

Successes and challenges of cassava enterprises in West Africa: a case study of Nigeria, Bénin, and Sierra Leone

L.O. Sanni, O.O. Onadipe, P. Ilona, M.D. Mussagy, A. Abass, and A.G.O. Dixon



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Acronyms and abbreviations

ADP	Agricultural Development Program, Edo State, Nigeria
CFC	Common Fund for Commodities
DPME	Direction de la promotion des petites et moyennes entreprises - Bénin
FAO	Food and Agriculture Organization
FIIRO	Federal Institute of Industrial Research, Oshodi, Lagos, Nigeria
HQCF	high quality cassava flour
IFAD	International Fund for Agricultural Development
IITA	International Institute of Tropical Agriculture
MICPE	Ministry of Industry, Commerce, and Employment Promotion - Bénin
MPC	Microprocessing center
MTI	Ministry of Trade and Industry
NEPAD	New Partnership for African Development
NGO	nongovernmental organization
NICAPMA	Nigerian Cassava Processors and Marketers Association
PDFM	Projet de Développement de la Filière Manioc
PDRT	Programme de Développement des Plantes à Racines et Tubercules
RMRDC	Raw Materials Research and Development Council, Abuja, Nigeria
RTEP	Root and Tuber Expansion Program - Nigeria
SEDI	Scientific Equipment Development Institute, Enugu, Nigeria
SLARI	Sierra Leone Agricultural Research Institute
SME	small–medium enterprise
SON	Standards Organization of Nigeria
UNAAB	University of Agriculture, Abeokuta, Nigeria
UNIDO	United Nations Industrial Development Organization
UNIPORT	University of Port Harcourt, Nigeria
UI	University of Ibadan, Oyo State, Nigeria

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Background

Cassava, once a neglected crop in some places, is fast becoming an elite food crop in sub-Saharan Africa (Phillips et al. 2004). Cassava's combined abilities to produce high yields under poor conditions and store its harvestable portion underground until needed make it a classic "food security crop" (Nweke 2003). Cassava is the most important food staple in Nigeria and Bénin and ranks second after rice in Sierra Leone.

In terms of volume, Bénin is the third and Sierra Leone the seventh among producers of fresh cassava roots in West Africa. According to FAO statistics, worldwide production of cassava roots has nearly doubled in the last 30 years, reaching 213 million t in 2005. Africa currently produces more than 50% of global production, 118 million t. This is an increase of nearly 70% compared with the 70 million t produced in 1990. Similarly, production in West Africa has roughly doubled from 25.8 million t in 1990 to 52.3 million t in 2004. Nearly two-thirds of total cassava production in Africa (38.3 million t) is grown in Nigeria, making it the largest producer of cassava in the world. In Bénin (4 million t) and Nigeria, cassava production has more than doubled since 1990. Similarly in Sierra Leone, cassava production even tripled (about 350,000 t) during the same period, as cassava proved to be crucial in providing food security to rural populations during the period of civil strife.

In the West African region, nearly 90% of cassava produced is for human consumption; less than 10% is semi-processed for on-farm animal feed. In Asia and Latin America, a significant part of the cassava grown is processed into several secondary products of industrial market value. However, the manufacturing sector in many African countries is still hesitant to take up cassava as a low-cost raw material or an ingredient for the manufacture of many food products, such as noodles, bread, and biscuits, and as a source of calories or energy for the animal feed industry.

Annual population growth is about 2.8% in most West African countries while annual urban growth is generally significantly higher (about 5%) than rural growth (1%). An annual urban growth rate of 5% for a 10-year period implies a 63% increase in the urban population and the demand for food (Essers et al. 2005). To feed the urban dwellers, food supply from every farm household has to increase by at least 63% in 10 years. An increasing trend emerging across Africa is the consumption of cassava as a basic urban food staple and an important cash crop for rural farmers. Therefore, high-yielding cultivars and labor-saving technologies are required. In the future, urbanization and the rural exodus will be driving forces behind the market demand for cassava. More of the harvest is being sold as gari (roasted, fermented granules), paste, or chips. The transition towards a cash crop is in a more advanced stage in Nigeria than in Bénin and Sierra Leone where the evolution from a food security crop to an income-generating commodity has commenced only recently.

Until the early 1990s, cassava cultivation in West Africa was mostly based on traditional low-yielding cultivars (with average yields of 11 t/ha) and manual processing. Since the early 2000s, many countries in West Africa have witnessed greater attention being given by different actors to the promotion of cassava as an industrial crop with the objectives of diversifying farmers' incomes, enhancing foreign exchange earnings, and increasing employment opportunities. The development of the cassava market achieved in a few countries has enhanced a stepwise adoption of high-yielding cultivars (with a potential for an on-farm yield of up to 25 t/ha) and the mechanization of labor-intensive processing stages (grating, pressing, roasting, drying, and milling) with very basic equipment.

However, the extent of leverage and adoption achieved by the various activities has not been fully documented. This publication provides an insight into cassava production, processing and utilization, marketing, equipment development, research, and capacity building in West Africa. A brief SWOT analysis is included with a view to developing strategies for sustainable cassava development in West Africa.

