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# Taking Local Business to Global Market: The Case for Nigerian Cassava Processing Industry

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**Abstract**
*Nigeria remains the second largest economy in Africa and the 22nd largest in the world with Gross Domestic Product (GDP) of $1.105 trillion on an annual growth rate of 5% as at 2015. To maintain the position, Nigeria must accelerate her industrial productivity by building new links with the rest of the global economy. Considering the global event in recent times, Nigeria needs to diversify her economy from resource-based to a knowledge-based and innovation-driven one. The cassava processing industry is one of the sectors in the Nigerian economy that can advance such competition. Since the 1980s, Nigeria has remained the global leader in cassava production with an annual production of 45 million metric tonnes. However, the utilization of cassava has largely explored traditional technologies for processing of its roots into human food such as garri, fufu, and flour. Through the application of science, technology and innovation (STI), Nigeria's cassava processing industry can create substantial new business opportunities that can prominently position Nigeria in the global market. This paper therefore examines some potential paths that are useful indicators of how Nigeria's economic growth and social progress may unfold through the productivity of the industry. The review concludes that cassava needs to be upgraded into primary industries such as starch, ethanol, chips, and flour in order to provide a strong industrial base for further diversification of the Nigerian economy. The paper recommends, among others, that government should develop a comprehensive programme that involves agribusiness strengthening, external collaborations, promotions as well as provision of technical and commercial assistance, such as export logistics with a view to fast-tracking and sustaining competitiveness of the cassava industry in the global market.*

**Key words:** Cassava Processing, Competition, Global Market, Technologies, Innovation

## 1.0 Introduction

The level of a nation's commitment to global production and trade competition is a plausible evidence of its development. Most important has been the totality of STI activities in such economy which includes scientific and technological research, experimental development, scientific and technological services, innovation and diffusion (Ilori, Adeniyi, Oyewale, Sanni, & Irefin, 2002; Ilori, 2006). The International Monetary Fund (IMF) has listed Nigeria as the world's 22nd largest economy in the world. According to a survey by IMF, with an annual growth rate of 5% during the course of 2015, Nigeria's GDP is set to total $1.105 trillion in 2015 representing a 5% growth from 2015 (IMF, 2016). The growth was recorded despite persistent fall in global crude oil prices by about three quarters over the last year; Nigeria has defied the negative growth that affected several crude oil producing countries. In terms of the growth, Nigeria was also the sixth highest achiever as only China, Indian, Egypt, Pakistan and the Philippines recorded highest GDP growth. The potential to achieve 7.1% annual GDP growth could make Nigeria a top-20 economy in 2030, with GDP of more than $1.6 trillion supported by rapid infrastructural expansion through investment of up to $1.5 trillion (MGI, 2014). To raise incomes and living standards, Nigeria must accelerate her industrial productivity by building new links with the rest of the global economy. The process of globalization has introduced inter-linkages for firms from developing nations to be actively involved in value addition that can transform commodities into semi-processed, intermediate or final products (Adeoti & Adeoti, 2010; Adeoti, Odekunle & Adeyinka, 2010; Dada, 2015). As argued by Siyanbola (2014), Nigeria needs to diversify her economy from resource-based to a knowledge-based and innovation-driven one within a very short time considering global event in recent times. One of the sectors in the Nigerian economy that can help in such transformation is the cassava processing industry. The industry is a major source ensuring food security and increased exports in Nigeria (Dada, Ali, Afolabi & Siyanbola., 2010; Dada, 2014).

The total world cassava utilization is projected to reach 275 million tonnes by 2020 (IFPRI in Westby, 2008) with estimations of the quantity closer to 291 million tonnes (Scott *et al.,* 2000; in Westby, 2008). The Nigerian cassava processing industry is made up of micro/cottage, small and medium-sized enterprises (MSMEs) in *garri*,

 

*fufu*, starch, cassava flour and cassava chips processing. It also includes firms involved in fabrication and sales of cassava processing equipment and machinery. Since the 1980s, Nigeria has remained the global leader in cassava *(Manihot esculenta crantz.)* production with an annual output of 45 million metric tonnes (FAO, 2011, 2013). Dynamic and sustainable approaches to cassava development have remained a great concern to Nigerian government and policy makers (Dada *et al.,* 2010). Moreover, the utilization of cassava has largely explored traditional technologies for processing of its roots into human food such as *garri*, *fufu*, and flour (FAO, 2009; Adebayo *et al.,* 2003a, 2003b; Adebayo, 2009; Dada *et al.,* 2010). The demand for cassava for other products such as starches for the textile, pharmaceutical, pulp and paper, adhesives for packaging industries and flour for bakery and confectionery industries which is more than 40 million tonnes is yet to be explored (RMRDC, 2004; Dada, 2014). Nigeria's cassava processing industry can create substantial new business opportunities that can trigger the growth of the economy thereby bringing Nigeria to the global market arena. Building a manufacturing sector has been a stepping stone in economic development for nations since the Industrial Revolution. Currently, only 10 percent of cassava is processed into flour, sweeteners, and industrial products in Nigeria. Most production is used for human consumption unlike Brazil where 85% of cassava goes to processors and 95% does in Thailand (FAOSTAT, 2012).

