing some portion of land where the company will operate in a tripartite MOU between OPGA, the UK firm and the Imo State government.

The firm promised to work with the cluster of farmers/processors and even use the sludge to generate electricity to the cluster. The firm will also train Nigerian youth graduates and technical school leavers as part of its workforce and to ensure technology transfer. The PIND scoping study team requested the following from the President of OPGA:

- To participate in the meeting with the Italian firm on their arrival since their vision is in line with PIND's intervention plan
- List of OPGA state coordinators and a list of farmers/processors in Imo and Rivers states
- List of reliable fabricators in Imo and Rivers states

The team communicated a proposed visit to the clusters and was assured that this engagement would be available in the future.

2.10.4 Vegetable Oils Producers Association of Nigeria (VOPAN)

The association which was established in 1999 has 125 members across the country with headquarters in Owerri. Due to a fire inferno that engulfed the secretariat along Orlu road, Owerri is the temporary head office located at Camela Vegetable Oil Company Ltd., Owerri.

The association was the brain behind the ban of vegetable oil importation during the Obasanjo regime and also ensured a high import duty after the lifting of the ban to protect the domestic market. Presently VOPAN is fighting the abuse of ETL and has petitioned the Minister of Finance for the cancellation of Presidential waiver for Abdulsalm Rabiu to import vegetable oils into the country. The VOPAN Onitsha branch pressured the Anambra state government for provision of social infrastructure such as roads and electricity. The government responded with the construction of the harbor industrial road that links most of them in Onitsha while promising to give them special consideration for power as soon as possible.

2.11 Female Participation in Palm Oil Sector

There is significant female participation at all stages of the value chain for palm oil production in Nigeria, exemplified in Imo and Rivers states. Women are also involved at the processing level, some input production (nursery of seedling), controlling of the retail market and part of the administration of secondary processors. The table below shows the level of participation:

Table 13: Female Involvement at Different Levels in the Palm Oil Sector.

Function in the Value Chain	Percentage of Female Actors	Types of Work Performed
Input supplies	20%	-Nursery development
Production	25%	-Gathering of ffb -Cultural operations
Processing	45%	-stripping -Fibre separation from kernels -Boiling of fruits -Filling of kegs with palm oil
Aggregation & Wholesaling	10%	- Agents -sales
Retailing	90%	-Sales

Source: Scoping study field data.

Women's involvement in Lagos is primarily in sales, administration and end-user companies.

A women owned mill in Umuagwo Ohaji, Imo state.

Women working in fibre separation at the mill.

2.11 Constraints in the Palm Oil Sector

The study team consulted a number of secondary reports including the palm oil value chain in the Niger Delta report (2011), a number of previous reports done by various consultants for UNIDO, CBN and World Bank. A range of value chain actors in different parts of Nigeria (Lagos, Benin, Onitsha, Ibadan, Owerri, P/Harcourt and Aba) were consulted to identify the issues and constraints that they are facing and the opportunities in the market. A validation workshop was conducted on August 28, 2012 in Owerri, Imo State to fine tune some of these issues, constraints and opportunities. Participants include actors from various value chain functions including end users, secondary processors, and primary processors/farmers. Other stakeholders like the financial institutions and fabricators were also in attendance. The identified constraints and their explanations are as follows:

Table 14: Constraints in the Niger Delta's Palm Oil Sector.

CONSTRAINTS	EXPLANATIONS
Shortage of FFB supply to millers in	Clusters in the area largely dependent on FFB supply from Imo

Umuagwo and Elele clusters resulting in 4 months of idle period of the mills	palm and Rison palm. However the recent privatization of the estate meant that the refinery was resuscitated. Harvested FFBs are now processed by the company as opposed to the former practice of outright sales of FFBs to neighboring small scale millers
Unavailability and high cost of hiring climbers leading to loss of about 50% of FFB available for processing	Youths, who were previously engaged in the harvesting of FFB are no longer interested in the job. There is also a lack technology for harvesting. This meant that harvesting of bunches cannot take place as and when due, resulting into losses.
Unavailability of technology and equipment for processing SPO resulting in the millers not maximizing their resources	The current situation is that millers resort to processing their FFBs to TPO. They achieve this by allowing FFBs stay 3 to 7 days prior to processing, during which time fermentation had occurred. The general reason for this is the lack of awareness of the premium for SPO production and the non-availability of technology for its production.
Lack of awareness among the millers of the gains in SPO production and inadequate knowledge of the technology for SPO production	
Lack of finance for the purchase of improved processing equipment preventing millers from additional potential income from producing SPO	Some of the processors recognize the benefits of engaging in SPO production. However they complained of lack of capital and the high cost of procuring the equipment
Lack of information and linkages to end users and secondary processors of SPO making the millers lose out on the opportunity to meet supply gap	The supply gap of over 350,000T of SPO is currently met by import. Yet the local millers are not able to key into the opportunity
Presence and the role of middle men limit the amount of income that can be earned by the millers	Most of the millers in the clusters are keen to sell their products at competitive price due to their cash flow needs. Wholesalers and middlemen who buy the goods off them get the benefits in terms of high prices and profit
Lack of storage facility for the producers meant they cannot take advantage of seasonal variation in prices	The lack of adequate storage facility lead to the product prices being dictated by middle men, making the millers earn less income
Inadequate safety and health environment endanger the health and safety of the operators and cause health hazards	Most of the mills visited do not meet minimum health and safety standards. There are no safety precautions observed among the operators

2.12 Safety and Environmental Interventions

The Nigeria Vision 20:2020 encapsulates the key principles and thrusts of the National Economic Empowerment and Development Strategy and the Seven Point Agenda (2007 – 2011), situating both within a single, long term strategic planning perspective. Fundamental to the Vision are two broad objectives – optimizing human and natural resources to achieve rapid economic growth, and translating that growth into equitable social development for all citizens.

Consequently, any intervention for smallholder farmers/processors, adequate water and sanitation facilities at milling sites and clusters, cannot be over-emphasized. If Nigeria wishes to comply with the rest of the oil palm producing countries, the domestication and adoption of the Principles and Criteria of the

Roundtable on Sustainable Palm Oil (RSPO) should be considered. As a result of the findings from the oil palm scoping study, the envisaged environmental issues/risks are summarized below along with proposed mitigations:

Table 15: Environmental Issues and Proposed Interventions.

s/n	Environmental Issues	Proposed Intervention
1.	Gradual destruction of natural resources and biodiversity due to replacement of wild groves with improved high yielding varieties	Protecting environmental and natural resource depletion through selective replacement of wild groves within farmers' own portion of farmland (that is, 150 stands yearly at three years interval) and intercropping of oil palm seedlings with leguminous cover crops. Conducting an informed environmental perspectives of the area by undertaking social and environment impact assessments before establishing new planting areas
2.	New plantation establishment may increase erosion problem due to clearing of natural forest	
3.	Significant greenhouse gas emissions in the atmosphere resulting in health hazards to human beings and animals	Reducing the effects of greenhouse gas emission on the environment through selective clearing of farmland and transplanting of oil palm seedlings within partially cleared land
4.	Sludge disposal may create air and water pollution which could lead to water and airborne diseases like diarrhea and cholera	Reducing effects of sludge disposal through appropriate channeling of sludge to serve as component of compost organic fertilizer
5.	Emission from boiler furnace can cause air pollution resulting to possible health hazards	Appropriate channeling of Exhaust from the boiler through the chimney and ploughed back to preheat the incoming fresh air thereby improving the efficiency of the furnace-boiler system.
6.	Heaping and decaying of empty fruit bunches, shell & fibre can lead to environmental nuisance	Empty fruit bunches, shell and fibre which are usually underutilized and form heaps in processing centers (and hence constitute nuisance) in the mini-technology being used by the processor. These byproducts can serve as fuel in the new technology as well as serve as fertilizer resulting in less degradation of the environment.

Strategy for Developing the Palm Oil Sector

The development of the palm oil strategy is structured as an inclusive, participatory, and transparent process to provide an in-depth analysis of the palm oil sector and to state issues and options for PIND's future engagement. As an integral part of the strategy development process, the views of diverse stakeholders on key challenges and opportunities facing the palm oil sector were sought. The result serves as a framework and a set of principles for guiding PIND's future engagement in the palm-oil sector, including specifying investment and advisory interventions that can maximize development outcome for communities and minimize adverse social and environmental impacts.

3.1 Vision and Strategy

By 2015, with PIND's project interventions, the special palm oil sector will be able to move from the current market share of 32% up to a 40% market share. This increase will translate to additional market size of N24.6 billion if the current gap/opportunity of 94,860t is met. Meeting the gap requires the participation of 387 small scale millers with an average milling capacity of 245t per annum. With the availability of over 700 millers in the Imo and Rivers States area and with the possibility that about 50% of them will participate, the vision looks plausible. This vision will be achieved by focusing on:

- The production of Special Palm Oil which currently attracts about 40% premium more than the Technical Palm Oil by improving knowledge sharing and better coordination among palm oil actors.
- Harnessing the opportunity of meeting 94,600t of SPO, which is the present gap in the local supply of SPO through the introduction of SPO processing equipment and access to finance.
- Capturing additional market share from the current 350,000t currently met by importation by fostering linkages of millers in the target states to secondary processors.

Table 16: Business Case for Upgrading TPO Processors to SPO Processing.

	Items	Quantity /Revenue
1	Total SPO Demand	511,500 Tonnes
2	Total Local Production	161,500 Tonnes
3	Total Importation	350,000 Tonnes
4	Shortfall of Secondary Processors to be filled by local supply	94,860 Tonnes
	Miller capacity and number of millers for annual production of 94,860 tones SPO (@ 17% Extraction Oil Report)	
5	Each miller processing 1.7 tonnes SPO/day and operating at 3days in a week	5.1 Tonnes
6	Each miller: 1.7 tonnes/day x 3days/week x 4 weeks /month	20.4 Tonnes
7	Each miller: 20.4 tonnes/month x 12 months/year	244.8 Tonnes
8	Total number of millers required to produce 94,860 tonnes	388 processors
9	FFBs requirement to produce 94,860 tonnes SPO	558,000 Tonnes
	Turnover of Miller	
9	Total turnover of each miller is 244.8 tonnes x N260000/tone	N63,648,000.00
10	Total turnover for all the 387.5millers	N24,663,600,000.00
11	Market size for the local supply	N24.7 billion
12	Import size: 350,000 tonnes x N 240,000.00/tonne	N84.0billion

3.2 Suggested Interventions

Based on the situation prevailing in the market and identified constraints, the team came up with one or more interventions for each of these constraints with probable implementation partners for these interventions. These interventions were identified based on the discussion with the value chain actors, experience of the scoping team and team discussion.