Study methodology and data sources

The information gathered for this publication was collected using primary and secondary data from different sources including the Country Coordinators for the Common Fund for Commodities (CFC) from Nigeria, Bénin, and Sierra Leone. Also, an extensive literature search was carried out at IITA from previous reports and publications.

Cassava production

Africa now produces more cassava than the rest of the world combined. The producing nations are Nigeria (35% of total African production and 19% of world production), the Democratic Republic of the Congo, Ghana, Tanzania, and Mozambique. Cassava production in West Africa has doubled from 25.8 million t in 1990 to 52.3 million t in 2004 (FAO 2007).

Across the countries, cassava production has witnessed a tremendous increase for different reasons, the introduction of high-yielding, disease-resistant varieties, for example, in Nigeria.

Nigeria

Nigeria is known to be the leading producer of cassava globally; harvesting from 3.81 million ha, it produced 45.72 million t in 2006, 18% higher than its production in 2004. This increase in production between 2004 and 2006 came about as a result of the interventions of the Nigerian Government and some developmental agencies. The Nigerian Government facilitated the development of new disease-resistant cassava varieties by the joint efforts of IITA, National Root Crops Research Institute (NRCRI), Root and Tuber Expansion Program (RTEP), and the Federal Ministry of Agriculture, in conjunction with State Agricultural Development Programs and cassava farmers.

The increases in crop area and production can then be related to the following:

- IITA, through its Integrated Cassava Project (ICP), implemented in the south-south and south-east States of Nigeria in 2002, campaigned extensively for commercializing cassava production. It distributed planting materials of high-yielding varieties of cassava resistant to cassava mosaic disease (CMD) with on-farm training on appropriate agronomic technologies and management practices. Findings showed that farmers' yields have doubled from an average of 11 t/ha to 25 t/ha.
- Under the preemptive management of CMD, 10 improved cassava varieties selected from the 43 varieties screened were officially released.
- Newly bred varieties were multiplied on more than 500 ha by IITA, NRCRI, RTEP, ADP, and other farmers using certified stocks.
- Large-scale cassava farms (> 1000 ha) e.g., Obasanjo Farms, Nigerian Starch Mill, Zimbabwe farmers, and Ekha Agro Farms, had begun production.



Figure 1. Cassava stems distribution in one of IITA's beneficiary communities in south-south, Nigeria, 2005. (Dixon and Tarawali 2007).

Bénin

Similarly, Bénin has recorded increased production of cassava over time, although not as much as that of Nigeria. The crop is grown all over the country and, by total production, the Atlantique Département had the highest recorded volume in 2006 (934,511 t), followed by Plateau (307,262 t) and Collines (287,864 t), all in the south. Communities with registered high production volumes are spread in the far south and north central parts of the country.

There is increased availability of land for commercial cassava cultivation, according to some farmers, NGOs, and government workers. At the inaugural stakeholders' workshop of the cassava value chain development project, held on 16 June 2008 in Abomey (Zou Département), the representative from the Ministry of Commerce and Industry said that the Béninois Government strongly supported the idea of a policy to include at least 10% cassava flour in bread flour, as they had witnessed the success of the same policy in Nigeria. Assuming this will be realized, the level of cassava production in Bénin will surely be different in the next couple of years.

Sierra Leone

Sierra Leone has the lowest volume of production among the three beneficiary countries. It produced only 350,000 t in 2006. In relation to this, it is important to note that the country is still in the process of recovery from a decade-long civil war that was officially declared over in January 2002. It was then that economic activities started to regain strength.

Cassava is also grown all over the country, just as in Nigeria and Bénin. Major production (based on production area), however, is recorded in different chiefdoms in the south-west, central, and far north regions of the country.

Cassava processing and utilization

The three countries have shown remarkable success in cassava processing at both domestic and commercial scales, although to varying degrees. The introduction of machines for most unit operations of processing has greatly eased the labor-intensiveness of the trade, releasing time for women into other income-generating activities and allowing them to attend to family responsibilities. In all three countries, cassava is processed into some common products: *gari*, *lafun*, and starch. Each country also has some exclusive cassava-based products being traded: *gari* and cassava bread (very thin, small, flat, round pieces) are traded mainly in Sierra Leone. *Gari*, starch, chips, and high quality cassava flour (HQCF) are common, mainly in Nigeria, and *gari* and starch in Bénin.

Direct involvement by Governments in the promotion of the cassava subsector and sometimes policy directives have enhanced development in Nigeria and other countries of West Africa. The Nigerian Government's Cassava Initiative that started in 2003 was highly successful in promoting new entrants and investment into cassava micro-processing as well as encouraging both small and large-scale processing industries.

Most micro- and small-scale processors are involved in producing traditional foods or intermediate products, such as chips, HQCF, or starch.

Medium-scale factories, processing cassava into HQCF, starch, and high-grade *fufu* for export, have also been established by local entrepreneurs near cassava farming communities. Some of the companies in this category (all in Nigeria) are Peak Products Ltd, Abeokuta; Vesa Farms Ltd and Deladder Investment in Benin City; Jodek Ventures, Oyo; Wahan Foods Ltd, Afon, Kwara State; Agadu Farms Ltd, Gboko, Benue State; Kanawa Nig. Ltd, Kano; Godilogo farms, Odudu, Cross River State; Rose Endeavors, Ahoada, Rivers State; Widows Mite, Abak, Akwa Ibom State, and Aquada Investment, Umuahia, Abia State.