Consequently, this paper highlights some potential paths that are useful directional indicators of how Nigeria's economic growth and social progress may unfold through the productivity of the Nigerian cassava processing industry. These indicators are made in the context of Science, technology and innovation (STI) capabilities which are of central importance in almost all economic sectors as they are the key elements in the change of the economic system (Malerba and Nelson, 2011). Such capabilities are required in the Nigerian cassava processing industry to increase the shelf life of cassava products, enhance cassava nutritional values, upgrade cassava traditional food technologies; as well as develop value-added products with export potentials. This could contribute considerably to transforming the Nigerian economy and the attainment of vision 20:2020.

## 2.0 The Nigerian Cassava Industry

Cassava (*Manihot esculenta crantz*) belongs to the family of *Euphorbiaceae.* It is a woody perennial shrub with an edible root, which grows in tropical and sub-tropical regions of the world (FAO, 2008; FAOSTAT, 2010). According to Adepoju and Oyewole (2013), cassava is the fourth most important crop in the world and constitutes a staple food for nearly a billion people, one – eighth of the world population. Cassava root is one of the most common economic and productive root crops in the tropics. It plays an enormous role in providing carbohydrate for human consumption (Ayodele, 2006). Cassava is not native to Africa but was introduced from Latin America in about 16$^{th}$ century where it is still widely cultivated. The importance of cassava is increasing in Africa because of its diverse uses, its tolerance to environmental stresses such as drought, fire, low soil nutrients, and its relatively high productivity where many other crops fail (McCormick & Hubert, 2001).

Cassava root crop (Plate 1) is grown in over 90 countries worldwide. In terms of the total land area cultivated to cassava, 50% is in Africa, 30% in Asia, and the rest in Latin America. FAO estimated the 2007 world output to be 212 million tonnes, 4 million tonnes above the figure in 2006. The world cassava areas, yield and production (1995-2011) is shown in Table 1. There has been a general increase in the production of cassava over time, with fluctuations across countries. Global production has been increasing continuously since 1999. In the early 1960s, Africa accounted for close to 42 percent of world cassava production. By the early 90s, Africa produced almost half of the world cassava output. This increase was attributed to higher production particularly by Nigeria and Ghana which increased production in four fold. Cassava production in Africa reached 25.8 million tonnes in 1990 and increased to 52.3 million tonnes by 2004.

**Plate 1: Cassava Root Crops** **Source:** International Institute for Tropical Agriculture, IITA (2007)

 

Two thirds of regional production is sourced from Nigeria, where 39.3 million tonnes are grown annually, making Nigeria the largest producer of cassava in the world (IITA, 2009; FAO, 2011; Adepoju & Oyewole, 2013). The availability of new Tropical Manioc Selection (TMS) cassava varieties by IITA increased cassava production in Africa by 40% without using any fertilizer. In the mid-1980s, the Nigerian government invested in the diffusion of the improved TMS varieties among the farmers. By the late 1980s, the TMS diffusion in Nigeria had become an Africa's agricultural success story.

**Table 1: The World Cassava Areas Cultivated, Yield and Production (1996-2011)**

| Year | Area (Million ha) | Yield (Tonnes/ha) | Production (Million tonnes) |
|---|---|---|---|
| 1996 | 16.46 | 9.87 | 162.48 |
| 2000 | 17.00 | 10.38 | 176.53 |
| 2005 | 18.42 | 11.18 | 205.89 |
| 2006 | 18.56 | 12.06 | 223.85 |
| 2007 | 18.42 | 12.28 | 226.30 |
| 2008 | 18.39 | 12.62 | 232.14 |
| 2009 | 18.76 | 12.51 | 234.55 |
| 2010 | 18.46 | 12.43 | 229.54 |
| 2011 | 19.64 | 12.84 | 252.20 |

**Source: FAO (2013)**

In 1989, IITA researchers conducting the Collaborative Study of Cassava in Africa (COSCA) found that farmers in 60 percent of the surveyed villages planted the TMS varieties. Figure 1 showed the trend in cassava production, area cultivated and yield (tonnes/hectare) in Nigeria. Nigeria's production of cassava is targeted at 60 million tonnes by the year 2020. Other organizations that had contributed to the development and improvement of cassava in Nigeria include National Root Crops Research Institute (NRCRI), a Federal Government Institute under the Federal Ministry of Agriculture and Water Resources with the main mandate of conducting research into the genetic improvement, production, processing, storage, utilization and marketing of root and tuber crops of economic importance. The Root and Tuber Expansion Programme which is an initiative of the Federal Government of Nigeria, is also involved in promoting accelerated expansion of cassava production in Nigeria. Other key factors that led to the growth of cassava production in Nigeria are the higher consumer demand for cassava foods by rural and urban households which encouraged the farmers to plant more land to cassava (Dada *et al.,* 2010).

