Economic Development for Peace and Stability in Plateau State, Nigeria

Promotion of Potato Value Chains in Nigeria

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1. Acronyms

AFAN	All Farmers Association of Nigeria
ASTC	Agricultural Services and Training Centre
ATA	Agricultural Transformation Agenda
ATP	Agriculture Transformation Programme
BDSP	Business Development Service Provider
BMO	Business Membership Organization
CIP	International Potato Centre
CF	Commercial Farmer
ECOWAS	Economic Community of West African States
EoPSD	Employment Oriented Private Sector Development
FCT	Federal Capital Teritory
FMARD	Federal Ministry of Agriculture and Rural Development
FSS2020	Financial System Strategy 2020
GES	Growth Enhancement Scheme
GFP	German Food Paertnership
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GSM	Global System for Mobile Telecommunication
IFS	Instrument For Stability
IITA	International Institute of Tropical Agriculture
L.G.A	Local Government Area
LRED	Local and Regional Economic Development
LSF	Large Scale Farmer
MANR	Ministry of Agriculture and Natural Resources
MSF	Medium Scale Farmer
MSMEs	Micro, Small and Medium Enterprises
NAFDAC	National Agency for Food and Drugs Administrion and Control
NGO	Non-Governmental Organization
NRCRI	National Root Crops Research Institute
PADP	Plateau Agricultural Development Programme
PFA	Potato Farmers Association
PIA	Potatoe Initative Africa

PRC	Potato Research Centre
PSD	Private Sector Development
SEDIN	Pro-poor growth and promotion of employment (SEDIN) programme
SHF	Small Holder Farmer
SON	Standards Organisation of Nigeria
SWOT	Strengths, Weaknesses, Opportunities and Threats

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2. About the funding project

The project 'Economic Development for Peace and Stability in Plateau State' is closely linked to and implemented together with **the GIZ-SEDIN Programme** which has been operating in Plateau since April 2011 and a predecessor programme since 2009, both promoting micro, small, and medium enterprises (MSMEs). Both are implemented jointly by the **Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH**. Due to this linkage, it is possible to have synergy and leverage effects of implemented activities. Complementary is also given with the P**otato Initiative Africa (PIA), a project of the German Food Partnership (GFP)**.

The project is funded through the **'Instrument for Stability (IfS)'** fund by the **European Union**. Furthermore the project collaborates with two NGOs, **Apurimac** and **Search for Common Ground**, which are implementing the other two **IfS**-funded projects in Plateau State.

The **overall objective** of the project is to contribute to the reduction of conflicts and improved peace and stability in Plateau State through employment creation and increased income.

Implementation Area: Selected Local Government Areas (LGAs) in Plateau State, specifically Jos North, Jos South, Jos East, Bassa, Riyom, Barkin Ladi, Bokkos, Kanke, Mangu, Langtang North, Langtang South and Wase.

Target groups and beneficiaries

Due to the variety of activities the project has various **target groups and beneficiaries**. Under the first pillar, MSMEs as well as MFBs are targeted; the final beneficiaries would be those MSMEs that are able to improve their financial situation. The second pillar works with NGOs and lobby groups as well as (potential) business start-ups and MSMEs, with a specific focus on the youth and on women. The third pillar deals with the private sector (MSMEs) as well as the public sector (local governments) on the local level aiming at improving the conditions for businesses in the selected areas. Lastly, the fourth pillar targets participants of the selected value chain, the producers as well the processors who are at the same time the final beneficiaries.

3. Executive Summary

Compared to a country like Kenya where the potato subsector is of high importance as a staple food and contributes to national food security the potato sector in Nigeria is only of marginal relevance for overall food safety in the country. Among the major staple crops such as cassava, yam and sweet potato harvest volumes of Irish potatoes hardly represent 1 % of the total annual output of all staple crops in Nigeria. Moreover Nigerians pay more for potatoes than for any other staple crops. Because efficiency of potato production is very low tubers cost up to 30-40 % more than cassava or yam .These facts help to explain why the Nigerian potato sub-sector is still underdeveloped marking one of the lowest yields in the world and with added value processing activities almost absent. Interest on federal institutional level to invest in the sub-sector has been limited so far; efforts have mainly been made on state level especially in Plateau state where potato production is omnipresent and therefore significantly contributes to economic growth and the improvement of the welfare of poor households. Despite all existing challenges encouraging signals arise from the demand side.

Although Nigerians still don't need potatoes (because cheaper substitutes are abundantly available) they increasingly want them. Overall consumption of potatoes is said to be on the rise since a couple of years and now should have passed the bar of 1 Mio. tons in 2012

This situation opens up new market opportunities for potato growers and to their trading and processing partners in the value chain. However there still exist numerous challenges that hinder the value chain actors to fully exploit the full potential. Main challenges and opportunities at production level are as follows:

- Late Blight is widespread and an important disease contributing to low yields, high harvest losses and poor quality of farm saved seeds
- Limited production, distribution and use of clean seeds and suitable varieties
- Insufficient crop rotation and common practice of intercropping (e.g. with maize)
- Improper application of best agricultural practices,
- Low level of mechanization as most small-scale farmers cannot afford mechanization
- Pre- and post-harvest management problems
- Limited number of and inappropriate storage facilities
- Absence of functioning umbrella organizations of farmer groups on LGA and State level
- Poor infrastructure increases the marketing costs
- Limited access to finance at affordable interest rates

In total 8 existing and 6 prospective processors have been identified. All existing companies together can process a maximum of 100 tons of potatoes per month. Because some processors have suspended production due to lack of capital, low demand or absence of suitable varieties only 60% of the potential capacity are used at present stage. This fact demonstrates that the processing has a very limited scale and is still at an infant stage. On the flipside it becomes evident that there is an immense untapped potential for processors to cater the ever increasing demand for processed potato products in Nigeria.

For their predominantly small scale production Nigerian processors currently use less complex technology to process and pack chips or crisps. Findings show that both existing

and prospective processors unanimously consider the following to be the major impediment for sustainable growth of the industry:

Lack of suitable potato varieties for processing into chips and crisps

Small and medium scale processors also face significant challenges with regards to financing of machinery and equipment.

In order to increase productivity, improve pre- and post-harvest management and develop an overall competitive potato value chain interventions in the following areas should be envisaged by the relevant stakeholders:

- Supply of high quality seeds suitable for research on varieties, local multiplication and different usages such as fresh markets and processing
- Technologies for seed multiplication
- Improvement of value chain financing
- Machinery and equipment for processing industry on small and large scale levels
- Improvement of pre- and post-harvest management
- Efficient linkages between farmers, processors and retailers
- Capacity building in areas along the value chain such as crop management, logistics, transport, processing, marketing and retailing

4. Introduction

The GIZ “Pro-poor Growth and Promotion of Employment in Nigeria (SEDIN)” is mandated by the European Union to implement in collaboration with two national NGOs the “Economic Development for Peace and Stability in Plateau State” measure. The project is funded through the European Union Fund ‘Instrument for Stability (IFS)’ which has been established as a mechanism to support conflict prevention, crisis management and peace building.

Among other activities the project supports potato farmers in training them on best agricultural practices to achieve substantially higher yields and income. Income increase is also intended by the establishment of storage facilities for conservation of ware potatoes and seeds.

In the context of growing production there is need to improve farmer-market linkages and to explore the potential for entering into partnerships with off-takers such as processors or retailers. In order to obtain a comprehensive overview on the players involved in potato processing and retailing; to better know their challenges as well as to identify market opportunities a market study has been conducted.

A study team of two consultants first identified and then interviewed potato processors, wholesalers and retailers at the following locations within Nigeria: Maikatako, Daffo, Mangu, Jos, Ampang-West, Lagos, Kano, Ibadon, Abuja, Portharcourt and Abeokuta.

Whereas the principal aim of the report is to shed light on the processing and retail sector it is also aimed at providing an update on the status quo of potato production.

Finally the report addresses all relevant stakeholders involved in the promotion of the Nigerian Irish potato value chain. The information provided in this paper should be used to design activities aimed at creating a vibrant, profitable and sustainable potato subsector in Nigeria.