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



Women processors in Bénin.



Cassava (small–medium enterprise) factory with flash dryer in Nigeria.

Figure 2. Cassava processing at two levels.

Ekha Agro Co. along Lagos–Ibadan road was commissioned in March 2007 to produce 26% of the annual national demand for glucose syrup. The company currently supplies cassava-based glucose syrup of high quality to Nestlé, Cadbury, and Guinness for the manufacture of beverages and malt production. However, many companies in Nigeria are yet to obtain the technology for processing cassava into adhesives and glucose syrup. Many manufacturing industries, again, are yet to adopt the use of cassava-based refined products, such as glucose syrup.

Nevertheless, apart from HQCF being used in the food industries, cassava also has found uses in other industries, especially feed and non-food industries, including starch for the manufacture of textiles, paints, adhesives, and other chemicals. In Nigeria, the industrial utilization of cassava is not merely emerging but increasing day by day.

Key traditional cassava products

Gari is the most consumed and traded of all food products made from cassava roots. It is a partly gelatinized, roasted, free flowing granular flour with a slightly fermented flavor, creamy-white (or yellow, if from yellow-fleshed roots or fortified with red palm oil).



Figure 3. Ekha Agro Farm, a factory in Ibadan, Nigeria, producing glucose syrup. (Sanogo and Adetunji 2008).



Figure 4. Cassava products from Vesa Farms Ltd, Benin City, Nigeria.

The demand for and market share of *gari* appear to be on the rise in West Africa. *Gari* processing is expanding to central and northern Nigeria, Sierra Leone, and Bénin. Rural processors perceive *gari* to be an interesting product, because it is a convenience food with very good storability and, on average, with better market demand than other products. It can compete with rice in convenience and price in urban and rural markets. In the drier parts of West Africa where firewood is expensive, *gari* (being precooked and not requiring extensive cooking before it is ready for the table) enjoys some advantages over cereals, such as maize, sorghum, millet, and imported rice that may require cooking for a relatively long time before consumption.

In Sierra Leone, *gari* was introduced during the civil war (from 1991 to 2002) and since then, it has become one of the Sierra Leonean staples. Here, *gari* is further milled into a fine, smooth powder and consumed as a complementary food. Some unit operations of *gari* processing, e.g., peeling, are still labor-intensive, although providing interesting labor opportunities for rural women and the poor.

Fufu is a fermented wet paste widely consumed in eastern and south-west Nigeria and in other parts of West Africa, such as Sierra Leone. It is ranked next to *gari* in importance. Lately, the use of instant *fufu* flour has become popular; apart from ease of preparation, the advantages of instant *fufu* flour include a longer shelf life, convenience of storage, and compact size.



Gari in Bo, Sierra Leone.



Different types of *gari* in Abuja, Nigeria.

Figure 5. Different types of *gari* on display in the open market.



Dried *fufu*.

Cooked *fufu*.

Figure 6. *Fufu*: another popular product at different scales of production.

Lafun is flour from fermented dried cassava that is later made into a stiff paste and eaten with sauce. *Lafun* is another cassava-based food commonly consumed in the three countries.

Tapioca. This is one name for the cassava plant. A granular product made from partly gelatinized cassava starch, is also known as tapioca. Moist cassava starch, in a mash is roasted or heat-treated in shallow pans in a manner similar to roasting *gari*. The roasted tapioca appears as irregular lumps, called flakes, or perfectly round beads. The processing steps are very labor-demanding and make the product quite expensive. It is consumed in many parts of West Africa, soaked or cooked in water, with or without sugar and milk.

Attiéké (cassava granules) is prepared from fermented pulp and steam-cooked. This process makes it possible to obtain the fresh *attiéké* that is usually sold in local markets. There is a dried form obtained from the fresh product. Dried *attiéké*, still called *attiéké*, is similar to *couscous*. The *attiéké* dish is a typical food in Côte d'Ivoire and the traditional processes of production are well known and widespread. Its trade is flourishing everywhere in the urban environments of Côte d'Ivoire and Bénin.

Other local cassava-based foods

The following traditional cassava-based products are peculiar to many towns and villages in Bénin: *Agléli klaklo*, *Kuté libo*, *Galikponnon* (cassava bread), sliced white bread, *Goman kluiklui* (snack), donut (*Yovodoko*), pie, (*Atchonmon*), *Kponnonvi* (goma biscuit), *Agléli mawè*, *Ayan* (cassava paste), *Kuté dida* (boiled cassava), *Abloyoki*, *Kuté mime* (toasted cassava), *Kuté founfouin* (pounded cassava), *Kuté siso* (cassava fried chips), and *Kutéta* (snack).

Kondugbala is a popular food in Sierra Leone. Cassava roots are peeled and cut into small pieces, partially cooked, dried, and stored. It is prepared for eating by soaking and then boiling.

Thoo is also eaten in Sierra Leone. Cassava roots are peeled and cut into small pieces and then dried, pounded into flour, and cooked into a paste.

Kpokpo gari is a common food in the mid-western part of Nigeria. The difference between *kpokpo gari* and conventional *gari* is just that the grated, fermented mash is not sieved before roasting.