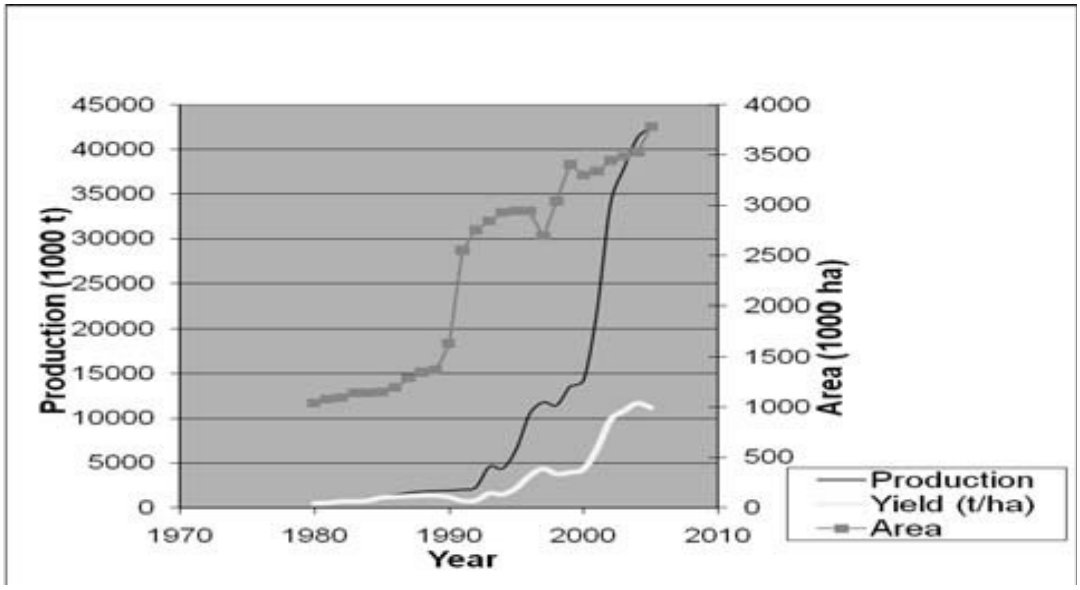


**Figure 1: Trend in Cassava Production, Area Cultivated and Yield (t/ha) in Nigeria**
**Source:** Plotted from FAOSTAT (2008) data

 

## 3.0 Characteristics of the Nigerian Cassava Processing Industry

Cassava is a perishable commodity once harvested with a shelf life of less than three days. This has important implications: marketing systems for cassava fresh roots have to be well integrated with production; it also means that processing is far more important than for other commodities. More than 40% of cassava is currently processed, mainly into traditional food products. Processing provides a means of producing shelf stable products (thereby reducing losses), adding value at a local rural level and reducing the bulk to be marketed.

In order to gain real benefits from using improved technologies in cassava processing industrial sector, effective linkages are essential between processors and markets, however such linkages do not always exist, particularly in remote areas. According to Westby (2008), small and medium scale enterprises (SMEs) can play important roles in the market chains by providing access to capital, processing facilities and commercial transport, relevant manufacturing experience, proven business record, proven record on quality, an understanding of marketing issues, and a willingness to support farmers and processors for mutual gain. Quality standard marks may also be used by enterprises in marketing in order to promote appropriate approaches to quality assurance through ratification of quality standards to protect consumers and assure them of the quality of products.

The key roles of the public sector in supporting activities of the private sector include the documentation and promotion of best practices and approaches to commercialization. The public sector also provides information on post-harvest technologies and how to access such information as well as guidance on the preparation of business plans. Other supports the public sector provides include development of regional and national strategies to commercialise cassava; facilitation of access to technical support for micro, small and medium scale enterprises and equipment manufacturers as well as policy guidance in support of commercialisation. It also supports development and application of food standards for cassava products and marketing strategy. The financial returns on investments in the cassava sub-sector depend on specific product being prepared and the market being accessed. At the simplest level, improvements in fresh cassava marketing systems can increase profits by 16% for certain members of the marketing chain (Manyong *et al.,* 2003).

Losses occur in all operations from harvesting through handling, storage, processing and marketing. They vary according to the influence of factors such as the perishability of the commodity; ambient temperature and relative humidity which determine the natural course of decay; fungal and bacterial decay; damage by pests - insects, rodents and birds; the length of time between harvesting and consumption; and practices of post-harvest handling, storage and processing.

In Nigeria, small-scale farmers have formed associations for processing cassava into flour that is sold to biscuit factories. Others are producing chips for the ethanol factory. Processed cassava products must compete in markets with grain products, so lowering costs of production is essential to its survival as an industrial crop. Developing a strategy that will contribute to food security and socio-economic growth and development would entail the existence of a growing demand (market) for cassava. This can occur when its unique characteristics are exploited in a specific end use market or cassava becomes economically more attractive for a particular use than do competing products. In Nigeria, the private sector does not provide sufficient research funding to overcome market barriers or access new markets. Therefore, the public sector should play a catalytic role in overcoming market-related postharvest problems. The reduction of the cyanide potential in cassava is another example where post-harvest research has had an important effect on food safety and this is particularly important in Nigeria.