5. The Nigerian Economy

In April 2014 Nigeria saw its Gross Domestic Product (GDP) rebased for the first time in 24 years. With a new GDP of US$ 509.0 billion Nigeria has surpassed South-Africa to become Africa's largest economy and the 25th largest economy in the world. This fact makes Nigeria even more attractive for foreign investments. However, the economic potentials still remain capped by weak institutions, security challenges and a huge infrastructural deficit. The table below presents key figures on Nigeria for the years 2012 and 2013.

Nigeria Key Figures 2012/2013	
Population	168.8 million (2012)
Land area	91 million hectare
Agricultural land	71 million hectare
GDP in USD	509.9 billion (2013)
Real GDP growth	7.4 % in 2013, 6.7 in 2012, 5.1 in 2011
Sectors in % of GDP	Agriculture 22%, Industry 26%, Services 52%
Labor Force	52 million (2012)
GDP per capita in USD	3035 (2013)
Inflation	8.5 % (2013)

Sources: World Bank |Central Bank of Nigeria| National Bureau of statistics Nigeria| FAO

6. Institutions Involved in the Nigerian Potato Sector

Besides the main actors such as input suppliers, farmers, traders, processors and retailers involved in the production and trade along the value chain various institutional players are currently involved in the Nigerian potato value chain. Most important actors are shown in the figure below in the boxes surrounded with a dotted line:

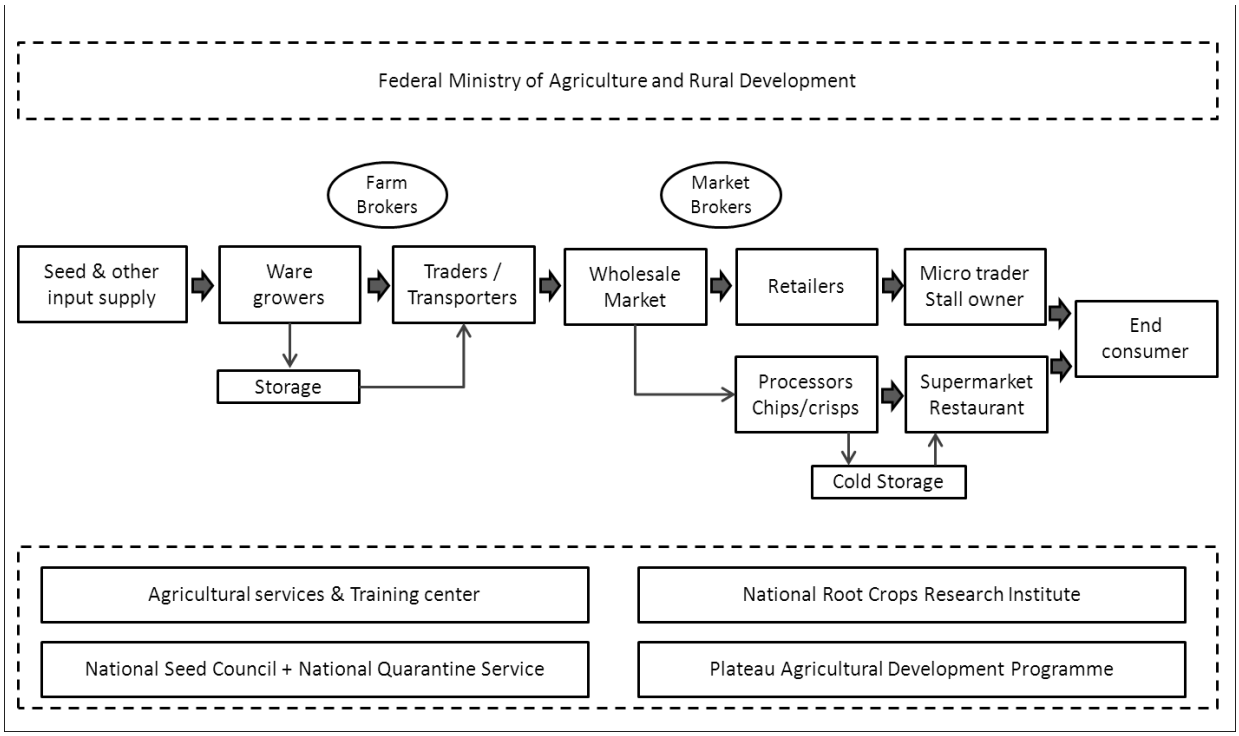

Figure 1: Potato Value Chain, main actors and institutional players

The Federal Ministry of Agriculture and Rural Development (FMARD) formulates the national policy and strategy for the agricultural sector in Nigeria. In 2011 the ministry adopted the Agricultural Transformation Agenda (ATA) that is aimed at revamping the Nigerian Agricultural sector. While the root tubers Cassava and Yam have always been part of the ministries transformation plans a national strategy for Irish potatoes was only adopted in 2013. This fact leads to the assumption that the ministry's level of interest in the promotion of the potatoes sector is rather limited. Faced with this hypothesis the ministry deplores its restricted possibilities of support to the sector and has to admit that the department in charge of Irish potatoes is currently under-staffed and lacks adequate capital funding. Thus, government interventions are cut back at the moment.

The National Root Crops Research Institute (NRCRI) and the **Potato Research Centre (PRC)** operate under the supervision of the FMARD and are located in Umudiek in South-East Nigeria and in Plateau state respectively. Both institutions dedicate their efforts to potato research and breeding programmes, potato seeds multiplication, training of farmers and the promotion of best practices in potato production technologies. Due to insufficient funding the researchers are continuously facing significant challenges in the execution of their mission. Particularly the necessary pest and disease controls in the cultivation areas cannot be conducted to a satisfactorily extent. Despite all limitations NRCRI-PRC successfully manages to build and maintain strong linkages with international potato research centers such as the International Potato Center (CIP) or the International Institute

for Tropical Agriculture (IITA). At the time this report is written the research institute is about to import new seed varieties donated from a European seed producer. The seeds' suitability for large scale introduction in Nigeria shall be tested.

In May 2008 the **Agricultural Services and Training Centers** (ASTCs) were established based on a joint venture agreement between the Plateau State Government and SEC Equipment & Communications (Nigeria) Ltd[1]. So far three centers in the senatorial districts Mangu, Kassa/Vom and Shendam have started operations. Potato farmers that frequent the centers can benefit from capacity building workshops, provision of extension services and farm inputs such as tractors, seedlings and harvesters among others. Particularly the availability of tractors has become crucial for farmers planting the new imported seeds. Only the use of tractors enables the farmers to respect the use of best agricultural practices and to plant seeds in a depth that is required in order to generate higher yields. At the moment ASTC disposes of more than 250 tractors. However, during the last planting period in 2013 ASTC faced significant challenges in satisfying all requests for tractors in due time because of a shortage in tractor drivers.

The **Plateau Agricultural Development Progamme** started as a pilot project in 1977 before it was deployed state wide in 1987. Similar to the set of interventions carried out by ASTC the PAD programme is mandated to offer training for farmers, provide extension services and promote best agricultural practices. Overall the scope and quality of extension and advisory services offered is inadequate. Currently the programme employs 96 extension officers that should cater 6 Local Government Areas. Knowing that there are about 260,000 potato farm families in the six LGAs the ratio extension agent (EA) to Farm family (FF) equals about 1 to 2700. This is very low when compared to 1:1,200 for Indonesia, 1:1,000 for Tanzania or China where there is one extension worker per 280 farm families.

The **Nigeria Agricultural Quarantine Service (NAQS)**[2] and the **National Agricultural Seeds Council (NASC)** both are solicited when it comes to the import and introduction of new potato seeds. Whereas the NAQS's main objective is to prevent the introduction, establishment and spread of exotics pests and diseases the NASC is mandated to oversee the production and standardization of seeds and to monitor that seeds are accessible and affordable for farmers. NAQS and NASC both face notable challenges in terms of receiving sufficient funding, correct allocation of funds and capacity of staff. As a consequence dealing with both organizations in the process of import and introduction of new seed varieties often represents a significant administrative bottleneck that can cause considerable delays.

All in all it must be noted that the institutional environment in the Nigerian Irish potato sector is not conducive. Governmental institutions lack pertinent capacity and sufficient funding in order to efficiently promote sustainable growth of the sector. However the inclusion of Irish potatoes in the Agricultural Transformation Agenda suggests that the government is committed to improve the present situation.

