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A Report on

Cassava Value Chain Analysis in the Niger Delta

2011

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List of Acronyms

ADP	Agricultural Development Project
AGOA	African Growth Opportunity Act
CBN:	Central Bank of Nigeria.
CEDP	Cassava Enterprise Development Project
DADTCO	Dutch Agricultural Trading Company
EDC	Economic Development Centre
EU	European Union
FAO	Food and Agriculture Organisation
FMARD	Federal Ministry of Agriculture and Rural Development
HQCF	High Quality Cassava Flour
IFAD	International Fund for Agricultural Development
IFDC	International Fertilizer Development Cooperation
IITA	International Institute for Tropical Agriculture
LAPO	Lift Above Poverty Organisation
MPC	Micro Processing Centres
MSME	Micro Small and Medium Enterprises
mt	metric tons
NDDC	Niger Delta Development Commission
NDR	Niger Delta Region
NGO	Non-governmental Organisation.
PIND	Partnership Initiatives in the Niger Delta
RMRDC	Raw Materials Research and Development Council
RSSDA	Rivers State Sustainable Development Agency
SON	Standards Organisation of Nigeria
SPDC	Shell Petroleum Development Company
SME	Small and Medium Enterprises.
TFI	Tai Farm International
UNIDO	United Nations Industrial Development Organisation
USAID	United States Agency for International Development

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Executive Summary

The objective of the cassava value chain analysis is to provide comprehensive information on the cassava sub-sector in the Niger Delta Region as a guide for future intervention and investment in the sector. Specifically, the study team was mandated to study cassava production, processing and market structures, major opportunity for growth, supporting organizations, regulatory framework, constraints and solutions and suggested actions for future intervention for sustainable economic growth of the cassava sub-sector in the Niger Delta Region. The study was commissioned by the Partnership Initiative in the Niger Delta (PIND) - a non profit organisation (supported by Chevron) that is interested in the sustainable economic growth and development in the Niger Delta region.

Nigeria is the largest producer of cassava tubers in the world with average annual production of about 35 million mt over the last 5 years. About one-third of the total national output comes from the Niger Delta region where many livelihoods depend on cassava as a main source of food and income. It has been estimated that the number of small commercially oriented cassava producers within the region would be in the range of 70,000- 120,000 (out of the more than 1 million producers) and over 400-500 cooperatives and cottage industries, 800,000-950,000 traders, 46 small medium processing industries and 1 large processing industry in the region. About 70% of cassava farmers in the region are women; also, women are almost entirely responsible for the processing and marketing of cassava and it's by products in the region.

The end markets for cassava in the Niger Delta region can be broadly categorised into: traditional food oriented segment (which is the dominant segment as it accounts for about 90% of cassava produced) and the industrial product segment (including starch and high quality cassava flour – HQCF) which accounts for less than 10%. Across Nigeria, the demand for industrial cassava based products such as glucose and dextrose, starch is rising; e.g. about 121,000 mt of glucose and dextrose was imported in 2008, which is about three times more than imports in 2002. The bulk of this demand is being met by importation and inadequate local production of starch and glucose syrup, thus opportunities exist for increased production of these products provided they are cheaper than imports. The demand for packaged and improved cassava food products (garri, odourless fufu flour) is also rising in urban centres; cassava products from factories like Vesa Foods Benin are found Shoprite and major supermarkets in Lagos, as well as Europe and America where a large population of Nigerians reside. In addition, demand HQCF for bread, bisquits and pasta could be strengthened significantly if the right quality were available at competitive prices.

The cassava value chain comprises input suppliers, farmers/farmers cooperatives, processors, traders, collectors, intermediate and final consumers within and outside the region. Cassava production is characterised by small holder subsistence farmers (who accounts for about 95% of total cassava farmers) planting 0.2-1 ha (usually intercropped with maize, melon, vegetables) with yield of 8-10 t/ha. The farmers who plant for commercial purposes usually have between 1-10ha and adopt the use of high yielding varieties, however a lot of them do not adopt good agronomic practices which results in an average yield of 11-15 t/ha instead of potential yield of 25-30 t/ha obtained for IITA/CEDP beneficiary farmers in the region. Large scale farmers are quite few in the region with farm size accounting for more than 10ha and up to >1,000 ha, improved varieties and mechanized farming are adopted by these farms with output of about 27 – 35 t/ha, however the high cost of operating the farms is making some of these firms to scale down on investments. One of the major cost components of subsistence and commercial cassava production is labour cost, which accounts for about 70% of total production cost.

Trading of cassava roots follows a seasonal pattern; it is as cheap as N4,000/mt during the rainy season when there is a glut in harvest and as high as N17, 000/mt during the dry season when it hard to harvest. As at the time of this study, the farm gate price was N7000 /mt while the factory gate price varies from N8,000 to N17,000 for the different processors. There is also a strong geographic consideration in the farm gate price of cassava – cassava grown close to major transportation arteries captures a higher price than the cassava grown in the interior because of proximity and timeliness of supply.

Processing of cassava occurs in household (mortar and pestle), micro processing centers, cottage milling, and small, medium and large scale processing plants. Cassava is processed into traditional

food products at household and micro processing centers while cassava is processed into improved food products and industrial products at the SMEs and large scale plants. Many recent SMEs processing plants have shut down because they could not produce HQCF due to low prices from the flour mills. This led to the unprofitable nature of producing HQCF which was the product most of them focused on, however few diversified into production of odourless fufu flour whose demand is increasing. Supply of cassava roots to urban based SMEs and large processing plants for production of industrial cassava products has been poor due to challenges of cost and timing of transport from the rural areas.

A major constraint identified for production of HQCF was the inability of many farmers to deliver freshly harvested cassava roots to processing plants within 24 hours; this has high cost implication in terms of labour for harvesting and transportation of roots to the processors. At the same time, the flour millers (who are the only user of HQCF) are unwilling to buy it at more than N85,000/mt whereas processors claim they are only profitable at N110,000/mt. So the product appears to be unprofitable, which prompted many SME processors to stop production.

There are three channels by which cassava and its by-products reach the end markets: small scale production for traditional food; medium scale production for improved food products and large scale production for industrial products. The first channel dominates the industry (at least 80% going for traditional food, nationally), with only 10 % passing through the third channel into the industrially processed products. While the traditional food market is fairly saturated and offers small opportunity for growth, the industrial processed products still offer significant growth potential, if the right dynamics can be created on supply relationships, cost of production, and demand by local end markets.

The recent investment by government, donor agencies and private sector organisations are targeted at utilising cassava for industrial products; IITA/USAID/SPDC investment in the region and the Presidential Initiative of Cassava. However, while there have been good advances on the production side (yields and varieties), there has not been success with developing the new markets, due to technical and relational constraints.

Over the last 5 years, there has been rising demand for industrial products (starch, glucose, dextrose) that could be produced from cassava, increased patronage of packaged cassava food products. While the flour millers have been flouting the mandatory 10% HQCF blending with wheat flour and the ban on importation of cassava based products have been lifted, there is still large potential to address the issues facing these market opportunities. Recent (2011) government engagement around enforcing the 10% minimum blending requirement is taking hold, however, and more factories are getting interested in HQCF again.

The constraints faced by actors in the value chain include: under utilization of cassava roots in the improved food and industrial products channels because of weak linkages between actors in the chain to deliver cassava to industrial processors within 24 hours, inadequate input supply, weak extension services, lack of access to credit for operating and expanding enterprises, low efficiency of processing enterprises, and the non commercial orientation of many farmers and processors in the region, etc.

Opportunity for Growth

Opportunity for growth lies with the industrial usage of cassava through expansion of competitive cassava production and improved products. The growth potential of the non traditional cassava food sectors in Nigeria is strong. The expansion of this non-food market will foster growth in the cassava production and processing especially the provision of diversified alternative products and sales outlets in the medium to long-term. This will ensure import substitution for starch, continued import substitution for glucose and open up export market for starch (native and modified). Import substitution can absorb up to 900,000 mt of finished product, equivalent to nearly 4.5 million mt of cassava tubers.

Strategy for Growth

While many of the challenges facing the cassava value chain are common to all agricultural products (weak extension services, poor access to credit, poor availability of input supplies, fragmented marketing, etc), addressing the needs of the processors to supply the processed food and industrial market needs coordinated strategies. PIND should develop a market based approach to addressing the challenges, initially focusing its efforts on those small farmers who are commercially oriented and on processors with a strong business foundation. These will address cost reduction strategies for producing industrial cassava products to make them more competitive with imported products. Some suggestions for proposed interventions to further develop the subsector in the Niger Delta region include:

Improve Value Chain Coordination

PIND should address the challenges in the coordination of the supply from the farmers to the processors to deliver the right raw material (consistent varieties) to the processing plants within the required time frame in a cost effective manner:

- Refine the understanding of the challenges linking the small commercially oriented producers to the viable SME and large scale processing plants that are producing for the flour milling and industrial markets;
- Address the challenges of improved bulking and logistic operations, and enhanced relations between the farmers and the processors;
- Facilitate linkages between medium/ large scale processors with micro processing centres (MPC) that can process cassava in rural areas for onward delivery to the former; and
- Engage with the DADTCO/IFDC/Dutch government initiative which provides market linkage for farmers through mobile processing with improved production practices to explore areas for replication.

Improve Production and Productivity

- Engage with the IFDC cassava production team to gain a better understanding of their support activities to small cassava farmers around group formation, production techniques, and access to services;
- Promote the consistent use of improved high yielding, disease resistant, cassava varieties coming from certified nurseries where the varieties can be traced;
- Promote good agronomic practices through public and private extension to farmers as a way of improving productivity, including improving access to and use of fertilisers, herbicides, pesticides, etc to farmers;
- Analyze the constraints around the commercial supply of labour saving devices (harvester, lifter) that could reduce the labour cost of farmers;
- Enable the provision of viable and relevant extension services to farmers; and
- Improve the capacity of nurseries to provide consistent varieties with the traits desired by the processing companies and to develop viable business models for commercial distribution.

Improve Processing to Meet the Supply Chain Needs of the HQCF Market

- Improve the MPC technology to facilitate the intermediate processing to reduce the weight and stabilize the cassava raw material, which will reduce the transport costs and facilitate logistical operations;
- Strengthen capacity of processors to optimize product quality and reduce operational cost of producing HQCF through market led activities;
- Examine opportunities for broadening the distribution of DADTCO's mobile processing technology which produces high quality wet cake in a timely manner for further processing into starch or HQCF; and

- Collaborate closely with IITA to address any issues related to the processing technologies and diagnose the specific reasons for the closure of the 40 SME processing plants started under CEDP to identify opportunities for rehabilitation.

Strengthen Coordination and Advocacy Bodies

- Engage actively with the new Ministry of Agriculture task force on Cassava to introduce and/or leverage sound market driven opportunities for increasing cassava production and marketing;
- Organise cross functional meetings with the producers, intermediate processors and end processors and supporting service providers in the Niger Delta to enhance the understanding of the needs and issues facing the value chain;
- Organise an innovative and learning platform which is mutually beneficial for all stakeholders and disseminate information of value to all the stakeholders. Of special importance is to identify the key issues surrounding the competitiveness of the value chain and ways to gradually wean the industry from its protective umbrella;
- Identify the most productive ways to take advantage of the various donor funded programs supporting Cassava production in Nigeria for the benefit of the Niger Delta; and
- Work with financial institutions to devise innovative low cost strategies for farmers and MPCs to access appropriate financial services.

Special Considerations for PIND in the Design of its Pilot Activities

As PIND puts together its activities, there are three central themes it should pursue: contact that it should coordinate closely with:

- Coordinate closely with IITA which has been a leader in the development of both new varieties and processing technologies. PIND's Economic Development Centre (EDC) will have a comparative advantage in addressing the challenges around the business models to ensure that they are logical and market driven. PIND's Appropriate Technology Centre will be able to work closely with the IITA and the private fabricators with whom IITA has been working to improve the processing technologies.
- Consider using the IFDC/DADTCO/Dutch initiative around mobile processing of cassava to produce wet cake and as poles of development for building the capacity of the farmers to optimize production and facilitate the introduction of commercial services; and
- Given all of the other work being carried out by donors (Dutch, Bill and Melinda Gates Foundation, USAID, IFAD, and the Ministry of Agriculture) on this topic, PIND should play a coordinating role in bringing the lessons learned to the broader benefit of the Niger Delta. As the strategy develops, special consideration must be placed on the inclusion of youth and women in the program, at all levels.

Introduction

Overview

Nigeria is the largest producer of cassava tuber in the world with production of about 45 million mt of the world's production of 242 million mt in 2009 (Figure 1 below). Between 2003 and 2008, the average annual production in the country was about 35 million metric mt[1] and the total area under cassava cultivation in Nigeria is about 3.60 million hectares. Although the world leader in cassava production, Nigeria is not an active participant in cassava trade in the international markets due to the uncompetitive nature of its production and weak processing systems.

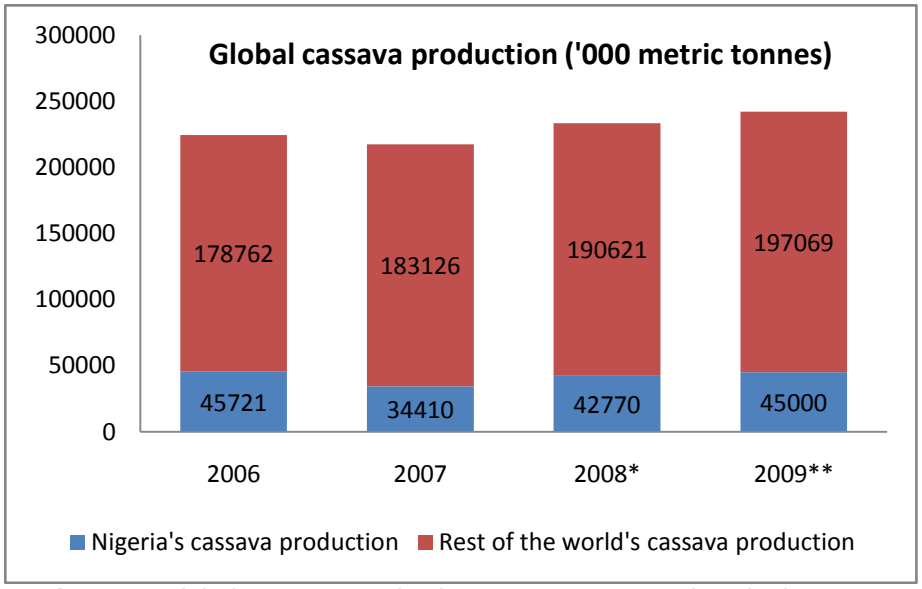

Figure 1: Global cassava production Source:FAO Food Outlook December 2009, http://www.fao.org/docrep/012/ak341e/ak341e06.htm

Cassava is one of the most important crops for Nigerian farmers; it is the most widely cultivated crop and provides food and income to over 30 million farmers and large numbers of processors and traders[2]. Common cassava products in Nigeria include *'garri'*, *'akpu',* tapioca, starch, chips and flour; *'garri'* is the most (it accounts for over 70%) common cassava product. Cassava is grown in almost all the states and thrives in all agro-ecological zones in Nigeria. Its production is characterized by small scale producers who use old varieties and traditional production technologies which largely accounts for low yield. Oyebanji et al (2003) noted that these small-holders account for over 80% of cassava production in Nigeria. Over 90% of cassava produced in the country is consumed locally with less than 10% utilised for industrial purposes.

International trade in cassava is growing rapidly; trade volumes between 1995 and 2005 have increased by about 36% and a conservative projection of the cassava trade for the year 2015 at a 40% growth rate is estimated at 11.76 million mt. Globally, the traditional use of cassava is changing from primarily human consumption to processing into industrialized products such as starch, flour and ethanol[3].

Studies have shown that cassava has the potential to industrialize Nigeria more than any other product if its potential is properly harnessed. Awoyinka (2009) affirmed that Nigeria can earn about US$5 billion per annum from cassava and its by-products, making it a key foreign exchange earner and instrument

[1] http://countrystat.org/nga/cont/pxwebquery/ma/159cpd010/en

[2] http://www.cassavabiz.org/News/reports/CEDP%20Program%20Description%20additional%20funding21.pdf

[3] *www.nigeriamarkets.org/files/UNIDO%20Cassava%20Masterplan.pdf*

for job creation and catalyst for development. In Nigeria, cassava is currently being promoted as industrial raw material in the form of starch, flour and ethanol. Hence, many development initiatives are underway by government and private sector for the processing of cassava into intermediate products for use by local industries and for export.

The Partnership initiative in the Niger Delta (PIND) - a non profit organisation supported by Chevron is interested in the sustainable economic growth and development in the Niger Delta region. Armed with overall goal to increase income and employment of people of the region, using the market driven approach, PIND commissioned a cassava sub-sector analysis in the region with aim of identifying constraints and opportunities for future intervention.

Reasons for Selecting Cassava Value Chain

- The importance of cassava in the region cannot be over emphasised because it serves as a main source of food in the region especially amongst the poor persons (in a study conducted by Philip et al. in 2004, it was revealed that on the average, about 45% of the respondents in the Niger delta states consume cassava meal more than 4 times a week) and it is also the main source of income for many rural economies in the region.
- About 35% of total national output of cassava in 2008 was produced in the Niger Delta. The principal production states are Cross River, Ondo, Imo, Akwa Ibom, and Rivers states and these states jointly produced about 80% of the total cassava output of the Niger Delta region in 2008.
- It has been estimated that the number of commercially oriented (as opposed to subsistence) cassava producers within the region would be in the range of 70,000- 120,000. In Edo state, it was gathered that about 16,000 cassava producers are registered with the Edo state Cassava Growers Association.
- Cassava plays a major role in the livelihoods of women in the Niger Delta region. About 70% of cassava farmers in the region are women; also, women are almost entirely responsible for the processing and marketing of cassava and it's by products in the region.
- Sale of cassava is an important source of income to rural households in Nigeria. In 2005, a report by FAO and IFAD revealed that income generated from cassava production contributed about 34% to the total household farm income of cassava farmers in Imo state.[4]
- The resolution to most of the problems with the rebels in the region has led to renewed attention on the plight of the people in the region, thus resulting in increasing investments by government, private sector and international development agencies in economic and social development of the Niger delta region. These stakeholders have identified cassava as a major vehicle for the transformation of the region.
- Many development initiatives have intervened in different aspects of the cassava value chain, with very mixed results; many opportunities still exist for Micro, Small and Medium Enterprises (MSMEs) in the region to process cassava into industrial products for use in breweries, textile/food industries, etc. thereby creating new incomes and employment for the people in the region.

Methodology

The methodology adopted for the study was the review of literature and qualitative research technique. Related literature was reviewed from various sources such as internet, newspapers, official documents and publications, etc. The field work component of the study was conducted using qualitative research techniques particularly key informant interviews (KIIs) and focus group discussions (FGDs). Key informant (in-depth) interviews were used for collecting data on individuals' personal histories, perspectives, and experiences while focus group discussions were effective in generating broad overviews of issues of concern to the groups or subgroups represented. Interviews were held with cassava farmers, processors, traders, and ADP staff, among others. The study areas cut across

[4] http://www.fao.org/docrep/009/a0154e/A0154E06.html

different areas in the Niger Delta region especially Benin, Akure Owerri and Warri, Uselu Uku. KIIs and FGDs were conducted in the course of the Value Chain Assessment.

A validation workshop was held with stakeholders with the aim of presenting and validating the findings on July 20, 2011 in Warri. The list of respondents interviewed and those at the FGDs and validation workshop are attached as Appendices. The major challenge encountered during the study was the lack of quantitative data.

Structure of the Report

The rest of this report will analyze the end markets for cassava in Nigeria, the different production and processing systems, and then how they relate into a structured value chain. The analysis will look at the major institutional and regulatory issues, as well as identifying the main points of leverage within the value chain and finally provide a review of the main constraints, before developing a Vision for Growth and strategy for PIND.

The End Markets

Cassava marketing is an important source of income to rural households in Nigeria. Considerable income is also generated from cassava processing. Women are actively involved in the growing of cassava, and are major actors in its processing and marketing. Thus, cassava provides women with an income-earning opportunity, enabling them to purchase commodities, which can contribute to household food security.

The cassava market in Nigeria can be classified into two broad categories based on the nature of demand namely: the traditional food-oriented market and the industrial market. The former refers to the demand for food consumption by individuals and households while the latter is the demand for cassava for industrial purposes (Knipscheer, et al, 2007).

Figure 2 shows the potential market or demand for cassava products in Nigeria. The greatest demand for cassava is for food; about 14,157, 438 mt (62% of total demand) by the urban market sector while the rural demand is estimated at about 4.3 million mt (averages 19% of total demand) . Cassava demand for industrial purposes i.e. flour, livestock, starch and ethanol, is far less compared to the traditional food demand. This probably is an indication of the low state of development of processing firms.

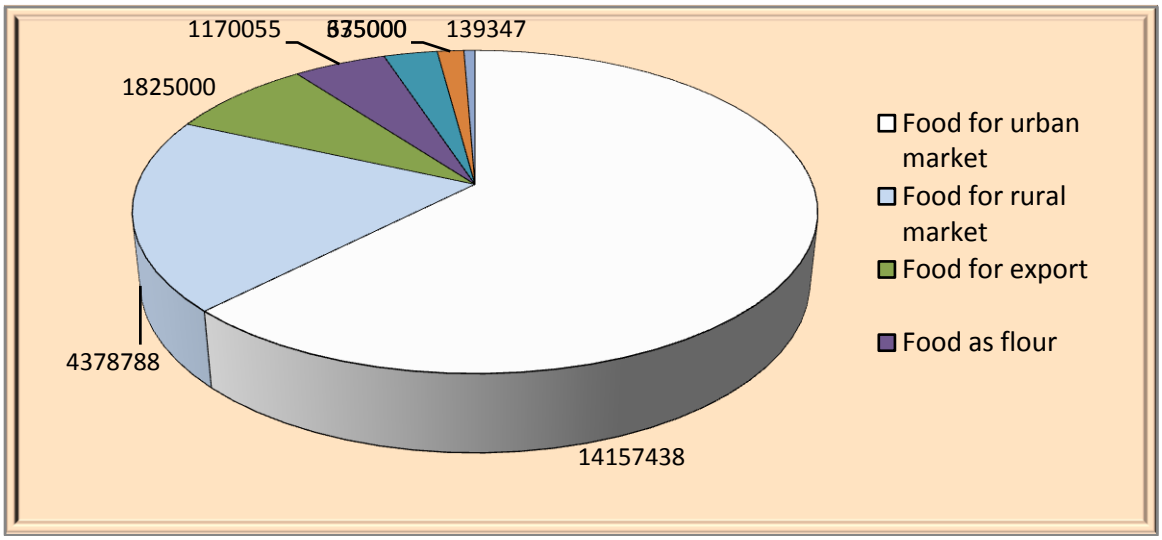

Figure 2: Potential market for cassava by product (Kormawa, 2003, quoted by Echebiri and Edaba, 2008)

Traditional Food Oriented Market

There is a vast local market for cassava in the Niger Delta region and other parts of Nigeria. Over 80% of the cassava produced in the region is consumed as food. Table 1 shows the results of a study conducted in 2004 which revealed that majority of the respondents consume cassava at least 3 times a week. The relevant processed cassava foods in the traditional (food) market include garri, *fufu*, edible starch, *kpokpo garri*, *lafun* and *abacha.*

Table 1: Frequency of Cassava Consumption

	Percent of respondents that consumed cassava in a week		
State	1-2 times	3-4 times	> 4 times
Akwa Ibom	29%	36%	33%
Bayelsa	21%	15%	51%
Edo	21%	25%	53%
Imo	24%	21%	43%

Source: Philip et al. (2004)

Garri

Garri is the most consumed and traded of all food products made from cassava roots. It is a creamy-white, partially gelatinized, roasted, free flowing granular flour with a slightly fermented flavour and sour taste. Major demand for cassava is in the form of *garri* and over 70% of the cassava produced in the Niger Delta is processed into this form. The *garri* prices, therefore, are a reliable indication of the demand and supply of cassava.