Abachai is a Nigerian food made by boiling peeled cassava roots, slicing them thinly and then sun drying. It is a popular food in the south-south of Nigeria, usually eaten as a dry snack with nuts. It is considered a delicacy in some communities, where the dried slices are dampened and then mixed with palm oil sauce and smoked fish or meat with other seasonings. *Abacha* is also a ceremonial dish served during indigenous festivals, such as agricultural festivals, funerals, and child naming.

Key industrial cassava products

HQCF is a major intermediate product. Development of HQCF is a key success in cassava processing, as it became the means to scale up industrial utilization in Nigeria. The flour is being used either alone or as a composite in bakery products. Before this, Nigeria used to import over one million t of wheat annually. In the 1990s, after the depreciation of the naira, the high cost of wheat almost sent bakers out of business, thus compelling them to look for an alternative. To face this challenge, IITA developed a simple and appropriate process for producing HQCF that is suitable for baking. This was tested in the baking and confectionary industries; it was found successful and the cost implications were favorable.

In Bénin and Sierra Leone, cassava flour is used, but not to the same extent. In Bénin, cassava flour is used in making fritters (small, round, or flat fried cakes) and some bakers, trained by NGOs, have started using cassava flour in bread making. In Sierra Leone, cassava flour has been used to produce a common local food called *dippa*. This is an intermediate food, which is stored and made into a paste like *fufu* and served with any choice of sauce.

Cassava starch processing is another success recorded in West Africa. The introduction of cassava starch in the food and non-food industries in Nigeria has transformed the cassava utilization industry. In Nigeria, cassava starch is used as an ingredient in manufactured foods (infant foods, confectionary, glucose, alcohol) and in non-food industries (glues, oil well drilling, adhesives, paper sizing and bonding, textile sizing and strengthening). It is also widely used as a thickening agent in soup and for laundry purposes. Starch is used in the other countries as well, although at varying levels. In Sierra Leone and Bénin, it is produced in minimal quantities and used by tie-dyers of cloth. The traditional starch is used for clothes or consumed at a local level in the form of tapioca, often with special flavors (vanilla, banana). Some NGOs are encouraging this form of utilization as an income-generating activity as the product can be sold at weekly or seasonal village markets.

Dried roots, chips. Dried (split) roots are the cheapest form of storable cassava. They are typically popular in transitional and savanna areas where sun drying is relatively easier than in forest zones. Peeled roots or chips are often slightly molded or fermented to a certain degree, according to climatic conditions, local taste, and consumption habits. They are milled or pounded into (fermented) flour that does not comply with standards for replacing wheat. The fermentation alters the sensory characteristics of the roots in a way that is often appreciated by local consumers. The process is mainly manual and offers some potential for mechanization in the short and medium term. In dry areas or seasons, the reduction of chip size, e.g., by a slicer or shredder, can speed up drying, thereby avoiding fermentation and moldiness, and after milling, chips can be turned into flour. The faster drying of intact cassava pieces means that this accelerated process should be applied only for non-consumable products (e.g., as a glue-extender in the plywood industry), or the cultivars used should be low cyanogenic or “sweet”.



HQCF.



Cassava–wheat bread.



Cassava chin chin.

Figure 7. Products from cassava.

Capacity building of key players

Farmers

Over time in the three countries, there have been several training in the cassava value chain; IITA, ADPs, and some NGOs have trained farmers and processors on these activities to enhance their capacities. Farmers in Nigeria have been trained on good agronomic practices to ensure maximum produce yield and given the Do's and Don'ts of planting IITA's improved varieties and other related training on production. Also, the Postharvest Unit of IITA, under technology transfer, has conducted a series of training at all levels on processing. There has been training of trainers in NGOs, community-based organizations, women's groups, and others (even faith-based organizations) who later go out to train end-users, especially at the grassroots.

Processors

Appropriate technology transfer through private–public partnership is one of the key outreach activities of IITA where research is being geared towards development. There is widespread dissemination of research findings. In Nigeria, there are women who earn their living from cassava processing. In Bénin and Sierra Leone as well, the key players reported having enjoyed capacity building programs. A major processor in Bénin reported being trained by a faith-based NGO and she has been making a living from the training.

Local fabricators

Generally, in terms of processing technology and scale, pilot areas in Nigeria are far in advance of those in Bénin and Sierra Leone. Processors in the north-central part of Nigeria, as in other regions of the country, are using, or have good access to, locally fabricated mechanized and high-capacity equipment, such as mechanical graters, motorized sieves, flash dryers, convenient and low-cost drying facilities, high-capacity and durable presses. Some now use mechanical peelers and the like.

The local fabricators have been and are still being trained on the use of such equipment, especially on finishing and quality control; gone are those days in Nigeria when cassava mash used to be dewatered using heavy objects such as stones and wood; there is now the hydraulic jack.

Graters are also used in Sierra Leone and Bénin, although at a very low level because of limited financial capacity and access to the equipment. This can be seen in Figure 11 where many people queue for just one available grater.

Also, sun drying is no longer the only method of drying as Nigerian engineers have come up with appropriate low-cost drying facilities. This innovation is still on-going as engineers bring different approaches to the mechanical drying of cassava in Nigeria; the use of solar dryers as well is being exploited.