[1] http://www.plateaustate.gov.ng/

[2] http://www.nigeriatradehub.gov.ng/Organisations/ViewOrganisation.aspx?AgencyId=10

7. Ware potato production

Supply and demand

Statistical Data on Nigerian agriculture and especially Irish potatoes is scarce, sometimes contradictory and not always reliable. This fact makes it difficult to present a serious estimate on harvested and marketed potatoes. The table below draws on data published by FAO, by the National Root Crop Research Institute (NRCRI) and by a Nigerian consulting firm named Smal-Konsult.

Parameters	FAO Official Data[3] **(2008)**	NRCRI Estimate **(2010)**	Smal-Konsult Estimate **(2012)**
Land area cultivated	263,000 ha	295,000 ha	300,000 ha
Annual Production	1,105,000 tons	1,475,000 metric tons	1,500,000 tons
Average yield per ha	4.2 tons	5 tons	5 tons
Potato consumption in Nigeria	502,000 tons	1,030,000 tons	1,175,000 tons
Annual consumption per capita	3.3 kg	6.5 kg	7kg
Total import (ware, seeds and processed potatoes)	40,000 tons	60,000 tons	No data available
Total export	No data available	30,000	No data available

Figure 2: Key figures on Nigerian potato production and consumption

For 2008 the FAO counted an annual production of 1.1 million tons on an area of roughly 260,600 ha resulting in an average yield of 4.2 tons. Then within 4 years' time this modest yield increased slightly to reach 5 tons per hectare in 2012 which remains one of lowest yields on Irish potato plantation worldwide. The major reason for such a low output is the scarcity of certified sees. Because clean seeds are not available most of the potato plants under smallholder production potentially carry diseases. The result is lower yields averaging only 5 tons per hectare instead of 20 tons that could be achieved by progressive farmers.

The table also reveals that annual consumption per capita of Irish potatoes has more than doubled between 2008 and 2012. Today, most of the potatoes marketed are consumed as fresh potatoes by end-consumers. However, in Nigeria like in many other developing countries, a change in demand patterns can be observed. Consumer demand is shifting from fresh tubers to processed products and ever greater quantities of potatoes are being

[3] http://www.fao.org/potato-2008/en/world/africa.html

processed to meet rising demand for convenience food and snacks. The major drivers behind this trend include expanding urban populations (Nigeria is one of the most heavily urbanized countries in the West-African region), rising incomes, diversification of diets, and lifestyles that leave less time for preparing the fresh product for consumption.

The local fresh potato markets including retail shops are the main destination of the production. Only a minor part of the production goes into potato processing, although future trends show an increased demand for processed products.

With regards to imports estimates published by NRCRI in 2010 indicate that Nigeria is a net importer of potatoes and imported 60,000 tons in 2010; exports totaled 30,000 tons that same year. However imports are minor and mainly take place in off-season due to a lack of storage capacities. It must be stressed that both the export and import data collected by FAO and NRCRI do not match official figures circulated by the Nigerian customs service (NCS). FAO and NRCRI calculated their figures based on estimations received from brokers and traders in local markets. This procedure allows for integration of cross border trade with neighboring countries that is often not recorded by NCS. For 2013 NCS counted 3,700 tons of imported potatoes which seems to be far below actual trade volumes. Fresh and frozen potatoes as well as seeds are mainly imported from: Belgium, Netherlands, United Kingdom and South Africa.

Cultivation and yield

Compared to the major crops cassava, yam and sweet potatoes the cultivation of Irish potatoes only plays a tangential role in Nigerian national food and nutritional security. In 2012 the annual production of Irish potatoes represented 1.15 % of the total output of root and tuber crops in Nigeria (FAOSTAT). To date, Irish potatoes are grown by some 400,000 farmers on about 300,000ha. Around 90% of the production is done by small scale farmers that own less than 1 ha of land and carry out their operations manually with traditional farms tools like hoses and machetes. Main reasons for this low mechanization rate are the high costs of renting coupled with the fact that the machines are not readily available.

Average yield for smallholder potato farmers is very low and ranges from 4 to 6 tons/ha. Even though yields have slightly increased in recent years, through training of famers and the import of improved seeds, they represent only 20% of what could potentially be achieved on the cultivated areas in Plateau state. In general the application of good agricultural practices remains suboptimal. Especially the use of tractors for soil preparation, planting, ridging and harvesting is very limited among the majority of the farmers which leads to reduced efficiency and lower yields. Farmers barely keep written records of production and marketing practices and tend to ignore market signals for better quality potatoes. As a result, good crop management, involving the appropriate and efficient use of inputs, such as good-quality seed, is seldom practiced.

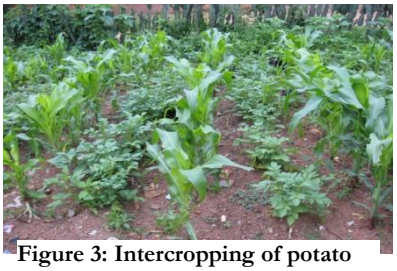

Figure 3: Intercropping of potato and maize

Ignoring recommendations that the practice of intercropping spurs the challenges in seed quality management over 90% of all farmers intercrop potatoes and maize as shown with the picture on the right.

Virtually all potato production occurs under rain-fed conditions. The crop is generally planted during the rainy season that lasts from April to August. In average the harvesting is done 3 month later and can drag on until November for the last potatoes that were planted in late August. Planting of potatoes under irrigation, which can be done at any time, normally takes place from October through January with harvest in February, March and April.

Geographical Scope of production

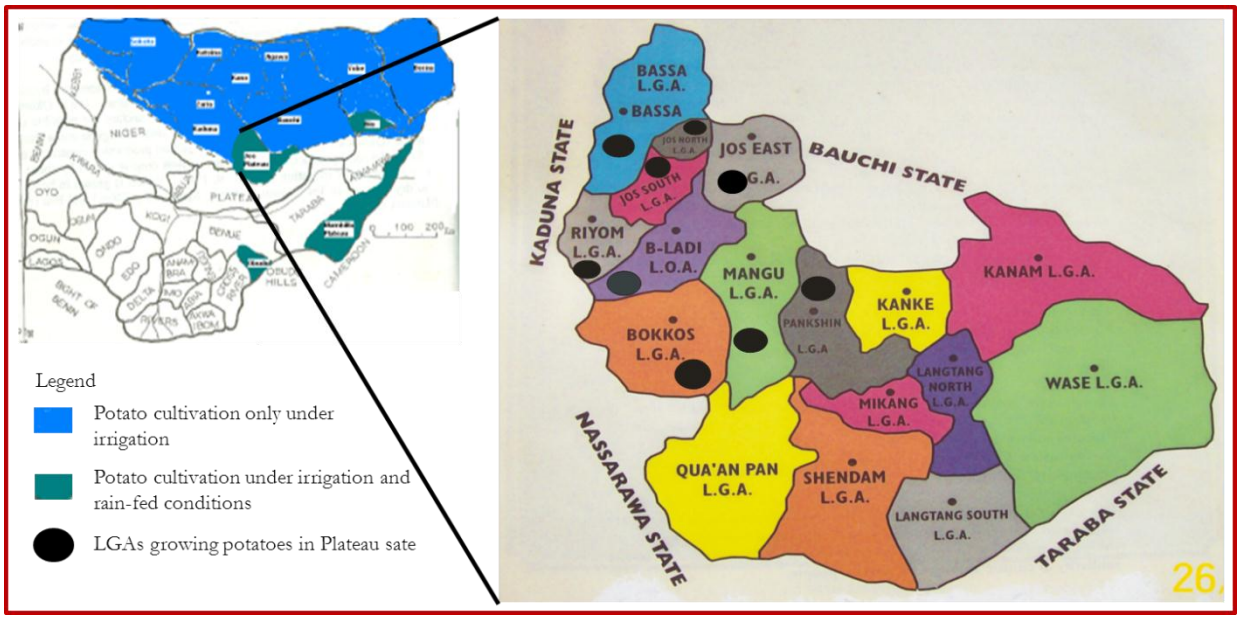

Figure 4: Irish potato production areas in Nigeria (left) and Plateau state (right)

In Nigeria potatoes are grown in 10 states located in the northern and extreme east parts of the country. The largest part of the cultivated area is only arable under irrigation because of low precipitations throughout the year. The most favorable conditions for potato production in Nigeria are found in areas with yearly rainfall between 1,000 mm to 1,400 mm. These conditions are met at Jos Plateau in Plateau state, at Biu Plateau in Borno state and at the Mambila Plateau in Taraba State. However more than 90% of all harvested potatoes come from the Jos Plateau that is located at elevations of 1,200m – 1,870 m above sea level. A survey of the Plateau Agricultural subsector showed that Plateau has a sole comparative advantage in the production of Potatoes. Potatoes can be grown in 9 of the 17 Local Government Areas of the State as follows:

Bokkos, Mangu, Barkin Ladi, Riyom, Jos-South, Bassa, Jos-north, Pankshin and Jos-East.