Table 17: Constraints, Suggested Interventions and Probable Partners.

Value Chain Functions	S/N	Constraints	Suggested Interventions	Probable Partners
End markets	1	High supply - demand gap of SPO for key end market users forcing end marketers to meet supply gap through importation	- Awareness creation among small scale millers in Imo and Rivers clusters of the commercial gains in SPO production - Linkages between millers in Imo and Rivers State to secondary processors in Owerri, Port Harcourt and Onitsha	Indomie Noodles, Lagos; Honeywell Noodles, Lagos
Secondary processing	2	Lack of working capital to meet raw materials supply needs and inability of the local primary processors to meet SPO supply requirements and standards resulting in the secondary processors operating below their installed capacity		Golden Oil, Onitsha; Envoy Oil, Onitsha; Camela Oil, Owerri; E.O. Amobi Oil, Onitsha
Processing	3	Unavailability of technology and equipment for processing SPO resulting in the millers not maximizing their resources	Access to processing equipment (including Stripper and Whole Bunch Sterilizer) for SPO production	Basicon Engineering Company, Owerri; Vico, Owerri; Erebeloved, Aba
	4	Lack of awareness among the millers of the gains in SPO production and inadequate knowledge of the technology for SPO production	Awareness creation among small scale millers in Imo and Rivers clusters of the commercial gains in SPO production	Secondary Processors; Millers; Fabricators; Banks
	5	Lack of finance for the purchase of improved processing equipment preventing millers from additional potential income from producing SPO	Access to finance for working capital and purchase of processing equipment	Diamond Bank; FCMB Bank; First Bank; USADF/DDI
	6	Lack of information and linkages to end users and secondary processors of SPO, making the millers lose out on the opportunity to meet supply gap	Linkages between millers in Imo and Rivers State to secondary processors in Owerri, Port Harcourt and Onitsha	Secondary Processors; Millers; Fabricators; Banks
	7	Lack of storage facility for the producers meant they cannot take advantage of seasonal variation in prices	Introduction to new storage facility to take advantage of economies of scale and take advantage of seasonal variations	6 selected Clusters of Millers in Imo and Rivers

Production	8	Shortage of FFB supply to large number of millers in Umuagwo and Elele clusters resulting to 4 months idle period of the mills	Introduction of new improved seedlings for propagation of new plantation	Imo State Ministry of Agric; Rivers State SDA
	9	Unavailability and high cost of hiring climbers leading to loss of about 50% of FFB available for processing	Access to improved harvesting technology to reduce harvesting time of the FFBs	Imo State Small Holder Unit
	10	Difficulty in getting highly improved seedlings other than NIFOR Tenera, and high cost of fertilizers and herbicides limit the farmers yield	Access to improved seedlings and inputs by linking farmers to Presco Plc & Okomu	Presco, Okomu, Imo Palm, Notore
	11	Inadequate safety and health environment endanger the health and safety of the operators and cause health hazards	Embedded in all interventions above Develop market for occupational health and safety training in Delta states.	

Table 18: Activities Required to Implement Suggested Interventions.

Strategic Intervention Area	Suggested Intervention	Activities for Implementation
Ensuring increased and effective linkage and coordination among different actors in the value chain	Awareness creation among small scale millers in Imo and Rivers clusters on the commercial gains in SPO production	-Identification and selection of value chain actors for the meeting including secondary processors for possible partnerships -organize match-making meeting between secondary processors, end-users, banks, fabricators, and small scale millers / farmers - Follow up periodical meeting(s) to ensure the coordination is taking place
	Linkages between millers in Imo and Rivers State to secondary processors in Owerri, Port Harcourt and Onitsha	
	Assisting in establishment and capacity building of association for the better coordination where no association is present (Umuagwo and Ikeduru in Imo)	-Identify influential and interested people in the cluster for establishment of association -Vision workshop with the initial members of the association - Support in doing required legal processes -Training for capacity building of the associations
Enhance capacity of producers/processors through provision of improved processing technologies and development of services & service providers of equipment and finance	Access to processing equipment (Stripper and Whole Bunch Sterilizer) for SPO production	-Identify and select partnering fabricators with capability and willingness to invest in the growth of the sector -Cost-sharing with selected fabricators to produce processing equipment -Organize demonstration on equipment use and performance for six clusters in Rivers and Imo States -Provision of NAEC training to upgrade millers management skills -Linking millers to financial institutions for provision of working capital and finance for purchasing of equipment -Support with establishment of equipment center
	Introduction to storage facility for SPO and transporting of SPO from primary processors to secondary processors	
	Access to improved harvesting technology to reduce harvesting time of the FFBs	
	Access to finance for working	-Identification and selection of banks and

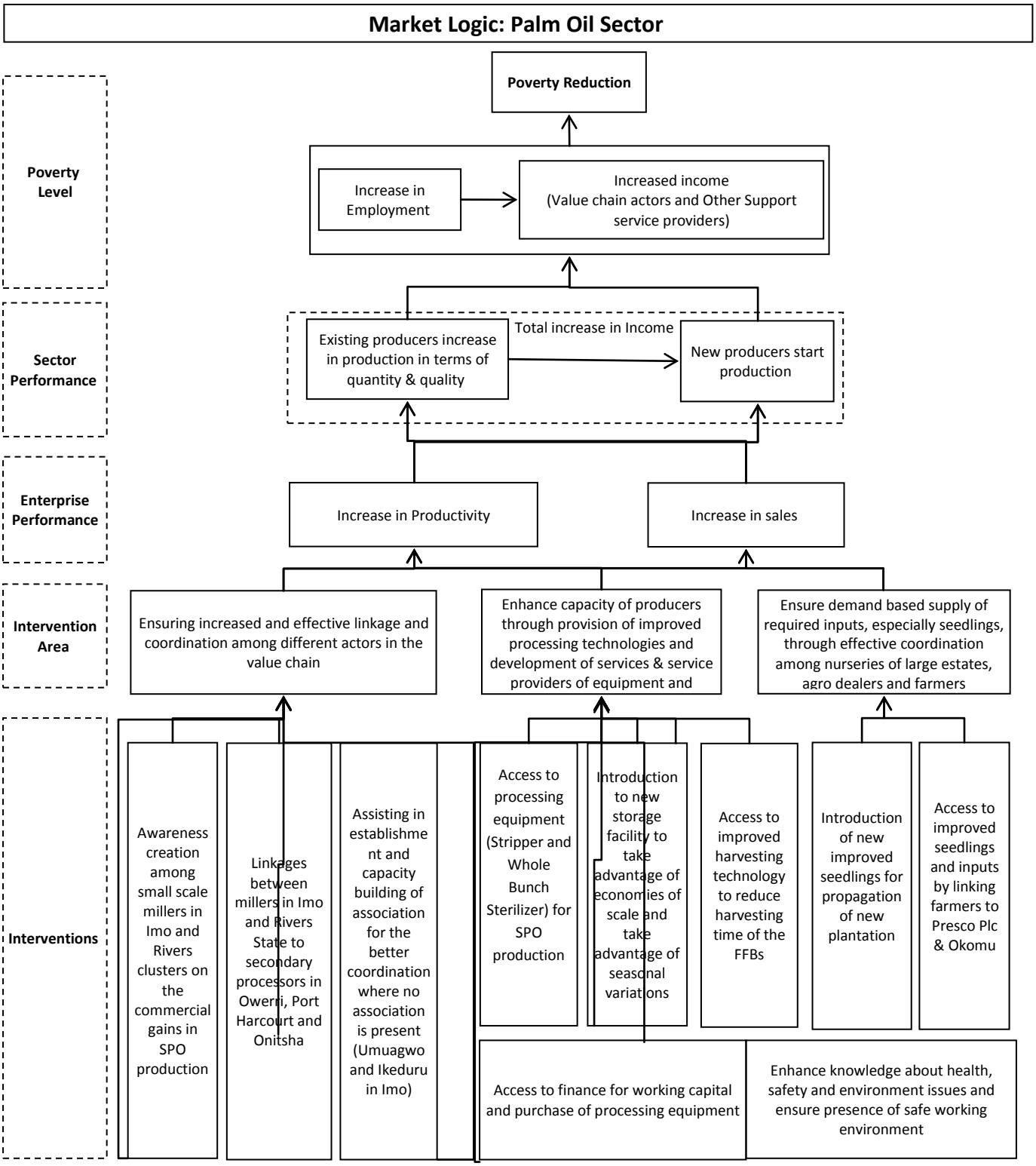
	capital and purchase of processing equipment	microcredit organizations -Assessment for design of loan product (size of loan, duration for repayment, interest rate, collateral requirement etc.) -Assist in development of loan product -Match making workshop(s) between the producers and financial institutions
	Enhance knowledge about health, safety and environment issues and ensure presence of safe working environment	Embedded in 2.12 above
Ensure demand based supply of required inputs, especially seedlings, through effective coordination among nurseries of large estates, agro dealers and farmers	Introduction of new improved seedlings for propagation of new plantation	-Identify and select potential seed supply company from among PRESCO, Imo Palm and NIFOR -Identify and select fertilizer company and agro dealers -Organize meeting to link seed suppliers to famers in Imo and Rivers -Organize meeting to link fertilizer company and agro dealers to famers in Imo and Rivers
	Access to improved seedlings and inputs by linking farmers to Presco Plc & Okomu	

Table 19: Partner Selection/Offer.