Women processors using local technologies in Bénin.



Modern processing technology at the cassava processing center of IITA.

Figure 8. Processing at the grassroots and at small to medium scale (Field survey 2008).



Grater



Presser



Adebash grater.



Starron Ltd rotary dryer.



Peak and Nijilucas flash dryers

Figure 10. Locally fabricated equipment (Field survey 2008).

Also, in collaboration with local fabricators, electrical/diesel-operated rotary dryers (300 kg/8 h) and a new version of the locally fabricated flash dryer with the product contact surface of stainless steel were developed and diffused to over 100 small-medium enterprises (SMEs) processing cassava (fufu flour and HQCF) in south-west and south-east Nigeria.

The fabrication and use of flash dryers are also gaining popularity although users questioned their efficiency and fuel usage in 2006. IITA assembled a team of engineers from UNIPORT, IITA, RMRDC, SEDI, UI, FIIRO, and Edo State ADP to understudy and come up with a more efficient flash dryer. Based on the preliminary report, RTEP under IFAD, RMRDC of the Federal Ministry of Science and Technology, Abuja, and Godilogo

Farms, Obudu, Cross River State, were brought into the flash dryer modification. This validated the workability of a public-private partnership in agricultural development in Africa. The new flash dryer, commissioned in August 2008 at Godilogo Farms, is producing 250 kg/h of cassava flour (Kuye et al. 2008). The design and technology are readily available for transfer to fabricators and SMEs in African countries as a regional public good. From two flash dryers before 2003, well over 100 flash dryers are now installed in Nigeria.



Figure 11. A grater serves the whole community in Waterloo, Sierra Leone (Field survey 2008).

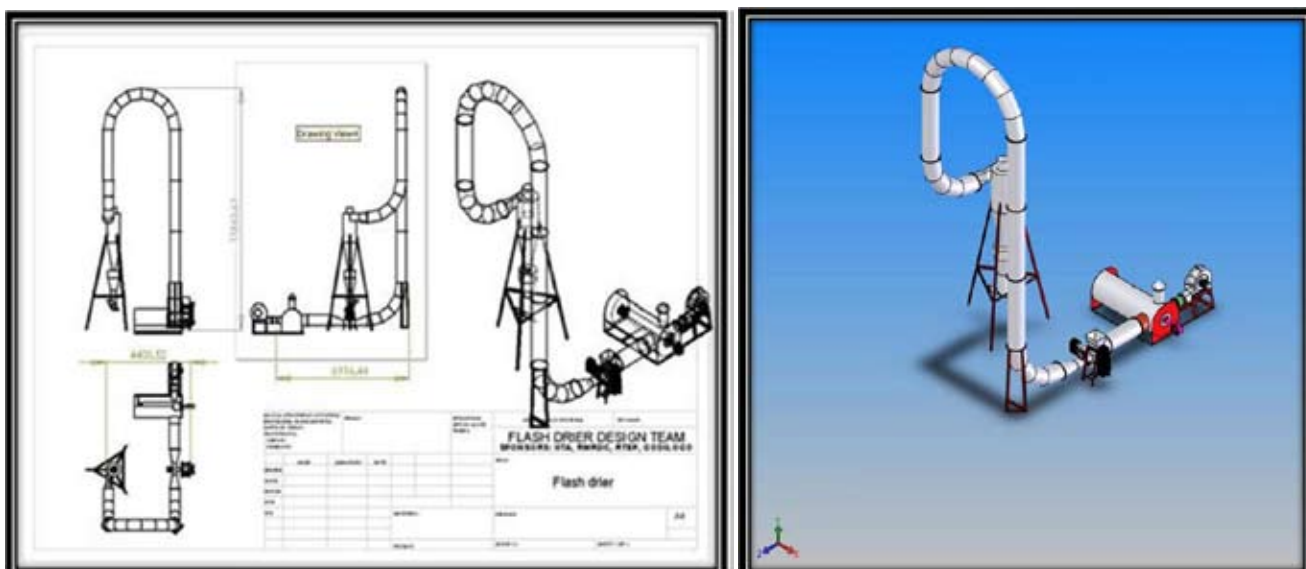


Figure 12. Newly fabricated flash dryer (Kuye et al. 2008).

In Bénin and Sierra Leone as well, appreciable successes have been made in cassava processing machinery. Although sun drying is the commonest method among the processors, there is now an improved system whereby cassava products are dried on raised platforms and even covered with net to reduce dust and dirt. Use of a mechanical dryer is nil to low in these countries.

Also, processors are coming up with alternative energy sources using locally available materials e.g., local usage of a drum heated by firewood.

Presidential Initiatives on cassava development

The Presidential Initiative on Cassava, launched in Nigeria in 2003, brought cassava and its potential to the national limelight (Sanogo and Adetunji 2008). The Initiative had as its goal the promotion of cassava as a viable foreign exchange earner and also the development of the production system to sustain the national demand. The Presidential Initiative focused its intervention on the development of production, processing, and marketing of the processed products.



Sun drying system (raised poles).



Sun drying system (concrete with dust protector).

Figure 13. Sun drying cassava (Field survey 2008).



Low-cost in-house dryer using heated drum.



Hole to allow spent air to be vented during drying.

Figure 14. Local cabinet dryer (Field survey 2008).