Seed potato production

The limited availability and use of quality (and certified) seed potato is a key impediment to increased productivity in the potato sector in Nigeria. Considering the short crop rotations farmers practice, seed quality is an important factor in improving the sustainability of production. Recent estimations suggest that between 1 and 2 million metric tons of ware potatoes are produced annually. Thus, a quality production of 1,000,000 tons per year would require 165,000 tons of seed potatoes. ASTC even estimates that the demand for improved seeds is about 600,000 – 1,000,000 tons based on feedback received from farmers.

However, the Nigerian potato value chain is faced with an almost complete absence of certified seed producers. Estimations suggest that in 2012 not more than 1 ton of potato seed was produced by local producers. Given the high demand for clean and improved seeds there is a tremendous opportunity for new players to exploit the untapped business potential in this sub-sector. Recent years have seen cautious attempts by some actors to prepare the ground for appropriate seed supply in Nigeria.

In 2011 ASTC imported improved seeds of the varieties Nicola and Diamant from Israel. Unfortunately, the vast majority of the seeds got rotten before they reached the fields because of significant delays in the transportation process. Then, in 2013 three other seed imports were recorded. The Kano based company BICCO AGRO Ltd and Lagos based SLEIMAN and MADI Ltd both brought in 25 tons of seeds each from the Netherlands. Seeds were mainly used for field trial purposes. Some months before the German Food Partnership together with GIZ Nigeria had facilitated the import of 25 tons of Marabel seeds provided by the German seed producing company Europlant. First results after two harvests showed higher yields and greater resistance for the Marabel seeds compared to the local varieties. The next import of new seed varieties for trial purposes by another German seed producer is planned for the third quarter of the year 2014.

Despite these efforts, farmer seed multiplication systems currently dominate the sub-sector. It is assumed that almost all Nigerian potato farmers use farmer's seed, either their own harvest or seed from neighbors. There is no reliable data on the seed renewal rate. However, estimations suggest that over 50% of the farmers never renew their seed.

The problem with this continuous use of farm-saved potatoes as planting material is the build-up of diseases. Virus and bacterial wilt are transmitted through the tubers. Ideally the farmers should renew their seed stock periodically with diseases free seed potatoes from a reliable source.

Main varieties and profitability

Since the potato was introduced in Nigeria in 1920 more than 400 different varieties have been planted and tested. Today there are about 10 varieties in circulation. A recent survey among farmer groups in the main production areas of Plateau state showed that the following four varieties are currently the most popular varieties cultivated.

NICOLA	DIAMANT	YELLOW VARIETY	BATITA
Local variety	Local variety	Local variety	Local variety

Figure 5: Most popular varieties cultivated in Nigeria

It is of utmost importance for potato farmers to wisely choose the right seed variety. Each seed variety owns specific characteristics that need to be assessed carefully before the germs are adopted the first time. In order to maximize the profit from ware potato production an adequate tradeoff has to be found between the varieties' adaptability to the condition of the soil, its vulnerability to diseases, its suitability for storage and its usability for processing. In the case of Nigerian ware potato production to find this tradeoff is even more complicated given the scarcity of clean and diseases free seed varieties.

The four varieties displayed above are characterized by high yields and a relatively short growth period. However they are easily affected by diseases in the given environment. The most serious diseases effecting varieties planted in the Plateau area include late and early blight. Prevailing climate conditions are favorable especially for the development of late blight that particularly occurs during the rainy season. An insufficient and often inappropriate application of pesticides by farmers further fosters the spread of such diseases.

In 2013 imports of 25 tons of the improved variety Marabel – shown on the right- raised hope that there is variety which resists major diseases. So far that hope has only been partially fulfilled. Results after three harvesting periods suggest that although the new variety produces yields up to 20 tons per ha in some areas it is not immune against the pathogens mentioned above.

Figure 6: Marabel, imported variety from Germany

However, farmers that managed to harvest 20 tons of Marabel potatoes per ha saw their profits increasing significantly. The return on cash invested could be multiplied by ten compared to earnings that previously originated from sales of a local variety. The figures presented in the table below illustrate that despite a cost increase of almost 440 % revenues generated from the planting of an improved variety have grown more than nine fold. This sharp rise is due to both, a considerable increase in yield (+570%) and higher market prices (+60%) received for better quality products.

Cost investments	Local variety	Improved variety (Marabel)
Investment expenses[4] (USD	314	314
Operating expenses (USD	473	520
Potato seeds (USD ha)	595[6]	6405
Other inputs, utilities and supply	561	1,321
Total cost of production (USD	1,942	8,560
Yields (tons per ha)	3.5	20
Price (USD per ton)	610	976
Revenue (USD ha)	2,135	19,520
Margins (USD ha)	193	10,960
Return on Cash invested (%)	10%	128%

Table 1: 1 Ha Budget of local variety vs. improved variety

Challenges in potato production

The previous chapter shed light on some existing major bottlenecks that hamper increased productivity in the potato sector in Nigeria; almost absence of clean and certified seeds of suitable varieties, limited institutional backing for the sector, small scale farming, limited mechanization and lack of knowledge about best agricultural practices. Besides this potato farmers also face the following challenges:

Inadequate Transportation infrastructure

Parts of the roads, even major routes, are in such bad condition that because of loss of time and high maintenance and repair costs for the trucks the transport costs are increased by up to 20% in comparison to the situation with good road conditions. Furthermore the high rate of corruption at all governmental institutions leads to additional costs of transport due to the

[4] Include farm land rents and cost for agricultural equipment (hoes, crates, wheel barrow, etc)
[5] Expenses are based on the number of Man-days needed to execute operations such as land preparation, planting, fertilizer and fungicides application, harvesting and transportation
[6] Costs of seeds is put at the average price of ware potato because of widespread use of farm-saved seed
[7] Comprises costs for Manure, fertilizer, fungicides and produce bags.

informal payments needed to pass the various road blocks, for example amounting up to 20 % of the transport costs on the way to Lagos or Port Harcourt.

Lack of proper storage facilities

Figure 7: Round hut for seed storage

In general the storage of potatoes aims at delaying the natural ageing process of the tuber as long as possible and at ensuring the quality of the potato. Often a distinction is made between storage of seeds and ware potatoes. Due to an absence of adequate in-house storage systems storing ware potatoes is very rarely practiced by Nigerian farmers. Nearly all tubers are sold immediately after harvest. Farm saved seed potatoes, however, are often stored on the floors of farm houses and in round huts made out of mud bricks and straw construction as shown on the right. To overcome the lack of adequate storage space the European Union funded the construction of 12 potato storage facilities in Plateau state at the time this report was written. One “diffused-light storage (DLS)” construction allows for storing of up to 20 metric tons of seed or ware potatoes for up to six months. This fact enables farmers to now sell parts of their harvest at higher prices during the off-season when demand for seed and ware potatoes is greatest.

Poor packaging and measurements

Different forms of packaging are presently in use, especially bags of various sizes and material at wholesale and retail level. Measurement in kg is not common at all. Baskets of various sizes are used at retail level at markets. In supermarkets and shops tubers are sold in nets of up to 5 kg and in bulk. At wholesale level it is common to use polypropylene bags with maximum filling volumes of 50 and 100 kg to package potatoes. However maximum filling levels are often not respected and many bags are extended as shown at the picture. In absence of standardized bag sizes traceable and comparable pricing is difficult. As a result farmers make heavy loses again and again. After harvest potatoes are generally first packed by brokers, not by farmers, sorting out rotten potatoes. Because potatoes are packed in extended backs spoilage is increasing since these bags rapture easily during the transport. Usually bags are not opened from the farm gate to the retail level and rotten or damage potatoes are mainly appearing at retail level. Retailers then have to sell these products at significantly lower prices.