Mueller and Jansen (1998) showed that grating and sun drying cassava roots cause substantial losses in total cyanogens and reducing the grate size which leads to more complete hydrolysis of the cyanogenic glucosides into non-glucoside cyanogens if the grates do not dry up too fast. Cassava can be processed into many products of commercial importance. These products can be classified into primary and secondary products (FIIRO, 2008). The primary products are those obtained directly from cassava roots, while the secondary products are obtained by further processing of the products or the bi-products. Some of the primary products include *garri,* cassava starch, detoxified cassava flour, *fufu,* cassava chips, cassava pellet, fermented cassava flour (*Lafun*). Secondary products from cassava include ethanol, cassava noodles, tetracycline, weaning food, glue or adhesive, tapioca, glucose syrup. More than 40% of cassava is currently processed, mainly into traditional food products. Processing provides a means of producing shelf stable products (thereby reducing losses), adding value at a local rural level and reducing the bulk to be marketed. Cassava finds application in a number of industrial products that require science and technology (S&T) applications (Balagopalan, Padmaja, Nanda, Moothy & Akigbo, 1988; Dada *et al*., 2009; Dada *et al.,* 2010; Dada, 2014).

 

## 4.0 Presidential Initiatives on Cassava Utilization in Nigeria

The composite flour programme was initiated by the Food and Agriculture Organization (FAO) of the United Nations in 1964. It was conceived primarily to develop bakery products from locally available crops particularly in those countries which could not meet their wheat requirements. The bakery products obtained from such formulation were of good quality and similar in some of their main characteristics to that of whole wheat flour bread. Since then, efforts have been made in many countries to produce bread by conventional methods from wheat flour to which other flours such as cassava flour were added.

In July 2002, the Presidential Initiatives on Cassava (PIC) under the leadership of President Olusegun Obasanjo was launched in Nigeria as part of elaborate economic reform programmes aimed at promoting the diversification of the foreign exchange earnings for the country (Sanni, 2011; Dada, 2014). The PIC policies encouraged public-private partnership by creating, through well-designed intervention mechanisms, an enabling environment for competitively advantageous industries identified as having the potential for fast growth and demand from export market.

The PIC also aimed to create awareness among farmers about the opportunities that exist in the cassava market through expanded cassava utilization and primary processing (Sanni, 2011). Several 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 youth) into the mainstream of Nigeria's national economic development. Moreover, new market opportunities were identified and developed to stimulate increased private sector investment in the establishment of export oriented cassava industries (FNG & UNIDO, 2006., Knipscheer *et al.,* 2007; Ezedimma *et al.,* 2007).

The specific objectives of the Nigerian Presidential Initiative on Cassava (PIC), which was to be achieved in 2007, included: enhanced productivity and production of cassava by increasing the area cultivated to 5 million hectares with the hope of harvesting 250 million tonnes of fresh cassava tuber annually; production of 37.5 million tonnes of processed cassava products (i.e *garri*, high quality cassava flour, pellets, chips, starch and ethanol) for local and export markets; organization of cassava exportation and provision of cassava products as a revenue-generating project; and earnings of about US$5 billion annually from exporting value-added cassava products.

The awareness created interest and increased investment in the industry by foreign and local investors. During the period, private sector participants established over 500 more processing centres (MPCs) and 100 small and medium scale enterprises (SMEs) for the production of intermediate cassava products. The enterprises provided substantial job opportunities for the young, technicians, professionals and artisans (Sanni *et al.,* 2006). There were investments in new factories for the manufacture of glucose syrup, starch and HQCF. Such factories include Ekha Agro Farms, Ogun State, a glucose syrup factory built in 2007, Dutch Agricultural Development Company Nigeria Limited Benue State, automated High Quality Cassava Flour (HQCF) factory built in 2006 and MATNA Foods, Ondo State a cassava starch factory built in 2005. Furthermore, some companies attempted regional marketing of cassava starch, for instance, MATNA Starch Industry exported cassava starch through Nestle Plc. to Cote d'lvoire.

The Nigerian PIC rested its success more on strong financial support to relevant institutions, most especially the International Institute of Tropical Agriculture (IITA), The National root Crops Research Institute (NRCRI), the Raw Materials Research Development Connect (RMRDC), and the Root & Tuber Expansion Programme (RTEP), towards the achievement of the objective of the initiative. Between 2007 and the present government, PIC has recorded a number of successes under the Federal Ministry of Agriculture and Rural Development (FMARD). The growth in demand activated the industrial scale-up of HQCF and starch processing by about 48 percent (Maziya-Dixon & Onadipe, 2007).