Garri is consumed by urban/rural households and institutions such as hotels, eateries, schools, hospitals, etc in the region. These institutions and some households usually prefer to buy in bulk (in 50kg sacks) because of their huge requirement. The main location of purchase is usually the open markets. The market for *garri* is characterized by perfect competition in the sense that there are many buyers and sellers who are not in a position to influence marketing transactions by refusing to either sell or buy. *Garri* is produced by numerous smallholder units that sell *garri* essentially in village markets (Figures 3 and 4). In major *garri* producing areas, there are scattered big markets in the region which act as assembly centres for *garri* from the numerous surrounding smallholder units. Such assembly markets, especially those markets that are well known for the supply of top quality *garri* are generally well attended by traders from far and wide.

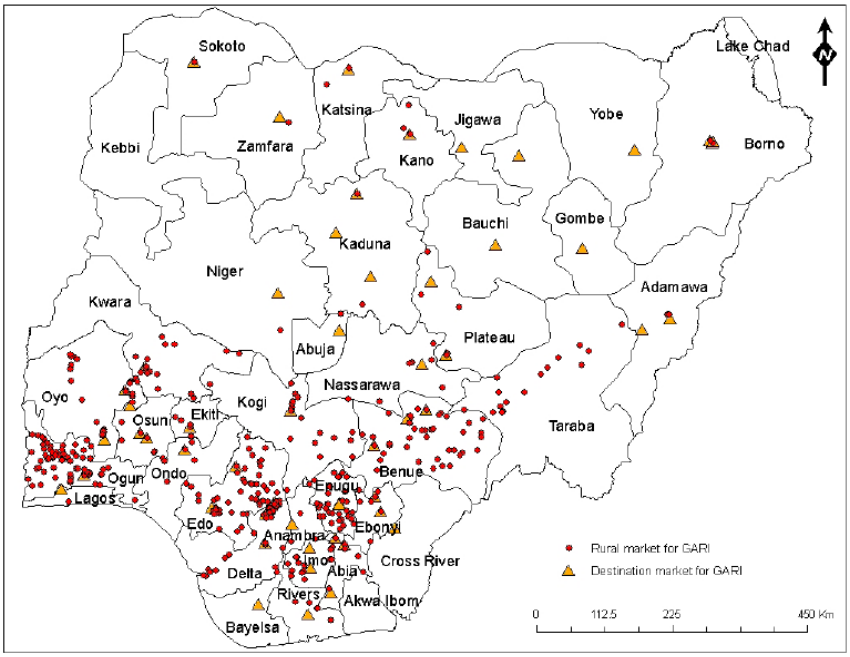

Figure 3: Major source (rural) and destination (urban) markets for Garri in Nigeria (Ezedinma et al 2007)

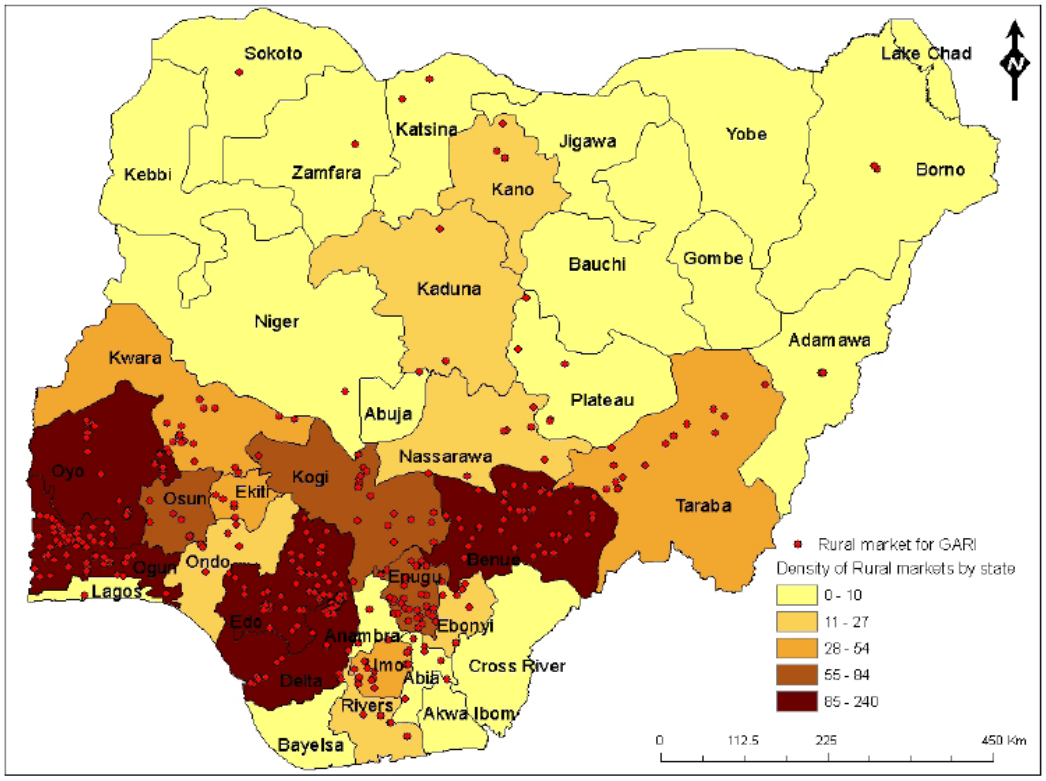

Figure 4: Distribution of Garri destination markets in Nigeria, source Ezedinma, et al 2007

The increasing rate of urbanization and demand for convenient way of shopping is also changing the way *garri* is sold. In addition to bulk sales, *Garri* is now being packaged in small sizes (mostly 1kg) in the Niger Delta for sale in major supermarkets like Shoprite in Lagos and also for the export market (see box below). In Shoprite, *garri* packed in 1kg bag goes for N287. The volume of cassava food products being sold in retail packs (amounting to over 500 mt in 2006) is increasing, with more and more local stores entering this market.

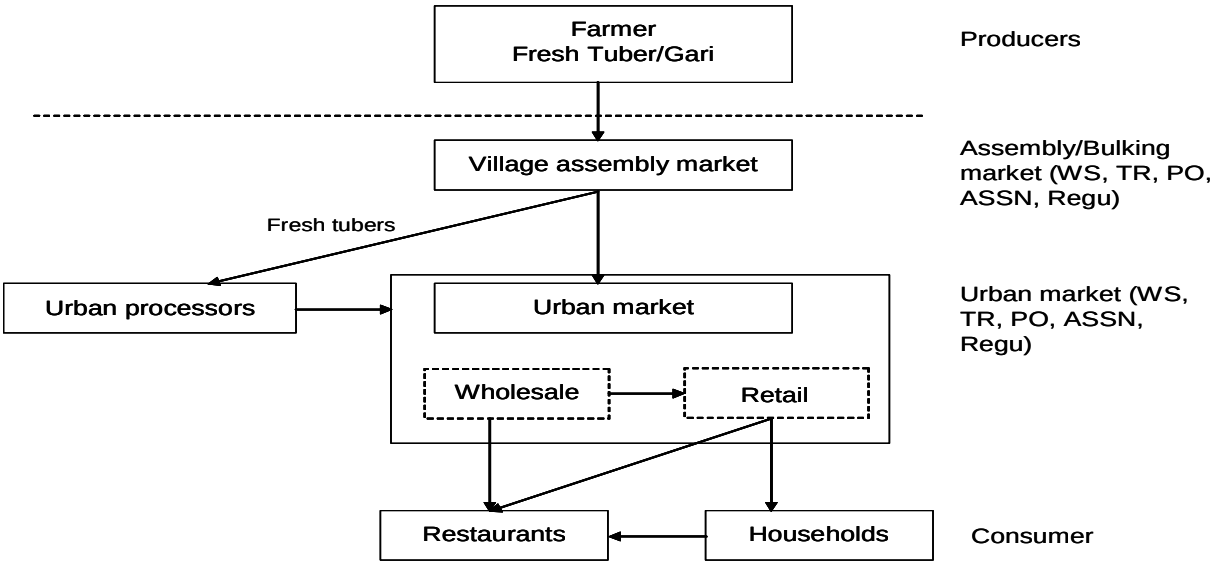

Figure 5: Commodity chain of Garri in Enugu and Benin City markets

Box 1 shows that attempts have been made by indigenous processors to export processed cassava food products, even if in small quantities.

Box 1: Export of Garri from the Niger Delta

The Niger Delta region has recorded a positive presence at the regional and international markets from 2006 till date. For instance, Aquada Development Corporation, Abia State exported let of *garri* flour labelled *Scintilla* **(**hyper-Fine, yellow *garri* flour) to Baltimore, USA, African Growth and Trade Opportunity Act (AGOA) meeting held in Ghana in 2007. Other attempts were made to export Odorless *fufu* flour and high quality *garri* to Lagos, northern region of Nigeria and at times Canada, USA, UK,. Such companies include Ugoeze Emelogu of Owo-Ahiafor, Obingwa LGA, Abia State, Jon Tudy Foods, Aniocha South LGA, Delta State, Miragate (http://www.websitenigeria.com/detail/link-454.html), Godilogo (Cross River State) and Widows Mite (Akwa Ibom State).

Fufu

Fufu is the second major product consumed by households and institutions, ranked next to garri in importance. It is a fermented wet paste widely consumed in eastern and south-western Nigeria. The marketing structure is similar to that of *garri*, however the price of wet fufu is lower, at N300 per basin. In recent times, modified version of fufu (instant *fufu flour)* has been developed and it has become popular due to its ease of preparation, longer shelf life, convenience of storage and its compact size. Vesa foods in Edo state produces '*cassavita*' which is a brand of odourless fufu flour and the company stated that there is an increasing demand for the products. The odourless fufu flour (Figure 6) is found in shops, supermarkets and open markets in urban areas especially in Lagos and it is being sold for N300 per kg. It is also being exported to England and America where there are huge populations of Nigerians living there.

Figure 6: Dried fufu and wet fufu, sanni et al (2008)

Kpokpo Garri

Kpokpo garri is a common food in Delta State. Its only difference from *garri* is that the grated fermented mash is not sieved before roasting.

Edible Starch

This is produced mainly for consumption among the ethnic groups Urhobo and Isoko in Delta state.

Abacha

Abacha is eaten as a snack in the eastern part of Nigeria. It is also considered as a delicacy in some communities, eaten with a palm oil source and smoked fish or meat. It is also a ceremonial food served during indigenous festivals such as agricultural festivals, funerals and child naming ceremonies.

Industrial Market

Cassava tuber is an important raw material for some industries notably those involved in food processing, textile, pharmaceuticals, breweries, etc. The three major industrial cassava products in Nigeria include:

(1) High quality cassava flour;
(2) Starch, which can be divided into the native starch and the modified starches (e.g. production of dextrin and glucose); and
(3) Chips or pellet for animal feed.

High Quality Cassava Flour - HQCF

In the 1990s, after the depreciation of the value of naira, the high cost of wheat almost sent bakers out of operation, thus compelling them to look for an alternative. To face this challenge, International Institute of Tropical Agriculture, IITA developed a simple and appropriate process for producing High Quality Cassava Flour (HQCF) that is suitable for baking. This was tested in baking and confectionary industries and was found successful and the cost implications favourable (Sanni et al., 2008). In 2006, in an attempt to conserve the huge foreign exchange that goes into importation of wheat flour, the federal government's directive through the presidential initiative on cassava (PIC), mandated flour millers in the country to include 5–10 % cassava flour in flour milled for bread baking and other confectionaries. However, the market for flour in Nigeria is still dominated by wheat flour. This is driven by the wheat millers' preference to mill just wheat, and the consumers' preference for finished product manufactured just from wheat. In 2010, Nigeria's import of wheat was valued at about 800 million dollars[5] with the bulk of it going to the flour milling firms.

The potential annual demand for (HQCF) in Nigeria has been estimated at 300,000 mt[6] however current production is about 50,000 mt per annum[7]. Since the expiration of the past government regime, the flour millers (except Nigeria Flour Mills) have not been complying with the directive due to reasons such as inadequate supply of good quality cassava flour from the domestic market[8]. The flour millers require cassava flour to be made to a certain standard that meets the quality specifications (HQCF standard set by SON) and also timely delivery of specified quantities of flour of a consistently high quality at a competitive price on a regular basis to meet their needs.

However, the requirement is not being met. There are severe quality challenges to producing HQCF, as which affect the demand for HQCF, and the subsequent profitability (associated with pricing). In order to obtain HQCF, fresh cassava tubers must be processed within 24 hours; this study gathered that the 24 hours limit is a major constraint for farmers and collectors in the region as they usually have to incur additional cost of harvesting and transporting the roots to the processing factories in order to meet this time schedule thus, this increases the overall production costs of HQCF.

[5] http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Exporter%20Guide_Lagos_Nigeria_6-24-2011.pdf

[6] http://www.tfinigeria.com/market.aspx

[7] http://www.punchng.com/Articl.aspx?theartic=Art2011030104025

[8] http://cassavanews.blogspot.com/2009/02/100-cassava-flour-plants-close-shop.html

Linked to this is low pricing by the millers to the processors due to poor quality of the product, and high transportation cost incurred in the moving the cassava flour to millers outside the region. The current buying price of about N80-85,000 per mt of HQCF is dictated by the flour millers (currently the only buyers of HQCF), which many processors in the Niger delta region consider to be unprofitable as this price barely covers their production cost. About 46 IITA/USAID CEDP cassava flour producers in the Niger delta region were identified in the course of this study, however fewer than 10 percent of them are still functional due to low profitability. A missing gap for these producers was the non-identification of other cassava products (besides HQCF) that they could produce when low pricing issues for flour came up.

The price of HQCF is however cheaper than the imported wheat flour which currently goes for about N125, 000 per mt and is even expected to rise due to the global rising prices of wheat. A recent market survey, Cassava: Adding Value for Africa, identified readiness of the flour milling industries to purchase quality flour (220,000 t/annum; at 10% inclusion rate) from processors but until the issue of low pricing is addressed, very few processors would tap into such opportunity.

Other sources of demand for HQCF are as substitutes to imported starch in the packaging, and soap industries. Biscuit factories could also increase the level of HQCF to 150,000t/annum (30% for a new product) and the use of HQCF could also be explored in the manufacture of weaning foods, pasta, glues, etc. This could be a good entry point to innovate a market platform for SMEs in the Niger Delta region. As a note of caution, the market driven plans for cassava could be derailed by the newly revised import prohibition list (trade) which will run from 2008-2012, in which the importation of cassava tuber with H.S 0714. 0000 is the only prohibited item while the other products of cassava such as flour, chips, starch, *garri* etc could now be legitimately imported into Nigeria at a 20% duty.

Starch

Starch is the major constituent of the cassava plant. Its thickening and binding qualities makes it useful in convenience foods and baby foods. Starch makes good adhesives. Dextrin is a modified starch with quality adhesive properties. It is commonly used in non-food industries such as corrugated cardboard, paper, furniture and plywood. Other examples of modified starches are dextrose and glucose. Dextrose and glucose are examples of sweetening agents, used in many candies such as jellybeans, toffee, gum and other kinds of sweets, and in fruit canning and jam industry. Starch is an important industrial raw material for food, pharmaceutical, textile and chemical industries in Nigeria and it is produced from corn, sweet potato and cassava. Globally, corn accounts for about 65 % of the bulk of starch produced while cassava accounts for about 12%.

The increasing demand for starch and starch based products in Nigeria (such as glucose and dextrose) is reflected in the quantity imported over the years (due to the inadequate local starch production). Table 2 shows that cassava starch import has increased significantly over the years, while the importation of glucose and dextrose has tripled over a 4 year period.

Table 2: Imports of Cassava Starch and Starch Based Products into Nigeria

Years	Quantity imported (mt) into Nigeria	
	Cassava starch [9]	Glucose and Dextrose[10]
2002	15	
2003		
2004		43,267
2005		58,434
2006		42,134
2007	62	98,665
2008	202	121,539

[9] http://faostat.fao.org/site/535/DesktopDefault.aspx?PageID=535#ancor
[10] http://faostat.fao.org/site/535/DesktopDefault.aspx?PageID=535#ancor

Annual demand for starch in Nigeria is estimated at 130,000 mt and this requirement is usually met by limited quantities of locally produced cornstarch and cassava starch and a bigger bulk of imported corn starch and cassava starch from America, Asia and even South Africa. Presently, the price of imported corn starch is about N150, 000 per mt (CIF), inclusive of the 5% duty. In 2008, 202 metric mt of cassava starch was imported into Nigeria from South Africa at N56, 345 per mt. It was discovered that starch is usually imported by the pharmaceutical firms who take undue advantage of the low tariff (5%) to import more than the amount they require for sale to other end users. The locally manufactured cornstarch is sold for about N130, 000 per mt (factory gate price) though the quantity produced is very minimal.

Two companies are noted for cassava starch production in Nigeria: Matna starch in Ondo state in the Niger Delta region which produces about 4,500 mt per year and the Nigeria Starch Mills in Anambra state (on the edge of the Delta) which produces about 14,000 mt per year. Matna starch produces food grade cassava starch for its main customers who are multi-national food processing companies like Nestle and Unilever who use the starch as binders in the manufacture of food seasoning products like "Maggi cube", "Royco cube" and tooth paste. The company also has non-food manufacturing companies as customers who use starch in the production of dry cell batteries, mosquito repellent coils, packaging glue etc. At present, Matna and Nigeria Starch Mills sell cassava starch at 150,000 per mt (factory gate price) which is about the same price with imported cornstarch, thus many firms prefer to buy the imported starch due to their high volume requirement.

Stakeholders in the cassava sector have attributed the uncompetitive price of cassava starch in Nigeria to the low tariff of 10% charged on imported starches for the pharmaceutical industry, which seem to dominate the official imports even though the rate for general starch imports is 35%.

Starch based products such as glucose and dextrose are also required for industrial use in food and pharmaceutical industries. In 2008, 121,539 metric mt of glucose and dextrose was imported into Nigeria at N52, 200 per mt (FOB). There is only one company (Ekha Agro which is situated in the western region of Nigeria) that is producing glucose in Nigeria. While their current production capacity is estimated at 26,000 mt per year which is about 50% of what the market requires, they are only producing about 13,000 mt per year. Reasons given for low capacity utilisation include high energy cost and the inadequate supply of cassava roots at competitive price. The company buys fresh cassava roots at N6500 –N7000 per mt at factory gate, however if the cassava is to be gotten from as far as Edo state, the cost would be not less than N15,000 per mt which is double the current purchasing price. One metric ton of glucose produced from the factory is cheaper (N105, 000 per mt) than the imported glucose which is about N115-120,000 per mt, therefore creating opportunity for local production of glucose.

In the textile industry, starch is used as yarn sizer and as a finishing agent. It enhances the weaving efficiency as it permits the loading of the fabric in such a way that the sizer is neither visible nor perceptible. In the textile industry, higher preference is given to cassava starch because corn starch gives a dull finish and may change the colour. In Nigeria, the textile industries are located in the north while tradable starch is localised within south as shown in figure 7. There is the need for sustainable strategies to push starch markets to the north to service textile industries.

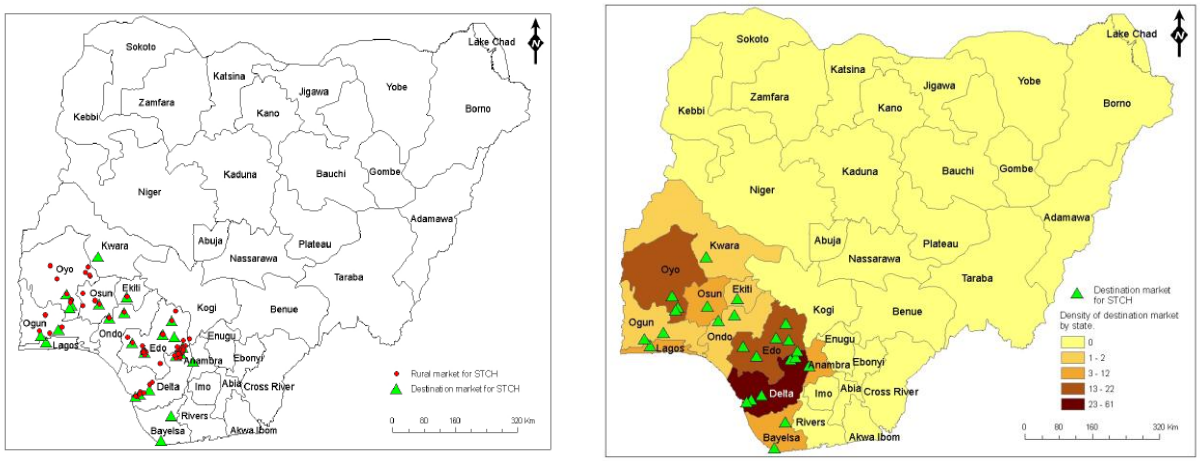

Figure 7: Major rural and urban markets for starch in Nigeria, source: Ezedinma et al, 2007

A final major opportunity for cassava lies in the beer brewing industry. Global brewing giant, SAB Miller is actively pursuing the development of a cassava based clear beer (in contrast to the brown sorghum beers) that will be cheaper than regular lager. SAB Miller is currently test marketing cassava beer in Mozambique and intends to introduce it into Nigeria, processing wet cake from the DADTCO mobile processors. This could open up a new lower end market segment that could greatly expand its market share in Nigeria, SAB could use up to 300,000 tons of cassava per year if they get the operation functioning.

Cassava Chips

Cassava is an important livestock feed material commonly used for feeding poultry, pigs and ruminants. Its starch nature ensures easy digestibility by livestock. In Nigeria, more than 80% of the industrial animal feed industry caters to the poultry sector (Knipscheer, et al, 2007). The middle belt region of the country has the comparative advantage in the processing of cassava into chips because the cassava chips can be sun dried naturally without the use of a dryer. Meanwhile, chips cannot be sun dried in the Niger Delta region because the area is usually wet almost all through the year, and requires mechanical drying.

Ethanol

Ethanol can also be produced from cassava, as it is produced from carbohydrate materials of which cassava is one of the richest sources of carbohydrate. However no firm in Nigeria is producing it. Cassava roots and dry cassava chips are used in the production of ethanol, nonetheless, while 1 mt of fresh cassava roots yields 150 litres of ethanol, 1 mt of dry cassava chips yields 333 litres of ethanol[11]. Therefore, the middle belt region also has the comparative advantage in ethanol production due to the natural advantage of sun drying cassava chips which cannot be obtained in the Niger delta region which is a wet region.

[11] http://www.probos.net/biomassa-upstream/pdf/FinalmeetingEcofys.pdf

Production and Processing

Cassava Production

Cassava is a main source of food and it is produced throughout the nine states of the Niger Delta by male and female producers either as a sole crop or intercropped with maize, melon or vegetables. The Niger Delta region accounts for about one-third (over 30%) of the national cassava output (as shown in Figure 8) and comes second after the middle belt region of the country in terms of production.