Actors	Selection criteria	Offer / responsible
Secondary processors (buyers) as Drivers of the Intervention	Accessibility to identified clusters Proximity that is within the state of identified clusters or neighboring states to reduce landing cost Willingness to partner with the clusters to guarantee market for SPO production from the clusters If possible sharing cost with fabricator to ensure standardization of SPO with available technology to the clusters Interest in M4P	Linkage to large cluster of millers in Imo and Rivers Organization of millers into registered association with bank accounts Business case for sourcing SPO from local millers (high quality of local oil) Cost sharing the availability and accessibility of testing equipment to ensure standard of SPO in terms of FFA level and moisture content Uninterrupted quality SPO supply all year round Competitive price Non violation of tripartite MoU involving the cluster, the fabricator and Secondary processors Timely construction and delivery of equipment to the cluster by fabricator
Fabricators	Knowledge and skill of general fabrication works Knowledge and skill of palm fruit processing machines No. and standard of past palm fruit processing plants installed Standard of workshop Education level (preferably technical knowledge) No. of personnel (workshop staff and administrative staff) Financial capability Timeliness of job delivery	Cost sharing with the fabricator the initial expenses for the fabrication of processing equipment Cost sharing the demonstration of equipment after construction by fabricators Linkage to cluster of millers in Imo and Rivers States numbering close to 700 millers Introduction of financial institutions to fund purchase of fabricating equipment The fabricator should accept the financial outlay of the payment for the services as guaranteed by the processor's financials

	Proximity to the catchment area of processors Acceptability by the processors Potential for upgrade of machines Interest in M4P	
Oil Mill Clusters	Strong association registered with constituted authority or processing registration with statutory body Access and availability of ffbs Large number of participating farmers and millers Use of modern technology that can be scaled up or upgraded for production of SPO Willingness and readiness to participate in M4P	Linkage with financial institution, the buyers and the fabricators Willingness to finance the upgrading of their processing mills for production of SPO Readiness to engage in aggregation and delivery of their products to the buyers Readiness to sign an MoU with each actor to facilitate production of SPO that will be economically met industry demand

Figure 10: Market logic palm oil sector.



Annexes

Annex 1: Terms of Reference

Introduction

PIND has selected the Palm Oil Value Chain as one of three major agricultural streams within its Economic Development programme in the Niger Delta over the next few years. A detailed assessment of the Palm Oil Value Chain was commissioned by PIND in 2011. It identified and recommended the Palm Oil Value Chain as an opportunity that met PIND's objective of enabling development programmes that would improve the living standards of many poor communities in the Niger Delta.

PIND now wishes to appoint a consultant to undertake a detailed scoping study for Palm Oil Value Chain pilot interventions, focusing on market systems, and based on M4P principles.

At the time of assessing the suitability of the Palm Oil value chain as a PIND priority, the following factors were considered.

- Are there large numbers of poor participants?
- Is there strong potential for competitiveness and growth?
- What is the feasibility of implementation (Government buy-in, lead time before results, etc)?
- Enough evidence was gathered during the Value Chain Assessment to convince PIND that the answer to each of these questions was positive. It is not intended that the Scoping Study should revalidate these findings.

The major conclusions on opportunities from the original Palm Oil Value Chain study, upon which this Scoping Study now needs to concentrate, were:

- There is a major growth opportunity to increase production for the SPO market with a leaning towards the more refined and fractionated palm oils.
- There is a major opportunity for improved profitability for producers/processors in Channels 2 and 3 by increasing the average yields of oil per kg of fruit.
- Following a recent internal review, PIND has decided that the Scoping Study will focus on Rivers State (working in collaboration with the Rivers State Sustainable Development Agency) and Imo State.

The Scoping Study must also include consideration of any Appropriate Technology Enabled Development (ATED) potential.

- The consultant will undertake the Scoping Study in collaboration with PIND's ATED and Market Development staff.
- Scope of Work.
- The Scoping study is to be conducted in two phases:

Phase 1 will consist of the following activities:

- Conduct a high level review of the analytical data and findings of the Palm Oil Value Chain Assessment and propose the make-up (and skill-sets) of a small action team to conduct this scoping study.
- In conjunction with PIND representatives, select and mobilize an action team.
- Identify clusters in Rivers State and Imo State that are best suited to a M4P based pilot intervention. Rank the clusters based on the highest potential for job & income growth.

Consideration must therefore be given to:

- Large numbers of clustered farmers and processors
- Identify LGAs
- Select focal locations
- Identify government-owned estates that are working and those that are not working to enable an understanding of the differences between well-performing, under-performing, and failed estates
- Profile a selection of communities within those clusters, identify the nature of their market exclusion or inequality, and assess the potential impact that a M4P based intervention could deliver to them.
- Define realistic poverty reduction objectives for each cluster.
- Complete a detailed Scoping Study of the Palm Oil Value Chain within selected clusters.

In this context, the following issues must be considered as priorities:

- Competitiveness of a larger market
- Medium scale producers and mini processing technologies (possible low hanging fruit)
- Profitability analysis
- Can Technical Palm Oil (TPO) producers shift into Special Palm Oil production (i.e. considering issues of quality control, technology, coordination, etc)?
- Rural infrastructure
- Quality of palm oil
- Quality of seedlings (question of reliability, do people trust quality of seedling?)
- Government policies (as protectionist policies are lifted, the incentive for local producers decreases since local prices can't remain competitive against import prices)
- Role of Business Membership Organizations (BMOs) and their interests
- Access to capital
- Available processing technologies
- Understanding small scale production process and technology
- Incorporating ATED
- Sampling of mini and medium farmers and processors (ie, crop yields, production volumes, costs, quality, selling prices, logistical processes and issues

Privatization issues:

- Identify newly privatized farms
- Identify farm locations
- Identify reasons behind selling
- Identify new owners
- Produce a strategic framework, and map the existing market systems for palm oil farmers in the selected clusters.
- Identify major systemic constraints in each market system.
- Focus on upgrading Channel 2 **and Channel 3** per the PIND Palm Oil Value Chain Assessment since **these are** the fastest growing channel**s**
- Focus on markets with greatest growth potential - industrial market (growing commercial use)
- Identify growth clusters (i.e. infrastructure, transportation to mill)

Depending on the outputs and results of Phase 1, it is contemplated that Phase 2 will include the following indicative activities. A final decision will be taken by PIND at the end of Phase 1.

- Identify and evaluate the key support function service providers in the market systems pertaining to the selected clusters.
- Summarise the rules (formal & informal) prevailing in each market system and describe how they affect the selected clusters and other market players.
- In relation to the selected clusters, review past and current market system interventions (including federal and state level interventions), summarise lessons learned, and identify opportunities for collaboration and consolidation in the future.
- Define realistic systemic change objectives so that the market system will better serve the needs of the poor.
- Broadly define intervention strategies and approaches to deliver job and income growth opportunities to the selected clusters, bearing in mind scalability, sustainability and crowding-in.

Specific Outputs & Deliverables

- Produce a detailed report for each Phase of the assignment presenting the findings and recommendations for the items listed in the Scope of Work.
- Identify specific clusters in Rivers State and Imo State as the best options for the first pilot intervention projects based on quick but sustainable results, and produce high level plans for pilot interventions in support of those clusters, including a timeline, identification of resources, and cost estimate.

Duration

- It is anticipated that Phase 1 of the scoping study will take four weeks to complete, and Phase 2 will take a further four weeks.

Start date

- Preferred start date is Monday 30 April 2012.

Annex 2: Question Guide

Background Information

Name of Mill:
……..

Location: Zone…..…… LGA…… Town……..

Ownership of Mill:

(a) single-private ( ) (b) cooperative private ( ) (c) government ( )

Owner's Name: …….. Age: ……. Sex: ……. Tel: …….

Scale of Operation: (a) small ( ) (b) medium ( ) (c) large ( )

Date of Establishment:
……

Land Acquisition: (a) inheritance ( ) (b) purchase ( ) (c) lease ( )

Structure: (a) temporary ( ) (b) permanent ( )

No. of Personnel: Permanent ……
Casual……

B. Information on Equipment used (Please fill the table below)

Equipment		Available or not	Type	Date acquired	capacity	source (imported or locally fabricated)	Cost	Source of spare parts
1	Steriliser							
2	Stripper							
3	Digester							
4	Press							
5	Centrifuge							
6	Clarifier							
Accessories								
1	Crude palm oil tank							
2	Decanter							
3	Vacuum drier							
4	conveyance system							
5	Nut fibre separator							
6	nut cracker							
7	diesel engine							
8	Boiler							
9	Furnace							

10	sludge treatment device							

C. Maintenance of Equipment (Please fill the table below)

Equipment		Maintenance			
		Interval of maintenance	locally or expatriate services	Ease of maintenance	cost of maintenance
1	Steriliser				
2	stripper				
3	Digester				
4	Press				
5	centrifuge				
6	Clarifier				
Accessories					
1	Crude palm oil tank				
2	Decanter				
3	Vacuum drier				
4	conveyance system				
5	Nut fibre separator				
6	nut cracker				
7	diesel engine				
8	Boiler				
9	Furnace				
10	sludge treatment device				

D. Abandonment of Equipment (Please fill the table below)

Equipment	Abandonment

		Date Abandoned	Reason for abandonment
1	Steriliser		
2	stripper		
3	Digester		
4	Press		
5	centrifuge		
6	Clarifier		
Accessories			
1	Crude palm oil tank		
2	Decanter		
3	Vacuum drier		
4	conveyance system		
5	Nut fibre separator		
6	nut cracker		
7	diesel engine		
8	Boiler		
9	Furnace		
10	sludge treatment device		

D. Education and Training of Operators

1. What is the level of education of operators?

(a) Primary school ( ) (b) secondary school ( ) (c) post-secondary ( )

2. Which type of training do the operators received?

(a) Formal ( ) (b) informal ( ) (c) no training ( )

F. Processing Operations

1. How do you source your palm fruits?

(a) Own a plantation ( ) (b) buy from different farmers ( ) (c) by from market ( )

How many plantations do you have or buy from?

(a) 1-10 (b) 11-20 (c) 21-30 (d) 31-40 (e) >40

What is the average size of each of the plantations?

(a) 1-5ha (b) 6-10ha (c) 11-15ha (d) >15ha

What is the average distance of each plantation to the mill (in km)?

(a) 1-10 (b) 11-20 (c) 21-30 (d) 31-40 (e) >40

Who harvest the fruits? (a) the miller ( ) (b) the farmers ( )

Who haul the fruits? (a) the miller ( ) (b) the farmers ( ) (c) buyers

What is the average cost of harvesting and haulage of fruits per season (₦ '000)?