In 2011, President Jonathan launched the Agricultural Transformation Agenda (ATA) in which cassava was paramount, with the goal of adding an additional 20 million metric tonnes of food to the domestic food supply by 2015 and stimulating the creation of 3.5 million jobs along the agricultural value chains (Adesina, 2012). The ATA is focusing on creating value added products from staple crops – through an aggressive import substitution programme and other policy reforms to accelerate food production and agricultural resilience. The primary strategy of the cassava transformation is to turn the cassava sector in Nigeria into a major player in local and international starch, sweeteners, ethanol, HQCF, and dried chips industries by adopting improved production and processing technologies, and organizing producers and processors into efficient value-added chains (Kuye *et al.,*

 

2008; Sanni, 2011; Dada, 2014).

According to Sanni (2011), the Presidential Initiative on Cassava/Cassava Transformation Agenda have 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. In Nigeria, the PIC/CTA have also stimulated an increase in cassava production and processing activities. The promotion of HQCF in the baking and confectionary industries was given further political support to enhance public and industrial acceptance. With strong advocacy at all levels, there was support for processing and export. A policy was promoted to add a percentage of cassava flour to the wheat flour used in bread, to open additional market opportunities for small holder farmers.

A method for producing higher quality cassava flour suitable for baking has also been developed by the IITA. The cassava flour was substituted for wheat flour at 20% to produce good quality bread; it was used at 100% level to produce sausage role, cassava queen cakes, cassava cookies, cassava biscuits (Plate 2.2) (IITA, 2011). The production processes for cassava flour is as shown in Figure 2.4 (Dada *et al.,* 2010). These processes can be grouped into three stages viz: Initial, Intermediate and Final stages.


**Plate 2.2: Various Cassava Food Products**
**Source:** International Institute for Tropical Agriculture, IITA (2011)

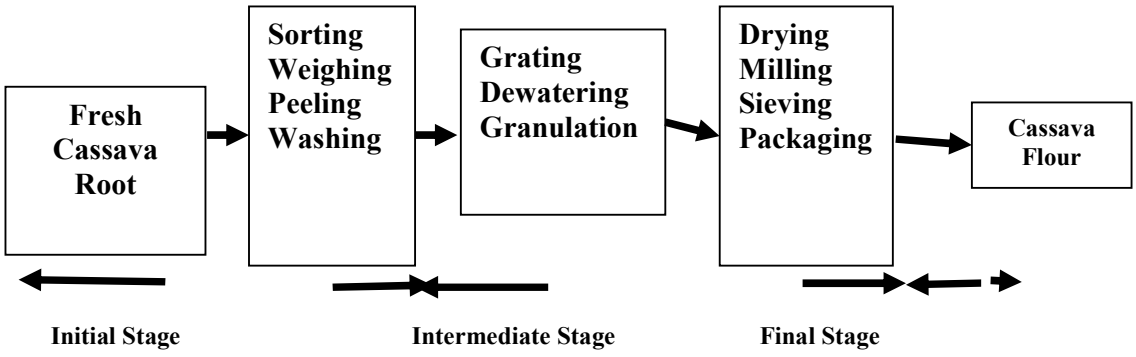


**Figure 2.4: Production Processes/Technology of Cassava Flour**
**Source: Dada *et al.* (2010)**

### 5.0 Cassava Processing Industry: Lessons from Thailand

Cassava is Thailand's second most important crop and third largest agricultural export (FAO, 2009). Thailand has been dominating global cassava trade since the mid-1960s. In 2008 it controlled 90% of cassava starch exports, and 70% of dried cassava exports. Thailand is considered here because the country produced 13% world total cassava (FAO, 2009) coming second after Nigeria that produced 19%. Moreover, in Thailand, cassava is grown as an industrial rather than a staple crop. The Thailand cassava industry is export oriented, with up to two thirds of total production exported in 2008 (TTSA, 2009). It consists of two value chains: the dried cassava and the starch value chain (Figure 2). Thailand's dried cassava exports surged in the mid-1960s, while starch only started in the mid-1980s (TTSA, 2009). The dried cassava value chain has two main products: chips and pellets.

 