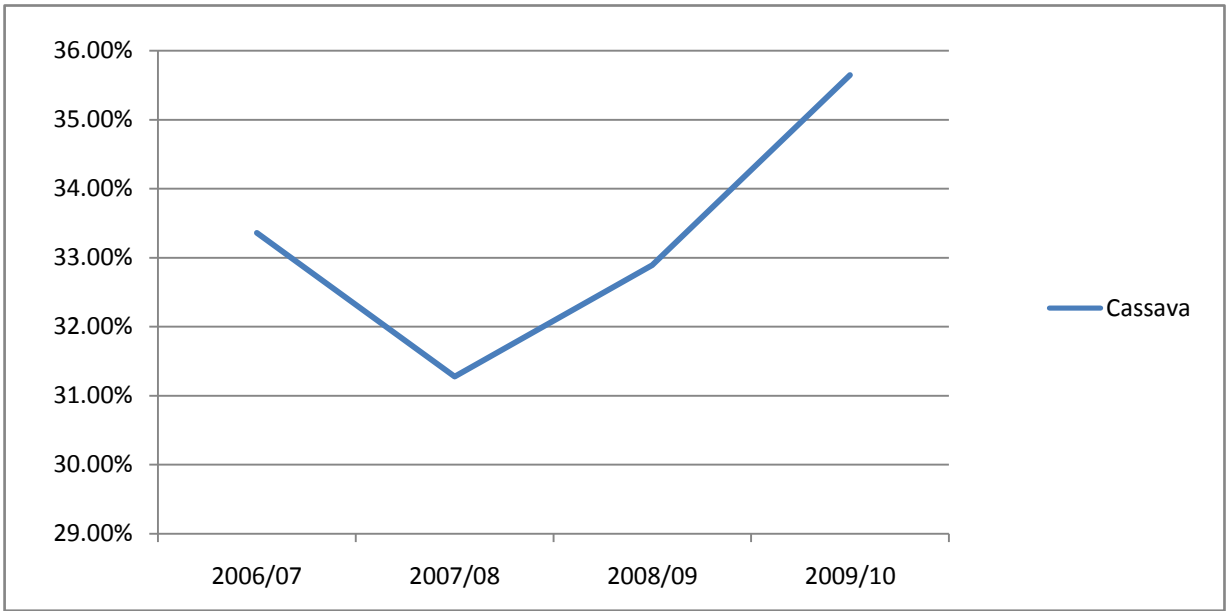

Figure 8: Percentage share of Niger Delta States in Nigeria's cassava output

Figure 9 shows cassava output of the different states in the region with the 5 principal production states being Cross River, Ondo, Imo, Akwa Ibom, and Rivers states and these states jointly accounts for about 80% of the total cassava output of the Niger Delta region. Production of cassava has increased over the period under review and this has been attributed to increase in area planted rather than productivity of the crop.

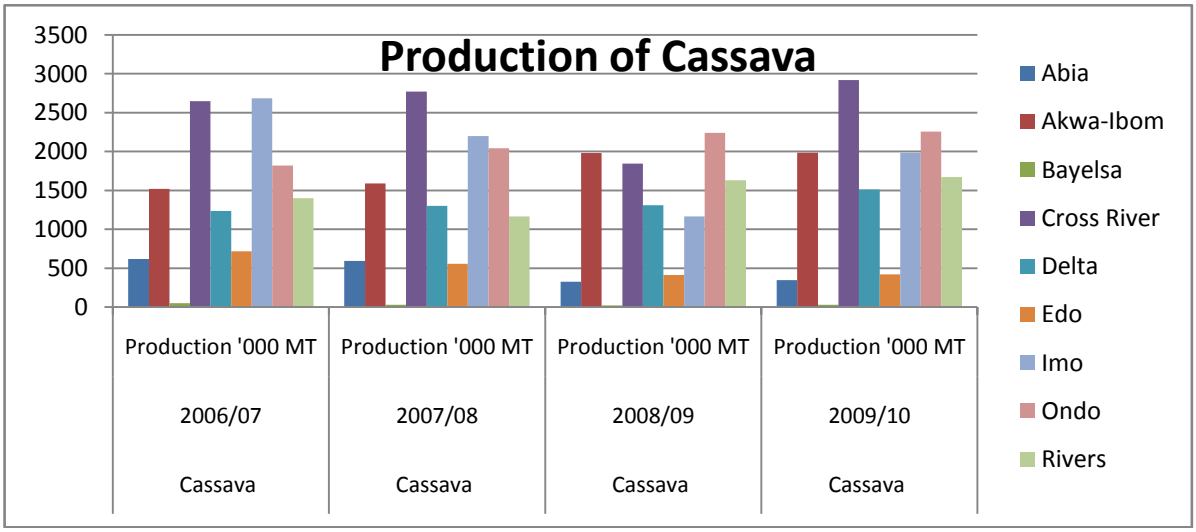

Figure 9: Cassava output in the Niger Delta region

Cassava Varieties

In recent times due to global interest in cassava, there has been considerable research on the improved genetic component of cassava in Nigeria and most of the research has been conducted by IITA and NCRI Umudike. Box 2 provides insight into improved varieties in the region.

Box 2: Improved Varieties of Cassava

The Integrated Cassava Project coordinated by the International Institute of Tropical Agriculture (IITA), National Root Crops Research Institute (NRCRI), Root and Tuber Expansion Program (RTEP) and other stakeholders, led to the release of twelve (12) improved cassava varieties in September 2005 by the National Release Committee under the Federal Ministry of Agriculture. These improved varieties - (TMS 98/0510, TMS 98/0581, TMS 98/0505, TMS 97/2205, TME 419, TMS 92/0326, TMS 96/1632, TMS 98/0002, TMS 92/0057, NR87184, THS 96/1089, and NR 930199) are resistant/tolerant to CMD (which is a common cassava disease in the Niger Delta region), and other major pests and diseases of cassava, such as bacterial blight, anthracnose, cassava green mite, and cassava mealybug. The other benefits of these improved varieties are:

- high yielding (25-40t/ha compared to the old variety with average yield of 10-12t/ha),
- early maturing (about 10-12 months compared to 18 to 24 months for the old varieties) suitable for food, industry, and livestock feed.

In the Niger Delta region, the improved high yielding disease resistant varieties are quite popular among direct and indirect beneficiaries of the IITA/SPDC/USAID Cassava Enterprise Development Project which operated in Abia, Akwa Ibom, Bayelsa, Cross River, Edo, Delta Imo, and Rivers states. The project introduced and disseminated resistant varieties on a very large scale to participating groups, individuals, and organizations. These varieties are now being extensively multiplied by contract farmers, the ADPs, research institutes, universities, NGOs, agro-processors, and the private sector for distribution to farming communities, churches, and schools. Some of the characteristics of the five varieties most popular among farmers are shown in table 3.

Traits	TME 419	96/1632	98/0581	98/0505	92/0326
Months to maturity	12	12	12	12	10
Root yield (t/ha)	25—40	25—45	30—45	25—40	25—41
% Dry matter	36	30.5	34	33.2	30
% Starch	68	65	68	67.1	62
Cyanide potential (ppm)	6.5	20	8	15	10

Table 3: Improved Varieties of Cassava Available in the Niger Delta Region

At the close of the project in 2009, a survey was conducted on the yield obtained from old and new disease resistant varieties, as shown in figure 10 below, an average yield of 29 mt/ha was obtained for the new variety while the old variety's yield was about 10 mt/ha; Abia state accounted for the highest yield of 32 mt/ha in the Niger delta region.

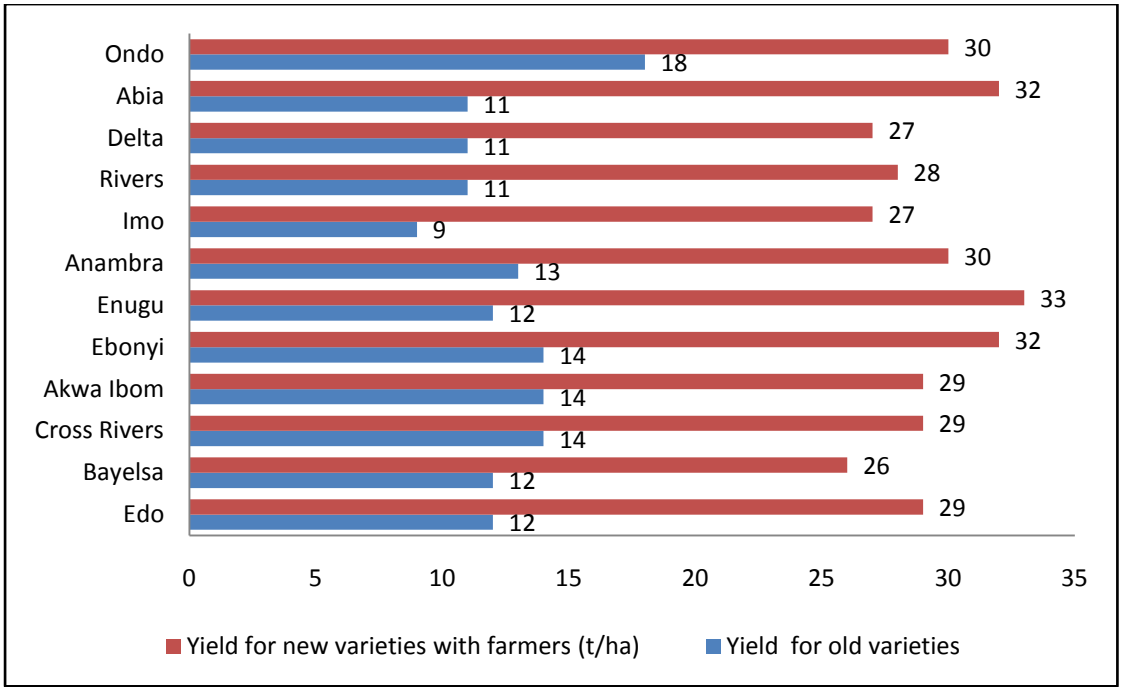

Figure 10: Yield of old and new varieties of cassava in the CEDP, from CEDP closeout report

This study gathered that a lot of cassava producers in the region are still unsure of the types of varieties they obtained from other farmers. This calls for proper deployment of pure lines of new varieties to farmers.

Table 5 shows the farm level budgets for the different producers. The table shows that subsistence farmers do not invest in renting land for production, purchase of improved varieties of cassava and purchase of herbicides, pesticides and fertilizers (these were broadly categorized as chemical application in the table) whereas the commercial farmers invested in such at varying levels of investment, thus these investments contribute to how well their yield fared. The difference in production cost between a small scale commercial farmer and a IITA/CEDP project beneficiary farmers is about N19, 688 (this represent a 14.7% potential increase in the production cost of the small scale commercial farmer), however the difference in gross income is huge at about N98, 000 (this is about a 48% potential increase in the gross income of the small scale commercial farmer). This implies that with a relatively lower increased investment in chemical application and good agronomy practices, the farmers could reap more money as gross margin. The IITA/CEDP beneficiary farmers (in table 5) had yields of about 29 mt per hectare compared to the average yield of 8-10 mt per hectare, thus the beneficiary farmers were able to reduce production cost per hectare (shown in table 5). Efforts should be made to promote the benefits of using high yielding improved varieties and ensuring good cultural practices among farmers.

A major cost component of cassava production is labour. As shown in table 5, own farmer labour (which is the total cost of labour employed) is N94,000. This represents 95%, 83% and 71% of total production cost of a subsistence farmer, small scale commercial farmer and IITA/CEDP beneficiary farmer respectively. In contrast, labour cost accounted for about 53% of total production cost of cassava farmers engaged in the Root Tuber Expansion Programme in Ogun state[12]. This implies that labour accounts for more than half of cassava production cost in the Niger delta region; this might be as a result of general high prices of goods and services in the region due to the presence of oil investments in the region. Affordable and accessible labour saving devices (farm mechanization) that can reduce the cost of labor and speed the harvest and transport of cassava roots to the site of processing in a timely manner should be introduced in a commercially introduced sustainable business model.

[12] http://belovedonigbinde.blogspot.com/2010/10/2009-farm-enterprise-budgets-for-crops.html

Table 4: Cassava Production Cost from Niger Delta Region

NDR Cassava Yield Status for 2008/2009	Yield for old varieties	Cost of cassava production for old varieties (N/ton)	Yield for new varieties with farmers (t/ha)	Cost of cassava production for new varieties (N/t)
Edo	12	9870.833	29	4084.483
Bayelsa	12	9870.833	26	4555.769
Cross Rivers	14	8460.714	29	4084.483
Akwa Ibom	14	8460.714	29	4084.483
Ebonyi	14	8460.714	32	3701.563
Enugu	12	9870.833	33	3589.394
Anambra	13	9111.538	30	3948.333
Imo	9	13161.11	27	4387.037
Rivers	11	10768.18	28	4230.357
Delta	11	10768.18	27	4387.037
Abia	11	10768.18	32	3701.563
Ondo	18	6580.556	30	3948.333

Source: Production cost estimated from yield report of IITA-CEDP

One of the very important actors on the production side is the nurseries that multiply the cassava plants for distribution. One of the big problems facing the dissemination of consistent and reliable quality plants to the farmers is at the nurseries where they do not always keep track of the varieties they are multiplying, which then affects the productivity and marketability of the cassava to the processors who want consistent varieties to ensure a homogenous quality product for sale to the flour millers or the starch industry. The business model for the commercial multiplication of cassava plants by nurseries is also hampered by the nature of the product:

- Cassava plants are fairly fragile and there have been bad experiences with the transportation of planting material over long distances, leading to high mortality (and low acceptance by the farmers); and
- Once farmers have purchased one time, they can multiply on their own and don't need to purchase again, reducing the opportunity for repeat sales.

Table 5: Farm Level Budgets for Cassava Producers in the Niger Delta Region

	Subsistence farmers (1ha)	**Subsistence farmers (1ha)**	**Small scale commercial farmers**	**IITA supported scale commercial farmers' field (1ha)**
Yield per type of farmer	**8**	**10**	**15**	**29**
Price per mt	**7,000**	**7,000**	**7,000**	**7,000**
Activity	**Cost (N)**	**Cost (N)**	**Cost (N)**	**Cost (N)**
Rental of farm land (N5000/ha)			NGN 5,000	NGN 5,000
Bush clearing, packing and burning	NGN 20,000.00	NGN 20,000.00	NGN 20,000	NGN 20,000
Ridging manually	NGN 20,000.00	NGN 20,000.00	NGN 20,000	NGN 20,000
Purchase of 50 bundles/1 ha of cassava cutting at N250/bundle			NGN 12,500	NGN 12,500
Tying ropes			NGN 200	NGN 200
Transportation of cassava cuttings			NGN 1,000	NGN 1,000
Transportation cost			NGN 500	NGN 500
Chemical Application				NGN 18,750
Planting: 15 man-day/ha at the rate of N1,800.00	NGN 27,000	NGN 27,000	NGN 27,000	NGN 27,000
Weeding twice: N6,000 x 2 times	NGN 12,000.00	NGN 12,000.00	NGN 12,000	NGN 12,000
Harvesting labour	NGN 15,000.00	NGN 15,000.00	NGN 15,000	NGN 15,000
Sub production cost	**NGN 94,000**	**NGN 94,000**	**NGN 108,200**	**NGN 126,950**
Contigencies at 5%	NGN 4,700	NGN 4,700	NGN 5,410	NGN 6,348
Total Production Cost	**NGN 98,700**	**NGN 98,700**	**NGN 113,610**	**NGN 133,298**
Production cost per ha	NGN 12,338	NGN 9,870	NGN 7,574	NGN 4,596
Gross Income (Yield/ha X Price/ tone)	NGN 56,000.00	NGN 70,000.00	NGN 105,000	**NGN 203,000**
Gross Margin(Gross Income - Production cost)	***NGN (42,700.00)***	***NGN (28,700.00)***	***NGN (8,610.00)***	***NGN 69,703***
Own farmer labor	***NGN 94,000***	***NGN 94,000***	***NGN 94,000***	***NGN 94,000***
Return to labor	***NGN 51,300***	***NGN 65,300***	***NGN 85,390***	***NGN 163,703***

Processing Activities in the Niger Delta

At all levels, the Niger Delta region had made remarkable success in cassava processing during the CEDP at cottage, small and medium commercial scales, although at varying degrees. Direct government involvements in cassava sector promotion and in some cases policy directives have enhanced the development of the cassava sub-sector in the Niger Delta Region. The Nigerian government cassava initiative that started since 2003 was highly successful in promoting new entrants and investments into cassava micro-processing as well as both small and large-scale processing industries. The introduction of mechanical machines for most unit operations of cassava processing has greatly eased labour intensiveness of the trade, freeing up more time for women for other income generating activities and to attend to other family responsibilities. Generally, in the region, cassava is processed into some common products; *garri*, and *fufu (akpu)*. Starch is traded mostly in Delta and Edo as food. There are processing facilities for HQCF but have little visibility.

There are four main processing technologies in operation in the Delta.

- **Cottage:** mostly carried out by women and children at the household level (contracts, grating, fry, 30Kg). This household production is very artisanal, where the women pound the cassava, grate it and fry it by hand. They can only process about 30 kg per day, but this is still one of the dominant forms of processing in the Delta.

- **Micro-Processing Centers:** these are a clear step above the household and cottage processing. They include a shed, a grater, 1-2 presses, 1 modern roaster (coop or individual). They can process about 200 kg of dry product/day; Cottage and micro-processors are involved in the processing of cassava into traditional products like garri, wet akpu and starch.

- **Small - Medium Processors:** these consume 1 ton dried product/day, require a staff of 10. The typically have a mechanical drier, with investment costs of at least N10mn ($66,000). Small-medium scale factories involved in the processing of cassava into HQCF, starch, high grade *fufu* for export, etc have also been established near cassava farming communities by local entrepreneurs. Some of the companies in this category, largely introduced during the CEDP program, include Vesa Farms Ltd, Benin City, Deladder Investment, Benin, Godilogo farms, Obudu, Cross rivers, Rose Endeavors, Ahoada, Rivers, Widow Mites, Abak, Akwa Ibom State, and Aquada Investment, Umuahia, Abia State (Numbers shown in Table 6).

- **Large Processors:** these can handle 5-100 T dry product/day, have investment costs of greater than N100mn ($660,000), going up to N500 million and are focused on industrial starch. They employ a staff of more than 20 and require a steady flow of cassava to make their operations cost effective. Many of the large processors also have hundreds of ha of their own cassava fields to guarantee the minimum throughput required for their businesses.

In addition to these four main types of processing, new mobile processing units are being introduced to address the transportation challenges encountered by farmers in moving cassava roots from rural areas to urban processing centres. The recent DADTCO/RSSDA/IFDC Cassava Plus project in Rivers State has introduced the concept of autonomous mobile processing units (AMPUs). These mobile processing plants, situated in a truck, are able to move round hinterland areas processing cassava roots into wet cake for onward transportation to the HQCF processing factory in Afam in Rivers State. They can effectively capture cassava produced within a 20 km radius and process it at a rate of 5 mt/hour into wet cake. This wet cake is very stable and can be safely stored for up to a year. The AMPUs are quite expensive (estimated price is about $1 million each), but they provide a viable solution to one of the major constraints to the value chain.

Figure 11: Women processors in Akwa Ibom, Source: IITA-CEDP

Table 6: List of Existing Cassava Processing Centers/ Enterprises in the Niger Delta Region

State	Small Medium Enterprises (SMEs)	Microprocessing Centers (MPC)
Abia	6	13
Akwa Ibom	4	18
Anambra	3	6
Bayelsa	1	20
Cross River	4	12
Delta	6	14
Ebonyi	0	6
Edo	7	33
Enugu	2	6
Imo	1	9
Rivers	4	11
Ondo	2	>15

**IITA Assisted Sites except 1 in Ondo State.46* *163*

The Cassava Enterprise Development Project (CEDP), which was in support of the PIC on cassava was a public-private partnership between the USAID and the Shell Petroleum Development Company. Implemented through IITA to support the development of the cassava sector in the Niger Delta region over a period of five years (2004/05 – 2008/09), it had a global objective of increase economic opportunities through sustainable and competitive cassava production, marketing and agro-enterprise development in selected communities of the South-South and South-East States of Nigeria. Under the CEDP, IITA strengthened the human and institutional capacity of producers, processors, commodity traders, and fabricators to produce, process and to market cassava efficiently as well as foster increasing private sector investment in the production, processing, storage and marketing of cassava.

Figure 12: Cassava products in the Garri market

On achievement of CEDP, Tarawali and Okarter (2010) reported that project beneficiaries and other stake holders realised income worth $3.2m with over 22,370 gainfully employed and 700 sustainable producer associations strengthened. It should be noted that all SMEs were supported with equipment sourcing, installation and capacity building by IITA-USAID-SPDC projects. Most of the processing equipment was multi-product and functional. The project made good progress due to the participatory approach employed in the design and implementation of the activities; the project made use existing cassava platform at the national and local level, in kind resources were contributed by beneficiaries as way of ensuring sustainability. Also a capacity building component was incorporated to enhance deliveries of building materials, processing equipment, raw material and finished products supplies.

Unfortunately, the over dependence on a project driven (subsidized) approach for the beneficiaries, reliance on inconsistent government market policy on HQCF, management problems leading to non diversification of cassava enterprises, poor marketing information and lack of negotiating power on pricing, has led to the closure of around 90% of processing units. It was evident that these processing units were not well conceived of as businesses and worked with inexperienced beneficiaries.

Large Scale Starch Production in the Niger Delta

Major large-scale cassava processors such as Nigerian Starch Mills in Ihiala, Anambra State, and Matna Starch Industry at Akure, Ondo State are the leading large scale cassava starch industries supplying high grade or refined cassava products to manufacturing industries such as Cadbury PLC and, Nestle Plc.

According to Matna Starch, the largest producer of starch in the Niger Delta Region (maker of edible Starch meant for food industries like Nestle) mentioned N115,000 as its production cost and sells at N150, 000. The factory requires 45,000 t/year to produce 9,000 t-Starch)/year. The company has staff strength of close to 50, purchases cassava at N4,000-13,000/T, but buys at N8000/t as of 15 July 2011. End users of Matna starch are food industries in Lagos (e.g. Nestle, etc) and negotiations are on with Breweries but cannot meet Demand for now. They make do with all varieties of cassava varieties for now but ensure delivery within 24 hours and must not be too old in age (Cassava within 2 years duration can be accepted). However, plans are on ground to introduce high yielding varieties to farmers for fee. Of great interest to PIND is the process through which Matna has arrived at its current solution for accessing sufficient raw material, captured in the box below.

Box 3: Matna's different approaches in sourcing for cassava roots

1. Arrangement was in place evolving State to State collection of raw cassava from farmers using company vehicles and personnel but was later abandoned due to high cost of operating this system.
2. Arrangement to operate depots as collecting centres in various States was later put in place but then abandoned due to the high cost of operating this system
3. Agents were later sought to collect and deliver to the factory, this arrangement also was dropped for inefficiency.
4. Currently farmers are requested to deliver Raw Cassava by themselves but within 24 hours. Delivery days have been specified and communicated to all Suppliers through notices at the gates and announcements. On delivery days all supplies are collected and paid for to at least encourage Suppliers.
5. Matna starch contracts outgrowers and also supports them through facilitating access to credit from agric banks, organise trainings for farmers on simple agronomic practices using IITA-USAID Markets Project, ensure distribution of high yielding disease resistant cassava varieties by IITA-USAID Markets, and extension services through local experts and other schemes.

Matna Starch is conscious of the quality of raw materials (roots or wet cake) to their multimillion dollar factory and therefore would not be willing to source direct wet cake for the production of food grade starch. Standards looked out for in processing grade 1 starch product for food industries include:

1. Hygiene level of the processed products;
2. Good means of preserving the wet cake before delivery as degradation could reduce the quality of product delivered and consequently affect the final starch product.

They however expressed willingness for industrial trials on the possibility of using wet cake for the production of grade two (2) starch that is meant for packaging and textile industries.

The constraints Matna faces in the course of production include:

1. High energy cost (which constitute about 35% of production cost). Currently, electricity supply is erratic and there is much dependence on fuel/diesel.
2. Inadequate water supply. About 24,000 litres of water is required to process 1 ton of starch.
3. Inadequate supply of raw cassava from farmers. The company requires 45, 000 mt per annum, out of which is getting 22, 500 mt. This shortfall is due to pricing and transportation cost. Farmers preferred to sell cassava roots to gari or fufu sellers at N10, 000-N11, 000 per mt as against N8, 000 per mt to Matna. In Edo State, farmers sell cassava in to the local market at N10, 000; however, if they are to take it to Matna, it will cost N15, 000 per mt, thus incurring additional N5, 000 transportation cost, which Matna is not willing to pay for.

The Value Chain Map

The Cassava Value Chain Map presents the major markets for cassava products, the major actors involved in the production, processing, and marketing of cassava, and their relationships as they move product from the fields through to the end markets. The map is categorized into three channels of small, medium and large scale production, each serving a different market. Various key players' functions are identified as production, collection, bulking, processing, storing, wholesaling, refining, packaging, retailing and marketing.