(a) 1-10 (b) 11-20 (c) 21-30 (d) 31-40 (e) >40

If you buy from farmers, in what measure do you buy? (a) in bunches( ) (b) in bags( ) (c) in lorry loads of bunches ( ) (d) in lorry loads of bags ( )

How much (Naira) do you offer per (a) bunch ( ) (b) bag ( )

(d) Lorry loads of bags ( ) (c) lorry load of bunches ( )

10. How much do you spend on purchase of fruit per season? …….

11. How long does it take to haul the fruits to the mill after harvesting (in days)?

(a) 1-5 (b) 6-10 (c) 11-15 (d) >15

12. How long does it take to process after getting to the mill (in days)?

(a) 1 3 (b) 2 (c) 3 (d) >3

13. What is the cost of labour used in processing fruits per tonne/charge/tank? .....……

14. How many tonnes do you process per day?

(a) 1-3 (b) 4-6 (c) 7-10 (d) >10

G. Marketing of Products

What are the products of your mill?

(a) Palm oil ( ) (b) Palm kernel oil ( ) (c) Palm oil & palm kernel oil ( )

How do you sell your products?

(a) Within the State ( ) (b) Outside the State ( ) (c) Export ( )

Who buys the products?

(a) Consumers ( ) (b) Industries ( ) (c) both ( )

What is the proportion of the quantity purchased by these buyers in percentage?

(a) Consumer …… (b) Industries……

Do you get order for your products? (a) yes ( ) (b) no ( )

If yes do you meet the order? (a) yes ( ) (b) no ( )

How much do you sell a tonne of Palm Oil? .....

How much do you sell a tonne of Palm kernel? .....

How much do you sell a tonne of Palm kernel Oil? .....

What is the estimated profit you make from the sales of the products?

Palm oil …… (b) Palm nut ……(c) palm kernel oil……

H. Waste Disposal/ Uses

How do you dispose your empty bunches, fibre and effluent?

Do you put them into uses? a) yes ( ) (b) no ( )

If yes what are the uses?

……

4. What is the estimated value of the waste? ……

Annex 3: List of Persons Interviewed

S/N	NAMES	CONTACT ADDRESSES	VALUE CHAIN FUNCTION
1.	DR. UMORU OMOTI	NATIONAL COORDINATOR, CFC/UNIDO/FGN OIL PALM PROJECT. (08036280453) uomoti@yahoo.com	research
2.	MR. LANRE JAIYEOLA	CEO, HONEYWELL SUPERFINE FOODS LTD, ALAUSA, LAGOS. (08022245430) Muyiwa88@yahoo.com	end-market
3.	OLAYINKA SHODEINDE	MANAGER, LOGISTICS AND SUPPLIES, HONEYWELL SUPERFINE FOODS LTD, ALAUSA, LAGOS. (07055804765) Shodeindeyinka1@yahoo.com	end-market
4.	RAJESH GAGGAR	HEAD-PROCUREMENT & LOGISTICS, DUFIL PRIMA FOODS PLC, SURULERE, LAGOS. (08056402213) rajesh.gaggar@dufil.com	end-market
5.	MRS. A.P. OBI	PRESIDENT, ELEPO-LO-LERE ASSOCIATION, OYINGBO MARKET, LAGOS.(08028873035)	retailing
6.	IYAWO	PRO, ELEPO-LO-LERE ASSOCIATION, OYINGBO MARKET, LAGOS. (08030618693)	retailing

7.	KUDZAI GUMUNYU	AGRICULTURAL BUSINESS FINANCE, FCMB, VI, LAGOS. (07068686825) Kudzai.gumunyi@firstcity.comgroup	support services - finance
8.	PETER OBASEKI	EXECUTIVE DIRECTOR, FCMB, VI, LAGOS Peter.obaseki@firstcity.comgroup	support services - finance
9.	TUNDE KUKU	SUDIT OIL & CHEMICALS COMPAANY, IDI-MANGO, IBADAN. (07028017922) babatundebalogunkuku@yahoo.com	secondary processing
10.	DR. OTURU	ACTING DIRECTOR, NIFOR, BENIN	input
11.	J.U. OBIBUZOR	RESEARCH CHEMIST, NIFOR, BENIN (08035500203) juobibuzor63@yahoo.com	input
12.	E.F. CHARLES	HEAD, NURSERY DIVISION, NIFOR, BENIN. (08037102341) enemscharles@yahoo.com	input
13.	ENGR. G.A. BADMOS	CHIEF RESEARCH OFFICER, ENGINEERING UNIT, NIFOR, BENIN. (08037646246)	input
14.	DR. C.E. IKUENOBE	INFORMATION UNIT, NIFOR, BENIN (08035522177)	input
15.	DR. GRAHAM HEFER	MANAGING DIRECTOR, OKOMU OIL PALM PLC, OKOMU-UDO VIA BENIN CITY. (08035352669) ghefer@okomunigeria.com	production-large estate
16.	CHRIS O. AMEDU	SALES MANAGER, OKOMU OIL PALM PLC, OKOMU-UDO VIA BENIN CITY. (08034739890) chrisamedu@yahoo.com	production-large estate
17.	UDAY PILANI	COUNTRY DIRECTOR, NIGERIA, SA SIAT NY, PRESCO PLC, OBARETIN, BENIN. (08033890909) UDAY.PILANI@SIAT.GROUP.COM	production-large estate
18.	TONY UWAJEH	PERSONNEL MANAGER, PRESCO PLC, OBARETIN, BENIN. (08060386555)	production-large estate
19.	UDAI N. DVIBEDY	GOLDEN OIL IND. LTD, POKOBROS AVENUE, ONITSHA. (08036359209) dvibedy@yahoo.com	secondary processing
20.	RANAJIT MAJUMDAR	GOLDEN OIL IND. LTD, POKOBROS AVENUE, ONITSHA. (08063811948)	secondary processing
21.	MRS. NNANA NWOGU	PERSONNEL MANAGER, GOLDEN OIL IND. LTD, POKOBROS AVENUE, ONITSHA. (08037622667)	secondary processing
22.	NWOKONTA UGOCHUKWU C.	HEAD COMMERCIAL, ENVOY OIL IND. LTD, OFF ATANI ROAD, ONITSHA. (08035817377) Ugkonta124@yahoo.com	secondary processing
23	MR. FELIX OTTA	ADMINSTRATIVE MANAGER, EA AMOBI GROUP IND. ONITSHA. (08063852680) ogbofelixotta@yahoo.com	secondary processing
	IMO STATE:		
24.	CHIEF OKEY IKORO JP	CAMELA VEGETABLE OIL CO. LTD, ONITSHA ROAD INDUSTRIAL LAYOUT, OWERRI. (08037880314) camelaoil@yahoo.co.uk	secondary processing
25.	ENGR. CHIDI DE NWIGWE	CXIDITECH WORKS & SERVICES LTD, ONITSHA ROAD INDUSTRIAL LAYOUT, OWERRI. (08037075963)	agro machinery fabrication
26.	ENGR. NWABUEZE AKOBUNDU	BASICON ENGINEERING CO LTD, ONITSHA ROAD INDUSTRIAL LAYOUT, OWERRI.	agro machinery fabrication
27.	ENGR. VICTOR U.N. OSUOKA	VICO AFROMETAAL, IKENEGBU LAYOUT, OWERRI. (08038477610) vicoafro@yahoo.co.uk	agro machinery fabrication

28.	MRS. ADADORA IJEIZE	HON COMMISSIONER, MINISTRY OF AGRICULTURE AND RURAL RESOURCES, NEW SECRETARIAT BLOCK2, OWERRI (08033592603)	institution-policy
29.	IGWE HILARY UCHE	PRESIDENT, OIL PALM GROWERS ASSOCIATION OF NIGERIA, OLD ADC OFFICE, SMALL HOLDER UNIT, NEKEDE, OWERRI. (08034840602)	bmo
30.	BEST IK UMEH	DADDY IYKE OIL MILL, OKOYA RD, UMUAGBO-OHAJI, IMO STATE. (08062487474)	primary processing – medium mill
31.	MADAM FLORENCE NNOROMELE	MILL OGOLOGO, UMUCHE-EWEMU, UMUAGBO (07062570368)	primary processing – small scale mill
32.	JONATHAN ONYEAMA	OIL MILL, UMUAGWO. (08164982846)	primary processing – small scale mill
33.	OKERE CASMIR	MILL OHURU, UMUAGWO. 907032254800)	primary processing – small scale mill
34.	MR. IFEANYI	BIGMAN GATE OIL MILL, UMUAGWO. (08068557108)	primary processing – small scale mill
35.	CHIEF DEMIA NWACHUKWU	OKOSISI LUCRATIVE IND. LTD, UMUAGWO. (08035427199)	primary processing – medium mill
36.	EVANS EKE	UMUOHE-NGOR MILL, NGOR-OKPALA (08039475462)	smallholder production/mini-processing
37.	MS CHIOMA OKERE	PALM KERNEL TRADER, NGURU-NTU, NGOR-OKPALA. (THROUGH 08035432329)	smallholder production/mini-processing
38.	MR. EKWAN	IKEMBARA MILL, IKEDURU AREA.	smallholder production/mini-processing
39.	MR. SAMUEL	UMUOKPARA UMUOSHIRI, IKEDURU AREA. (08069261788)	smallholder production/mini-processing
40.	MR. BENEDICT	AMAZARA AMAIMO MILL, IKEDURU AREA.	smallholder production/mini-processing
41.	MR. OBASI EZEN	IDOHIA UMURI MILL, IKEDURU AREA. (08064233252)	smallholder production/mini-processing
42.	MRS. J. NKECHI NWAMAKA	ORGANIHU COOP WOMEN SOCIETY MILL, AWO-MBIERI, MBAITOLI	smallholder production/mini-processing
43.	OKORO ALBERT	DIMOFOR ODUNMARA MILL, ORODO. (07038254199)	smallholder production/mini-processing
44.	BENJAMIN AZOBIANI	ROCHE AGRIC-IMO PALM PLANTATION, OHAJI (07037238803)	production-large estate
45.	JOHN ORISHO	PRESIDENT, EZIORSU COOPERATIVE UNION, OGUTA, IMO STATE (08066586230)	smallholder production/mini-processing
46.	SIR & LADY CLIFFORD UDOGU	OIL PALM PROCESSING & CUTTERS ASSOCIATION, OGUTA (08066657745)	smallholder production/mini-processing
47.	HARRISON	CRISTO-GENERAL EZIORSU FARMERS	smallholder