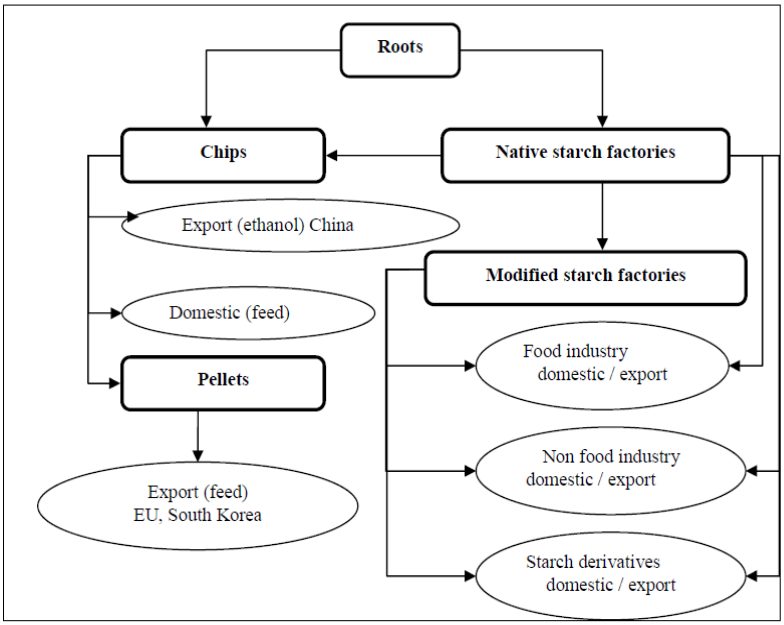


**Figure 2.3: The Thailand Cassava Value Chains**
**Source:** Tijaja (2010)

Chips are sun dried crudely-cut cassava pieces. Pellets are small cigarette-shaped particles made out of chips, which are ground, steamed and moulded. Chips are sold to three market channels (TTSA, 2009). These include the animal feed industry in the domestic market, ethanol producers in China, or as intermediary inputs in pellet production. Pellets are used as animal feed in more developed markets. Pellet production requires more capital and labour than chip's and is done at a much larger scale. The starch value chain also has two main products: native and modified starches. Starches are used in numerous food and non-food industries to produce sweeteners, paper, textile, monosodium glutamate, glue, plywood among others with modified starch feeding into more technology-intensive ones (Carlsson, 2006). Modified starch production involves additional processing of native starch, and is much more capital and technology intensive (Tijaja, 2010).

The Thailand cassava industry benefits from a strong presence of active commodity-specific trade associations and research institutes. Thailand has four official trade associations: the Thai Tapioca Trade Association (TTTA), Thai Tapioca Starch Association (TTSA), Thai Tapioca Products Factory Association (TTPFA), and North Eastern Tapioca Trade Association (NETTA). TTTA, the largest and oldest, is dominated by exporters and larger dried cassava producers, while TTSA represents the starch value chain. The TTPFA and NETTA are both regional based. These trade associations often assist in the promotion and dissemination of new cassava varieties and farmers' trainings. The two largest associations (TTTA and TTSA) actively participate in policy dialogue. They also often organise trade missions and investors' visits either on their own or jointly with the government. Thailand also has a few cassava-dedicated research institutes and work programmes. The Thai Tapioca Development Institute (TTDI) is an independent non-profit organisation, established using the fund from the auction of export quota to the EU. It runs trainings on farm management and technology and closely collaborates with the Kasetsart University in cassava varietal development. The Centro Internacional de Agricultura Tropical (CIAT) works with farmers to promote participatory farming practices. While the Suranaree University of Technology (SUT) researches on yield improvement using alternative inputs e.g. lime scale and starch waste water, and works with cassava processors to distribute these free inputs to the farmers. The promotion of cassava utilisation as animal feed in the domestic market is undertaken by the Suwanvajokkasikit Animal Research and Development Institute (SARDI), part of Kasetsart University. All these initiatives promote the development of cassava production and processing capacity in Thailand. Thailand does not only focus on improving yield and farm productivity but creates market opportunities through cassava products promotion and attracts appropriate investments. The Thailand cassava industry has benefited from favourable agricultural policies. The market-friendly policy has given rise to large agribusinesses, including cassava processors and commodity exporters.

 

The presence of Thailand Chinese entrepreneurs also facilitated the cassava industry development. Many cassava processors and traders are Thailand of Chinese descent. They are highly entrepreneurial and are culturally comfortable in working effectively with the farmers. They provide important market linkages for the farmers through the provision of inputs, business services and market access. The Chinese Diasporas in Thailand are also instrumental in promoting cassava export to China (Yeung, 2000). An understanding of the Chinese business culture and knowledge of a common language generated a sense of kinship that facilitates bilateral trade. The demand for cassava chips by the Chinese markets is another factor that propelled and sustains Thailand's dried cassava industry. China has been importing chips from Thailand since late 1990s but in small volume. China imports chips instead of pellets, using them as ethanol input rather than animal feed. China's imports increased in 2003 due to tariff elimination under the Early Harvest Programme (EHP) of the China-ASEAN Free Trade Agreement. The removal of the 6% import tariff on dried cassava in China boosted the competitiveness of Thailand's (and other ASEAN countries) chips in China. Imports peaked in 2006 at nearly four million tonnes from just 74,000 in 2000. After a slight drop in 2007/2008, it bounced back to three million tonnes in 2009 (FAO, 2009; TTTA, 2009). By 2005, over 90% of Thailand dried cassava exports was in the form of chips. Aside from the temporary reversal in 2008, chips have since become Thailand's dominant dried cassava exports (TTTA, 2009). Thailand starch value chain has also been growing consistently. Starch production is often undertaken by the same large groups that also run pellets production and exports.

Moreover, the China's demand for cassava starch from Thailand has also been increasing. China became Thailand's largest starch market in 2004. Its share in Thai's total starch export has grown from 6 % in 1997 to over 19% in 2008, and the forecast was 26% in 2009 (FAO, 2009). For Nigeria, the prospects of taking the local cassava processing industry to global market in achieving economic growth and development may be learned from the experience of Thailand.