Lack of financial resources for short and long-term investment

Most changes needed to improve the value chain, such as storage facilities, purchase of clean seeds, equipment for production and processing, , transport means, etc. require capital investment but most actors in the VC neither have sufficient own means nor the chance to obtain formal credit.

In fact, financial institutions, including Microfinance Banks, Microfinance institutions as well as commercial banks are generally reluctant to lend to the potato sector. This is mainly due to declining productivity, highly fragmented market, poor record keeping, inadequate storage, absence of tangible guarantees and meager value addition infrastructure. Adding to this the sector is poorly linked and lowly integrated. Also, it has to be

mentioned that, for a long time, many financial institutions used to lack the expertise to adequately understand and address the issues involved in financing of agricultural value chains. This situation, however, has improved in the recent past as some commercial banks such as Fidelity, Keystone and Diamond Bank started to set up dedicated agricultural departments. These units are equipped with skilled personnel who are increasingly able to structure innovative financing and risk mitigation products for various actors of the agribusiness value chains.

8. Potato processing – sector overview

In general potato tubers can be processed in many different ways and forms. Starting with the more traditional ones, fresh potatoes are baked, boiled or fried and used in a staggering range of recipes as for example: mashed potatoes, potato cake, potato soup or potato salad. Technically more advanced potato processing with higher added-values creates products that are described below and grouped by food and non-food uses

Food uses: Fresh, Frozen or dehydrated

Potato crisps, French fries (fresh or frozen), potato dice, dehydrated potato flakes (used in retail mashed potato products and as ingredients in snacks), potato flour (used to bind meat mixtures and thicken gravies) and potato starch (fine, tasteless powder with higher viscosity than wheat or maize starch; used as thickener for sauces and stews and binding agent in cake mixes, biscuits and ice cream.)

Non-food uses: Glue, Animal Feed and Fuel Grade Ethanol

Potato starch is used by the pharmaceutical, textile and paper industry as an adhesive, binder or texture agent. It can substitute polystyrene and other plastics and used for example in disposable plates, dishes and knives. In addition potato peel with high starch content can be liquefied and fermented to produce fuel-grade ethanol. In many countries tubers are also used as farm animal feed.

Demand for processed products

Consumer demand is shifting from fresh tubers to processed products and ever greater quantities of potatoes are being processed to meet rising demand for convenience food and snacks. The major drivers behind this trend include expanding urban populations (Nigeria is one of the most heavily urbanized countries in the West-African region), rising incomes, diversification of diets, and lifestyles that leave less time for preparing the fresh product for consumption. The formalization of businesses from kiosk to supermarket and the increasing number of fast food restaurants also contributes to higher demand for factory made French fries. French fries and potato crisps are the most popular processed potato products that are consumed in Nigeria. Especially potato crisps are gaining in popularity among kids and youth.

While demand for fresh potatoes in Nigeria has been largely met locally, the demand for processed potato products has so far been supplied mainly through imports. With regards to French fries it is assumed that the major part of all restaurants and hotels process their own French fries and only a minor part get fresh or frozen products from processors on a daily basis.

The processing industry

Overview

Estimations suggest that only a small part of less than 1 % of all harvest potatoes in Nigeria is processed in potato crisps or French fries by local processors. Thus, the industrial use of potato has not been fully exploited and owns tremendous potential when compared to Germany for instance where about 40% of all harvested potatoes undergo value-add

processes. In Nigeria most of processed crisps are imported from the EU, South Africa, Israel, India, UK and the USA.

The study tour[8] revealed that there are a least 8 existing/visible and 6 prospective processors in Nigeria. The graphic below gives an overview on their respective locations and (planned) scale of production.

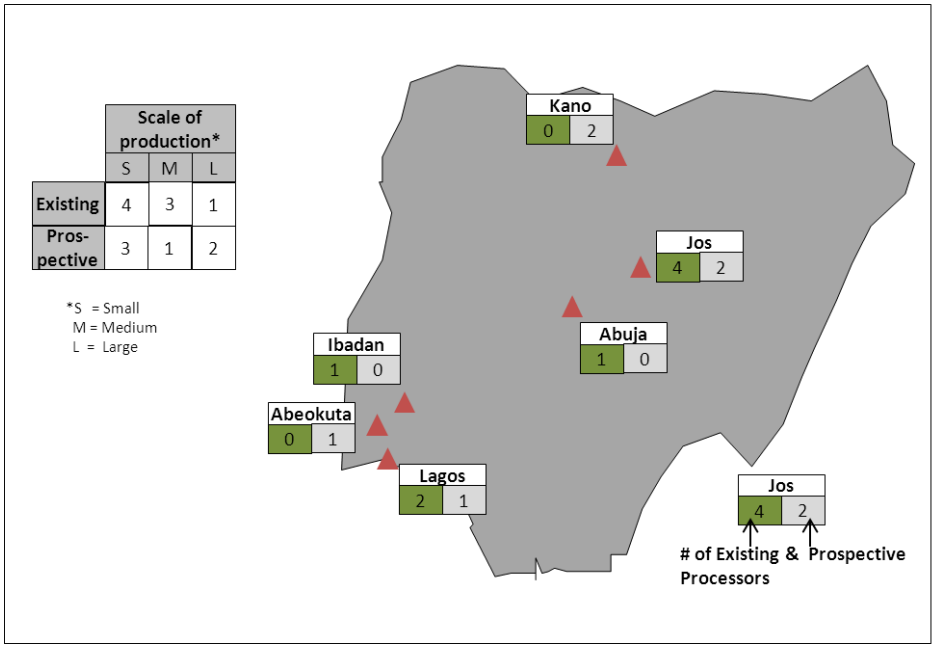

Figure 8: Map of Nigeria with locations and number of existing and prospective processors; their location and scale

[9]

The map shows that half of all existing and two third of all prospective processors are located in the northern parts of the country, in or close to Plateau State. Processing in proximity to the country's major cultivation area grants these companies a more convenient and cheaper access to supply sources of potato tubers. Overall it has to be mentioned that existing production facilities use less complex technologies and are rather of small or medium scale. Given the small number of processors, the limited scale of production as well as the minor capital investments in machinery and equipment one can conclude that the sub-sector is still at an infant stage.

Existing processors

The following table provides key information on all existing and visible processors that have been identified by the study team. A more detailed overview is given in Annex II to this report.

[8] In addition to the six cities mentioned in the graphic Port Harcourt was also visited but neither an existing nor a prospective processor could be identified

[9] Categories of scale of production are defined by the monthly production capacity as follows: small = < 10 tons/month, medium = 10 – 20 tons/month, large = > 20 tons/month

Company (Location)	Year of Establishment	Type of End Product	Max. production capacity/ month (#of employees)	Raw material	Remarks on Sourcing	Remarks
MAPA Industries Ltd "PIPO Chips" (Ibadan)	2010	**Crisps** (30g pack @ 50N in 2 flavors)	15 tons (20)	**Potato granules and starch**	Import from China and India	Face difficulties with sales and urgently searching for convenient market outlet
APFM and Company Ltd. "Harbin's Chips" (Lagos)	2013	**Crisps** (40g pack at @100N)	4 tons (12)	Nicola potato	Buy from wholesalers in Lagos and Bida	Produce only on orders and supply to Lagos; purchase potatoes at very high cost of N230/kg
Jogindah Nigeria Ltd. "Monties Potato Chips" (Jos)	2009	**Crisps** (30g packs @ 100N in 3 flavors)	10 tons (30)	Nicola potato	Buy from collection markets in Plateau State	Has run out of capital and suspended production
Fruits and Veggies Global Nigeria Ltd. "Fruits and Veggies Chips" (Jos)	2010	**Frozen potato chips** (French fries, whole, sliced, diced, wedges)	20 tons (30)	Nicola, Marabel and Diamant potato	Own potato production and collection markets in Plateau	Imported and planted 12tons of Marabel variety in 2013; produces and processes broad range of mixed vegetables (onions, carrots, broccoli,etc.)
Lomic Enterprises. Nigeria. "Lovely Potato Crisps" (Jos)	2009	**Crisps** (33g and 130g packs)	2 tons (10)	Diamant and Nicola potato	Collection market in Plateau state	Not yet registered with NAFDAC[10], uses simple and inefficient production machinery (bread slicer) to cut potatoes, also deals in wedding and children wares
Dangi Foods Ltd.[11] "Dangi Potato Chips" (Abuja)	2012	**Frozen potato chips** (French Fries)	30 tons (not available)	Nicola	Buy from collection markets in Plateau State	So far only in 2013 a small quantity of products has been produced and sold ; since then production has stopped; cannot source needed varieties in Nigeria
Aarvee Investment Nig. Ltd. "Popcy Potato Crisps" (Lagos)	2012	**Crisps** (33g packs @N50 in 2 flavors)	15 tons (20)	**Potato granules and starch**	Import from China and India	Core business is production of flavored drinks and corn crisps; ventured in potato crisps only recently;
Jos Masterminds ltd. "Master Chips" (Jos)	2014	**Crisps** (40g packs)	<5 tons (9)	Nicola	Buy from collection markets in Plateau state	Currently in test phase; purchase & installation of machinery for roll-out is on-going, production start in Q3 2014