	UZORGU	COOPERATIVE SOCIETY LTD, EZIORSU OGUTA. (07030807968)	production/mini-processing
	RIVERS STATE		
48.	DUMMUBANI ELEKIMA	"OGHIARISHIS PALM OIL PRODUCERS AND PROCESSORS ASSOCIATION", ABUA CENTRAL, RIVERS STATE.(08164976931)	smallholder production/traditional processing
49	DIROKWENI SANSOTOUR	"OGHIARISHIS PALM OIL PRODUCERS AND PROCESSORS ASSOCIATION", ABUA CENTRAL, RIVERS STATE. (08134251818)	smallholder production/traditional processing
50.	ARIKERI OBODO	"OGHIARISHIS PALM OIL PRODUCERS AND PROCESSORS ASSOCIATION", ABUA CENTRAL, RIVERS STATE.(07055763100)	smallholder production/traditional processing
51.	LINUS A. EWENIKE	PRESIDENT, PALM OIL PRODUCER & PROCESSORS ASSOCIATION, APOKU ETCHE	smallholder production
52.	GODSPOWER EEGBINEFU	TREASURER, PALM OIL PRODUCER & PROCESSORS ASSOCIATION, APOKU ETCHE	smallholder production/mini-processing
53.	MARTIN NWAGWU	SECRETARY, PALM OIL PRODUCER & PROCESSORS ASSOCIATION, APOKU ETCHE	smallholder production
54.	Markus Amadi	PRESIDENT, Obuoma Cooperative Society, Elele, Rivers state (08037779804)	smallholder production/mini-processing
55.	Christopher Omenezo	V.PRESIDENT, Obuoma Cooperative Society, Elele, Rivers state (08066980016)	smallholder production/mini-processing
56.	Chf Solomon Awabara	SECRETARY, Obuoma Cooperative Society, Elele, Rivers state(08137808967)	smallholder production/mini-processing
57.	Mr. Uchenna	TREASURER, Obuoma Cooperative Society, Elele, Rivers state(08061371743)	smallholder production/mini-processing
58.	MATTHEW	MATTHEW ENGINEERING CO, AHOADA RD, ELELE, RIVERSSTATE	small-scale fabrication
59.	DENNIS AMADI	ETCHE ENGINEERING CO, P/HARCOURT RD, ELELE, RIVERSSTATE (07030225173)	small-scale fabrication
60.	PRINCE ACHILEFO	EREBELOVED FARMS INTERNATIONAL FABRICATOR, OSISIMA, ABA, ABIA STATE (08037653010)	agro machinery fabrication
61.	MONDAY JAMES	CHAIRMAN, PALM OIL ASSOCIATION, BOROKIRI, P/HARCOURT (08037950710)	wholesaling
62.	ENGR. WISDOM OKEREKE	INTEGRATED SYSTEM LTD, ELECHI BEACH RD, MILE 1, P/HARCOURT	small-scale fabrication

Annex 4: Profile of Potential Partners

HONEYWELL SUPERFINE FOODS LIMITED (HSFL)

The interview was conducted at the company premises located at plot YABB, Mobolaji Johnson Avenue, Alausa, Lagos State. The interview took place on June 13, 2012 and three key management staffs of the company willing granted the interview to PIND team of experts on study. These staffs are the CEO, Logistics & Supplies Manager and Food Scientist in charge of quality control. The findings from the interview are as follows:

- Major suppliers of RBDO to HSFL: Golden Oil; Presco; Sudit; BUA
- Challenges encountering in getting RBDO
- Congeal of product during rainy season
- Control of product in transit so that the driver will not tamper with the quantity
- Price fluctuation
- The acquisition cost ranges between N260, 000 to N270, 000 since 2011, therefore RBDO sometime carries highest cost in noodles production.
- The company demand of RBDO per month is put at 350 tonnes and the chef life of the product is 3 months after which it will develop high peroxide level that will lead to rancidity. The quality of RBDO depends on three factors and these are:
- Moisture content with 0.1% maximum
- Acid value with 0.4% maximum
- Peroxide value of 4% maximum at the point of receipt.
- Profile of HSFL
- Operational in December, 2006
- 60-70% capacity utilization of installed plant
- Produces 67 tonnes of noodles per day
- Turnover in excess of N15 billion
- Staff strength of 600
- Other companies competing in the noodle production industry
- De-United – producer of Indomie (controlling 80% of the market)
- Golden Penny Noodles
- Chikki Noodles
- Dangote Noodles
- Cherrie Noodles
- Star Noodles
- Mimee Noodles
- Mog Noodles
- Chefmie Noodles
- Tummy-Tummy Noodles

In conclusion the management of HSFL restated that the company believes in backward integration and there is demonstration of willingness to engage in partnership for the promotion of the sector. The CEO advised the PIND team of expert to incorporate finding the idea extraction rate from SPO into RBDO in the course of the study as well as stabilization of RBDO prices.

RECOMMENDATIONS

The palm oil supply chain is dynamic and a thorough analysis should be captured on a consumer-by-consumer basis. Many of Nigerian companies should be working in conjunction with the Roundtable of Sustainable Palm Oil (RSPO) to solely purchase certified produced palm oil. Efforts should made so that companies can utilize this certification system so consumers can trace where the palm oil is coming from and these will reduce importation of less quality SPO into the country.

SUDIT OIL AND CHEMICALS

The interaction with company management took place at company premises, Ibadan on Thursday, 14th June, 2012. The company is among the secondary processors in the value chain functions. The highlight of the meeting with the MD is as follows:

- The company has two plants and the one located at New Garage, Ibadan is devoted to RBDO production for De-United (producer of Indomie noodles) and the production capacity is 130 tonnes per day. The plant which completely automated can also process PKO, Soybeans oil & Groundnut oil.
- The major sources of SPO are the Western African countries of Cote d'Ivoire, Ghana and Republic of Benin. Okomu Oil Palm Plc (with about 10,000ha plantation) is a reliable high quality SPO source but the quantity is small compare to the demand of the company. The ECOWAS trade liberalization to them was design to weaken Nigerian economy.
- Some Wholesale Palm oil Dealers from Okitipupa also supply SPO to the company but the quality in most cases is not up to standard with about 10%FFA a times.
- The company MD complaint of non-performance or inefficiency of large estate plantation such as OOPC with 16,000ha plantation, Rison palm with 10,000ha plantation, Ada palm etc. Subsequently, the company resorted into importation so as not to close down.
- The company had acquired land in Okitipupa, Ondo State to establish her own plantation with integrated processing equipment to address the demand supply gap in the future, but inaccessibility of credit facility has delayed the take-off of the project.
- The MD revealed that the secondary processors have not gotten an organized BMO that can serve as pressure group to pursue their interest.

FIRST CITY MONUMENT BANK (FCMB)

Mr. Kudzai Gumunyu in charge of Agricultural Business Finance Department of the Bank granted the team on Palm Oil Scoping Study audience at the Bank Corporate head office at Adetokunbo Ademola Street, Victoria Island Lagos. The Bank is among the support organizations in the value chain analysis and FCMB organized a two day workshop last year tagged "Oil palm Stakeholders and Investors" with the theme "tapping into the opportunity in the Oil palm industry in Nigeria".

The team informed the Bank of effort of Chevron through PIND to develop three commodities that is, Palm Oil, Cassava and Aquaculture to competitive level with setting aside of N50 million while other donors such as USAID and DFID are also contributing to the fund to access the opportunity for improved profitability for producers and/or processors in the Palm Oil value chain through M4P approach by making market works while the donors will facilitate the process. Since the scoping study also involves identification of possible private and public sectors partners, hence the reason behind the visit to the bank.

Responding Mr. Kudzai said that FCMB had firm up concrete policy to finance agricultural sector of the economy with special interest in Cocoa, Oil palm, Cassava, maize, Rice, Soybeans as well as L/stocks. He said there is urgent need to change the orientation of Nigerian farmers from seeing as farming as

hobby but instead as a business and organization like PIND has role to play in this aspect as well. He was of opinion that sustainability can only be ensured in any intervention when Nigerian farmers engage farming as a profitable venture and being willing to engage in the competitiveness of the market.

He revealed that FCMB had started financing agriculture through Off-takers. The Off-takers in turn provide credit facility to farmers in kind inform of inputs especially in the South-West geopolitical zone. And the Off-takers enforcing farmers' repayment of the loans by collecting quantified produce with the prevailing price proportion to the loan granted. The Bank also release the credit facility to the Off-takers not by cash but by paying directly to suppliers of inputs the Off-takers will distribute to the farmers. He defines Off-takers as individuals with processing ability.

Finally, since the team noticed the willingness of the bank to invest in the development of the sector, the following steps of action are itemized as follows:

- Need to identify potential clusters in Rivers and Imo States and rank them on the highest for job and income growth
- Prepare a report and share with FCMB
- FCMB using the report as a guide in further assessment
- The chosen pilot clusters should be registered with CAC

The goal would be building processing capacity of the sector with robust production base.

DUFIL PRIMA FOODS PLC, ERIC-MORE, LAGOS

In order unravel the quantity of SPO need of major End–Users; another visit was scheduled with the Head-procurement & logistics of Dufil Prima Foods Plc for Friday, 15th June 2012. During this in-depth interview with Mr. Rajesh Gaggar (Head-procurement & logistics) by the Team, many things came to fore about the relationships among the buyers, sellers, service providers and regulatory institutions that operate within or influence the range of activities required to bring a product or service from inception to its end use. The excerpts of the interview are as follows:

- The average monthly requirement of RBDO by the company is 4,000 tonnes and the SPO is imported into the country for fractionation in order to meet this demand. Sudit Oil & Chemicals Ltd processes this SPO for the company under close supervision by Dufil Prima Foods staff.
- The Nigerian government placed high import duty on imported SPO to discourage importation and boost local supply of SPO but the gap is still there and it is difficult to assess the specific gap because of incomplete statistics. Apart from that the imported SPO is cheaper than locally produced SPO. According to him the landed cost of Malaysian SPO is about $900 which is equivalent to N144, 000 while SPO from Okomu Palm Oil Plc is N220, 000.
- Despite price differential the door of the company is opened to any local supplier of SPO as long as the product meet acceptable standard of SPO for industrial use. The physical and chemical properties any SPO is subject to before acceptance is contained the table below:

S/N	DESCRIPTION OF PROPERTIES	ACCEPTABLE LEVEL
	PHYSICAL:	
a.	Colour	Reddish or Orangish
b.	Form/Appearance	Liquid
c.	Aroma/Odour	No rancid smell
d.	Foreign matter	Nil

	CHEMICAL	
a.	Moisture content % (max)	1.00
b.	Free fatty acid % (max)	5.00
c.	Peroxide value (meg/kg)	1.50
d.	Iodine value	50.00 – 55.00

Dufil Prima Foods Plc had mapped out strategic plan to stop importation of SPO in the long-run by involving in mechanized Oil palm plantation of not less than 100,000ha. Due to this vision, letters were written to the Governors in the Palm Oil belt States but none has responded or even acknowledge the receipt of the letters.