The promotion of HQCF in the baking and confectionary industries was further given 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 10% of cassava flour to the wheat flour used in bread, to open additional market opportunities for smallholder farmers. This national effort created a potential market for 330,000 t of cassava flour yearly. The growth in demand activated the industrial scale-up of HQCF and starch processing by about 48% (Maziya-Dixon and Onadipe 2007). The awareness created greater interest and increased investments in the industry by foreign and local investors.

During the period, private sector participants established over 500 microprocessing centers (MPCs) and 100 SMEs for the production of intermediate cassava products. The enterprises provided substantial job opportunities for youths, technicians, professionals, and artisans. There were substantial investments in new factories for the manufacture of glucose syrup, starch, and HQCF. Such factories include Ekha Agro Farms, a glucose syrup factory in Ogun State built in 2007, an automated HQCF factory in Benue State, Dutch Agricultural Development Company Nigeria Ltd, built in 2006, and a cassava starch factory, Matna Foods, built in 2005 in Ondo State.

Although there has not been a similar initiative on cassava in Sierra Leone and Bénin, the interest is growing in the private and public sectors to encourage the Governments of the two countries to initiate special programs. There is interest in a policy of using at least 20% of cassava flour for baking bread and confectionery in Sierra Leone.

Cassava marketing

As the main food staple for urban and rural people in West Africa, cassava already makes a major contribution to the national and regional economy. Since 2003, export opportunities for Nigerian cassava products (e.g., *gari*) within the West African subregion have been growing, particularly to land-locked countries such as Niger and Mali. The cross-border trade in *gari* and tapioca is also important among the coastal West African countries of Bénin, Côte d'Ivoire, Ghana, Nigeria, and Togo.

The direction of trade or supply is often determined by the price of the raw material. Prices of cassava products in Ghana are similar to those in Nigeria. The prices in Bénin are generally lower. This explains the ease with which Béninois *gari* enters the Nigerian markets in Lagos. *Gari* prices fluctuate in all West African coastal countries, and not necessarily at the same time. A cross-border trade study (Ezedinma et al. 2007) in northern Nigeria showed a substantial export to Niger (mostly *gari* and chips) (www.cassavabiz.org).