Table 2: Overview of identified existing Irish potato processors in Nigeria

[10] NAFDAC = National Agency for Food and Drugs Administrion and Control
[11] All information gathered is from secondary sources as Dangi Management was not available for any interview with the study team

Given the information above the 10 major findings come as follows:

- Nigerian processors **produce either Crisps or Chips** but no other potato derivatives such as starch or granules
- **Crisps are** the **preferred** end-product by Nigerian potato processors as 6 out of the 8 focus on crisps fabrication;
- Only companies that **also sell other products** than potato derivatives manage **to sustain** continuous **production**; to solely rely on potato processing seems to be a challenging undertaking
- **83%** of currently produced **crisps** are **made out of granules and starch** (the calculation does not include companies that are in pre-production phase or have suspended production)
- In the **south** (Ibadan, Lagos), where costs of Nigerian ware potatoes are high (>200N/kg[12]), **processors** mainly **use imported granules** and **starch** to produce crisps
- In the **north** (Plateau state), where cost of ware potatoes are much lower (~N100/kg), **crisps production** is almost **absent** (only Lomic enterprise produces 2tons/month)
- Given the fact that Dangi Foods has suspended production there is **only 1 company** that currently **produces potato chips** on medium scale in Nigeria : Fruits and Veggies.
- **None of the** processors has been operating for more than 5 years and together they all own a **max. production capacity of about 100 tons/month**
- **Nicola, Diamant and Marabel** are the varieties presently used to produce chips and crisps in Nigeria
- **No contract farming** is exercised by Nigerian processors and only one company grows its own potatoes (Fruits and Veggies)

Prospective processors

During the cause of the study tour six prospective processors were identified. In this paper the term “prospective” refers to existing companies which do not yet produce potatoes derivatives but plan to do so in the future. Analyzing the information given in the table below it turns out that there are two companies intending to start a large scale processing operation in Plateau state, Hamtul Investment Ltd and AlanRessler Ltd. If both corporations manage to further capitalize on achievements made recently and in tandem with Dangi Foods back on track after production stop, there could soon be three processors of significant size capable of giving the sub-sector a decisive impetus. Besides these two promising projects four other companies also plan to venture into potato processing but on small and medium scale levels as outlined in the table below.

[12] Also refer to the table in Annex II for purchasing prices of processors

Company name	Location of company	Planned Scale of prod-uction	% of Process completion on way to existing processor	Remarks
Hamtul Investments Ltd	Kwal in Bassa LGA (Plateau State)	Large	**80%** (End of implement phase)	Existing company currently involved in seed multiplication on a 3 ha land at Kwal in Bassa LGA (Plateau State). Claim to have acquired all necessary machinery for processing and now await installation.
AlanRessler Ltd	Barkin Ladi LGA, Plateau State	Large	**50 %** (Start implementat ion)	Recently founded company; main activity shall be production of French fries out of locally sourced potatoes; no production plant on ground yet but publicly announced the investment in a EUR 2 Mio. cold storage facility from a Dutch company and in mechanized farming machineries worth EUR 1,2 Mio.; Facing challenges with land acquisition to build factory
Rehoboth Ventures	Lagos	Small	**10%** (Doing feasibility study)	About to conduct a feasibility study on chips and crisps production.
Dala Food Nigeria Ltd.	Kano	Medium	**5%** (Idea in mind)	Currently involved in blending, processing, packaging and marketing of Tea, Grains, Cereals and Herbs. They do contract manufacturing and dispose of a solid sales structure with partners in Abuja, Ibadan, Kano, Sokoto and Maiduguri.
ABRAH food chain	Kano	Small	**5%** (Idea in mind)	Currently involved in small scale seed production and planning to venture into potato processing
Mrs. Yemi Ogunbiyi (Sweet Potato Chips)	Abeokuta (Ogun State)	Small	**5%** (Idea in mind)	Currently producing crisps out of sweet potato, plantain and cacao; wants to diversify into Irish potato processing but lacks capital to invest in machinery

Table 3: Overview of identified prospective Irish potato processors in Nigeria

Major challenges

As highlighted before industrial processing in Nigeria seems to be a challenging undertaking in terms of setting up a continuous and profitable production. In fact, the findings of the study tour suggest that for both prospective and existing processors, the two **major impediments** to growth are **capital resources and access to finance**. This is not a coincidence, if one considers that the processing chain is the most demanding chain as far as value chain financing is concerned. Processors have to invest in the plant and equipment and also invest in securing quality raw materials to guarantee smooth operations of their processes. Because investments are often significant in size and equity capital of many processors is limited financial institution are approached to bridge the gap. Nigerian banks, however, are (still) reluctant to finance agro businesses for various reasons that have been mentioned in section 4.6. In cases banks do issue credits, they often either charge a significant markup or require guarantees of up to 100% of the loan amount in order to take into account the

increased risk. Thus, high costs of credit end and exigent eligibility criteria are two of the main reasons why processors struggle to acquire external financing.

In addition to finance related challenges that almost all companies are facing, the majority of processors interviewed see themselves confronted with the following constraints:

- Absence of potato varieties suitable for processing; existing varieties (Nicola and Diamant) are degenerated as well as infected by diseases and therefore inappropriate for processing into crisps or chips
- Lack of continuous high quality supplies especially in the off-season mainly because appropriate storage facilities are not available
- Exiting packaging material is expensive, not always available and of minor quality; to print branded and marketable packages is also very costly
- Poor power infrastructure and epileptic power supply leads to increasing use of diesel generator which increases costs of operations
- Relatively high costs of raw potatoes coupled with high cost of operations, marketing and transportation (because of bad rural road infrastructure) result in high prices charged for end products and decrease competiveness
- Stiff competition from imported brands of chips and crisps; major competitors are Lays, McCain and Pringles
- Lack of commercialization and professional, reliable market linkages

Challenges that cannot be generalized but are rather specific to individual companies interviewed are listed in the table of Annex II.

9. Wholesale markets and retail value chain

Wholesale markets

Nigerian potato wholesaler are mostly merchants/dealers who normally come from the major cities or use their agents to organize bulk procurements for onward distribution through supplies/export or sale to retailers for onward retail marketing.

Primary wholesale markets are found near the main harvesting areas in Plateau state and major secondary collection markets are located in the large urban areas such as Abuja, Lagos, Port Harcourt, Ibadan, Kano, Sokoto, Maiduguri and Jos. The two major primary collection markets in Plateau state are Maikatako and Bokkos together are handling over 50% of total potatoes traded on wholesale level. The table below compares the turnover (estimated figures) of the major primary collection markets in Plateau state for the years 2012 and 2014. Projections for 2014 were made after about 75% of the peak season harvest had been brought in. Findings show that the turnover in 2014 is likely to drop significantly by almost 50%. This is mainly due to the outbreak of the “potato late blight diseases” in almost all the potato producing LGAs especially Bokkos and Mangu (the two leading potato producing LGAs in Nigeria).