In order for the small-holders farmers and/or processors to respond effectively to market opportunities, upgrading is the process by which business owners innovate to add value to products or services and to make production and marketing processes more efficient. On this issue Mr. Gaggar suggested minimum requirement for upgrading to be effective among the small-holders farmers/processors:

- Education and capacity building to increase their technical knowhow of the industry
- Willingness to be in an organized cluster
- Vertical and horizontal linkages with other actors in the value chain

Nigerian Institute for Oil palm Research (NIFOR)

NIFOR is structured as a top-heavy body with a large number of administrative staff. While only about a third of the regular staff are directly involved in research, most of the organization's budget is used to pay the salaries of the vast number of administrative, scientific and support staff (David, 2003). As a result of the lack of sustainable funds and due to inconsistencies in policies, researchers are often unable to adopt a long-term vision (Oyejide). This sometimes results in ineffective research that restricts the positive impact on smallholders.

Originally founded in 1939, it was transformed into the West African Research Institute (WARI) in 1951 with funding from other external sources. However, in 1960, the Nigerian government reverted back to NIFOR and reassumed control over its activities. The functions of NIFOR include:

• To provide quality seeds to producers (the institute is presently the main source of good Seeds).
• To disseminate information on good crop husbandry.
• To provide knowledge and training on pests and disease management.
• To engage producers through extension services.
    - Through 'Farmer Field Days.'
    - By handing out information bulletins.
    - By conducting training seminars at the institute.
• To provide small-scale processing technologies (NIFOR produces small processing Machines that are of immense benefit to smallholders).

With these wonderful mandates in mind the palm oil scoping study team visited the Institute and to seek possible areas of collaboration and partnership with in respect of planned intervention in the pilot states. Three divisions were visited and the findings are as follows:

NURSERY DIVISION: The demand supply gap of spouted nuts and oil palm seedlings are gradually becoming a thing of past with the rehabilitation of germinators in the Breeding Division of NIFOR coupled with the supply of two newly generators to power the section by the Hon. Minister of Agriculture and Rural

development. The Minister order for 9 million sprouted nuts and the unit is moving in achieving this with turning out of 300,000 sprouted nuts per batch from germinator. The availability of high quality seeds/seedlings of Tenera is now guaranteed since it is now possible for the germinators to work at maximum capacity of 5 – 10milliom annually. The nursery unit of NIFOR is immediate section to breeding division and they are in top gear of activity with establishment of 20,000 pre-nursery seedlings every week. Consequent to transformation going on in the Institute, there is upsurge in demand for seedlings as summarized in the Table 3 below:

Year	Seedlings demanded	Remarks
2011	294,553	Annual request
2012	90,000	Only request for the 1st quarter

The support services to this unit are nursery poly bags producing companies and fertilizer producer/supply companies. Despite the staff strength of 74 the head of the unit mentioned that the only constraint in the unit is manpower, the workforce the team sees as been over bloated.

BIOCHEMISTRY DIVISION: At Biochemistry division of NIFOR, Benin, the team discovered that the much talk about free fatty acid (FFA) which is used as quality parameter has categories, that is, inherent FFA and induced FFA. The view of Research Chemist in the division shows that attaining of less than 5% FFA by smallholder farmers/processors is herculean task due to the level hydrolysis after harvesting before processing. Even during clarification by this group based upon available equipment at their disposal water hydrolysis still takes place which builds up FFA.

He suggested possible solutions to all the issues associated with increasing FFA such as

- Clustering of smallholder farmers/processors
- Facilitating installation of NIFOR medium or large SSPE for the cluster
- Guaranteeing of appropriate pricing for the industrial needed SPO
- Training and enlightenment for the cluster participants to know that palm oil quality starts from the plantation.

SPO and PKO can be further refined into Refined Bleached Deodorized Oil (RBDO) and defined Palm Kernel Oil, respectively. These are the end products that are further fractionated into Olein and Stearin, which are the end products used in the food industry.

The team findings also revealed that a good palm oil has 50:50 fractionation proportions of palm olein and stearin. Despite that olein has a close resemblance to palm kernel oil; red palm olein is more stable than kernel oil. RBDO is another important product and as the name implies it is a product of secondary processing of SPO through the activities of bleaching and deodorization. The idea output of RBDO from 100gm of SPO with 2% FFA is 90%. At commercial level the Golden Oil Industry Ltd revealed that the ideal extraction rate of SPO with about 5% FFA to RDBSPO is 92%.

ENGINEERING DIVISION: As part of the scoping study the team the visit was made to NIFOR in general. The observations made at Engineering Division are highlighted below:

NIFOR has three different version of the small scale processing equipment (SSPE) tagged NIFOR small, medium and large, respectively. The latest technology adopted which is regarded as NIFOR large consist of the machine described below.

- The palm fruit screen which removes calyx and other fibre materials from the fruit;
- A sterilizer of 500kg of fruit capacity capable of sterilizing whole or quartered bunch which sterilize the fruit to soften the mesocarp for easy digestion and oil extraction;
- A bunch/quarter stripper which can be used to strip fruits from sterilized bunch /quarters or fresh quarters;
- A digester screw press of 1.5ton/hr capacity of fresh fruit bunch (FFB) which digest the sterilized fruit and also extract the oil;
- A clarifier of capacity 1.5 ton/hr of FFB which clarifies the oil to remove sludge and water;
- an oil storage tank for storing the clarified oil;
- A nut fibre separator of 1.5 ton.hr of FFB which separates the nut from fibre after extracting the oil; and
- A sludge-fibre-shell bracketing machine which compact the mixture of sludge, fibre and shell as briquette for producing fuel material for firing sterilizer and clarifier.
- Empty fruit bunches or quarters are used for mulching in oil palm plantation particularly for the small palms; they also used for making ash for soap industry
- Report from the scientists had it that the quality of oil from the processed moderately and fairly ripe bunches are as follows:
    -the FFA is less than 5% which is acceptable (SPO)
    -the moisture content is about 0.1% which also within the range of the SPO
- Oil from the overripe bunches is of low quality regarded as TPO which is always sold at cheap prices.
- The Agricultural Engineering Research Division (AERD) of NIFOR has a standard workshop with the following sets of equipment:
- A guillotine for cutting sheet metals which has capacity of cutting up to a quarter of an inch;
- Two drilling machines for drilling holes on sheet metal and other materials;
- Two milling machines for cutting gears etc;
- A central lathe machine which is multipurpose i.e. for cutting shaft, threading shaft;
- A rolling machine for rolling sheet metal into cylindrical shape;
- A shaping machine which is capable of forming steel materials into different shapes; and
- Two generators to provide electric power for the workshop
- The sets of equipment were supplied by UNDP and EEC in 1979 and 1990, respectively.
- The staff strength of the Engineering section is 51.
- The section has capacity to produce 7 sets of the SSPE in a year all things being equal but the usual schedule is 1 set in 4 months (16 weeks); usually 5 sets can start at the same time.
- The division gets order which are met on first come first served
- The division has trained 72 fabricators located in the various places in the country (list to be provided) which some can be visited
- Extension network has been isolated and as such feedback from trained fabricators is difficult

GOLDEN OIL INDUSTRY LIMITED

The company which commenced operation in 1988 is in category of Secondary processors in the palm oil value chain. The company had 150 permanent staffs made up of 135 male and 15 female; in addition, 200 temporary staffs made up of 140 male and 60 female who are making livelihood in the company. The company operating at 30% installed capacity used between 500 to 1,000 tonnes SPO every month which is usually refined into RDBSPO, Stearin and Olien with the by-product of DFA. The Managing Director stated the price range of N250,000 to 300,000 per tone RBDSPO. In addition, the company processed palm kernel cake into PKO, soy bean into soy oil and groundnut into groundnut oil.

The price of refined PKO is N200,000 per tone. The source of SPO is majorly from Okomu Palm Oil Company Plc while soy beans are brought from Benue state by dealers. The philosophy of the company is “Work hard, Work long & Work smart”.

When the team informed the MD about the M4P approach for the intervention pilot clusters in Imo and Rivers States especially to increase the processing efficiency of smallholder processors, his advice is as follows:

- The smallholder farmers/processors should organize
- Modern production technology should be transferred into them and the starting point should be plantation establishment not support towards processing efficiency
- Development NGO should be engaged to mentor the clusters

ENVOY OIL IND. LTD

The company was established in 1998 and is in the category of Secondary processors in the palm oil value chain. The staff strength is 450 made up of 200 permanent and 250 casual staffs. The company operating at 40% installed capacity used about 1,320 tonnes SPO every month which is usually refined into RDBO, Olien and Palm Stearin with the by-product of DFA.