## 6.0 Constraints Facing the Cassava Processing Industry in Nigeria

Cassava is a highly perishable tuber crop and has a storage life of less than three days. Fresh cassava tubers contain about 62 to 65% moisture, hence because of quick spoilage, farmers usually leave the roots in the ground after they have matured and harvest them for processing when required. The cultivation and harvesting of cassava in Nigeria are not mechanized. Consequently, the average yield is low, ranging from 7-10 tonnes per hectare, which is much lower than the world average of 30-40 tonnes per hectare. Moreover, the cost of cassava has been unstable in Nigeria. Increased labour wages for planting, harvesting and transporting of harvested roots to processing plants, as well as unpredictable climatic patterns seem to have affected the price of cassava. Another constraint of utilizing cassava for industrial production is the competition for cassava by man for food and industry.

Preparation of flour is one of the traditional ways of preserving and adding value to cassava tubers in Africa (RTEP, 2001). However, the traditional methods of flour preparation, which results in poor quality flour, thus making it unsuitable as a substitute for wheat flour in bakery products. A combination of increased urbanization, rising incomes, market promotions and specific policy decisions favoured the importation of large amounts of wheat into Nigeria between 1960 and 1987 (Bokanga & Djoussou, 1998).

In 1985, Nigeria was the largest importer of wheat in Africa, with imports totalling US$37 million. This accounted for 2.2% of the nation's foreign exchange earnings (Djoussou & Bokanga 1997). By 1995, the value of wheat and wheat flour imports exceeded US$293 million (FAO, 2004). Between 1987 and 1990 the Federal Government of Nigeria (FGN) banned importation of grain, thus drastically reducing consumption of wheat products. In order to reduce the import bill on wheat, the FGN compelled flour mills to include cassava flour in in all flour produced in Nigeria in the ratio of 90% wheat flour and 10% cassava flour as against the use of 100% whole wheat bread conventionally consumed. The policy was institutionalized in 2004 while its implementation was to commence in January, 2005. Implementation of this policy would require 200,000 tonnes of cassava flour out of which only about 10,000 tonnes can be supplied (Oke, 2005).

In order to gain real benefits from using improved technologies, effective linkages are essential between processors and markets. However, such linkages do not always exist, particularly in remote areas (Dada, 2014).

 

Farmers have not always been able to set up linkages themselves and may need assistance. According to Westby (2008), small and medium scale enterprises (SMEs) can play important roles in market chains by providing access to capital, processing facilities and commercial transport, relevant manufacturing experience, proven business record, proven record on quality, an understanding of marketing issues, and a willingness to support farmers and processors for mutual gain. Quality standard marks may also be used by enterprises in marketing in order to promote appropriate approaches to quality assurance through ratification of quality standards to protect consumers and assure them of the quality of products.

Most post-harvest handling, processing and marketing systems in Nigeria also operate at a primary level and present few opportunities for farmers, processors and traders. Post-harvest handling of cassava is the largest constraint to increasing cassava production in Nigeria. Most often, post-harvest losses are a symptom rather than the problem. Knowledge of the root- cause is, therefore, essential for deciding measures to prevent them. Such measures may have to be taken by the small farmer, the private trader, a cooperative, the marketing board or other operator, handlers and transporters, wholesale and retail markets among others.

The International Food Policy Research Institute (2010) identified four major trends within the global food system that are making post-harvest activities increasingly important in terms of economic returns and nutrition. Urbanization, changes in the agricultural sector, market liberalization and shifting market options as well as improvements in infrastructure and communications were identified as areas of impact that justify increased funding for post-harvest research and development. The rapid rate of urbanization, particularly in developing countries, is causing major changes in the food system. As people live farther away from where food is prepared, they rely increasingly on rapid reliable transport, storage, processing, and marketing systems to give them access to a secure food supply. The reduced time available for food preparation and increased demand for processed food also increases the need to develop healthy, affordable food products and appropriate processing systems to feed the growing urban populations. On changes in the agricultural sector, the contraction of the sector in terms of a declining agricultural Gross Domestic Product (GDP) as a share of total GDP and a declining labour force engaged in agriculture is of note. Alternative rural income sources are essential to limit rural-urban migration and this need is acute in many developing countries where industrial employment is not sufficient to absorb the inflow.

Post-harvest activities such as processing and marketing can provide much needed employment for those who are not in the agricultural sector. Research on policies, institutions, and technologies to strengthen the development of rural agro-enterprises directly contributes to enhancing the rural economy even within a contracting agricultural sector. Participation in international markets demands relatively sophisticated marketing, information, and transportation networks. Thus, the more liberalised international trade system and an increasing orientation of developing countries towards export markets as a source of economic growth requires new skills and structures within the existing agricultural sectors. Successful competition needs quality control and product standardization. While large companies are economically able to develop sophisticated marketing strategies, smaller producers will greatly benefit from methods and technologies that allow them to compete in international markets.