Collection Markets in Plateau State	Turnover in tons		2012 turnover	2014 turnover projected	Change in %
	Peak season	Off-season	Total	Total	
Maikatako, Bokkos LGA	33,600	11,400	45,000	19,540	- 57%
Bokkos, Bokkos LGA	27,720	12,600	40,320	17,943	- 55%
Daffo, Bokkos LGA	15,960	2,700	18,660	11,970	- 36%
Mangu, Mangu LGA	16,200	5,760	21,960	13,725	- 37%
Ampang – West, Mangu LGA	19,440	10,080	29,520	18,150	- 38%
Total	**112,920**	**42,450**	**155,460**	**70,263**	**- 48%**

Table 4: Estimated turnover of Plateau state collection markets for 2012 and 2014

Many primary as well as secondary collection markets require physical improvements. Often market places handle far more tons of produce per year than their capacity would allow for. This situation has resulted in high congestion and an overflow into surrounding areas causing very poor hygienic conditions. In addition the poor maintenance of many markets and improper handling of produce has resulted in high marketing losses. Pictures below show Maikatako market located in Plateau state.

Picture 2: Maikatako collection market

Picture 1: Maikatako collection market

More details on wholesalers, their challenges and recommendation can be found in Annex III. Annex V contains more pictures of Maikatako, Bokkos Collection Markets.

Retailers

Urban Retail sector

In the 1980s and 1990s Nigeria decided to attract foreign direct investments into the country. Attractive investment incentives such as full capital mobility/repatriation were provided and enabling policies like foreign exchange liberalization and independent monetary policy have been established. As a result more and more foreign retail chains have penetrated into major Nigerian cities over the past years. Their penetration enabled the formal retails sector to expand very rapidly with strong growth in value sales. Leaders of this expansion drive include Shoprite, Africa's biggest retailer, Spar, Europe's largest retail network, and Massmart, South Africa's second –largest retailer. Shoprite opened its tenths shop by the end of January 2014 with many more underway. According to Whitey Basson, Shoprite's CEO, the retail chain plans to increase the number of stores in the country by 25 by the end of 2015.

The entrance of international players in the formal retails sector is gradually creating a new business paradigm in Nigeria. Prior to now, informal markets were predominant in the country, with a bargaining culture determining prices. Nowadays these new retail outlets are changing the face of retailing.

Supermarkets' Role in Potato Retailing

Up to now supermarkets have not played an important role in the distribution of potato and potato derivatives. Estimations suggest that more than 90% of fresh products such as potatoes are sold in open air markets and kiosks, only a minor part of less than 5 % is channeled through supermarkets[13]. Adding to that the vast majority of ware potatoes, crisps and chips sold in supermarkets are imported from Europe or South Africa, whereas sales volumes of locally sourced tubers and processed products are negligible. This underrepresentation, however, is likely to change in the near future.

[13] Annex IV lists some major retail outlets that have been identified during the study tour.

Supermarkets are currently exploring the potential of sourcing more ware potatoes locally and to establish long-term linkages with preferred suppliers. Large modern food retail chains such as Shoprite tend to move to contracts with these preferred suppliers instead of relying on spot market transactions. Additionally supermarkets are interested in getting potatoes in high quality, big sizes and with a long shelf life since losses of up to 25% of the produce occur in the shop in the display shelves through rotting or greening.

During the course of the study tour and facilitated by GIZ contacts have been established between farmer groups from Plateau state and the two supermarkets Spar (Park'n'Shop) and Shoprite. Both retailers expressed interest in sourcing fresh ware potatoes of new Marabel variety in bulk as wells as packed in nets. Purchase agents of both markets confirmed that Marabel potatoes are as good as imported tubers in terms of tuber size, quality and characteristics such as long shelf life. Knowing that Shoprite currently imports about 20 tons and Spar about 10 tons of ware potatoes per month farmers are given the opportunity to deliver up to 30 tons of Marabel potatoes per month at present stage.

Without doubt this initiative is a promising starting point in establishing long term relationships between Nigerian potato farmer groups and two of the major retailer in the country.

Sales Price Dynamics

Sales prices of ware potatoes in Nigeria show significant fluctuations depending on market location and type of distribution channel (either retail or wholesale). This fact suggests that the market is not very competitive.

The graphic below shows the sales prices per kg of locally grown potatoes (Nicola variety) for the major cities in Nigeria and for the most important collection markets in Plateau State. Furthermore the figure highlights the sales price per kg of potatoes imported by Shoprite. All amounts represent a four month average comprising the period from Mai to August 2014.

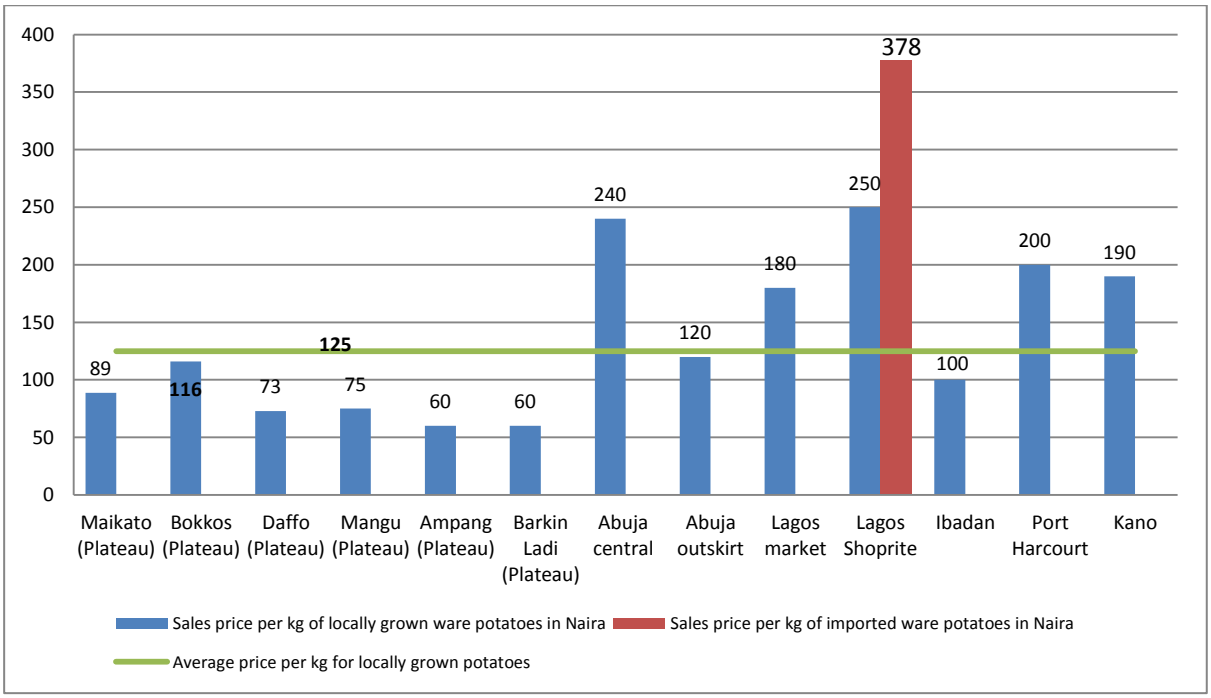

Figure 9: 4-month average sales prices of potatoes for various market places in Nigeria

It can be observed that the average sales price of locally grown ware potatoes is N 125 for the respective period. All prices below the green average line where obtained at wholesale markets and prices above at retail markets. Considering markets in Plateau it becomes obvious that the two major markets Maikato and Bokkos feature higher amounts than the rest. Higher prices can be explained by higher demands and better quality products found at Maikato and Bokkos market.

With exception of Ibadan cities in the South (Lagos and Port Harcourt) as well as Abuja center and Kano show significantly higher prices that range between N180 and N250. High costs of transportation (because of long distances and bad roads), considerable mark ups for brokers and high living costs in Abuja Centre and Kano are main reasons for such sudden price increases. With regards to Shoprite in Lagos retail prices of imported ware potatoes are higher by more than 50% compared to tubers produced locally. The imported ware potatoes are however larger in size and of better quality especially for processing.

Locally produced French fries cost less by 50% compared to imported products. However, imported brands are still of higher quality than the ones fabricated locally. The same applies for potato crisps where local products cost in average only half as much as imported derivatives as illustrated in the graphic below.