According to Mr. Nwokonta Ugochukwu - the Head Commercial, the company acquired the SPO at cost ranging between N180,000 – 200,000 per tone while that of PKO is between N160,000 – 180,000 per tone. The buyers of the company products especially Olien and refined PKO are the distributors and retailers in the local markets. The company sold to distributors in jerry cans of different volumes. To be a distributor a person should be able to order for a truck load of refined PKO or Olein that is, 600 jerry cans of 20litres each. A 20 lt jerry can of PKO is sold at N3,600 while that of Olien is N4,400 only. In compliance with NAFDAC directives the company adds Vitamin A to all their vegetable oils being sold in the markets. The company is a member of Vegetable Oil Producers Association of Nigeria (VOPAN) with headquarters in Owerri. The major constraints in this sector of the value chain according to him are as follows:

- None availability of adequate primary raw materials that is , SPO and Palm Kernel Nuts/PKO
- Biofuels’ negative impact on the global prices of vegetable oils
- High operating cost due to lack of electricity which forced the company to generate 80-85% of its power need through generators
- Multiple taxation

CAMELA VEGETABLE OIL

The company was established in 1990 and is in the category of Secondary processors in the palm oil value chain with special focus on refined PKO production since inception till 2012 when plant for production of refined SPO and its derivatives being slated for commissioning by November. The staff strength is above 100 permanent staffs, apart from casual. The major products since inception are refined PKO and Fatty acid which are purchased in bulk by companies from Kano, Warri, Ibadan and Onitsha; as well as PZ which is major buyer of fatty acid. The minimum truck load for any buyer is 5,000 tonnes despite the fluctuations in prices, the current prices for the two products are N220,000/tonne and N173,000/tonne for refined PKO and fatty acid respectively.

Camela vegetable oil is the only company in Owerri with installed plants for refined PKO and SPO and the main raw material since inception is palm kernel nut except SPO which company is preparing a letter of credit to import from Malaysia because the new plant requires 100 tonnes of SPO per day to operate at commercial level. The regular and major suppliers of palm kernel nuts to the company are Jude Agulama from Mbaise, Chibuike Mark from Umuahia, Morgan Samuel from Aba, Alex Onyenubi & Sammy Ibeawuchi all from Ikeduru. The acquisition cost of palm kernel nuts from the supplier is averagely N70,000 per tone. At times to meet the short fall the company purchase PKO from SeaMaster crushing Mill and Mawa Tech all based at Orlu at an average cost of N87,000/tone. The minimum quantity acceptable each supplier is 10 tonnes.

The major constraint facing the company is power outrage which forces the company to operate at 50-60% installed capacity. According CEO Chief Okey Ikoro, this outrage at times happens 10 times in a day leading to damaging of refinery plant pump on many occasions. Other constraints facing sector in the value chain is high import duty on plants and machineries which the government reduces to zero in recent time, but in spite of this policy the clearing cost is still high to the extent that the company cough out N25 million for the newly installed plant of SPO as clearing cost.

The CEO who doubles as President, Vegetable Oil Producers Association of Nigeria expressed his disappointment about the abuse of ECOWAS Trade Liberalization (ETL) in which large volume of imported vegetable oils are coming to country through Western African countries of Cote d'Ivoire, Ghana and Republic of Benin by some scrupulous Nigerians to sabotage high duty rate imposed by government to protect local market. This is serious affecting price stability in the market.

On understanding of PIND intending intervention to facilitate the reviving of the entire sector through smallholder farmers / processors, he demonstrates his willingness to partner in this initiative and he offers the following suggestions:

Since there have been no programmes for mass planting of improved seedlings in the last 20 years coupled with no ease access to land for large plantation, oil palm replacement programme scheme should be the focus that is, for every Dura cut down two Tenera or other high yielding varieties should be planted in its place.

Even there is no concerted effort in seeds/seedlings production for long therefore; private seed companies should be allowed as in other crops but careful regulations to guide the purity of improved seeds/seedlings. Thereafter the distribution should be monitored so as to get the right smallholder farmers group that drives the 80% ffb production in Nigeria. The distribution can also channel through the Traditional Rulers. He said Presco, Benin and Real oil, Calabar have developed Seed Gardens and they should be encouraged.

The other inputs such as fertilizers and chemicals should be subsidized for farmers involving in this replacement programme of Dura

On the processors angle, he advised that technology that will support cut and process technique should be made available to smallholder processors. And this should go with installation of cluster mill which should be nearly automation but of low capacity. He said Basicon Engineering, Owerri developed a prototype recently. He said field report about NIFOR SSPE revealed high failure percentage due to frequent breakdown and therefore, should not be introduced to smallholder processors.

OIL PALM GROWERS ASSOCIATION OF NIGERIA (OPGAN)

This is the umbrella body of smallholder farmers and processors in the oil palm producing belt comprising of 24 states in Nigeria. The President of the group, Igwe Hilary E. Uche received the team to their headquarters office at Small holder Unit, Old ADC Office, Nekede road, Opposite Zoo, Owerri. He said due to the recognition the Federal Government has for the group he is a member of Oil Palm Transformation Committee set up by the Hon Minister of Agric and Rural Development.

The group had successfully organized all oil palm farmers in all the producing states under the state coordinator. Each state also has LG or cluster coordinators with the names of members written along with their farm locations.

In addition to that the group had successfully conducted a survey of all palm trees plantations and wild groves and their utilization level during harvesting time for ffb. It was discovered by the group that 50% of ffb wasted in the bush and rot away because of lack of labour to harvest the ripe ffb because of the method being used traditionally. Therefore the main challenge facing the group is acquisition of "Adjustable Harvester" which has two categories that is, 8-15 feet & 16-20 feet adjustable levels respectively. From the market survey each Adjustable Harvester will cost about N500,000. According to the President, the availability of the harvesters will solve major problem confronting the sector in producing SPO because this will ensure timely harvest of adequate ffb for milling at every point in time.

The OPGAN has succeeded in attracting the attention of an Italian firm based in London by the name "International Trade and Financial Investment". The company will be first oil palm Seed Company in Nigeria in addition to other investment. OPGAN brought the firm to Imo state government and a tripartite MOU has been drawn between the firm, the Imo state government and OPGAN; and the firm will be in Imo state on Tuesday, 26thh June, 2012 to perfect the agreement and start operation.

The firm promised to work with cluster of farmers/processors and even use the sludge to generate electricity to the cluster. Also the firm will train two categories of Nigeria youths that is, graduates and technical school leavers to part of its workforce and to ensure technology transfer. The PIND scoping study team requested the following from the President of OPGAN:

To be part of meeting with Italian firm on their arrival since their vision is line with PIND intervention plan
List of OPGAN state coordinators and list of farmers/processors in Imo and Rivers states
List of reliable fabricators in Imo and Rivers states

The team informed him our plan to visit the clusters and interact with members and he said he would make time to with the team during this visit.

VEGETABLE OILS PRODUCERS ASSOCIATION OF NIGERIA (VOPAN)

The association which was established in 1999 has 125 members across the country and a headquarters office at Owerri. Due to fire inferno that engulfed the secretariat along Orlu road, in Owerri the temporary head office is at Camela Vegetable Oil Company Ltd, Owerri. The association was the brain behind the banning of vegetable oils importation during the Obasanjo regime and also ensured a high import duty after the lifting of the ban to protect the domestic market.

Presently VOPAN is fighting the abuse of ETL and it has petition Minister of Finance for the cancellation of Presidential waiver for Abdulsalm Rabiu to import vegetable oils into the country. The VOPAN Onitsha branch pressurized the Anambra state government for provision of social infrastructure such as road and electricity. The government had responded with the construction of harbor Industrial road that linked most of them in Onitsha while promising them to give them special consideration for power as soon as possible. The association has challenge PIND to ensure Palm Oil Revolution through their intending intervention in the sector.

PRESCO PLC

Presco is a fully integrated agro-industrial establishment with oil palm plantations, palm oil mill, palm kernel crushing plant and vegetable oil refining plant. It is at present the only one of such in West Africa. Presco specialized in the cultivation of oil palm and in the extraction, refining and fractionation of palm oil into finished products. Presco supplies specialty fats and oils of outstanding quality to customer's specification and assures a reliability of supply of its products all year round. This made possible by the integrated nature of the company's process (PRESCO NEWS, 2011).

According to Mr. Tony Uwajeh (the editor Presco News), a major challenge faced by large scale commercial agriculture in Nigeria is access to land. In global terms, taking oil palm for example, a 5,000ha plantation is a relatively a very small plantation. To be commercially viable and competitive, an oil palm plantation that would have modern processing facilities (oil mill, turbine/boiler for energy generation etc) should not be less than 10,000ha. The larger the size of the plantation, the higher will be the efficiency of operation. But despite the abundant arable land available in most parts of Nigeria, the process of acquiring land for large scale agriculture is very cumbersome due to the land tenure system.

The company had recently acquired Rison palm in Rivers State and its planning to acquire large plantation in obiora in Imo State. The land area of the company is 70,000ha out of it 28,000ha is under oil palm cultivation and 25,000ha are matured. A total of 60,000 tonnes SPO was produce in 2011 which was not enough to meet the demand. According to PRESCO News, May,2011, the 2010 sales RBDO, Olien and Stearin were 9,273 tonnes, 5,569 tonnes and 1,532 tonnes respectively.

Although the Federal government has at various times initiated policies and programmes aimed at boosting oil palm production in Nigeria, there remains a serious disconnect between policy objectives and policy outcome, resulting from poor implementation. As part of its contribution towards the attainment of the target set in the oil palm road map, Presco Plc, in addition to efforts towards doubling its planted area and processing capacities, initiated out-grower scheme under which about 170 farmers drawn from its host communities in Edo & Delta states were assisted with high quality planting materials, fertilizer and technical support to develop their own farm.

It is the opinion of Presco News that a turnaround in the fortunes of the palm oil sector can only be achieved through a public/private partnership, tapping on the facilities and technical know-how available in well-established estate plantations.

OKOMU OIL PALM COMPANY PLC

Okomu Oil mission statement is to be Nigeria's leading agro-business, through the efficient and effective management of our various plantations by a more motivated workforce, working in harmony with our

other stakeholders, and continuously returning favourable results to our shareholders. According to Mr. G.O. Oyebode, chairman Board of Directors, he revealed the operating & economic environment in 2011 during the annual general meeting as thus:

Commodity prices which in the early part of the year showed resilience dropped as the problems within the Eurozone and USA came to the fore once again, despite continued demand for these products, both internally as well as externally in 2011. Hard currencies, such as the US dollar and Euro continued to come under pressure as a result of the above mentioned financial troubles in Europe, coupled with inflationary fears in the USA. The Naira was also negatively affected against the crosses and depreciated against both Euro and the US dollar. However, inflation trended downward to 10.5% for the year, down from 13.5% in 2010.