The raw cassava is either purchased by the consumer directly or sent to the processor for value addition via private collectors or cooperatives and even by the farmer and or households. Traders in turn collect processed products from rural markets and transport to rural, semi-urban and urban markets for sales. Medium and large scale processors collect raw produce and products to further process and refine for industrial and export markets.

Description by Function

Cassava Producers

Almost all farmers in the region produce cassava either for food consumption or for sale to other end users. In the region, about 70% of the cassava produced is utilised for food, specifically it was gathered that 98% of the cassava produced is for food consumption in Rivers state. In the region, cassava is produced by four types of producers: small scale subsistence farmers, small scale commercial farmers, medium scale commercial and large scale farmers.

- **Subsistence Farmers –** These farmers account for about 95% of the cassava farmers in region. The farmers usually plant cassava on 0.2 ha to less than 1 hectare (which is usually scattered plots) and the crop is usually intercropped with maize, melon, vegetables, etc. These producers plant cassava mainly for food consumption and sell excess. The traditional use of crude implements such as hoes and cutlass and the use of family labour are employed by these producers. In rare cases, hired labour is engaged during weeding and harvesting periods. The old, disease prone variety is common among these farmers and as such they record the lowest yields of 8-10 mt/hectare. Most of the farmers are financially constrained, therefore they cannot afford to improved varieties, fertilizers and herbicides and as such do not operate the farm as an enterprise.

- **Commercial Farmers** - The farmers in this group operate farms as an enterprise and could be further subdivided as:

    - **Small Scale Commercial Farmers:** They manage about 1 - 5 hectares of cassava farms with hired labour and a major characteristic of this group is the use of improved varieties of cassava for planting. On the average, their yield is about 11-15mt/ha which is quite low compared to the potential yield of about 25 mt/ ha. One of the reasons attributed for the current low yield is that beyond the use of the improved varieties for planting, the farmers do not apply fertilizer, herbicides, and pesticides and do not ensure good cultural practices. Some farmers in this group were involved in the IITA/ SPDC/USAID CEDP as well as the NDDC project in the region and such farmers were obtaining yields of about 25-30 mt/ha due to the technical support (such as improved varieties, extension services, training).

CASSAVA VALUE CHAIN MAP

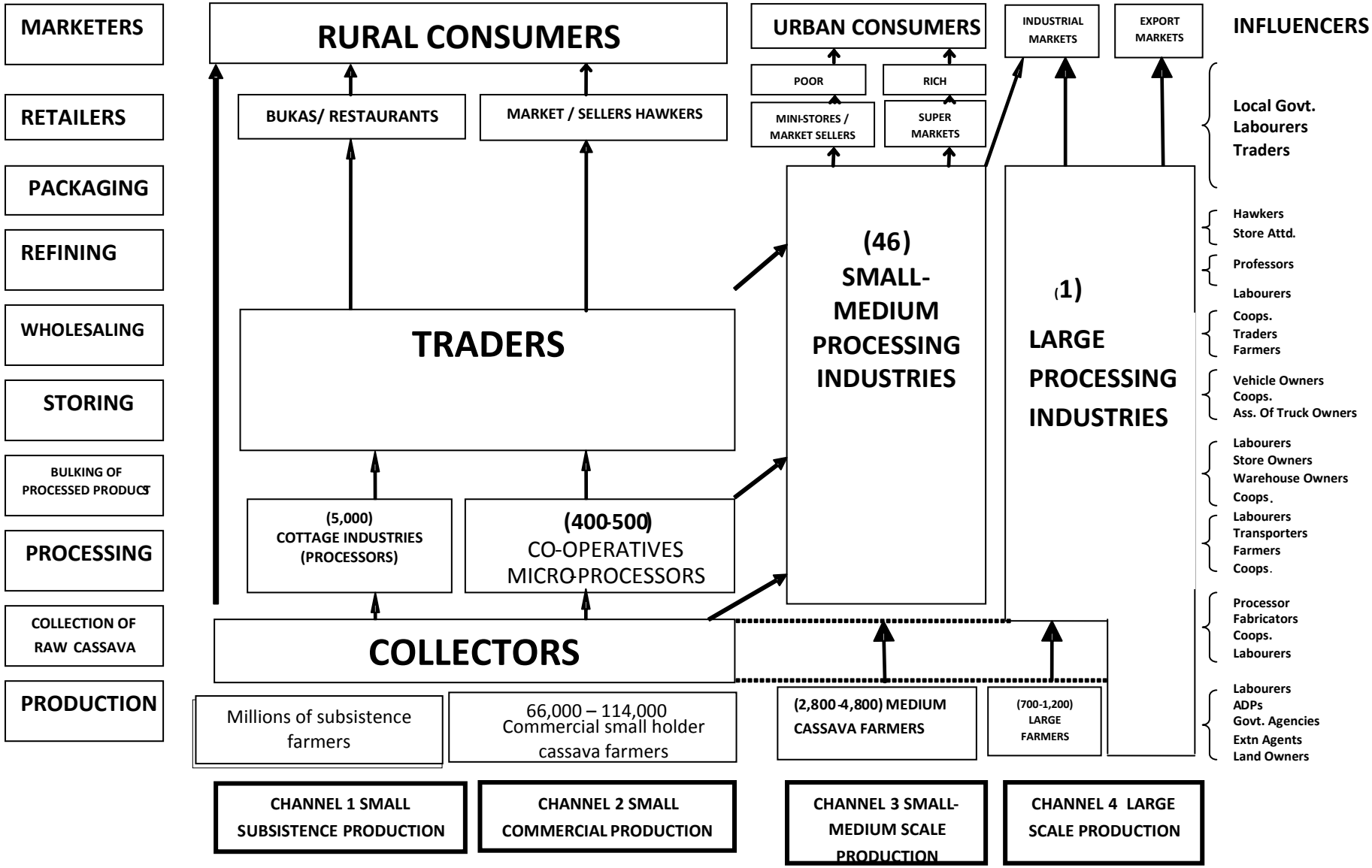

Figure 13: Cassava value chain map

rendered to them. However such farmers are few compared to the large numbers of subsistence farmers in the region. Opportunities exist for the majority of farmers in this group to increase yield per hectare to about 25 – 30 mt /ha with training, extension services and available/affordable farm inputs.

- **Medium Scale Commercial Farmers:** The farmers manage about 6 - 10 hectares of contiguous fields with some level of mechanization adopted. The farmers use improved varieties and get yields of about 27- 30 mt/hectare.

Large Scale Farmers: are quite few in the region with farm size accounting for 10ha and up to >1,000 ha. Some of these farms are set up by the large scale processing firms such as Nigerian Starch Mills Limited in Abia state and Godilogo Ltd in Cross River state. Mechanized farming is adopted by this group practice and yield output is about 27 – 35 mt/ha when all the necessary technical requirements are adopted. The high cost of operating the farms is making some of these firms to scale down on investments, thus leading to and an estimated output of 16-18 mt/ha.

Traders

Although cassava can be harvested all - year round, the trade follows distinct seasonal patterns. During the dry season, cassava roots are usually expensive due to increased associated cost of harvesting due to the hardiness of the soil and extra strength required to harvest. As such this increases the price of cassava to about N17, 000 per mt at factory gate. On the other hand, cassava roots are cheap during the rainy season, due to the ease of harvesting the roots; as such many farmers harvest during this period thereby leading to a glut in the market and price falls, the price of cassava during the rainy season could be as low as N8, 000 per mt at factory gate.

There are different types of cassava traders in the Niger Delta, which include the collectors, farmers' cooperatives and retailers.

- **Collectors:** collectors are the most common buyers who go to rural areas noted for cassava production within the region to purchase unharvested and/or harvested cassava from farmers directly, though payment is usually made after sale of the product. They engage village labour to harvest and load cassava roots into hired vehicles for onward deliveries to open markets and factories. It was gathered that collectors make at least 15% profit after sales. It is estimated that the collectors account for about 20% of traded volumes of cassava roots. Some collectors (about 5%) engage village labour to further process the cassava into garri or wet fufu which they carry to sell in the markets. The collectors have the funds to be able to address the main challenge facing the harvesting of large quantities of product at one time: shortage of labour.

- **Cooperatives:** cooperatives account for between 2-8% of cassava traded as raw roots or products. As such, they are not major participants, but their role can grow. These cooperatives usually have cassava farmers as members and sell cassava roots to processors like Matna, Vesa food, Gon –Chuks, etc and processed products (garri and fufu) to traders. In most cases, the cooperatives hire vehicles (high cost of hiring vehicles is a major constraint that farmers and cooperatives face) to collect cassava from member's farms for onward delivery to rural markets and factories. The mode of payment by processors to cooperatives is cash on delivery and in some cases on credit based trust, this scenario also occurs in traders – cooperatives relationship.

- **Retailers*:*** the cassava retailers are mainly found displaying *garri*, wet fufu and other cassava food products in open markets, supermarkets, and stores for final sales to consumers, restaurants, hotels and other institutions. Some farmers (5-7 %) function as retailers, who process cassava into gari and fufu for sale in rural markets. Another set of retailers are found along the major highways in the region, these traders have temporary shelters/store houses displaying the 50 kg bags of *garri* ready for sale to passersby and other community dwellers.

Cassava Processing

As noted in the processing section, there are four main types of processors with one new one coming into existence – the mobile processing unit. The dominant forms of processing remain the cottage and micro processing units which handle most of the local food production. These units deal in very small quantities and often process their own production. Since this is for the traditional market, primarily Garri, the standards are lower than for processed foods and starches and the timelines are not as strict for processing. Meanwhile, the SME processors are dependent on rapid delivery of product to their mills to enable them to produce the right quality demanded by the market. The very large mills do some outsourcing from contract and other small farmers, but are largely dependent on their own production to meet their minimum volumes.

- **Cost Structure for Processed Cassava Products:** Table 7 highlights the cost elements in the production of three cassava based products that are currently being produced in commercial quantities in Nigeria. Looking at each cost element for each of the product, it will be seen that cassava root which is the basic raw material for each of the products constitutes between 55% and 70% of the total cost of production. The next critical cost element is total energy cost which accounts for about 23% of the total cost of production with only fuel being 16.5%. The results show that margins are very low if HQCF is sold at N65,000 per mt. This explains that about 90% of the SMEs that have invested in flash dryers prefer either not to use the equipment or use it for alternative purposes (e.g. production of instant fufu or starch). Unfortunately, the flour milling industries are still buying at N65, 000/t (Kleih et al., 2008; Siwoku, 2011) which compelled almost all SMEs with Flash dryers closed down including those in the Niger Delta.

Table 7: Cost of Production of HQCF, Fufu and *Garri* (~~₦~~ Per Mt)

Cost Item	**HQCF**		**Fufu Wet Mash**	***Garri***
Cassava Roots (N10,000/mt)	40,000	-	N20,000	45,000
HQCF Wet Cake (N18,000/mt)	-	36,000	-	-
Peeling	3,000	-	2,500	3,000
Bags	1,200	-	2,200	600
Fuel for Drying (Black oil)	12,000	12,000	-	-
Generator	3,800	3,800	-	-
Electricity	1,000	1,000	-	-
Transport to Market	2,700	2,700	3,500	2,500
Grating	2,000	-	-	1,500
Pressing (De-watering)	1,000		-	600
Fixed Cost	4,078	4,078	-	-
Frying	-		-	4,000
Firewood	-		-	2,900
Market Fees, Security, etc	-		1,500	1,000
Contingencies (3% of Fixed + Var. Cost)	2,123	1,787	1,041	1,872
Water (fetching)	-	-	1,500	500
Sieving	-	-	3,500	800
Total Cost of Production	**72,901**	**61,365**	**35,741**	**64,272**

Source: Siwoku (2011).

Description by Channel

Three (3) channels are identified in the cassava value chain based on the utilisation of end products:

1. Small scale production for traditional food
2. Medium scale production for improved food products (targeting HQCF)
3. Large scale production for industrial products

Small Scale Production for Traditional Food

This comprises most of the subsistence farmers who sell a little bit of surplus, linking into the cottage and microprocessors. Many of the farmers sell through traders to the processing units. Production activities are labour intensive (i.e. highly dependent on human energy input). Most cassava production and processing activities occurs in the rural areas and are small scale in operation, which probably accounts for low output. Cassava tuber production is characterized by low yielding technologies. Processing activities is not much different. Most processing is undertaken at small scale level using traditional technologies (manual labour) for cassava peeling, grinding and pressing.

Medium Scale Production for Improved Food Products

Although human labour is still a major input in the production process at the medium scale production level, the use of modern machinery is also incorporated in the production process. Thus, unlike the small scale producers, the medium scale producer is able to generate more output and such outputs are targeted at processors within and outside the region. The processors purchase cassava from farmers, collectors, cooperative groups at the factory gate and occasionally on farm. They have consistent truck owners that assist in delivering raw roots and also finished products to the end user markets.

Large Scale Production for Industrial Products

Large sized processing firms usually have back up farms in order to feed their processing facilities. These farms are characterized by the use of modern machinery which enhances efficiency thus increased output at reduced production cost. These firms also procure cassava roots from collectors, cooperatives and engage contract farmers for steady supply of cassava roots. Due to heavy investment, the processing plants are structured to remove all metals, fibre, stones and classified final products, promoting their high premium quality pricing by the end users.

Table 8 shows the price differentials of cassava and its products along the value chain. The table reveals that although cassava farmers sell N7,000 per mt at farm gate price, value added to cassava along the chain increases the price as well as gross margin accruing to other actors within the chain; farmers could therefore be encouraged to add value to their produce, thereby increasing incomes accruing to them. Also, the final prices of improved and traditional food products outweighs that of the industrial products, this might be due to increasing demand for these products among the urban populace who desire convenient and well packaged food, thus farmers prefer to sell to these guaranteed markets as people would always consume food. However as people earn more incomes, there is less tendency to spend such on food, thus the market for food products would become saturated over time. Opportunities exist for industrial use of cassava products in food, textiles, breweries, pharmaceuticals and other related industries; however the issues of low pricing of cassava roots by industrial processors have to be dealt with in order to ensure adequate supply of cassava roots for their production process.

Table 8: Price Differentials of Cassava Along the Value Chain

	Small scale production for traditional food		***Medium scale production for improved food***			***Large scale production of Industrial products***		
	Garri	Wet Fufu	Packaged garri	Odourless Fufu flour		Starch	Glucose	HQCF
Final price to end consumer (mt)			287,000	220,000 249,000 (in Shoprite supermarket	270,000 417,000 (in Shoprite supermarket	150,000	105,000	85,000
Retailers				170,000	250,000	-	-	-
Wholesalers				150,000	230,000	-	-	-
value of product at processor's level	120,000			120,000	166,000	115,000	105,000	110,000
Mill gate price of cassava	32,000	32,000	40,000	60,000[a]	85,000[b]	40,000[c]	40,000[d]	64,000[e]
Farm gate price of cassava	7,000-10,000	7,000-10,000	7,000-10,000	7,000-10,000	7,000-10,000	7,000-10,000	7,000-10,000	7,000-10,000

Note: 2 basins equals 50Kg bag of garri
a: The mill gate price of cassava root is N15,000 and 4 mt of root is required for 1 mt of cassavita fufu flour
b: The mill gate price of cassava root is N17,000 and 5 mt of root is required for 1 mt of odourless fufu flour
c: The mill gate price of cassava root is N8,000 and 5 mt of root is required for 1 mt of starch
d: The mill gate price of cassava root is N10,000 and 4 mt of root is required for 1 mt of glucose syrup
e: The mill gate price of cassava root is N16,000 and 4 mt of root is required for 1 mt of high quality cassava flour

Supporting Organizations and Regulatory Framework

Support Organizations

The following are organizations that can support the growth of the cassava value chain:

Table 9: Role of Public Sector Actors

Organizations	Supporting Role
Ministries of Agriculture and Natural resources (state and local)	Development of appropriate policies that will promote production, processing and export
	Dissemination and training of producers on use of improved varieties
Local government councils	Improving transportation network through grading of rural feeder roads Provision of local inspection to rural and urban

	markets.
Academic institutions (universities, polytechnics, colleges of education)	Conduct training & research on cassava, its product as well as disseminate findings
Research Institutes: e.g. National Root Crop Research Institute at Umudike, Abia state	Deployment of high yielding varieties to extension agents Technical backstopping on new technologies and processes for positive impact on cassava development in the NDR.
NARCB NEXIM and Bank of Industry	Loan to producers, processors and marketers

Table 10: Role of Private Sector Actors

Value Chain	Organizations	Supporting Roles
Production: Input suppliers	Fertilizer/agro-chemical companies	Supply of inputs such as improved varieties, fertilizer, etc
Processing	Equipment Fabricators	Supply of equipments for processing purposes
		Strengthen capacity of fabricators in the NDR for maintenance and innovative user friendly equipment
	Processing factories e.g. Gun-Chuks at Mbiri; Cassava processing factory at Umunede; Vesa Food at Benin; Nigeria Starch Mill at Uli, Anambra state (largest processor in Niger Delta)	Process cassava products
Marketing	Financial institutions	-Give loans to small and medium producers, processors and marketers Provide insurance
Sustainability	NGOs e.g. LAPO agricultural & Rural Devt Initiative, Forward Africa & Morgan Devt Foundation & New Nigerian Foundation	Dissemination of information relating to cassava Capacity building for cassava value chain actors especially producers, processors & marketers Project monitoring and evaluation
Monitoring & Evaluation	Consulting agencies	Conduct need assessment studies, Assess the project regularly for impact
Funding/grant	International organizations/Donor agencies	Provide grant for research and other development enhancing project e.g. USAID, FAO Support country wide studies with funds and expertise Support research and development into cassava value chain e.g. IITA

Quality and Safety Standards for Cassava in Nigeria

Standards for cassava roots, chips, high quality cassava flour, *garri* and starch have been developed and released by the Standard Organisation of Nigeria (SON) as outputs towards the attainment of the President Initiative on Cassava since 2006. It is expected that stakeholders including the supply side (producers, transporters, processors, and merchants), the government inspection and regulatory authorities, the support institutions (laboratories, R&D and training centres), and consumers would implement these standards in order to ensure high quality and thus guarantee end users confidence. However, the study reveals that very few stakeholders are familiar with the standards and therefore do not adopt the standard requirement which they attribute to lack o awareness of such standards and lack of enforcement by the regulatory bodies (SON).

The Presidential Initiative for Cassava

President Obasanjo initiated the Presidential Initiative of Cassava (PIC) to stimulate Nigeria's potential as the world's largest producer of cassava into a major national industry. The overall objective of the initiative was the promotion of cassava production and processing to satisfy domestic demand and as a source of foreign exchange earner; it was to be implemented between 2002 -2007. To this end, actions were taken to increase productivity and expand annual cassava production in order to achieve global competitiveness, while integrating the rural poor (especially women and youths) into the mainstream of Nigeria's national economic development. Furthermore, new market opportunities were identified and developed to stimulate increased private sector investment in the establishment of export oriented cassava industries (UNIDO, 2006). The specific objectives of the Nigerian presidential initiative on cassava (PIC) which was to be achieved by 2007 include:

- Enhance the productivity and production of cassava by increasing the area cultivated to 5 million ha, with the hope of harvesting 150 million mt of fresh cassava tuber annually
- Produce 37.5 million mt of processed cassava products (i.e. *garri*, HQCF, pellets, chips, starch, and ethanol) for local and export markets
- Organize the export of cassava and processed-cassava products as a revenue-generating project
- Earn about US $5 billion annually from exporting value-added cassava products.

The PIC helped create awareness about the multiple uses of cassava to produce value added products such as flour, starch, cassava chips, glucose syrup, animal feed, ethanol, and composite (cassava–wheat) baking flour, and also stimulated an increase in cassava production and processing activities. The initiative led to a tremendous supply response on the part of producers, unfortunately, there was not a subsequent market response to absorb the surplus of production. Without the development of new markets, beyond the traditional food market, there was a glut of cassava, much of which was actually thrown away, and led to dissatisfaction by the farmers and disinterest in new initiatives.

A major component of the PIC was the mandatory inclusion of 10% HQCF in flours used for baking and confectionary products which was given political support to enhance public and industrial acceptance of HQCF and promote the production of cassava for industrial use, This encouraged farmers to produce more cassava, thus there was a significant supply response (national output of cassava in 2006 was 45 million mt), however there were no good linkages into the improved food products and industrial products channels, thereby, farmers were not able to sell their cassava and many were forced to throw it away which dampen farmers' morale. Table 11 shows the achievement and challenges of 10% HQCF inclusion in Nigeria:

Table 11: Achievements and Challenges of 10% HQCF Inclusion in Nigeria

Achievements	Challenges
• Strong Government promotion of industrial use of cassava (e.g. HQCF mixed with wheat flour), which unfortunately has somewhat waned since 2007.	• The majority of HQCF processors in the region complain about lack of profitability of enterprises, and only 10% of flash dryers are used for cassava flour drying.

• There is good local knowledge of manufacturing and installing processing equipment. • Equally, processing technology of HQCF and other products is well known, in particular through work at UNAAB and IITA. • Over 15 flash driers are installed. • Some wheat millers already buy and mix cassava flour with wheat flour destined for bread baking. • New flash driers are being installed in different States for processing of HQCF or other products. • The currently high price of wheat provides an incentive for millers and bakers to search for substitutes (such as HQCF), and there is still substantial room for increasing the amount of HQCF supplied to the milling industry.	• Millers buy HQCF at N65,000 / mt from SW Nigeria and sun-dried cassava flour of unknown quality from North/Central Nigeria at lower prices (N37,000 – N50,000 / mt). • Millers currently only include 2% - 5% of HQCF in flour destined for bakers. Hence, more publicity and lobbying work is required to increase inclusion rate. • The first generation of flash dryers (installed around 2003/2004) appears to be less efficient than the recent ones. As a result, older models require updating (e.g. improved heat exchanger). • Processors need to be better linked with farmers and their associations. This should ensure more reliable supply of good quality roots. It should not be expected that processors will be able to pay root prices that are significantly higher than those in place in mid-2008, but provide an assured market outlet for farmers.

The new minister of Agriculture is placing a renewed emphasis on cassava and has convened a cassava task force. He is reinforcing the requirements for using the 10% HQCF minimum flour blend for millers,

Tax Regime

Given the nature of cassava as a potential export food crop, and the potential as a substitute for starch imports, the various import duties are very important considerations to building up Nigeria's competitiveness. To date, Nigeria has taken an infant industry approach to protecting local production to build up domestic supply. This has included everything from absolute bans on import of products to heavy protection of certain industries. Table 12 below, summarizes the duties on key products.

Table 12: Duties for the Import of Cassava and Cassava Competing Products

CET code	Description	Import Duty	Value Added Tax
3505100000	Dextrins and other modified starches	5	5
1103110000	Groats and meals of wheat	5	
1008100000	Buckwheat	5	
1001900000	Other wheat and meslin	5	
1001100000	Durum wheat	5	
1108190019	Other starches	35	
1108140017	Other manioc (cassava) starch	35	
1108130015	Other potato starch	35	
1108120013	Other maize (corn) starch	35	
1108110011	Other wheat starch	35	
1101000000	Wheat or meslin flour	35	

1904300000	Bulgur wheat	20	5
1903000000	Tapioca and substitutes prepared from starch in flakes, grains, pearls, siftings etc	20	5
1106201000	Flour, meal and powder of cassava (including Cassava flakes or Gari)	20	
0714100000	Manioc(cassava), fresh, chilled, frozen/dried, whether/not sliced or in form of pellets	20	
2303100000	Residues of starch manufacture and similar residues	10	5
2302300000	Brans, sharps and other residues of wheat	10	5
1109000000	Wheat gluten,whether or not dried.	10	
1108190018	Other Starches: Pharmaceutical Grade	10	
1108140016	Manioc(cassava) starch: Pharmaceutical Grade	10	
1108130014	Potato starch: Pharmaceutical grade	10	
1108120012	Maize (corn) starch: Pharmaceutical grade	10	
1108110010	Wheat starch: Pharmaceutical grade	10	

Source: www.customs.org.ng

This table highlights that there are four main regimes for flour and starch related products.