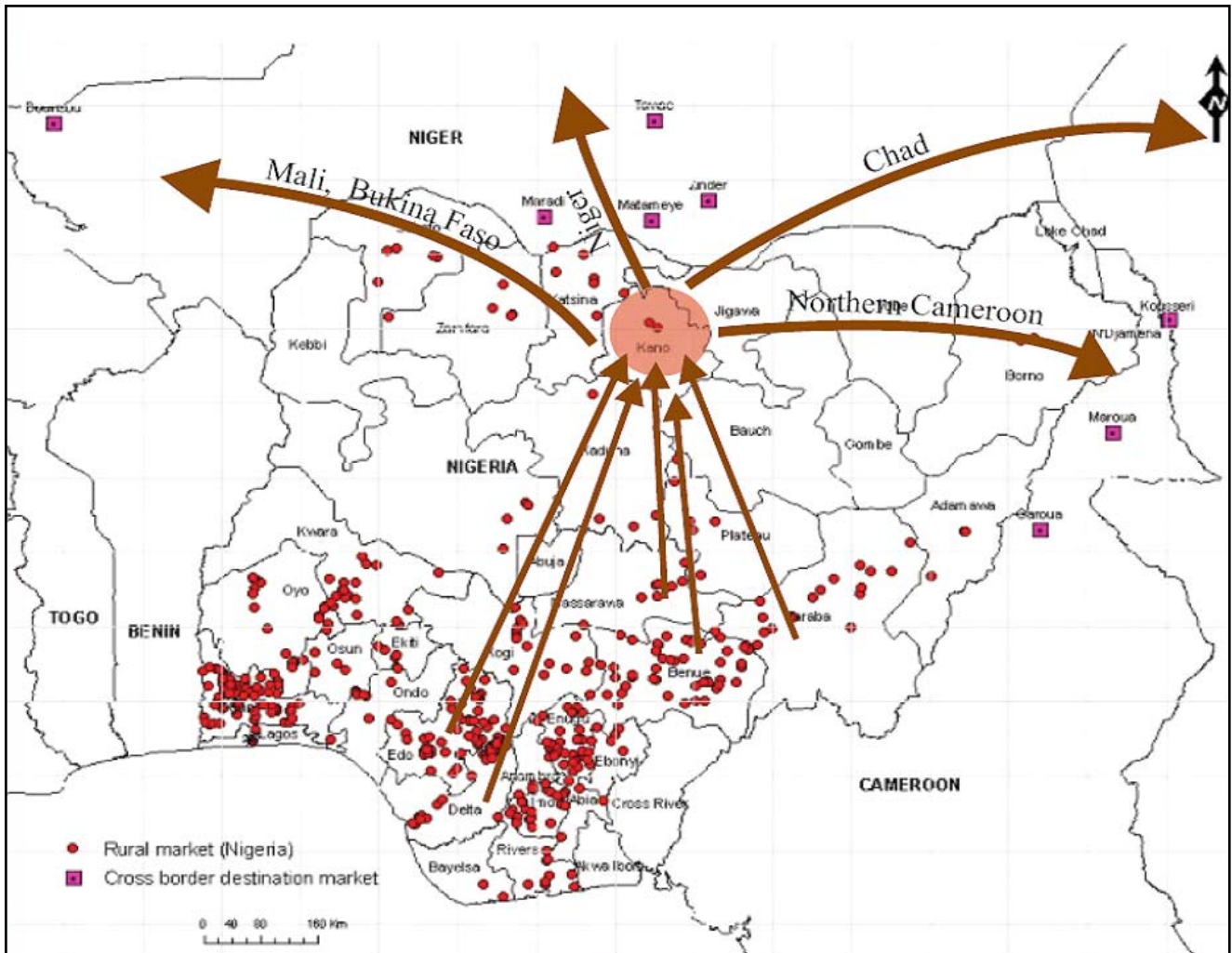


Figure 15. Cross-border trade in gari and chips: supply and demand zones to Dawanau market, Kano. (Ezedinma et al. 2007).

In the past 5 years, factories in Nigeria have exported cassava starch to Côte d'Ivoire (Matna Company); cassava flour and instant *fufu* flour have also been exported to the USA, UK, Ireland, and Italy (Aquada Investment and Olu Olu Industries).

However, the production and processing costs of cassava are not competitive in international markets, thereby making it difficult for Nigeria to continue the export of chips to the Republic of China. There were two export trials in 2005/2006, after which the price of chips in China stabilized at US\$120/t.

SWOT analyses of cassava development

The goal of this process is the development and maintenance of a well-functioning market for West African cassava and cassava products that is able to compete successfully with products from other regions in Africa. The expected end result would be new efficiencies gained, economic incentives identified, opportunities for product development and use realized, and finally, the industrial growth of the cassava industry.

Nigeria

Strengths

- Available cultivable land area.
- Available market, locally and internationally.
- Adaptability of cassava to different soil conditions.
- Available water bodies.
- Conducive weather conditions for increased production.
- Human resources—over 70% of the Nigerian population is involved in one form of agriculture or another, largely in the rural areas.
- Available improved cultivars.
- Viable and functional stakeholders' associations, especially of processors, growers, fabricators, and exporters.
- Available local resources for appropriate technology.
- Available labor for processing, especially among women.

Weaknesses

- Relatively low productivity: subsistence farming is still widely practiced, mainly because of the low level of mechanized farming with little or no encouragement/motivation for farmers.
- Poor to low infrastructural facilities, especially of energy. The power supply is erratic, compelling industrialists to go to an alternative energy source, presently limited to the use of a generator. Diesel and petrol add to the cost of production. Use of other sources of energy such as solar power is low at present. Other infrastructure includes good roads and potable water. These are not easily available, especially for processors who, in trying to cope with the situation, incur very high production costs that often discourage them from continuing in the trade. This particular weakness cuts across all stakeholders in cassava, especially farmers and processors at all levels, small, medium, and large.
- Lack of entrepreneurial skills and strategies: most of the key players in cassava enterprises lack a plan to guide them appropriately in business, especially the MPCs and SMEs. The skill to quantify activities and expenses is completely lacking, making it difficult to clearly define profit or loss. For instance, some use family labor that is never quantified.
- Inefficient market information system: there is a wide gap from farmers to processors and end-users, and no adequate and prompt information on market trends to control each of these activities appropriately. This obviously results in a lack of balance between demand and supply, causing either glut or scarcity.
- Institutional credit facilities for agriculture are inadequate at affordable interest rates to increase production.
- The supply of agricultural production inputs is inadequate.
- Lack of sustainability.
- Lack of coordination of rural and agricultural development efforts through the multiplicity of agencies involved.

- Inefficient processing equipment, especially drying facilities.
- Low-level use of appropriate/modern technology—drying, peeling, processing equipment.
- Inadequate number of experienced and committed processors.
- Gender discrimination: low purchasing power of female processors in the acquisition of the appropriate equipment (pressing machine, graters, grinders).

Opportunities

- Developing human capital development by focusing on the youth who are presently restive.
- Filling the demand gap for food and supplying food items to the subregion.
- Exploring investment through public–private partnerships.
- Availability of research institutes such as NCRI, IITA, FIRRO, and RMRDC.
- Availability of high-yielding cassava varieties.
- Opportunities to export cassava and its products.
- Available markets.
- Industrial use as a cheap raw material and a substitute for more expensive materials.
- Diversification of cassava utilization based on varietal differences to suit different purposes.
- Easy linking of stakeholders in the value chain.
- Efficient market information system.
- Increased production.
- Availability of more cassava products.

Threats

- Lack of clearly defined division of labor in agricultural development among the three tiers of Government that poses the danger of continuous role laxity and role confusion.
- Competition from the other cassava-producing countries in the world.
- Need to meet cassava demand domestically and industrially.
- Possibility of elite capture and political interference; this puts a wedge in the flow of policy benefits to rural people, as originally intended.
- High cost of labor for the strenuous activities in cassava production, especially harvesting.
- Unfavorable market climate for sustainable cassava industry.
- The preponderance of older people in agriculture is a hindrance to encouraging farming enterprises.
- Inadequate funding of agriculture inhibits the activities of Government organs, stakeholders, and agricultural performance generally.
- Relative prices of other food crops and products.
- Problems over the available energy source.
- Financial involvement and gender disparity.
- Climate change.