The interaction the Oil Palm Scoping Study team had with Dr. G.D. Hafer, the MD, Okomu Oil Palm company Plc afforded the team the opportunity to understand the company's operational performance. The total palm tree as in 2011 was 10,080ha, with mature area totaling 8,857ha. The remainder consisted of immature palm of 898ha. Total FFB production for 2011 was 145,334 tonnes which represented an average FFB tonnage of 17 t/ha. This tonnage is the highest yield recorded on the plantation in nearly 25 years and its indicative of management's continued focus on replanting with new clones, strict fertilization regimes and ongoing input management control measures. The oil mill processed 30,538 tonnes of SPO called crude palm oil (CPO) and oil extraction rates averaged 21.01% for 2011 while the CPO prices for 2011 averaged N217,088 per tone (Annual report & accounts, 2011). The present sales price of CPO (SPO) is N220,000 per tone. In addition, the total area under Rubber increased by 165ha to 6,025ha in 2011, with 4,551ha being classified as mature plantings. Wet cup lump production 9on a dry rubber equivalent) was 6,340 tonnes which was 13% higher than 2010. The average yield of dry rubber for 2011 was 1.39t/ha, this being 27% better than 2010. He advised the scoping study team to encourage smallholders farmers to include rubber along with oil palm plantation so that during trough period of oil palm rubber is there to bring good income to them. It was revealed that the company bought 1,607t of 3rd party rubber in 2011 in order to increase throughput, thereby lowering unit cost in the factory. The company is willing to partner with PIND to build the capacity of smallholder producers and processors in palm oil and rubber production and to share their high yielding planting materials with the identified clusters.

The company has 5,000 workforce out of it 1,200 are permanent staffs. In 2011, the company used between 5,000 to 8,000 tonnes of fertilizers of various types ranging from Urea, MOP & NPK (12:12:15). SUCFINO an Indonesia company produces sprouted nuts used by Okomu and company practice integrated pest control system to protect young oil palm seedlings in the field.

Basicon Engineering Company

Head Office Address: Plot C3/49A Onistha Road, Industrial Layout, Owerri, Imo State.

E-mail: sales@basiconengineering.com, info@basiconengineering.com, contact@basiconengineering.com; basiconmachines@yahoo.com,

JOB PROFILE

S/no	Client	Project	Address	Contact

1	Fuetuk Ltd	2mt/hr Oil Mill	Ikpeannang Ekpene, Akwa Ibom	
2	Johnny Kelle Farms Ltd	2mt/hr Oil Mill	Ikwuano, Abia	
3	Egbu Women Co-op (Anglican Church)	½ mt/hr Oil Mill	Ngor Okpala, Imo.	
4	C.K.C School	½ mt/hr Oil Mill	Okpala Imo State	
6	Abdul Malik Ventures	2mt/hr Oil Mill	Biase Plantation,Cross river.	08037603112
7	Imo State Min. of Agric	10 units of mini Oil Mill	Amakohia, Ikeduru etc	
8	M P P 6 Project	3 units of 1mt/hr oil mill		
9	Forward Africa,		Umunoha Mbaitoli, Imo	
10	Adapalm	Refurbishment of 25 Cages and Storage Silos	Ohaji Imo State	08186925831
11	Adapalm	5tonnes/hr Steam Boiler	Ohaji, Imo state	08186925831
12	Abiss Farms Ltd	3mt/hr Oil Mill	79, Igbalaye Street,Owe Akala Junction Akure ,Ondo State	070823221096
13	UNDP 1996	5mt/day Oill Mill (10 units)		
14	Adapalm	30mt/hr Oil Mill Turn Around	Ohaji, Imo state	08186925831
15	CPI Limited	8mt/day Cassava Flour Plant	Boki, Cross River State.	08033023540 07086437379
16	Ideawor Industries	3mt/day Cassava	Auchi, Edo State.	08033074272

	Limited	Flour Plant		08169332032

5*MT*/DAY PALM FRUIT MILLING PLANT

THE PLANT

This plant has the capacity to process 5mt of palm fruit per 8hrs in a day into 1mt of oil and 200kg of kernel. Every stage of the processing is mechanized, from brunch stripping to oil and kernel production.

This plant should be located within villages to relieve the villagers the burden of carrying heavy bunches to neighboring villages for processing.

PROJECT COST

Complete 5Mt/Day Palm Fruit Milling Plant	3,500,000.00
9m x 12m x 5m Factory Building	1,800,000.00
Borehole and water tank	1,350,000.00
Total	#6,650,000.00

MANAGEMENT /OWNERSHIP STRUCTURE

This mill is best run as a contract milling plant. Villagers bring their fruit which are measured and processed for a fee. Also the co-operative members are encouraged to borrow money and source fruit for processing at the mill as their own separate business. This business model has already been practiced by village women.

We recommend a co-operative of 5 school leavers and 1 graduate so that the income generated will sustain them and repay the cost.

2) 10MT FFB/DAY AUTOMATIC PALM FRUIT MILL PLANT

THE PLANT

This plant is designed to take up palm fruit within 3km radius of its location due to its capacity. It is fully automated with all moving parts driven by electric motors.
It has the capacity to produce 2mt of palm oil and 200kg of palm kernel each day.

PROJECT COST

10MT/Day Fully Automated Palm Oil Mill	9,350,000.00
12m x 18m x 6m(H) Factory Building	5,000,000.00
60KVA Generator	2,500,000.00
Electric Switchgear and Cabling	1,240,000.00
Borehole and water tank	1,350,000.00
Total	#19,440,000.00

STAFF REQUIREMENT

9 Operators
1 Technician
1 Marketing/procurement personnel
2 Securities
1 Manager

MANAGEMENT/OWNERSHIP STRUCTURE

This mill will take advantage of the advanced processing technology to produce high grade oil both on contract or direct processing or both. We recommend a 10man co-operative, made up of 8 school leavers and 2 graduates who can be trained to provide management skills.

EQUIPMENT LIST FOR 5MT/DAY OIL MILL

Item	Quantity	Equipment	Amount
1	1	Full Bunch Stripper/Sanitizer	380,000
2	1	Steam Boiler	450,000
3	1	Twin Sterilizer	200,000
4	1	Digester/Auto Screw Press	500,000
5	1	Fibre Separator	200,000
6	1	Nut recovering Unit	300,000
7	1	oil clarifier	150,000
8	1	Nut drying Platform	150,000
9	1	Screw conveyor	400,000
10	1	Oil Pumps	90,000
11	1	Water Pumps	90,000
12	6	Electric Motors	300,000
13	1	18kva Generator	200,000
14	Lot	Control Panel	90,000
	Total		**#3,500,000**

EQUIPMENT LIST FOR 10MT/DAY OIL MILL

Item	Quantity	Equipment	Amount
1	1	Boiler with Water pump	1,250,000
2	2	Sterilizers	800,000
3	1	Bunch Stripper	550,000
4	4	1 Digester/Auto Screw Press	1,100,000
5	1	Cake Breaker	550,000
6	1	Fibre Separator/ Cyclone	450,000
7	1	Nut Polishing Unit	200,000
8	1	Nut Recovering Unit	750,000
9	1	Oil Clarifier with Oil Pump	650,000
10	5	Conveyors	1,750,000
11	Lot	Control Panel	500,000
12	12	Electric Motors	800,000
Total			#9,350,000

HIGHLIGHT ON EREBELOVED FARMS INTERNATIONAL FABRICATOR, OSISIOMA ABA

BACKGROUND

- Prince Achilefo is the MD of Erebeloved international based in Aba Abia state which was established in year 2000 and presently with 30 apprentices. The education qualifications of the MD is B.Sc Agricultural Economics, B.Sc Agric Engineering and M.Sc Educational Technology (in view). The contact is 08037653010, 08050535712

ACTIVITY SUMMARY

CLIENTS:

- The clients cut across 4 states as stated below:
- Taraba state- 2
- Abia state- 28
- C/River state- 10
- A/Ibom State- 5

CAPABILITY:

- Cassava processing equipment
- Aquaculture equipment
- Oil Palm processing equipment
- Nursery establishment and farm management

OIL PALM PROCESSING EQUIPMENT

- Standard automated Oil Mill with conveyor- N15million
- Standard Oil Mill without conveyor with capacity of 10tonnesffb/day- N5 m
- This mill will take 8 months to construct and deliver.

PROCESSING EXPERIENCE

- 100 bunches of standard size is equivalent to 1 tonne.
- After stripping, the loosed fruits will fill 4 drums.
- The crude palm oil from the 4 drum is 200 litres.
- 1 drum of loosed fruits after extraction of palm oil and fibre separation will give 0.25 kernel nuts (un-cracked).

OPERATIONAL HIGHLIGHT OF RISONPALM (SIAT NIG LTD)UBIMA / ELELE ESTATE, RIVERS STATE

- Present status of the estate: The management of the estate transferred to SIAT NIG LTD since January, 2012
- List other Government owned estates in Rivers state: Delta Rubber estate(5 sites)
- Well- performing workers paid as at when due their wages, meet set standards / targets
- Profit making on annual turn-over and exceed budget with appreciable margin. Reverse is case with non- performing estate.
- Host communities of Sait Nig ltd:
- Elele , Elele Alimini, Akpabu, Itu , Eligbo, Odiamude, Odemisama, Omudioga , Egbeda, Oporomini, Ubima, Omerelu, Apani , Egbu,Ozuzu, Ihie, Ogida Omademe , and Isu.
- Varieties; NIFOR Tenera and IRHO Tissue culture.
- Age of plantation: 27-38yrs (Ubima Estate); 23-27yrs (Elele estate).

S/N	TOPCAL ISSUES	2010	2011
1.	TOTAL FFB HARVESTED (TONNES)	NA	NA
2.	MATURE PLANTATION AREA(Ha)	16000 HA	16000 Ha
3.	TOTAL PLANTED AREA(Ha) Ubima/Elele	16000Ha	16000Ha
4.	IMMATUREPLANTATION AREA (Ha)	NONE	NONE
5.	CRUDE PALM OIL PRODUCTION(TONNES) SPO	NA	NA

	TPO		
6.	SALES OF FFB (TONNES)	NA	NA
7.	PRICE OF FFB/ TONNE	NA	NA

Note: Risonpalm operated without records for many years .
Functioning departments of Siat Nig Ltd: Plantation, Admin/HR, Finance/ acct, ICT, Security, Workshop, Logistics/Store, Medical, Mill undergoing rehabilitation.
Workforce: Mgt -9 ,Production – 25 , Production (unskilled) -3000

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