1) Raw material for further processing in Nigeria, with low duties (5%);
2) Intermediate processed goods for further processing in sensitive categories (10% on pharmaceutical grade starch);
3) Processed goods such as tapioca, cassava and cassava flour (20 %) where Nigeria should have a competitive edge; and
4) Protected industries with high duties (35%), where Nigeria is protecting its current industries in order to promote them.

Concretely, this plays out with products such as durham wheat for milling into flour having little protection (5% duty) while wheat flour has a 35% duty to promote the local flour milling industry. The protective duties for local starch industry (35% duty) are designed to protect and promote Nigerian production of starch. However, there is often finagling of product definitions, as it was widely reported to the review team that imports of starch were assigned pharmaceutical grade rates (10%) but were used as regular starch inputs.

This trade regime has several impacts on the cassava industry. While it promotes the development of the processing industry through protection, it has the effect of raising the costs to the downstream industries (users of starch) which can have a negative effect for Nigeria as a whole by promoting higher prices to the end users. It will not drive improved competitiveness in the industry unless the protective measures are gradually slated for removal.

International Institute for Tropical Agriculture – IITA

IITA requires special mention in any discussion about cassava in Nigeria. IITA has been instrumental in the development of new high yielding varieties which are mosaic disease resistant. IITA has also devoted significant energy on new processing technologies and building capacity of local machinery manufacturers to produce and disseminate these technologies. As the worldwide leader in cassava issues, IITA's presence in Ibadan makes it a valuable resource for PIND to tie into on all elements related to a cassava strategy. PIND's appropriate technology team should analyze the processing technologies with relation to practical use by small businesses and their dissemination by local manufacturers. IITA is also a leading partner with the government of Nigeria on their new cassava initiatives and are anticipating organizing programs to stimulate increased production from 15,000 farmers around clusters of large scale processors over 4 years to meet the anticipated demand for cassava products.

Donor Funded Programs

Given the importance of cassava in the Nigerian economy, there is already significant investment by international donors in this arena. Since the mid 1980s, when UNICEF identified the very positive role that cassava could play in addressing household nutrition issues, significant international investment has gone into the topic, centered on the IITA. In the Niger Delta, USAID has funded the Cassava Enterprise Development Project (CEDP - implemented by IITA, 2004 - 2009) and has more recently funded activities to improve the linkages between the Matna starch factory and small, commercially oriented producers. Shell has an ongoing project based in Port Harcourt, in conjunction with IFDC and the Dutch foreign aid program. IFAD has funded the root and tuber expansion project (2002-2010) that has also had good results on the production side, but been challenged on the processing and marketing side.

The Bill and Melinda Gates Foundation is currently funding the Cassava: Adding Value for Africa (C:AVA), which is implemented by Natural Resources Institute (NRI) focusing on Nigeria, Tanzania, Malawi, and Ghana. With a special focus on the development of cassava for HQCF, the project targets:

- ensuring a consistent supply of raw materials;
- developing viable intermediaries acting as secondary processors or bulking agents in value chains; and
- driving market demand and building market share (in, for example, bakery industry, components of traditional foods or plywood/paperboard applications).

Therefore, there are numerous similar efforts with strong synergies to the ones being proposed by PIND. The challenge that many of them have had are that they are disconnected from market realities and have not had a business oriented approach focused on building the links to the markets. PIND's EDC will be able to bring this value chain approach to sustainably address the challenges at each level along the value chain to ensure that the right product is produced by the farmers and delivered to the processors in a consistent and timely manner in order to feed the industrial markets.

Value Chain Dynamics and Points of Leverage

Trends and Drivers

Trends

Within the value chain, there was substantial growth in channel 2 during the Obasanjo years, but this has dropped radically since 2008. The starch channel (3) seems to be showing some impetus for growth, but is still not dynamic. Meanwhile, the local food consumption channels have remained fairly stagnant, growing only at rates of population growth. This lack of growth in the overall market for cassava products was responsible for the significant drop in production following the supply side push during the beginning of the PIC.

There is rising demand and importation of industrial products that could be produced from cassava. About 43,000 mt of glucose and dextrose were imported in 2006, which rose to 121, 000 mt in 2008. Over 335,000 mt of starch is demanded in Nigeria.

There is a new trend of retailing packaged cassava products to meet the needs of the urban markets. The volume of cassava products retail packs sold in supermarkets amounted to over 500 mt in 2006 and this has been rising as more firms have also started to package cassava products for sale in supermarkets and even for export.

Demand for HQCF has been decreasing, though this might change with the renewed government involvement. Since the expiration of the past regime, many flour millers have not been blending HQCF with wheat flour as mandated by the federal government. Therefore, many of processors who had focused on HQCF have since closed shop, while very few ones have diversified into improved food products such as packaged odourless fufu flour and garri. However, with rapidly increasing global prices of wheat, it may become increasingly profitable for millers to blend cassava flour in for the end products.

Cassava products are facing increasing competition from imports. The import prohibition list (which will run from 2008-2012) has recently been revised, the importation of cassava tuber with H.S 0714. 0000 is the only prohibited item while the other products of cassava such as flour, chips, starch, *garri,* etc. can now be legitimately imported into Nigeria. This will provide competition to the local industries and place a greater emphasis on increasing competitiveness within the value chain.

With the new varieties being introduced into Nigeria by IITA, production is on the increase and the ability of farmers to greatly expand their production is quite high. If the markets for products are developed, the adoption rate could be quite high.

Drivers

The driving forces include:

- Increasing rate of urbanization and demand for convenience foods is driving the demand for packaged cassava food products. Odourless fufu flour and cassavita are packed in the Niger delta for onward deliveries to supermarkets in major cities across the country.
- The increasing demand in the industrial market remains a potential major driver in the future, but it has not been to date. Beyond interest from the industrial starch users, there is significant interest from the brewing industry to develop a beer based on cassava starch, which could open up a new market segment based on price in Nigeria
- Government policy has been an important driver in the cassava sector as evidenced by the PIC, though it has not always been implemented in a coordinated way to address the constraints within the value chain that could have helped yield the desired results. While there has been good success on the production side (see below), this has not linked into the end markets which must drive all value chains. The recent initiatives might once again drive significant increase in demand for HQCF.
- Donor funding. Numerous donor projects, including the IITA/USAID/SPDC Cassava Enterprise Development Project and the current Shell cassava program have helped promote

increased production and investment in the region. Donor programs introducing processing technologies and new varieties have led to increased production and processing of cassava in the Niger Delta. With CEDP, new improved varieties of cassava were introduced and over 12 SMEs processing industries were set up in the USAID sponsored program. However, most of the processing factories that were set up have since closed shop due to the unprofitable nature of the product (HQCF) they were producing and their disconnect from the end markets.

Points of Leverage

A leverage point is a place in a system where efforts can be made, where actions and changes in structures can lead to significant and enduring improvements. We recommend the following points of leverage:

Producer Associations

There are many cassava farmers cooperatives existing in the rural areas of the Niger Delta a good example is the Cassava Growers Association which exists in all states in the region (for example, personal communication with the Chairman of the Association reveals that only 16,000 farmers are formally registered with the Association in Edo state). These associations usually organize trainings for their members and help to secure funding support for members; however, these associations are weak in terms of organizational capacities and linkages with end users. The Project can lay credence to Ekha Agro Model of contract growing scheme which engage growers association to sign agreements on areas of support, ensure farmers open bank accounts, clear land for farmers, link them to input suppliers like Syngenta, directly pay costs incurred on inputs to Syngenta, provide technical backstopping on simple agronomic practices till harvest period. These can be involved in structured trade relationships with larger companies, deducting incurred costs from selling of farmers' roots and release the balance to the farmers through bank transactions.

Large Processors

The few large processors, such as Matna, offer excellent points of leverage for reaching large numbers of small farmers with organized supply chain activities. Tying into DADTCO's mobile processing units can also be an excellent source of leverage to address demand for cassava products.

Extension Service Providers

This study identified that cassava farmers are in dire need of extension services which currently is being provided mainly by the Agricultural Development Project (ADP). The ADPs exist in every state in the region and are adjudged to be the closest source of information to the farmers; however they are inadequate and financially handicapped to carry out these extension activities. As a result of this lapse, private sector organisations (such as LAPO agricultural and rural development initiative) are springing up to fill this gap. Opportunities exist for more private sector organisations to render extension services in terms of capacity building for cassava producers in the area of adoption of production technologies and even small scale processors to farmers within the region.

Ministry of Works/NDDC/Oil Companies

Are stakeholders in the development of the region and can facilitate the construction of feeder roads to ensure prompt farm produce evacuation and electricity supply to reduce processing cost at the village level where they currently depend on diesel powered machines. Cassava producers and processors associations could advocate for these infrastructures in the region as it would ultimately reduce production cost. They have a great ability to influence the nature of assistance programs and provide the needed resources to implement appropriate support programs.

IITA and other Donor Programs

IITA and the other existing donor programs provide excellent points of leverage for PIND to access the right resources, but also to influence approaches to help them to adopt more market led programs. Some of these could be implementing partners for PIND, while others might actually fund/subcontract through the EDC to generate innovative strategies to addressing the problems that have plagued the sector for so long.

Constraints and Opportunities Matrix

The matrix below summarizes the main issues that arose during the study and coming out of the validation workshop. This is a very broad and sweeping set of constraints that have not yet been prioritized in terms of developing a consistent strategy.

Table 13: Constraints and Opportunities Matrix

I. MARKET ACCESS						
	Constraints	**Cause**	**Result of Constraint**	**Who affected (Target)**	**Proposed Interventions**	**Existing Provider of Services**
1	Under utilization of cassava roots in the improved food and industrial products channels of cassava value chain	Price rigidity on the part of industrial end users (e.g flour millers) and processors on what they are willing to pay for products and roots. Increased cost of producing for improved food and industrial products channels compared to traditional food channel	Inadequate supply of roots and quality processed products Untapped income for farmers for supplying cassava roots Low capacity utilisation of processing facilities, thus high cost of products Importation of cassava products for use by industrial users	Processors Farmers Industrial users Consumers	Organise innovative and learning platform which is mutually beneficial for all stakeholders concerned Devise cost reduction strategies for producing industrial cassava products to make it competitive with imported products	
2	Weak linkages between industrial users of cassava products and cassava processors.	Inability of processors to diversify into other products (as a lot of beneficiaries were not commercial oriented) when production of HQCF became unprofitable.	90% of IITA CEDP assisted processing centres not operational Stagnant	Farmers Processors	Advocate the restructuring of management of these mills to operate as business enterprises and adopt diversification strategies Advocate for the imposition of	Association of Nigerian Starch Manufacturers

		Cheaper imports of cornstarch due to low import tariff (5%) makes cassava starch uncompetitive	investment in the cassava sector		higher tariff on cornstarch and promotion of the use of cassava starch as a substitute for imported cornstarch Devise cost reduction strategies for producing industrial cassava products to make it competitive with imported products Strengthen linkages of industrial users of cassava products and cassava processors e.g use of cassava starch in textiles and pharmaceutical firms Organise innovative platform of stakeholders	IITA, C:AVA
3	Weak market information; farmers do not know where their products are sold and for how much or which are the best links for disposing produce.	Lack of appropriate market information systems.	Unstable pricing Poor pricing of cassava roots from producers.	Producers	Establish a private sector led cassava marketing innovation/shared learning platform. Facilitate the establishment of a market information system for cassava and other related commodities.	Govt Agencies Civil Society Orgs
II. TECHNOLOGY/ PRODUCT DEVELOPMENT						
	Constraints	**Cause**	**Result of Constraint**	**Who affected (Target)**	**Proposed Interventions**	**Existing Provider of**

						Services
1	Low rate of adoption of improved technical package by farmers in the region	High cost and unavailability of fertilisers, herbicides ,pesticides, etc to farmers when and where needed Resistance at the local level to adopt improved varieties Inadequate provision of viable and relevant extension services Lack of awareness on the benefit of using high yielding, improved varieties	Low productivity of cassava farmers High cost of cassava roots Low sales recorded by input supply providers	Farmers Processors Input suppliers	Facilitate the access to affordable and available fertilisers, herbicides ,pesticides, etc to farmers when and where needed Processors could incentivize outgrowers to adopt improve technical packages Enable the provision of viable and relevant efficient and effective extension services to farmers, it could be offered by input suppliers as a package for selling their products Advancing use of pure single strain varieties	ADP LAPO
2	Unavailability and unaffordability of tractor rental services and other labour saving devices	ADP is usually the only source of renting tractors which are not sufficient Dearth of private sector investment in tractor services due to high cost of procuring tractor Resistance of research institutes to release research outputs/design drawings for commercialisatio	Low productivity of cassava farmers High amount expended on labour High cost of cassava roots	Farmers Processors	Enable the provision of viable tractor renting services to farmers at affordable rates Enable mutual beneficial relationships between agricultural mechanization research institutes and private sector machine fabricators Re-cluster and re-train fabricators	ADP National center for Agricultural Mechanizati on Agricultural Machine fabricators

		n, rather they embark on unsustainable production of such machines			round existing SMEs Facilitate the commercial production of labour saving devices (harvester, lifter) that could reduce the labour cost of farmers	
3	Non processing of cassava into semi processed form for industrial products at cassava production hubs within the region	High cost of processing equipment and associated infrastructure cost (which is beyond the reach of micro processors) for industrial products Absence of storage facilities that could extend the shelf life of semi processed cassava Lack of capacity to process cassava into non traditional food products (eg wet cake) Very high resistance on the part of medium and large scale processors to procure wet cake from micro processors due to the high quality requirement by their end users	No value added to cassava in many rural areas of the region, thus low value for cassava roots Increased cost of transporting cassava roots to the processing centres outside the rural areas due to the bulky nature of the cassava	Farmers Processors Collectors	Devise cost reduction strategies of processing cassava into industrial products that meet end users requirement Facilitate linkages between medium /large scale processors with micro processing centres that can process cassava at 1st level for onward deliveries to the former. Facilitate the production of simple processing equipments	Micro processing centres DADTCO/RRS SDA/IFDC Cassava plus project
4	Higher production down time experienced by SME processors due to machines breakdown	Low fuel efficient dryers Fake machine spare parts, and lack of funds to purchase the	Inefficient processing Low utilization of installed machines High cost of	Processors End users Consumers	Conduct production audit of existing SMEs Search for appropriate solution to obtain efficient dryers Retrofits	

		requisite spare parts Low skills of local fabricators for machine maintenance	processed products		existing dryers in the NDR Establish techno-economic assessment of before and after retrofitting Conduct open day on new production system Create awareness with fabricators and auto dealers on those spare parts and their importance to stock original spare parts Strengthen the capacity of local fabricators for machine maintenance Engage policy makers on necessary tariff support for the importation of quality spare parts	
III. MANAGEMENT/ORGANIZATION						
	Constraints	**Cause**	**Result of Constraint**	**Who affected (Target)**	**Proposed Interventions**	**Existing Provider of Services**
1	Uncoordinated system of collection of cassava roots from farmers to processors	Low pricing of roots by processors serve as disincentive Weak capacity/lack of resources of farmers associations to undertake such function	Inadequate supply of cassava for processors Excessive waste of cassava produced	Farmers Collectors Processors	Improved bulking and logistic operations Promote buying of roots from farmers cooperatives and purchase of semi processed cassava from MPC cooperatives	Processors (Matna, DADTCO) Cassava Growers association(rivers state)
2	Shortage of viable cassava	Lack of capacity and skills to run	Farmers do not invest in	Farmers Processors	Strengthen capacity of	

	enterprises	farms and processing facilities as self sustaining enterprise High labour cost for cassava production High energy cost for processing facilities	the farm Low productivity Processing factories become non operational Unprofitable nature of cassava production /processing	Consumers	commercial cassava producers/MPC and SME processors on business development, record keeping, negotiating power etc. Shared learning trips for SMEs in well established cassava countries outside Nigeria	
IV. INPUT SUPPLY						
	Constraints	**Cause**	**Result of Constraints**	**Who affected (Target)**	**Proposed Interventions**	**Existing Provider of Services**
1	Unavailability of inputs (improved varieties, fertilizers, pesticides and herbicides) to farmers when and where needed	Uncoordinated distribution of high yielding disease resistant cassava varieties Limited private sector involvement in fertiliser and tractor supply due to price distortion by government subsidy High distribution cost of getting inputs to farmers in hard to reach areas	Low productivity per ha Low income to farmers and traders Late receipt of fertilizers by farmers Low sales experienced by input suppliers Inadequate quantity and quality supply of raw roots to the processors, therefore underutilisation of processing factories	Farmers Processors Input suppliers	Coordinate deployment of improved varieties to farmers Devise innovative means of getting inputs to farmers as at when and where needed. This could be tied to an extension service scheme that could be offered by the input suppliers Encourage processors to provide inputs to farmers which is then deducted after harvested tubers have been delivered	IITA/NRCRI ADPs Private Farmers with improved varieties Inputs suppliers (biostadt)
2	Inability of many farmers to deliver cassava to industrial processors	Harvesting is usually done manually which takes time and it is expensive	High cost incurred in delivery of cassava to processors	Farmers Processors	Promote use of appropriate technologies (eg. lifter) for harvesting and	

	within 24 hours	High cost of transporting cassava roots to industrial/improved food processing centres due to poor infrastructure (bad feeder roads, rickety vehicles) Weak linkages between the large processors and the farmers (very few outgrower schemes or arrangement with farmers to supply raw product)	which processors are unwilling to pay for, thus low supply of raw roots to the processors Low capacity utilization of processing factories Low income to producers and processors	End users	processors could introduce use of mobile peelers to farmers cooperatives or out growers Promote wet cake/ industrial semi processing at MPC Engage private sector transport companies to transport produce and semi processed products Strengthen linkages between processors-transporters-producers through effective contractual agreements Improved bulking and logistic operations	

V.FINANCE						
	Constraints	**Cause**	**Result of Constraints**	**Who affected (Target**	**Proposed Interventions**	**Existing Provider of Services**
	Lack of finance for many farmers for cassava production and processors to purchase processing equipment and vehicles (for collection of roots and onward transportation of finished products)	Stringent conditions (collateral, repayment period, interest rate) required for accessing loans from banks High interest rate for micro finance banks Delay in release of loan (mostly offseason) and unconducive payment terms for agric based activities by commercial banks High cost of servicing low net worth clientele such as farmers Rate of returns on investments for most farmers and processors are usually low	Restricted investment on farms/processing as commercial enterprises, thus low productivity. Inadequate supply of roots to industrial processors and processed products to industrial end users A lot of MSMEs remained unbanked due to stringent terms and conditions	Farmers Processors Industrial end users	Devise innovative low cost strategies for farmers and MPCs to access funds Explore the use of associations/co operatives in accessing funds for members in order to reduce cost of servicing individual farmers Encourage processors/input supplier/banks/farmer relationships that are mutually beneficial Strengthen the capacity of farmers and processors on enterprise development, this could be provided by banks as a way of incentivising farmers to save with them.	EfINA Rivers state Cassava Growers Association/MAMCIS
VI. POLICY						
	Constraints	**Cause**	**Results of Constraints**	**Who affected (Target)**	**Proposed Interventions**	**Existing Provider of Services**
1	Poor implementation of the 10% HQCF inclusion policy	Low pricing of HQCF by flour millers Quality of Cassava Flour for addition into the Wheat Flour, did not meet t the SON NIS 294 2004 standard for	Non utilization of excess production of cassava which dampen farmers morale A lot of processors	Processors Collectors Farmers	Educate flour mills on the cost benefit of substituting cheaper HQCF with wheat Strengthen capacity of	Flour Millers Association Cassava Processors Association of Nigeria

		composite flour (the processors responded that to meet the requirement, cost of production would increase which the millers are unwilling to pay for)	closed shop		processors to optimize product quality and operational cost of producing HQCF Advocate for the implementation of the 10% HQCF inclusion in composite flour as way of saving foreign exchange that could go into importation of wheat Advocate for the prohibition/high tariff of imported cassava by-products in the next revised import prohibition list of 2013, however this can only be achieved provided local supply can meet the much needed demand for these products.	
2	Global rising cost of wheat flour provides an opportunity for substitution with HQCF	The long spell of uncontrolled bush fires in Russia and Australia, to the flooding in the United States and Canada has aided the skyrocket of the price of wheat[13]	Increased production cost of baking and confectionary products (in 2010 about 800 million dollars was spent on importation of wheat Increased price of basic wheat related food products	Flour millers Consumers		Flour millers
VII. OPERATING ENVIRONMENT/INFRASTRUCTURE						
	Constraints	**Cause**	**Result of Constraint**	**Who affected (Target)**	**Proposed Interventions**	**Existing Provider of Services**
1	Restricted expansion of farmlands for increased cassava production	Land tenure issue (all land belongs to government) Communal ownership of land whereby land belongs to nobody but the communities	Small fragmented plots of land and high cost of rentage and maintenance	Farmers especially women	To solicit for land expanse from government and communities Improve productivity per hectare in order to maximise income per hectare	Govt. Agencies Traditional community leaders
2	Multiple taxation	Uncoordinated tax regime by government	High cost of production	Farmers Collectors	Solicit harmonise tax	

[13] http://allafrica.com/stories/201105250093.html

			and sales	Transporters Consumers	regime Advocate for removal of illegal duties charged at many checkpoints by police and community associations	
3	Poor infrastructural support for production of industrial/improved cassava products	Poor feeder roads for transportation of raw cassava produce Lack/Insufficient power supply (alternative energy cost about 35% of processors total cost)	Higher wastages of cassava roots Limited value addition to cassava High cost of products Reduced profits for farmers and processors	ALL	Engage policy makers (LGAs/State Govts) or development partners (i.e. World Bank, Oil companies) on social responsibility to upgrade feeder roads Provision of alternative power supply such solar energy, Bio-gas fossil fuels, etc Establishment of PVC oriented Solar Roasters/Dryers	NGOs Experts Institutes Parastatals
VIII. TRADE ASSOCIATIONS						
	Constraints	**Cause**	**Result of Constraints**	**Who affected (Target)**	**Proposed Interventions**	**Existing Provider of Services**
1	Weak Lobbying/Negotiating Power	Lack of active producer associations Leadership tussle	Inability to take advantage of Govt policies on industrializing cassava sector on a large scale.	ALL	Organize capacity building initiatives Strengthen community practices for producer associations	Experts Institutes

Vision for Growth

The assessment team believes that an appropriate vision for growth of the cassava industry targets to be achieved in the Niger Delta is:

> ***Increasing the sale of cassava by 20% from the Niger Delta into industrial processing for food and other industrial products by 2017.***

Major Opportunities for Economic Growth

Several opportunities exist for economic growth in Nigeria through cassava product development and marketing (see Figure 14).