In order to facilitate the adoption of cassava as viable raw material, the highly perishable cassava roots need to be transformed, as closer to the farm as possible, into stable products with a longer shelf life, and lighter to transport than the fresh roots. Such products can be cassava chips or cassava flour. Its production technology is simple and inexpensive and can be adopted by farmers. In Nigeria, small-scale farmers have formed associations for processing cassava into flour that is sold to biscuit factories. Others are producing chips for the ethanol factory. In Ghana, there is a growing cassava chips export market. Processed cassava products must compete in markets with grain products, so lowering costs of production is essential to its survival as an industrial crop. Developing a strategy that will contribute to food security and socio-economic growth and development would entail the existence of a growing demand (market) for cassava. This can occur when its unique characteristics are exploited in a specific end use market, or cassava becomes economically more attractive for a particular use than do competing products. An immediate concern would be to identify and analyse the current uses and the potential markets for cassava and its products.

## 7.0 Strategies for Promoting Nigerian Cassava Processing Industry in the Global Market

It has been generally recognized that technology and successful appropriation of new technologies are important for economic growth and development (Gebauer, Worch & Truffe, 2012). Such adoption of the technologies as well as development of technological capabilities by the developed and newly emerging countries has enabled them to advance technologically (Kang & Kang, 2011). Emerging economies and transition countries have

 

increasingly recognised that knowledge, new technology and innovation are crucial to progressive socioeconomic development and vital for a country's competitiveness in international markets (Rammer, 2009).

With the help of a targeted technology and innovation strategy, some emerging markets have been able to significantly enhance the levels of production and income and were able to successfully bring innovative products to international markets. Therefore, given the large stock of knowledge in the world and its rapid expansion, developing countries would seem to have tremendous potential for moving up rapidly to the world technological frontier (Volberda, Foss & Lyles, 2010). Technology is a term used for not only physical devices, but also encompasses ideas, procedures, know-how and social institutions involved in the technological processes; they are inseparable elements in technological processes. Technology is a dynamic process which involves the introduction and diffusion of new technologies and as well the update and utilization of the existing technologies. Technology is a body of knowledge which is used scientifically by a given society at a given moment to resolve concrete problems in accordance with culture and scale of value (OECD, 1996).

The dynamism of technology determines or accounts for technological trajectories which are important factors in achieving social, economic and environmental goals at both local and global level. Hence, the mechanisms and driving forces of the technology evolution, as well as characteristics and structure of both prevailing and emerging technological regimes must be understood in order to conceive the actions necessary to stimulate the change in the required direction. The critical issue for industrial countries and firms is not the technology they possess, rather; how they learn to evaluate, adopt, and effectively appropriate the technology for their development. With the pace of industrial transformation in developing countries, firms are experiencing a growing need for innovation. Unfortunately, the absence of strong technological capability which contributes to sustainable competitiveness often impedes the firms from improving their innovations.

Developing countries need to create and commercialize knowledge because new knowledge is a key to competitiveness. This is particularly true for assessing relevant global knowledge, acquire and adapting it to local conditions (World Bank, 2010). Innovation in developing countries is based mostly on adoption, recombination, and adaptation of existing technologies rather than on development of new technology. Innovation is therefore more 'new to the market' or 'new to the firm' than 'new to the world' (World Bank, 2006).

In consequence, the capabilities of developing countries to innovate depend, on the one hand, on foreign sources of knowledge and technology and, on the other hand, on the country's capacity to absorb, adapt and diffuse innovation (World Bank, 2010). In developing countries and regions, the process of industrial development especially for the SMEs involves the employment of extant technologies to overcome the wide gaps between them and the industrial forerunners (Oyelaran-Oyeyinka, 2005).

Thus, to close the wide technological gap between the developed and the developing countries, the latter need to adequately develop, deploy and update the existing technologies and as well strengthen necessary technological capabilities and knowledge required/needed for technological development or advancement. Acquisition and adaptation of new technology and their management in the immediate or new environment through technological learning may also drastically reduce technological disparity between the developed and the developing countries.

## 8.0 Conclusion and Policy Recommendations

To put Nigeria on a sound pedestal for global competition, the country needs to bridge the existing global divide in cassava processing and utilisation by upgrading the use of cassava into primary industries such as starch, ethanol, chips, and flour in order to provide an industrial base for further diversification of its national economy. The value addition could make cassava to become industrial raw materials that may well serve for the production of finished products of commercial interest to the western countries and; hence, become Nigeria's source of foreign exchange on a sustainable basis.

Furthermore, policy compliance and implementations have long been affecting Nigerian economy. The cassava transformation process involves a shift from production of a low-yielding, famine reserve crop to a high-yielding cash crop. The policy direction of the government to promote the production and marketing of flour that is 90% wheat and 10% cassava for bread and other confectioneries production since 2004 necessitates the need for research to evaluate the implementation strategy by the government, level of compliance with cassava composite flour initiatives by the flour millers, appraise and promote inclusion by the bread bakers and inspire acceptability

 

by the bread consumers in Nigeria. The government should also develop a comprehensive programme that involves agribusiness strengthening, external collaborations, promotions as well as provision of technical and commercial assistance, such as export logistics with a view to fast-tracking and sustaining competitiveness of the cassava industry in the global market.

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