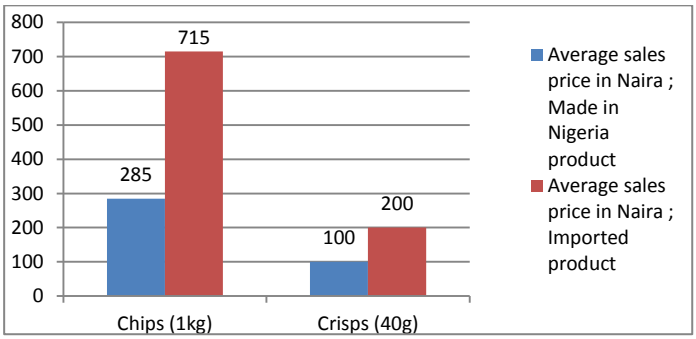

Figure 10: Average sales prices for crisps and chips in 2014

10. Conclusion and recommendations

Conclusion

Compared to a country like Kenya where the potato subsector is of high importance as a staple food and contributes to national food security the potato sector in Nigeria is only of marginal relevance for overall food safety in the country. Among the major staple crops such as cassava, yam and sweet potato harvest volumes of Irish potatoes hardly represent 1 % of the total annual output of all staple crops in Nigeria. Moreover Nigerians pay more for potatoes than for any other staple crops. Because efficiency of potato production is very low tubers cost up to 30-40 % more than cassava or yam .These facts help to explain why the Nigerian potato sub-sector is still underdeveloped marking one of the lowest yields in the world and with added value processing activities almost absent. Interest on federal institutional level to invest in the sub-sector has been limited so far; efforts have mainly been made on state level especially in Plateau state where potato production is omnipresent and therefore significantly contributes to economic growth and the improvement of the welfare of poor households. Despite all existing challenges encouraging signals arise from the demand side.

Although Nigerians still don't need potatoes (because cheaper substitutes are abundantly available) they increasingly want them. Overall consumption of potatoes is said to be on the rise since a couple of years and now should have passed the bar of 1 Mio. tons in 2012. In fact growth in urban populations, rising incomes and dietary diversification have led to rapidly increasing demand for potatoes from the fresh market, fast food, snack and convenience food industries. This situation opens up new market opportunities for potato growers and to their trading and processing partners in the value chain. In order to tap such potential one can conclude that the subsector has to overcome numerous challenges, including:

- Low yields, high incidence of disease and lack of suitable varieties
- Limited production, distribution and use of clean seeds and suitable varieties
- Insufficient crop rotation and common practice of intercropping (e.g. with maize)
- Improper application of best agricultural practices, ineffective and inappropriate diseases control; even recently imported clean seeds have been affected by late blight disease
- Insufficient number of well qualified extension workers
- Low level of mechanization and misallocation and non-use of available equipment; e.g. ASTC owns numerous tractors but lacks trained drivers
- Pre- and post-harvest management problems (harvesting of immature tubers, poor handling of tubers, inappropriate packaging ,inefficient marketing practices)
- Limited number of and inappropriate storage facilities
- Absence of functioning umbrella organizations of farmer groups on LGA and State level
- Not conducive institutional environment with governmental institutions that lack pertinent capacity and sufficient funding
- Low added value and limited agribusiness activities since the processing industry is still in infant stage
- Lack of continuous high quality supplies for processing industry
- Access to finance

The study tour particularly aimed at uncovering players and current developments in the processing chain of the potato sector. In total 8 existing and 6 prospective processors have been identified. All existing companies together can process a maximum of 100 tons of potatoes per month. Because some processors have suspended production due to lack of capital, low demand or absence of suitable varieties only 60% of the potential capacity are used at present stage. This fact demonstrates that the processing has a very limited scale and is still at an infant stage. On the flipside it becomes evident that there is an immense untapped potential for processors to cater the ever increasing demand for processed potato products in Nigeria.

For their predominantly small scale production Nigerian processors currently use less complex technology to process and pack chips or crisps. Among the existing processors only one is currently producing French Fries and over 80% of all crisps manufactured are made out of imported granules and starch. Furthermore findings show that both existing and prospective processors unanimously consider the following to be the major impediment for sustainable growth of the industry:

Lack of suitable potato varieties for processing into chips and crisps

Small and medium scale processors also face significant challenges with regards to financing of machinery and equipment. One can conclude that in order to develop and sustainably grow the processing industry all stakeholders involved urgently need to find lasting solutions to the two pressing issues mentioned above.

Recommendations

The development of a vibrant, profitable and sustainable potato subsector in Nigeria depends on measures to overcome a number of persistent constraints that have been outlined throughout the report. In order to increase productivity, improve pre- and post-harvest management and develop an overall competitive potato value chain one could opt for the following activities:

Functioning seed potato sub-sector

- Clean seeds of suitable varieties for processing need to be imported and multiplied locally to reduce cost price and to make it affordable for growers and processors
- Further encourage stakeholder dialogues on seed import with the aim of authorization of direct imports from Germany for testing and commercial purposes
- Facilitate cooperation between German seed companies and Nigerian public and private partners for multiplication of registered varieties
- Conduct cost-benefit analysis for various seed potato multiplication options and prospective joint-ventures; e.g. partnership with companies interested in venturing into seed multiplication
- Strengthen the Potato Research Centre in terms of technical capacity and funding in order to spurs local research on suitable varieties; the center should collaborate more closely with ASTC and IITA
- Improve seed potato distribution network

Crop protection and disease management

Again in 2014 yields will drop by estimated 50 % due to the outbreak of the late blight disease in almost all potato producing LGAs. Effective crop and disease management is therefore critical in order to increase yield and effectively deal with constraints such as seed quality, fertilizing and spraying. It is recommended

- To support larges and small-scale farmers in improving cropping and appropriate application of fertilizer and pesticides
- To conduct soil analyses in selected areas as a basis for fertilizer application
- Companies such as Syngenta or Bayer could partner with farmers on crop protection and management services;

Enhancement of mechanization

- Existing machineries for ware potato production such as tractors owned by ASTC should be made available more effectively to smallholder farmers
- Evaluate mechanization options for smallholder farmers, taking into account that the size of machineries supplied for potato growing should be geared to local needs
- There is opportunities for german machinery and equipment supplier to partner with local agricultural machinery manufactures or with farmers/ farmer groups

Improvement in processing industry

- Given the tremendous demand for processed products and the limited scale of present production more investors should encouraged to venture into processing
- Conduct a cost-benefit analyses for local processing on small, medium and large scale level targeted towards both farmers intending to do forward integration and investors interested in funding processing plant(s)
- Support small- and medium scale processors in establishing business relationships with reliable raw material suppliers that continuously deliver suitable varieties
- Initiate stakeholder discussions also involving financial institutions with aim of finding realistic and feasible solutions to pressing issues related to value chain finance
- Facilitate cooperation between German companies providing processing technologies for production of crisps, frozen and fresh chips; pilot processing plants for both small and large scale processing
- Encourage the potato processors to form an Association of Potato Processors of Nigeria which can serve as a platform to benefit from Government programmes and other common interest activities

Efficient linkages between farmers, processors and retailers

- Support farmers in marketing activities; assist in developing and strengthening of existing linkages and continue to facilitate new business linkages with existing and prospective retail chains as well as processors
- Facilitate establishment of functioning farmer groups umbrella associations on LGA and state level with the aim to improve bargaining positions in negations with suppliers and off-takers
- Evaluate the opportunities and challenges of contract farming from the farmer and off-taker perspective

Storage facilities

- Assist farmer groups in managing fair usage and proper repayment of newly build diffused-light storage; Closely monitor and evaluate the success of the facilities and possibly upscale construction
- Support interested VC actors in determine investments in (cold) storage to store fresh potatoes
- Conduct profitability analysis of storage facilities and develop a profitable business case with the aim to attract local or international investors

Extension services

- PADP and the Potato Research Centre should be strengthened to provide adequate extention services to the farmers to enable them adhare strictly to best practices for optimum yields as size and quality of ware potatoes is of essence at the marketing/processing chains

Strengthening the institutional environment

- Plateau state government is recommended to pay special attention to the development of the Value Chain – a Technical Committee should be constituted.The recent decision by the Federal Ministry of Agriculture and Rural Developments declared by the minister at the recent potato stakeholders forum held in Jos, in May, 2014 to include potatoes in the list of Value Chains to be promoted under the ATA is commendable and should be sustained to promote the sector

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12. Annex

Annex I Potato Value Chain Supporters

Annex II Summary of Outcome of Survey- Processors

Annex III Summary of Outcome of Survey- Wholesalers

Annex IV Summary of Outcome of Survey- Retailers

Annex V Pictures of Bokkos and Maikatako Markets in Bokkos LGA

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