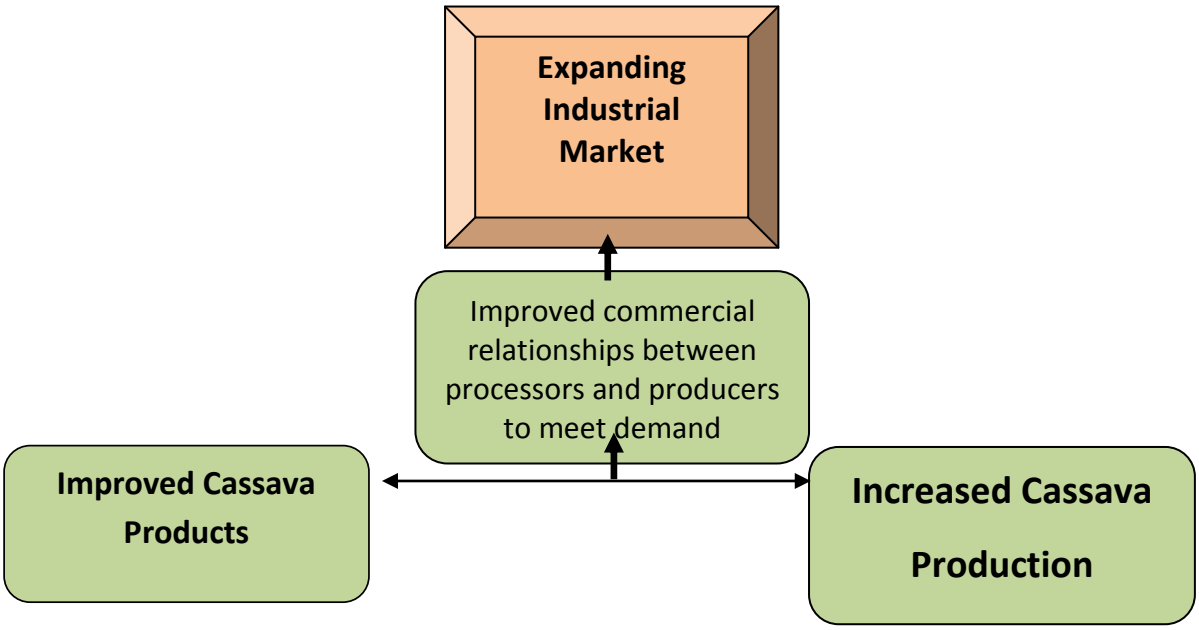

Figure 14: Opportunities for economic growth

Expanding Industrial Markets

The growth potential of the non-food sectors in Nigeria is strong. The expansion of this non-food market will foster growth in the cassava production and processing especially the provision of diversified alternative products and sales outlets in the medium to long-term. A key driver of this cassava non traditional food market is the emergence of several processing firms utilizing cassava roots as a major component of their production process. There is the need to have sustainable supply lines to the industrial processing industry. This will ensure import substitution for starch, continued import substitution for glucose and open up export market for starch (native and modified).

Creation of reliable interactive programs with major stakeholders in the supply of HQCF to the baking industry becomes more critical judging from high volume of investment already residing in the Niger

Delta Region. The strategy should be a direct interaction with HQCF processors at the bakery level, and biscuit processor levels. There is an emergence of use of wet cake in the beer industry by one of the largest beer conglomerates (SAB Miller) and this conglomerate has investments in the Niger Delta region. This is an opportunity for the cassava sub-sector in the Niger Delta Region.

The livestock industry in Nigeria is predicted to expand and align with the population growth. National Bureau of Statistics (2008) shows a steady increase in livestock population in the country between 2001 and 2008. For example the poultry (chickens) stock almost doubled within the period from 124,618,191 in 2001 to 245,564,058 in 2008. A key component of the animal feed is cassava product. Thus, growth in this sector will translate to positive growth in cassava production and processing.

If Nigeria could successfully substitute for imports on wheat flour, starch, and sucrose/dextrose, it could sell another 900,000 mt of finished product through the commercial channels in the value chain, or nearly 4.5 million tons of cassava tubers (nationally equivalent to 10 % of total production and a far higher percentage of commercialized product).

Improved Linkages within the Value Chain

While the markets are there, the major disconnect is between the producers and the processors – getting the proper raw material to the processors at the right time, throughout the season. This has been the major failure of the activities to date and needs to be the focus of future activities to ensure meeting the end market needs.

Increased Cassava Production

The increased demand for cassava tubers and products will also impact positively on general economic growth by stimulating growth among firms engaged in development of technology or equipment required for cassava production/processing. In addition this becomes a platform for generating employment.

Improved Cassava Products

The development of improved and high quality cassava products locally can reverse the importation of such products and conserve the foreign exchange used for importation and overtime such products could be exported to neighbouring West African and other African countries.

Recommended PIND Implementation Strategy

Given the long laundry list of constraints that have been identified and all of the efforts that have been put into the cassava value chain in the past, developing a clear, coherent strategy for PIND in the Niger Delta is a necessity.

While many of the challenges facing the cassava value chain are common to all agricultural products (weak extension services, poor access to credit, poor availability of input supplies, fragmented marketing, etc), addressing the needs of the processors to supply the processed food and industrial market needs coordinated strategies. PIND should develop a market based approach to addressing the challenges, initially focusing its efforts on those small farmers who are commercially oriented and on processors with a strong business foundation interested in developing new markets. These will address cost reduction strategies for producing industrial cassava products to make them more competitive with imported products. Some suggestions for proposed interventions to further develop the subsector in the Niger Delta region include:

Improve Value Chain Coordination

PIND should address the challenges in the coordination of the supply from the farmers to the processors to deliver the right raw material (consistent varieties) to the processing plants within the required time frame in a cost effective manner.

- Refine the understanding of the challenges linking the small commercially oriented producers to the viable SME and large scale processing plants that are producing for the flour milling and industrial markets.
- Address the challenges of improved bulking and logistic operations, and enhanced relations between the farmers and the processors.
- Facilitate linkages between medium /large scale processors with micro processing centres that can process cassava in rural areas for onward delivery to the former.

Improve Production and Productivity

- Promote the consistent use of improved high yielding, disease resistant, cassava varieties coming from certified nurseries where the varieties can be traced;
- Promote good agronomic practices through public and private extension to farmers as a way of improving productivity, including improving access to and use of fertilisers, herbicides, pesticides, etc to farmers;
- Analyze the constraints around the commercial supply of labour saving devices (harvester, lifter) that could reduce the labour cost of farmers;
- Enable the provision of viable and relevant extension services to farmers; and
- Improve the capacity of nurseries to provide consistent varieties with the traits desired by the processing companies and to develop viable business models for commercial distribution.

Improve Processing to Meet the Supply Chain Needs of the Industrial Processors

- Improve the MPC technology to facilitate the intermediate processing to reduce the weight and stabilize the cassava raw material, which will reduce the transport costs and facilitate logistical operations;
- Strengthen capacity of processors to optimize product quality and reduce operational cost of producing HQCF through market led activities.
- Examine opportunities for broadening the distribution of DADTCO's mobile processing technology which produces high quality wet cake in a timely manner for further processing into starch or HQCF; and
- Collaborate closely with IITA to address any issues related to the processing technologies and diagnose the specific reasons for the closure of the 40 SME processing plants started underCEDP to identify opportunities for rehabilitation;

Strengthen Coordination and Advocacy Bodies

- Engage actively with the new Ministry of Agriculture task force on Cassava to introduce and/or leverage sound market driven opportunities for increasing cassava production and marketing;
- Organise cross functional meetings with the producers, intermediate processors and end processors and supporting service providers to enhance the understanding of the needs and issues facing the value chain;
- Organise innovative and learning platform which is mutually beneficial for all stakeholders and disseminate information of value to all the stakeholders. Of special importance is to identify the key issues surrounding the competitiveness of the value chain and ways to gradually wean the industry from its protective umbrella;

- Identify the most productive ways to take advantage of the various donor funded programs supporting Cassava production in Nigeria for the benefit of the Niger Delta; and
- Work with financial institutions to devise innovative low cost strategies for farmers and MPCs to access appropriate financial services.

Special Considerations for PIND in the Design of its Pilot Activities

- As PIND puts together its pilot activities, there are three central elements it should pursue:
- Coordinate closely with IITA which has been a leader in the development of both new varieties and processing technologies. PIND's Economic Development Centre (EDC) will have a comparative advantage in addressing the challenges around the business models to ensure that they are logical and market driven. PIND's Appropriate Technology Centre will be able to work closely with the IITA and the private fabricators with whom IITA has been working to improve the processing technologies.
- Consider using the IFDC/DADTCO/Dutch initiative around mobile processing of cassava to produce wet cake and as poles of development for building the capacity of the farmers to optimize production and facilitate the introduction of commercial services. In particular look to leverage the work that is being done by IFDC on improving production and the access to services, and explore opportunities for collaboration; and
- Given all of the other work being carried out by donors (Dutch, Bill and Melinda Gates Foundation, USAID, IFAD, and the Ministry of Agriculture) on this topic, PIND should play a coordinating role in bringing the lessons learned to the broader benefit of the Niger Delta. As the strategy develops, special consideration must be placed on the inclusion of youth and women in the program, at all levels.

Further Information and Analysis

This value chain analysis has identified many of the key issues related to the cassava value chain in the Niger Delta and allowed PIND to develop an overall strategy. However, before the activities can be finalized within the overall strategy, additional, more detailed analysis is required in a number of arenas, most notably:

- Identification of the specific status of the various SME processing HQCF plants to determine how many are really operating and how competitive they are (or can be), including their real costs of production, the ways that they market, and their links into the market;
- Greater discussion with the large scale processors (Matna and Nigeria Starch Mills) about their needs, the ways that they communicate with the farmers to access raw materials, and opportunities for enhancing closer supply relationships;
- More detailed discussions with IITA staff who have been involved in the various cassava projects to ascertain their opinions on the best ways to build on experience to date, primarily around the commercialization of the various technologies and varieties that they have developed and promoted over the last decade;
- Meetings with nurseries that are providing the planting material to the farmers to understand their business models and identify the constraints to expanded commercial production and distribution of cassava plants; and
- Meetings with the private processing equipment manufacturers to better understand their approach to meeting the needs of their clients (the small processors), the cost effectiveness of their technologies, and their opinions on improvements that could be made to the equipment.

Appendices

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Appendix 1: Survey Analysis Report

Introduction

Methodology

This study was carried out in four of the Niger Delta States mainly Edo, Delta, Imo and Ondo States. A combination of Focus Group Discussions (FGDs) and surveys were used in the conduct of this study in the various areas. Four FGDs were carried out with 3 in Imo state and one in Delta States. A field survey was conducted in Ondo and Edo States. The survey covered the three senatorial districts of Edo state comprising Edo north, Edo central, Edo south. Due to the limitation of time only one senatorial district (Ondo central) was covered in Ondo State. Two local governments were randomly selected from each of the selected senatorial districts while one community was further sampled from each of selected local government council.

Data instruments were administered to 5 categories of actors in the cassava value chain namely Marketers (n = 139), Demand (n = 40), Suppliers (17). Data analysis was done using frequency tables, percentages and graphs.

The instruments employed for data collection was an adaptation of the ones provided by PIND. Open question formats were encouraged to give respondents the liberty to express their views on issues raised.

Results and Discussion

Section 1: Marketers

Table 1.1 shows that farmers (62.6%), and processors (31.7%) are highly involved in cassava produce/product marketing. Male and female appears to play important roles in this with a percentage of 51.8% and 48.2% respectively. Most (60.4%) cassava produce/product marketers belong to the economically active age group i.e. between 30 to 50 years.

Marketing Channels

The major channel of marketing cassava produce/products by the respondents are traders (69%) (Fig. 1.1 or table 1.2 in appendix: survey tables). Most respondents sell directly to them. About 22.3% sell directly to households while close to 14.4% are patronized by cottage industries. This finding suggests that cottage processing industries need to be better equipped to expand processing functions.

Marketing channels identified during focus group discussion include: Traders, Consumers, Restaurants, while others include pharmaceuticals companies who use industrial starch to produce drugs and bakeries.

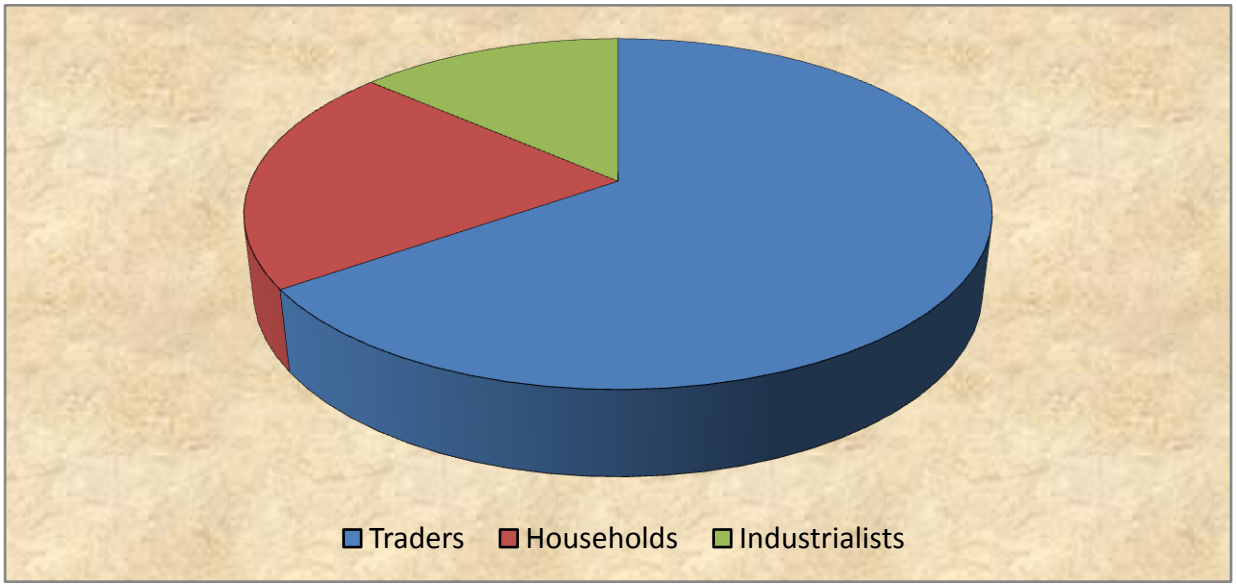

Figure 1.1: Marketing channels

Perceived Market Demand for Cassava Products

The general perception among respondents (78.4%) is that the level of market demand for cassava products/tubers is high and will remain high (fig. 1.2/table 1.3). According to focus group discussion, respondents believed that families will continue to demand for cassava products since the crop constitute a major component of traditional meal.

Focus group discussants acknowledged the existence of several market opportunities for cassava products. These include small, medium and large firms that manufacture or produce:

- baby food, adhesives,
- sweet,
- biscuit
- cassava cake,
- industrial starch used for drug manufacturing, starch,
- flour,
- tapioca & garri,
- bread, and fried cake.

A participant personalized her experience by stating: "*I have some companies especially the drug companies who are calling on me to supply them industrial starch.*"

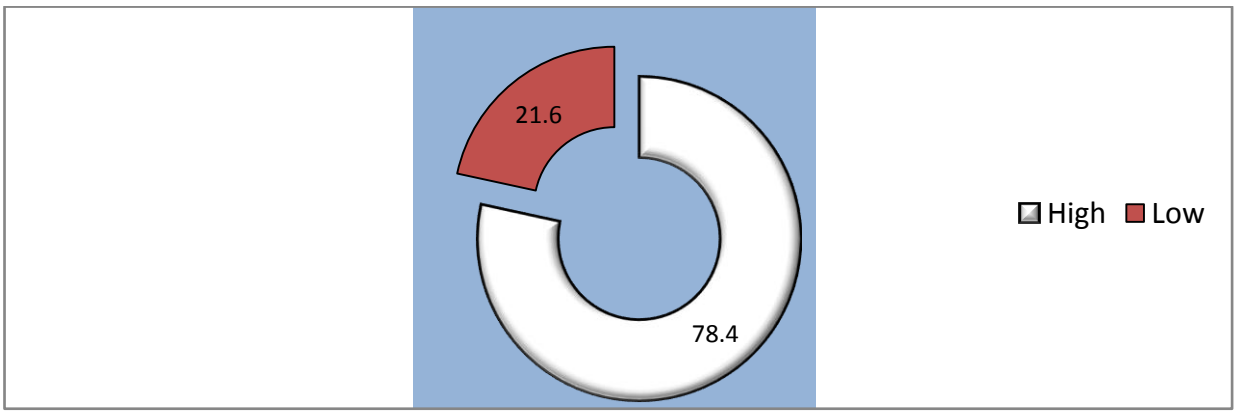

Figure 1.2: Perceived market demand for cassava products

Factors Determining Pricing of Cassava Products

The major price determinant for cassava products is market demand (66.9%) (Table 1.4). Demand frequency (10.8%) and production costs (12.9%) play little role as far the respondents are concern. It is therefore important to note whatever factors affect market price will greatly affect demand for cassava products.

Table 1.4: Factors Determining Pricing of Cassava Products

	Frequency*	Percent
Market price	101	66.91
Production expenses	26	12.95
Frequency of demand	23	10.79
Associations/Govt	1	0.7

**Multiple response*

Sales Promotion Strategies Used by Respondents

Different sales promotional strategies are employed by the respondents according to the results of table 1.5: the most common ones include direct supply of cassava products/produce to clients (43.9%) and by announcing to people (31.7%). Hawking (12.2%) and advertisement (9.4%) are less common. The strategy of supplying directly to customers reduces the inconvenience of getting the products by the customers.

Table 1.5: Sales Promotion Strategies Used by Respondents

Strategies	**Frequency**	**Percent**
Supply clients directly	65	46.8
Announcements	45	32.4
Advertisement	14	10.1
Hawking	19	13.7

**Multiple response*

Issues on Processing Equipments (n = 44)

Table 1.6 focuses on processors. Almost all of them (97.7%) employ locally fabricated tools in the processing activities largely because of its ready availability (52.3%), and cheaper cost (34%). Unfortunately, slightly more than half or 54.5% are ignorant of tools that could improve their processing venture. The findings suggest that they will need to have to be informed of improved processing technologies.

Table 1.6: Type of Machine/Tools Used (n = 44)

	Frequency	Percent
Foreign	1	2.3
Local made	43	97.7
Total	44	100.0
Reason for using particular machine/tool		
Cost	15	34.1
Durable	5	11.4
Available	23	52.3
cost/available	1	2.3

	Frequency	Percent
Foreign	1	2.3
Local made	43	97.7
Total	44	100.0
Aware of machine/tool that could improve business		
Yes	20	45.5
No	24	54.5
Total	44	100.0

Skills Needed to Improve Business

Results of table 1.7 reveal the areas respondents believe they need training. About 36% believe they require training in the various areas involved in their cassava business i.e. production, processing and marketing. Interestingly, about 13% indicated interest in being trained on how to secure loans.

Table 1.7: Skills needed to Improve Business

	Frequency*	Percent
General training	50	36.0
Fund procurement skill	18	12.9
Farm chemical application	6	4.3
Use of equipment	9	6.5
Training in processing	3	2.2

*Multiple response

Business Management Status of Respondents

Close to half the respondents (47.5%) manage their business on their own without assistance (table 1.8). About 53% receive assistance from hired labour (24.7%) and family members/friends (11%). However, the generality incorporates all three in their business management operations (58.9%). The fact that almost half the respondents are still managing the business on their own suggests their operations are still small scale.

Table 1.8: Business Management Status of Respondents

	Frequency	Percent
Management status		
Sole management	66	47.5
Assisted	73	52.5
Total	139	100.0
Business Assistant (n = 73)		
Hired labour	18	24.7
Family member/friends	8	11.0
Contractor	1	1.4
Hired labour/family member/friends	43	58.9
No response	3	4.1
Total	73	100.0

Inputs Sources

Non-finance enterprise inputs of respondents are sourced from farmers (61.2%) (Table 1.9). Inputs suppliers follows next (19.4%). The finding suggests that the government plays an insignificant role in input supply in the cassava marketing chain. Microfinance Banks (MFBs) constitute the most important source of finance for business operations for the majority of the respondents (43.9%). The fact that only about 18% of the respondents solely depend on their personal savings suggests that marketers in the cassava value chain will need financial support. The low proportion of respondents that accessed commercial bank loan is not surprising. A female participant in the focus group explained her difficulty thus: "*One of the major bank in the country demanded that I deposit ₦250,000 for 3 months to access a loan of ₦2,500,000.*''

Table 1.9: Inputs Sources

	Frequency*	Percent
Source of raw materials/inputs		
Open market	13	9.4
Farmers	85	61.2
Inherited	11	7.9
Ministry/ADP	6	4.3
Input suppliers	27	19.4
Source of business funds		
MFBs	63	43.9
Associations	25	15.1
Self Sponsor	36	18.7
Friends/Relations	14	9.4
Moneylenders	4	2.2
Commercial Banks	5	2.2

*Multiple response

Trading Arrangements with Clients

Fig. 1.3/Table 1.10 shows there exists some special trading arrangements between marketers and customers. Although almost 80% accept complete payment before releasing products, about 52% also supply on credit wile close to 50% accept part-payment.

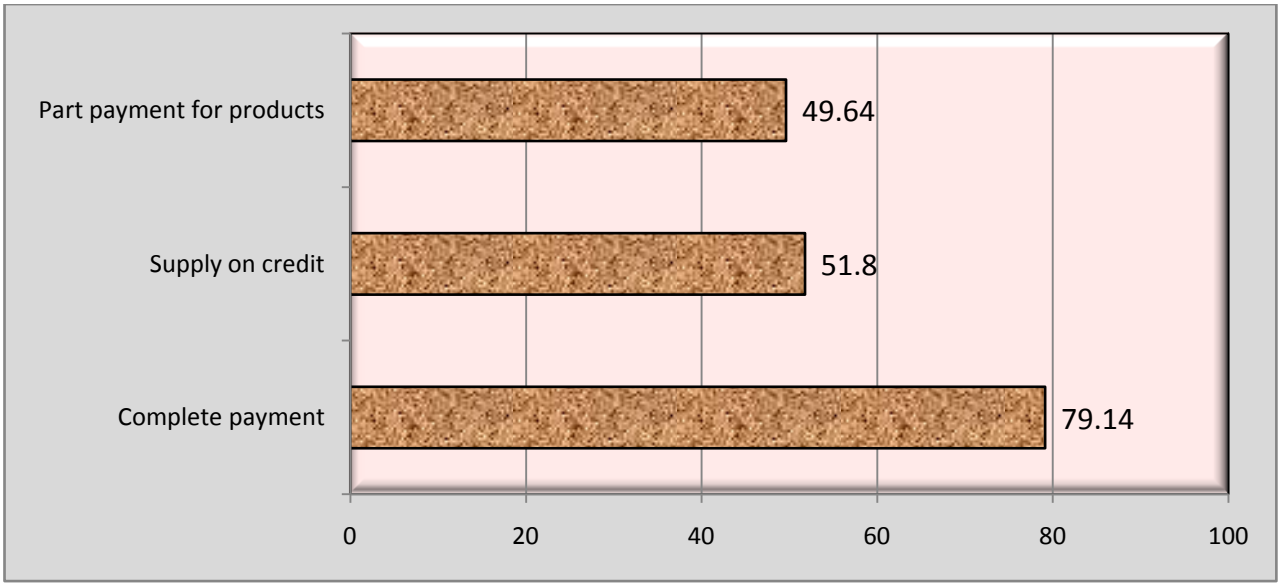

Figure 1.3: Trading Arrangements with Clients

Business Constraints

The marketing component of the cassava value chain appears to face some serious limitations. Results of table 1.11 show that inadequate finance is the major constraint (78.4%). Lack of processing and preservation methods was considered severe by about 27% of the respondents. No severe policy or regulation was considered to affect respondent's enterprise. Only in few cases (13.7%) was revenue collected by local government councils said to a challenged faced by the respondents. Sometimes the charges are said to high and in some cases there is multiple charges levied on marketers by government agencies.

Table 1.11: Business Constraints

Business constraints*	Frequency	Percent
Inadequate finance	109	78.4
Processing difficulties	38	27.3
Poor transport network	22	15.8
Poor storage	11	7.9
Non-availability of inputs/raw materials	2	1.4
Policies/regulations constraints		
None	109	78.4
Government Revenue	19	13.7
Taxes	10	7.2
Cooperatives Rules	1	0.7
Total	139	100.0

**Multiple response*

Other important constraints facing cassava tuber producers and processors that emerged from focus group discussion (FGD) include:

- Transportation arising from poor road network. A discussant expressed her feelings as follows: "I *am a dealer and the greatest problem I experience is transportation. Sometimes when I get to travel by 7am to Idheze in Aviara, there are few transporters that will be available and willing to*

transport my farm produce. The police also create problem by extorting money from the drivers when they are aware they are transporting food produce which are highly perishable"

- Non-availability and/or high cost of processing machines;
- Limited funds to invest sufficiently on the land and operate on a large scale. "*Century hotel at Okota in Lagos buys a lot of cassava tubers for processing into industrial starch but my constraint is funding, as I can't meet up to their demands and time schedule*" said a male participant.
- Pest and diseases. A female discussant captured this limitation by stating: *"Pests have really dealt with my farm, so I made up my mind to know something about them. My research gave me these common pests: cassava mealy bug, green spider mite, white ants, and cane rats." Another participant notes "In my own case I experienced devastating damage to my cassava farm by diseases that naturally attack the plant (cassava) and I found out about these diseases: cassava mosaic, cassava bacterial blight and root rot," another female participant stated.*
- Bad and unsustainable government policies e.g. 10% substitution of wheat flour with cassava flour by bakeries and confectionaries.
- Reduced soil nutrients due to constant use of the land without fallowing and oil spillage, which are common in the Niger Delta area.
- Rottening of tubers.
- Inadequate and high cost of labor to work on the farms.
- Lack of key inputs such as fertilizers. Even when available its cost is usually beyond the reach of the farmer. Other times the fertilizer in circulation is substandard fertilizer
- Lack of contact with extension agents with the implication that recent development and practices are not communicated to farmers and processors.
- Lack of improved cassava varieties.
- Manual processing methods still dominate.
- Labor constraints as young people are not willing to engage in farming preferring rather to engage in commercial bike transport.

Participants (processors) equally noted the peculiar challenges facing cassava processors as follows:

- Low capacity utilization- only few customers process their products in our facility.
- High energy costs- the cost of diesel is too high; it makes our processing cost to be high thereby driving away our customers who cannot afford our rates.
- Breakdown of machines, fake machine spare parts, and lack of funds to purchase the requisite spare parts.
- High cost of processing our cassava.
- Low returns on processed sale cassava for example garri.

Some proffered solutions to the identified limitations by discussion participants are:

- Government should monitor the activities of agricultural and commercial bank who illegally demand collateral from farmers before they can grant loans to them.
- Government should provide insecticides at subsidized rates.
- Disseminate pest resistant varieties to farmers.
- Enforce government policies to ensure compliance.
- Advocacy by NGOs to ensure oil companies take responsibility for oil spillage and compensate affected communities/farmers. Beyond this, it is expected that oil companies make concrete efforts to improve soil condition by making relevant chemicals available.
- Plant early or at appropriate time.
- Subsidized the product as is done in the north by the government where fertilizer sells at N1000/bag.

In suggesting ways of improving the processing component of the cassava value chain participant's recommendations centred more on tackling the production challenges believing that this will go a long way to improve processing such as input provision, credit, and increase land scale. They emphasized the need for funds for purchase of processing equipments.

Section 2: Demand Component

This section examines the demand angle of the cassava value chain (i.e. those who make demand on cassava products/services).

Demographic Characteristics of Respondents

The demographic profile (table 2.1) reveals that the sampled respondents constitute 62.5% females and 37.5% males. They belong to the economically active age group of 30 – 49 years (72.5%). Majority are farmers (55%), while processors and traders constitute 32.5% and 12.5% respectively.

Source and Perception of Service Provided

The findings of table 2.2 show that MFBs are largely patronized by the respondents (70%). This probably suggests that a great need of the respondents is finance. About 53% of the respondents make regular demand on their service providers. Many of the respondents believed that amount charged by the provider was rather high (57.5%). In terms of satisfaction with the service almost half or 47.5% expressed strong dissatisfaction with service rendered. This may constitute an important point of leverage for any intervention programme. Quality service delivery should therefore be given high consideration in any programme development design to improved demand for cassava products/services.

Table 2.2: Service Issues

	Frequency	Percent
From whom do you patronize services		
Farmer	10	25.0
Microfinance institution	28	70.0
Money lenders	2	5.0
Total	40	100.0
How often have you patronized the service		
No response	4	10.0
Often	21	52.5
Occasionally	13	32.5
Not regular	2	5.0
Total	40	100.0
How was service acquired		
High fee	23	57.5
Moderate fee	8	20.0
Low fee	5	12.5
No response	4	10.0
Total	40	100.0
Level of satisfaction with service		
Neutral	4	10.0
Satisfied	17	42.5
Not satisfied	19	47.5
Total	40	100.0

Nature of Service Payment

Most service received is paid for in cash (55%) according to table 2.3. however, instances of credit arrangements exist (32.5%) while advance payment is rare (2.5%). Although respondents considered the service fee charged to be high in table 2.2, they however feel the price is fair (62.5%).

Table 2.3: Nature of Service Payment

	Frequency	Percent
How was service paid for		
No response	4	10.0
Cash	22	55.0
Supplier credit	13	32.5
Advance payment	1	2.5
Total	40	100.0
Service price is fair		
Yes	25	62.5
No	6	15.0
Undecided	1	2.5
no response	8	20.0
Total	40	100.0

Strategies for Improving Service

Suggestions proffered to improve service delivery include financial empowerment of service providers (22.5%) and capacity building (22.5%) (Fig. 2.1/table 2.4 in appendix). It is possible that the reason for poor service rendering may be because the providers lack funds and technical skill to deliver quality products/services. Increased loan volume and interest rate reduction are two measures proposed to improve the services of MFBs.

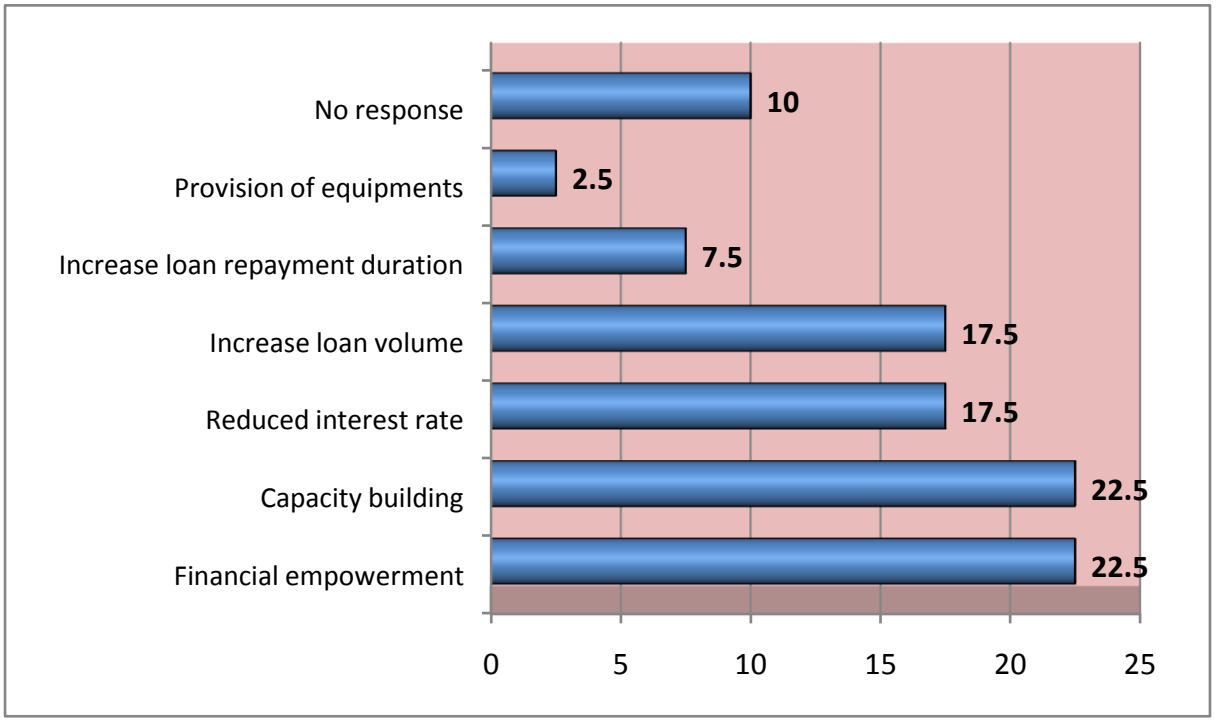

Figure 2.1: Strategies for improving service

Focus group discussant proffered measures to improve cassava demand in the Niger Delta area as follows:

- "Extension officers and NGOs should carry out extensive campaign/training in the communities to sensitize and create awareness on modern and improved methods of farming, improved cutting stems of cassava,

- provide support in transportation of products from rural areas to the cities where the demand is high already"
- "If our government can make agricultural policies and enforce them; like the policy of 10% use of local raw material by industries in their production, the demand for cassava products will skyrocket" she added.
- "PIND and other major stakeholders should advocate on behalf of actors in the chain and see that these policies when made are enforced to the later."

Section 3: Supply Component

This section addresses issues relating to the supply chain of the cassava value chain.

Demographic Characteristics of Respondents

Most respondents are males (82.4%) and the fact that over half are input providers (52.9%) and 23.5% are microfinance providers implies that this sector of the value chain is dominated by males (table 3.1). Most (76.5%) are still energetic being 30 -39 years of age.

Service Providers and Beneficiaries

Many of the respondents feel many individuals are involved in providing supply service in the cassava value chain (47%) (fig. 3.1/table 3.2). Farmers (41.2%) and food centres (35.3%) are considered the major beneficiaries of supplier services.

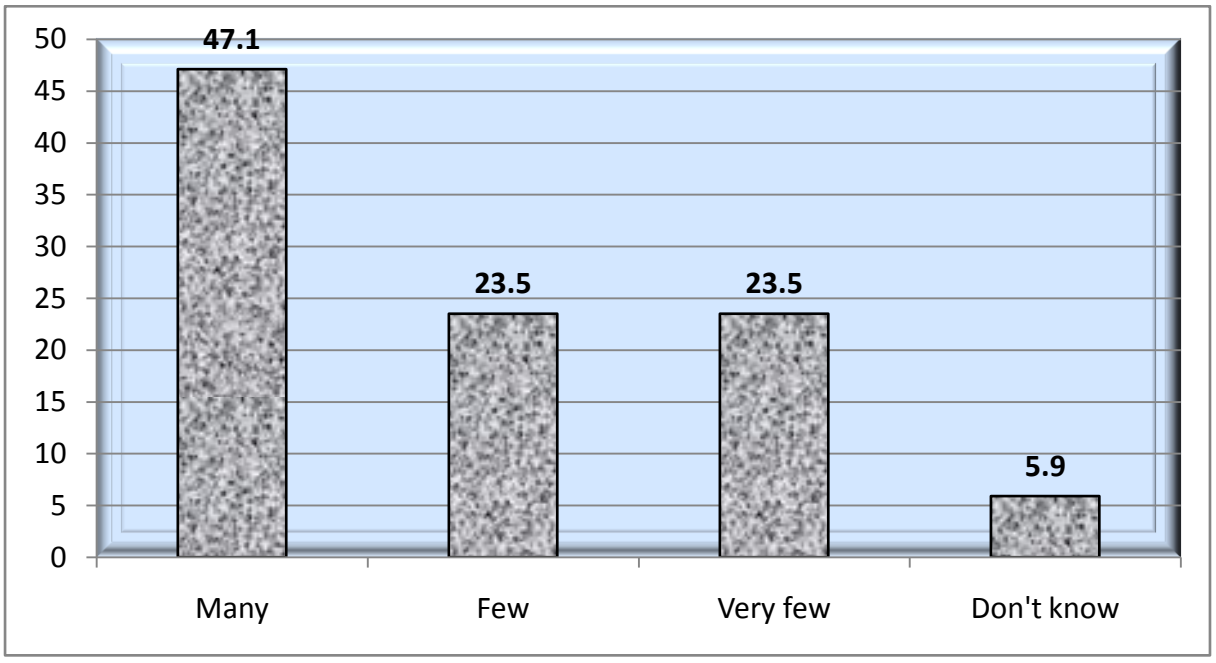

Figure 3.1: Volume of service providers

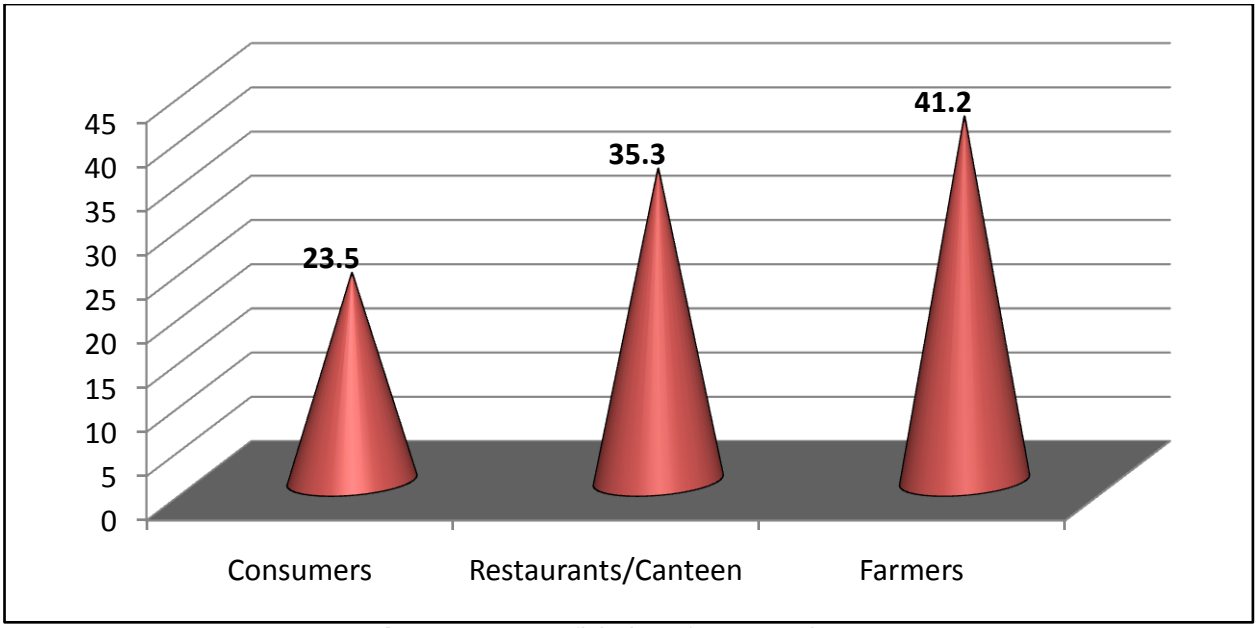

Figure 3.2: Beneficiaries of your services

Constraints Faced and Mitigation Measures

Several constraints were listed as facing the supply chain of the cassava value chain but loan repayment was considered a challenge especially by the microfinance service providers (35.3%). Poor accessibility by road or transport difficulties (23.5%) was equally an important challenge.

Most respondents believe that increased access to finance is a key strategy to ameliorating the identified constraints (70.6%) (Table 3.3). Human capacity development (17.6%) and provision of machinery/equipments (17.6%) were equally proffered solutions by the respondents.

Table 3.3: Constraints Faced and Mitigation Measures

	Frequency	Percent
Constraints faced in providing service		
Prompt loan repayment	6	35.3
Transport challenges	4	23.5
Poor management	3	17.6
Inadequate finance	1	5.9
Erratic power supply	1	5.9
Inadequate finance/prompt loan repayment	1	5.9
No response	1	5.9
Total	17	100.0
Support needed to mitigate constraints*		
Finance	12	70.6
Trainings	3	17.6
Machines/equipments	3	17.6
Land	2	11.8

**Multiple response*

Source of Business Funds

Most respondents are operating their business from personal savings (70.6%). This is likely to have an impact on the scale of business as finance may be required to operate large scale enterprise (Fig. 3.2/table 3.4). Results of table 3.5 shows respondents believe there is large market potential for their service (88.2%).

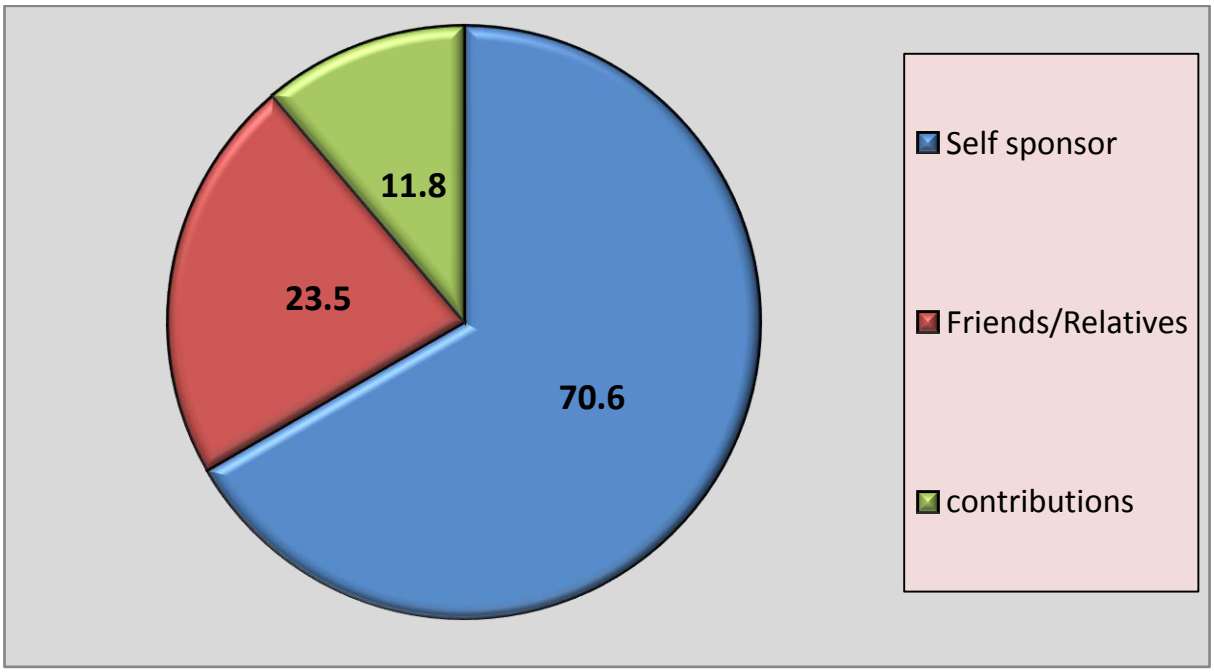

Figure 3.2: Source of business funds

Table 3.5: Potential Market or Demand for Service in Business Area

	Frequency	Percent
Very wide	15	88.2
Limited	2	11.8
Total	17	100.0

Survey Tables

Table 1.1: Demographic Characteristics of Respondents

	Frequency	Percent
Cassava status		
Farmer	87	62.6
Processor	44	31.7
Trader	7	5.0
Input provider	1	0.7
Total	139	100.0
Gender		
Male	72	51.8
Female	67	48.2
Total	139	100.0
Age (years)		

	Frequency	Percent
Cassava status		
Farmer	87	62.6
Processor	44	31.7
Trader	7	5.0
Input provider	1	0.7
Total	139	100.0
Gender		
Male	72	51.8
Female	67	48.2
20-29	13	9.4
30-39	48	34.5
40-49	36	25.9
50-59	35	25.2
60 & above	7	5.0
Total	139	100.0

Table 1.2: Marketing Channels

Channels	Frequency*	Percent
Traders	96	69.1
Households	31	22.3
Industrialists	20	14.4

**Multiple response*

Table 1.3: Perceived Market Demand for Cassava Products

	Frequency	Percent
High	109	78.4
Low	30	21.6
Total	139	100.0

Table 1.10: Trading Arrangements with Clients

	Frequency	%
Complete payment	110	79.14
Supply on credit	72	51.8
Part payment for products	69	49.64

Table 2.1: Demographic Characteristics of Respondents

	Frequency	Percent
Gender		
Male	15	37.5
Female	25	62.5
Total	40	100.0
Age (years)		
20-29	2	5.0
30-39	17	42.5

	Frequency	Percent
Gender		
Male	15	37.5
Female	25	62.5
40-49	12	30.0
50-59	4	10.0
60 & above	5	12.5
Total	40	100.0
Demand status of respondents		
Farmer	22	55.0
Processor	13	32.5
Marketer	5	12.5
Total	40	100.0

Table 2.4: Strategies for Improving Service

	Frequency	Percent
Financial empowerment	9	22.5
Capacity building	9	22.5
Reduced interest rate	7	17.5
Increase loan volume	7	17.5
Increase loan repayment duration	3	7.5
Provision of equipments	1	2.5
No response	4	10.0
Total	40	100.0

Table 3.1: Demographic Characteristics of Respondents

	Frequency	Percent
Gender		
Male	14	82.4
Female	3	17.6
Total	17	100.0
Age (years)		
20-29	3	17.6
30-39	13	76.5
50-59	1	5.9
Total	17	100.0
Status of respondents		
Marketer	2	11.8
Input provider	9	52.9
Microfinance institution	4	23.5
Money lenders	2	11.8
Total	17	100.0

Table 3.2: Service Providers and Beneficiaries

	Frequency	Percent
Volume of service providers		

Many	8	47.1
Few	4	23.5
Very few	4	23.5
Don't know	1	5.9
Total	17	100.0
Beneficiaries of your services		
Consumers	4	23.5
Restaurants/Canteen	6	35.3
Farmers	7	41.2
Total	17	100.0

Table 3.4: Source of Business Funds

	Frequency	
Self sponsor	12	70.6
Friends/Relatives	4	23.5
Contributions	2	11.8

*Multiple response

Appendix 2: Statistical Tables

Table 1: Estimate of Potential Demand for Cassava (mt) in Nigeria

Sector	Potential Market	%
Food for urban market	14,157,438	62.4
Food for rural market	4,378,788	19.3
Food for export	1,825,000	8.0
Food as flour	1,170,055	5.2
Livestock	675,000	3.0
Starch	335,000	1.5
Ethanol	139,347	0.6
Total	22,680,628	100

Source: Kormawa (2003) (quoted by Echebiri, R. N and Edaba M.E. I , 2008)

Table 2: Current Ethanol Demand in Nigeria

Industry	Annual Consumption (million litres)
Liquor blending	40.4
Plastics	12.9
Petro-Chemical	78
Cosmetics	6.9
Paints	3.6
Brewing/Bottling	17
Other	5.2
Total	90

Source: Obasanjo Reforms Cassava Initiatives, 2006 (quoted by Awoyinka, 2009)

Nigeria Cassava Production Statistics (1995 – 2006)

Yr	Area planted	output ('000 mt)	farm gate price (naira/kg)	qty of cassava cuttings (m.mt)	cost of cassava cuttings (mn naira)
1995	2,141.97	23,831.39	6.46	3,312,610.00	5,209.44
1996	2,233.97	25,285.17	7.94	3,442,220.00	6,597.33
1997	2,348.57	27,548.06	11.85	3,621,428.00	10,336.94
1998	2,473.91	29,648.47	15.58	3,710,865.00	14,490.72
1999	2,549.76	29,924.08	15.85	3,824,640.00	15,158.03
2000	2,446.06	29,634.10	15.94	3,668,090.00	14,845.96
2001	2,327.56	27,702.93	14.91	3,491,340.00	12,925.46
2002	2,337.43	28,804.28	17.11	3,424,995.00	14,665.87
2003	2,491.81	30,392.73	18.48	3,450,715.00	16,734.72
2004	2,499.80	30,668.19	19.15	3,749,700.00	17,515.88
2005	2,570.25	32,015.39	19.81	3,855,375.00	18,632.00
2006		35,614.05	20.01	4,185,000.00	20,600.00

Source: National Bureau of Statistics (2008

AREA PLANTED (THOUSAND HECTARES) OF *CASSAVA* BY STATE

STATE	1994/95	1995/96	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Abia	40.38	36.25	38.53	34.66	32.93	19.70	14.29	27.90	31.46	38.46	18.14	37.64
Akwa Ibom	98.40	108.00	93.60	99.00	102.50	122.50	138.50	141.00	149.00	150.00	155.00	160.00
Bayelsa	3.56	3.11	2.92	4.20	2.36	2.66	2.74	5.70	5.91	6.25	2.30	2.99
Cross River	196.97	186.64	207.29	166.00	170.48	179.91	189.51	190.10	176.00	178.41	189.64	198.20
Delta	73.96	70.97	68.04	65.36	67.03	71.72	74.16	76.01	78.00	78.00	81.48	95.00
Edo	40.05	41.10	52.41	52.93	52.85	52.67	54.86	52.53	50.19	50.27	51.78	52.53
Imo	140.50	144.28	63.00	182.85	187.00	171.50	164.40	172.70	162.00	166.00	166.40	161.10
Ondo	85.54	84.47	81.25	87.75	84.40	84.47	69.01	77.29	77.60	78.70	94.44	83.59
Rivers	185.08	161.74	151.62	164.12	157.83	157.13	172.85	125.13	120.20	123.81	103.02	120.51
Nigeria	2141.97	2233.97	2348.57	2473.91	2549.76	2446.06	2327.56	2337.43	2491.81	2499.80	2570.25	2790.00

Source: National Bureau of Statistics (2008)

PRODUCTION (THOUSAND METRIC MT) OF *CASSAVA* BY STATE: 1994/95 - 2005/06.

STATE	1994/95	1995/96	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Abia	714.00	650.00	644.00	602.00	572.00	857.00	551.00	585.00	618.00	654.00	304.00	634.00
Akwa Ibom	896.00	948.00	911.00	885.00	890.00	1068.00	1123.00	1205.00	1265.00	1290.00	1300.00	1335.00
Bayelsa	39.34	34.37	32.27	46.41	26.11	29.37	30.25	62.97	65.28	69.00	25.42	33.06
Cross River	2295.00	2142.00	2330.00	1934.00	1978.00	2191.00	2464.00	2661.00	1994.00	2029.00	2290.00	2520.00
Delta	828.00	803.00	782.00	756.00	795.00	795.00	818.00	872.00	903.00	902.00	961.00	1333.00
Edo	457.00	469.00	598.00	604.00	603.00	601.00	658.00	630.00	602.00	603.00	621.00	630.00
Imo	1827.00	1877.00	812.50	2359.00	2460.00	2208.00	2344.00	2952.00	2251.00	2285.00	2332.00	2315.00
Ondo	1478.00	1439.00	1320.00	1536.00	1460.00	1437.00	1179.00	1354.00	1357.00	1450.00	1738.00	1515.00
Rivers	2080.00	1592.00	1507.00	1756.00	1663.00	1745.00	1936.00	1402.00	1351.00	1405.00	962.00	1251.00

Nigeria	23831.39	25285.17	27548.06	29648.47	29924.08	29634.10	27702.93	28804.28	30392.73	30668.19	32015.39	35614.05

Source: National Bureau of Statistics (2008)

FARMGATE PRICES (NAIRA PER KILOGRAMME) OF CASSAVA BY STATE: 1994/95-2005/06

STATE /YEAR	1994/95	1995/96	1996/97	1997/98	1998/99	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006
Abia	6.23	7.95	12.03	16.10	16.29	16.62	15.38	16.87	17.60	18.26	18.92	19.29
Akwa Ibom	6.56	8.15	11.70	15.25	15.76	16.32	13.67	17.28	18.01	18.49	18.96	19.27
Bayelsa	8.87	10.09	16.13	20.59	20.90	21.35	19.52	21.83	22.71	23.32	23.92	24.31
Cross River	6.47	8.12	11.43	14.74	15.18	15.75	13.28	16.52	17.44	18.20	18.96	19.41
Delta	7.30	8.75	12.11	15.47	15.96	16.54	13.92	17.43	18.28	19.51	20.74	19.99
Edo	7.23	8.64	13.44	18.24	18.25	18.67	17.81	18.28	19.92	20.51	21.10	21.09
Imo	6.12	7.50	11.17	14.83	14.93	15.35	14.20	15.25	16.61	17.28	17.95	22.36
Ondo	6.81	7.92	11.77	15.61	15.62	15.90	15.31	15.64	16.75	17.81	18.86	18.25
Rivers	7.63	8.68	13.34	18.00	18.11	18.49	17.39	18.45	19.62	20.00	20.38	20.40
NIGERIA	6.46	7.94	11.85	15.58	15.85	15.94	14.91	17.11	18.48	19.15	19.81	20.01

Source: National Bureau of Statistics (2008)

QUANTITY OF CASSAVA CUTTINGS (METRIC MT) BY STATE: 1994/95 - 2005/06.

STATE	1994/95	1995/96	1996/97	1997/98	1998/99	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006
Abia	60,570	54,375	57,795	51,990	49,395	29,550	21,435	41,850	47,190	57,690	27,210	56,460
A/Ibom	147,600	162,000	140,400	148,500	153,750	183,750	207,750	211,500	223,500	225,000	232,500	240,000
Bayelsa	5,343	4,669	4,377	6,300	3,540	3,990	4,110	8,550	8,865	9,375	3,450	4,485
Cross River	295,455	279,960	310,935	249,000	255,720	269,865	284,265	285,150	264,000	267,615	284,460	297,300
Delta	110,940	106,455	102,060	98,040	100,545	107,580	111,240	114,015	117,000	117,000	122,220	142,500
Edo	60,075	61,650	78,615	79,395	79,275	79,005	82,290	78,795	75,285	75,405	77,670	78,795
Imo	210,750	216,420	94,500	274,275	280,500	257,250	246,600	259,050	243,000	249,000	249,600	241,650
Ondo	128,310	126,705	121,875	131,625	126,600	126,705	103,515	115,935	116,400	118,050	141,660	125,385
Rivers	277,620	242,610	227,430	246,180	236,745	234,695	259,275	187,695	180,300	185,715	154,530	180,765
Nigeria	3,312,610	3,442,220	3,621,428	3,710,865	3,824,640	3,668,090	3,491,340	3,424,995	3,450,715	3,749,700	3,855,375	4,185,000

Source: National Bureau of Statistics (2008)

COST OF CASSAVA CUTTINGS (MILLION NAIRA) BY STATE: 1994/95 - 2005/06

STATE	1994/95	1995/96	1996/97	1997/98	1998/99	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006
Abia	94.34	108.07	173.82	209.26	201.16	122.78	82.42	176.50	207.64	263.36	128.70	272.28
A/Ibom	242.06	330.08	410.67	566.16	605.78	749.70	709.99	913.68	1006.31	1040.06	1102.05	1156.20
Bayelsa				32.43	18.50	21.30	20.26	46.66	50.33	54.66	20.63	27.26
Cross River	477.90	568.32	888.50	917.57	970.46	1062.59	943.76	1177.67	1151.04	1217.65	1348.34	1442.65
Delta	202.47	232.87	308.99	379.17	401.18	444.84	387.12	496.82	534.69	570.67	633.71	712.14
Edo	108.59	133.16	264.15	362.04	361.69	368.76	366.40	360.09	374.92	386.64	409.71	415.45
Imo	322.45	405.79	263.89	1016.88	1046.97	987.20	875.43	987.63	1009.06	1075.68	1120.08	1350.82
Ondo	218.45	250.88	358.62	513.67	494.37	503.65	396.20	453.31	487.43	525.62	667.93	572.07
Rivers	529.56	526.46	758.48	1107.81	1071.86	1089.50	1127.20	865.74	884.37	928.58	787.33	921.90
Nigeria	5209.44	6597.33	10336.94	14490.72	15158.03	14845.96	12925.46	14665.87	16734.72	17515.88	18631.63	20600.07

Source: National Bureau of Statistics (2008), *Note: an empty cell implies that the state did not report cultivation of the crop during a given year*

Value Chain Description by Function & Influencers

Key players	Function
1. Consumers of food based cassava products	Final market
	-Determine market dynamics for the final product fabricated with cassava ingredients.
	-Determine product standards, pricing.
	-Create demand.
2. Primary consumers are mainly textiles, Pharmaceuticals, plywood, paper, glue and adhesives, bakeries, petroleum and animal feed processing industries	Provide direct market for cassava ingredients
	-Create demand for cassava based products.
	-Establish market Quality.
	-Determine pricing.
3. Secondary cassava processors - (Industrial medium sized and large-scale processors):	Primary market for intermediate cassava products (mainly chips)
- Processors of ethanol, starch and flour and pellets.	-Determine quality, pricing and volume of intermediary products.
4. Primary cassava processors, producing mainly chips, but also flour, crude ethanol, and starch from cassava roots	Primary market for tubers
	-Determine quantity of tubers that can be processed daily and the price of tubers.
5. Farmers: -Small–scale and Mechanized farmers.	Supply of raw material
	-Determine quality and quantity of cassava supplied to the industries.
	-Determine farm gate pricing.
6. Input suppliers	Supply of seeds, fertilizers and pesticides.
	-Determine quality and yield at farm level.
7. Equipment suppliers	Fabrication and supply of farm and processing equipment. - Determine affordability, efficiency and durability of equipment.
8. Professional associations	Contribute to innovations in the sector.
	Act a pressure groups
	Provides feedback to government on policy implementation status & challenges
9. Distributors	Storage and distribution of intermediate and final product, inputs equipment etc.
10. Government	Policy environment regulator
	Create an enabling business environment.
11. Finance institutions	Provide investment credit and insurance

Source: Adapted from "Cassava Master Plan" by FGN and UNIDO (2006) p32

Appendix 3: Standards of Cassava Based Products

Standard for Cassava Starch (Food and industrial grade) [NIS 386: 2004]

Scope

This standard prescribes the quality requirements, methods of processing and tests for food and industrial grade cassava starch.

Classification

Cassava starch shall be classified as food grade or industrial grade.

- **Food-grade Cassava Starch**
  - is a white granular product that is obtained by wet extraction process from mature cassava root.
  - satisfies the quality requirements as outlined in Clause 4 of this standard.
- **Industrial Grade Starch**

Industrial grade starch is starch other than food grade starch, which may or may not be modified.

Essential Quality Factors and Analytical Characteristics

Quality factors

- **Colour**

The colour of cassava starch shall be white.

- **Taste and Odour**

Cassava starch shall be free from objectionable odour and taste.

- **Foreign Matter**

White granular cassava starch shall be free from foreign matters.

- **Particle Size**

Not less than 95% of mass of cassava starch shall pass easily through a sieve of 100–140μ (0.1–0.12mm) mesh screen.

- **Solubility**

The cassava starch shall not be soluble in cold water and in (96%) ethanol.

- **Iodine Test**

Cassava starch when tested with iodine shall give a blue-black coloration.

Analytical Characteristics

Food grade starch shall comply with the analytical characteristics shown in Table below:

Analytical characteristic	Requirement
Total Acidity (%) (max)	1.0
pH	5-7
Cyanide content (mg/kg) (max)	10.0
Starch content (%) (min)	95.0
Moisture (%) (max)	12.0
Fibre (%) (max)	0.2

Sulphated ash (%) (max)	0.6
Viscosity or pasting properties	33–34 stem hall second
Acid insoluble ash (%) (max)	0.2
Chloride (%) (max)	0.64

Note: *Every other starch that does not conform to this table is classified as industrial starch.*

Food Additives

In addition to other additives approved by the NAFDAC, food-grade cassava starch may contain ascorbic acid 0.2% maximum as colour improver.

Hygiene

It is recommended that the product covered by the provisions of this standard shall be prepared in accordance with the international code of Hygiene practice entitled "Recommended International Code of Hygiene Practice General Principles of Food Hygiene" (CAC/RCP: 1-1969, Rev.1). When tested by appropriate methods of sampling and examination, the product:

- shall be totally free from pathogenic microorganism;
- shall contain no more than total aerobic count of 10,000 CFU/g or mL;
- shall not contain any other poisonous extraneous or deleterious substances in amounts which may present hazard to health

Contaminants

Maximum residue limits for pesticides shall be in conformity with NAFDAC regulations on pesticide residues. In addition, it shall conform to prescribed levels of contaminants in Table below:

Contaminants	Maximum level permissible in mg/kg of dry matter
Sodium (Na)	74
Manganese (Mn)	12
Iron (Fe)	22
Copper (Cu)	4.3
Bromine (Br)	6.6
Zinc (Zn)	19
Molybdenum (Mo)	17
Aluminium (Al)	30
Oxalate	26
Lead (Pb)	0.1
Cadmium (Cd)	0.1

Labelling

The package shall be hermetically sealed and marked with the following:

- **Name of the product**

The name of the product to be shown on the label shall be "Food-grade Cassava Starch". The name shall indicate the particle size of the granules in accordance with the descriptions contained on page 71.

- **Net weight**

Net weight shall be declared in metric system.

- **Name and address**

The name and address of the manufacturer and /or packer shall be declared.

- **Date marking**

The date of manufacture and batch number on packing shall be declared. The expiry date shall be well written on the label.

- **Country of origin**

The country of the product shall be declared.

- **NIS Certification Mark**

The NIS Certification mark if the product is certified.

Packaging, Transport, and Storage

- Food-grade cassava starch shall be packed, transported, and stored in containers, which will safeguard the hygienic and organoleptic qualities of the product.
- The packaging material shall be such as to protect the product against bacteriological and other contamination; it shall protect the product as far as possible against any infiltration of moisture, insect infestation and leakage. The packaging material shall not impact any odour, taste colour or any other extraneous the product.

Quality and safety standards for HQCF

Scope: This standard applies to HQCF prepared from common cassava (*Manihot esculenta* crantz) which is pre-packaged ready for sale to be use in preparation of other products.

Description
Product Definition

- High Quality Cassava flour is the product prepared from cassava (*Manihot esculenta* crantz) by peeling, washing, grating, pressing to reduce the moisture content followed by drying.

Essential Composition and Quality Factors

Quality Factors - General

- HQCF shall be safe and suitable for human consumption.
- HQCF shall be free from abnormal flavours, odours, and living insects.
- HQCF shall be free from filth (impurities of animal origin, including dead insects) in amounts which may represent a hazard to human health.

Quality Factors - Specific

- **Moisture Content** 13% m/m max

  Lower moisture limits should be required for certain destinations in relation to the climate, duration of transport and storage. Governments accepting the Standard are requested to indicate and justify the requirements in force in their country.

Contaminants

- **Heavy Metals**

  HQCF shall be free from heavy metals in amounts which may represent a hazard to human health.

- **Pesticide Residues**

  Wheat flour shall comply with those maximum residue limits established by the Codex Alimentarius Commission for this commodity.

- **Mycotoxins**

  Wheat flour shall comply with those maximum mycotoxin limits established by the Codex Alimentarius Commission for this commodity.

Hygiene

It is recommended that the product covered by the provisions of this standard be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice - General Principles of Food Hygiene (CAC/RCP 1-1969, Rev. 2-1985, Codex Alimentarius Volume 1B) and other Codes of Practice recommended by the Codex Alimentarius Commission which are relevant to this product.

To the extent possible in good manufacturing practice, the product shall be free from objectionable matter.

When tested by appropriate methods of sampling and examination, the product:

- Shall be free from microorganisms in amounts which may represent a hazard to health;
- Shall be free from parasites which may represent a hazard to health; and
- Shall not contain any substance originating from microorganisms in amounts which may represent a hazard to health.

Packaging

HQCF shall be packaged in containers which will safeguard the hygienic, nutritional, technological and organoleptic qualities of the product.

They should not impart any toxic substance or undesirable odour or flavour to the product. When the product is packaged in sacks, these must be clean, sturdy and strongly sewn or sealed.

Name of the Product

The name of the product to be shown on the label shall be "High Quality Cassava Flour."

Labelling of Non-Retail Containers

Information for non-retail containers shall either be given on the container or in accompanying documents, except that the name of the product, lot identification and the name and address of the manufacturer or packer shall appear on the container. However, lot identification and the name and address of the manufacturer or packer may be replaced by an identification mark, provided that such a mark is clearly identifiable with the accompanying documents.

Table 12: Quality Specifications for HQCF

FACTOR/DESCRIPTION	LIMITS	METHOD OF ANALYSIS
Ash	Buyer Preference	AOAC 923.03 ISO 2171:1980 ICC Method No. 104/1 (1990)
Acidity	Not more than 50 mg of potassium hydroxide shall be required to neutralize the free fatty acids in 100 grammes flour on a dry matter basis	AOAC 939.05
Particle size (granularity) fine flour	98% or more of flour shall pass through a 212 micron (No. 70 sieve)	AOAC 965.22

Source: Sanni et al. (2006)

Appendix 4: List of Nicapma Members as of September 2010

S/N	Organisation/ Plant	Products	Installed Capacity	No. Of Flash Dryers	Location	Status
1.	Widow Mites				Akwa Ibom State	
2.	Rose Endeavours				Ahoada, Rivers	
3.	Micmakin Nig. Ltd	HQCF	4	2	Akure, Ondo State	Functional & not in operation
4.	Ore Irele Oil Palm	HQCF	2	1	Ore, Ondo State	Moribond
5.	Ogenyi Nig. Ltd	HQCF	4	2	Abakaliki, Ebonyi State	Functional & not in operation
6.	Imo State Polytechnic	HQCF	2	1	Owerri, Imo State	Functional & in operation
7.	Oyebola Farms Ltd	HQCF & Garri	2	1	Ondo State	Functional & not in operation
8.	Hepsibah Farms	HQCF, Garri & Starch	2	1	Irrua – Edo State	moribund
9.	Santa Maria Nig. Ltd.	HQCF, Chips & Starch	4	2	Benin – Edo State	Functional not in operation
10.	Edeawor Farms	HQCF, Chips & Starch	2	1	Edo state	Functional & in operation
11.	Gowin Wowo	Garri & Starch	2	1	Warri – Delta State	Functional & not in operation
12.	Winosa pares	HQCF & Starch	2	1	Agbor – Delta State	Functional & in operation
13.	UIDC Project	HQCF & Starch	2	1	Ugheli – Delta State	Functional not in operation
14.	De-ladder Nig Ltd.	HQCF	4	2	Benin – Edo State	Moribond
15.	IITA CEDP/CMD Project	HQCF	4	2	Onne – Rivers State	Functional not in operation
16.	IITA CEDP/CMD Project	HQCF	2	1	Umuahia – Abia State	Functional not in operation
17.	IITA CEDP/CMD Project	HQCF	2	1	Umudike – Abia State	Functional not in operation
18.	IITA CEDP/CMD Project	HQCF	4	2	Abak – Akwa Ibom State	Functional not in operation
19.	IITA CEDP/CMD Project	HQCF	2	1	Eket – Akwa Ibom State	Functional not in operation
20.	IITA CEDP/CMD Project	HQCF	2	1	Obudu – Cross Rivers State	Functional not in operation
21.	IITA CEDP/CMD Project	HQCF	2	1	Ahaoda – Rivers State	Functional not in operation
22.	IITA CEDP/CMD Project	HQCF	2	1	Owo – Ondo State	Functional not in operation
23.	University Of Nigeria.	HQCF	2	1	Nsuka, Enugu-State	Functional not in operation

Appendix 5: Report of PIND Cassava Value Chain Assessment Validation Workshop

Held on the 20th of July 2011 at Cyprian Hotel Warri.

Workshop Objectives

- To provide participants with PIND's findings related to the value chain study
- To give participants an opportunity to discuss the findings
- Participants will assist PIND by contributing to PIND's intervention designs

Session 1: Presentation of finding and value chain Map (facilitated by Daniel)

Issues Arising	Comments
Research Methodology	• Rivers and Bayelsa states not included in research. KI conducted in Rivers at NDDC. • Agreement reached that research reflective of entire Niger Delta Region
Pricing and Collection of cassava roots	• I wheelbarrow(100kg) =N1500 10 wheelbarrows/ 1 pickup (1 mt) =N15,000 • Factory gate of cassava roots : N14-N16k • 3mt of roots costs N30,000 to transport from EDO to Ondo state where the largest processor is located in the Niger Delta • Nigeria flour mills remain the only mill purchasing HQCF at the rate N80, 000-N85000 /t. However, cost of production too high for processors to manufacture make profit hence most small to medium processors have abandoned the production of HQCF. • Nigerian Starch Mills with large farms in the Niger Delta continues to source roots from other parts of the country- Benue, Nassarawa and Kogi states. Potential in ND to explore. • Industries buying all varieties of cassava roots. Anything called cassava roots is bought by the industries irrespective of variety in order to meet their installed capacity.
Processing of Odourless fufu	• Cassava contains 75% of water. Has to dry to about 10%. Cassava that is more than two years is mostly chaff. • As a result, flash dryer is required to reduce water content to the barest minimum. • No additives to produce (100% natural)

Session 2: Discussion on Constraints (facilitated by Ganiat)

Objectives of the Session

To present and validate identified constraints and generate ideas/support for addressing the constraints.

Producers

1. Out grower schemes structure available between farmers and ADPs but not functioning.

2. Need for training/capacity building/Mechanization: Use of chemical sprays/sprayers including liquid fertilizers (Folia fertilizer) should be encouraged. Need to pass information on and processors to help farmers in this regard. Herbicides (contact and systemic herbicides) 3 Litres needed/HA/N4600.

3. Funding for producers is a major constraint: Efforts have been made in past for example formation of co-operatives, but these haven't worked. Suggestion that funding go through community leaders however need for checks and balances. Farmers' loan fund needed.

4. Constraint of perception: Change of orientation and attitude towards farming should be encouraged. There needs to be a shift from farming been seen as solely a heritage to farming as a profitable business to be ventured into.

5. Inadequate and quality extension services: There is growing need to use and engage private sector extension services.

6. Tractor services: Ineffective tractor hiring has hindered production as farmers cannot afford tractors. Private sector needs to provide tractors. However fragmentation of land due to land tenure systems hinders access to land by large machinery. Formation of co-operatives who can acquire large portions of land should be encouraged.

8. High cost of transportation of farm produce: There is need for good roads, fuel and private sector engagement. Marketing agencies to be engaged to mop up produce from farmers, then industries contacted to collect.

9. Low adoption rate of improved varieties of cassava as farmers' mix of different varieties: Each cassava genotype should be planted separately and contract / growing schemes should be encouraged where farmers are actually contracted to grow specific varieties.

Processors

1. Inadequate training of technicians.

2. Semi-processing/ wet cake: This may not be feasible as some processors won't necessarily buy wet cakes. However with good arrangements put in place in communities, processors and producers can liaise and standards set for local processing units. However, all stakeholders such as the government, end users need to agree on such arrangement.

Marketers

1. Promotion of products through effective adverts (private sector can be engaged).

2. Village heads, churches, social centres, schools, co-operatives, use of text messages to pass information.

3. Cassava growers association can help disperse information and address price differentials.

Session 3: Discussion of Strategies/Interventions to Address Constraints (facilitated by Andy and Ganiat)

Producers		
Constraints	**Interventions**	**Activities**
1. Low productivity per hectare	• To promote the use of high yielding varieties/ fertilizers /inputs • Partnerships with private extension service suppliers • Improve the distribution system of fertilizers/inputs	• Improve extension services- Work with ADP, extension services to train farmers (TOT) • Improve supply of improved varieties • Improve planting/ farm management techniques: Inter cropping of cassava with cover crops (low growing crops). Issues may arise with is so perhaps plant these crops after harvesting to replenish land • Make available inputs like fertilizer offpeak so farmers can store and use during farming season. This can be achieved through warehousing of by private agencies but requires FG engagement • Identify cooperatives for extension and training.
2. High Transportation costs	• Advocate with government and private sector participants to construct feeder roads • Promotion of wet cake/ semi processing at the village level	• Facilitate private transporters to purchase vehicles to convey cassava from farms. • Formation of assembly points /clusters where farmers gather produce to central location for onward transmission to processors • Organize farmers' co-ops who should advocate for feeder roads. • Identify communities with high yield and use of mobile graters and peelers at farm level to reduce bulkiness. Such graters peel a ton/hr

Processors		
Constraints	**Interventions**	**Activities**
1. Inability to receive cassava from producers within 24hrs due to - high labour costs incurred during harvesting - Transportation costs	• Transport arrangements with private sector. Strengthen linkages between processors-transporters-producers through contractual agreements • Promote outgrowers schemes • Use of appropriate technologies.	• Promote contractual agreements • Promote use of mobile graters and cassava lifters to reduce harvesting time. Improved harvesting technologies.

2. Inaccessibility of markets due to infrastructure and equipment and finance.	• Advocacy with relevant authorities on infrastructure • Promote promotion of quality and standard products.	• Strengthen capacity of processors to produce quality products • Provision of enabling environment. • Develop linkages with international markets and collaborate with domestic banks to provide finance.
Marketers		
1. Weak Market information	No specific information as time allotted for session had elapsed	

Lessons Learned from Workshop

- Use of appropriate examples in explaining the value chain should be taken into consideration.
- Group dynamics to avoid hijack by a few persons.