Bénin

Strengths

- Existence of expertise.
- Availability of raw materials.
- Ability to appreciate the quality of the products compared with those from the older cassava varieties.
- Availability of processing materials and tools.
- Better profitability of processing.
- Existence of management organizations.
- Availability of the raw materials.
- Existence of private service providers.

Weaknesses

- Low production.
- Bad quality of the products.
- Difficulty of the processing operations.
- Lack of appropriate equipment.
- Poor business plans and market record keeping.
- Inadequate product preservation technology.
- Neglect of standards of hygiene.
- Less competitiveness of the products.
- Lack of a proper policy framework for cassava development.
- Difficult access to equipment due to their high cost.
- Lack of knowledge of the market requirements.

Opportunities

- Existence of consumers and users of the products.
- Increased availability of cassava products.
- Existence of a potential market for the products.
- Existence of a network of stakeholders who can find solutions to the problems (research, control, microfinance).

Threats

- Competition from other products.
- Abundance of cereals (maize, cowpea, millet).
- The market is not diversified.
- The products are not diversified.
- Lack of a steady supply of the raw material.
- Competition from alternative products to the by-products of cassava.
- Changes in government agricultural policy.
- Climate change.

Sierra Leone

Strengths

- Cassava production culture.
- Availability of processors, especially women.
- Well-organized farmers' associations.
- Effective linkage among research, producers, and processors.
- Available local equipment fabricators.
- Cassava market outlets.

Weaknesses

- Small holdings of farmers.
- Inadequate processing equipment.
- Low capacity development for women.
- No access to credit/loans.
- Inadequate number of experienced and committed processors.
- Poor product quality.
- Inadequate infrastructure.
- Ineffective information system.
- Low capacity development.
- Inefficient market system.

Opportunities

- Growing demand for cassava products.
- Improved processing techniques.
- High-yielding cassava varieties available.
- Apparent political will.
- Available local resources.
- Bakers are willing to use HQCF.
- Diverse uses of cassava and products industrially.

Threats

- Relative prices of other food crops and products.
- Gender disparity in access to loans.
- Political interference.
- Security in neighboring countries.
- High cost of energy.
- Climate change.

Challenges to cassava enterprises in West Africa

1. High production cost of cassava-based products from price fluctuations and limited sources of supply.
2. The quality of products in Sierra Leone and Bénin is still low, thus limiting their public acceptance. There is little or no product quality control or standard to ensure consistency.
3. Poor and inadequate infrastructural facilities; good roads and regular water supplies are needed. These are vital to value addition; hence, farmers still have low income.
4. Most farmers and industrialists find it impossible to get loans from the Banks. The few that have the opportunity are limited because of the high interest rate.
5. Inconsistent policy has adversely affected the Nigerian cassava industry so much that willing investors are discouraged while some in the business are folding up.
6. Easy access to alternative products through importation, e.g., starch. The industries using starch reported that they found it easier to import cornstarch than search for cassava starch that is not readily available and so they will not use it.
7. Lack of a good market information system to create a network among the stakeholders, especially in Bénin and Sierra Leone.
8. Poor capacity building of the processors: especially the women who are in the forefront of cassava processing. The women are not empowered for the enterprise.
9. Low promotion of SMEs for value-added cassava products in Bénin and Sierra Leone.
10. Effective strategies are needed for stakeholders to share their experiences with those of other countries of the subregion who are participating in the processing of cassava.
11. Cooperation linkages are needed with other important stakeholders (agricultural research, microfinance institutions, quality standards organizations, and equipment fabricators).

Perception of stakeholders on cassava development

Some cassava stakeholders attributed the successes of cassava enterprises in West Africa to the following:

- Ready-made market for *gari* and other key products.
- Increased production since 2002.
- Establishment of processing facilities not too far from the available cassava farms.
- Readiness of research institutes (national and international) to showcase successful innovative technologies to the private sector. For instance, processors in DR Congo, Ghana, Bénin, Sierra Leone, Cameroon, and Côte d'Ivoire are using equipment transferred through the IITA network system.
- Various training on production, processing, marketing, and management organized by IITA and other organizations for stakeholders.
- Cassava is not only strategically important as a food source and famine reserve but is now seen as a pro-poor vehicle for economic development.
- Regulatory agencies and research institutes, such as IITA, have collaborated to promote various standards in Nigeria (Sanni et al. 2005), Ghana (Dziedzoave et al. 2006), and Madagascar, Tanzania, and Zambia (Abass 2008).
- The promotion of various tiers of processing centers by national and international researchers has stimulated more investment.
- With effective mobilization, training, and mentorship by IITA and other national agencies in the region, local fabricators have been able to produce high-quality processing equipment.
- Formidable producers' associations have been established, such as Cassava Growers Association of Nigeria, All-Nigeria Cassava Processors and Marketers Association, and Cassava Equipment Association of Nigeria.

Conclusions

Four main areas for intervention emerge as follows:

- Provision of adequate policy and infrastructure to support cassava industrial development.
- Improvement of the quality and quantity of raw material supply.
- Promotion of investment in primary, secondary, and tertiary levels of processing.
- Development of the domestic market in the short run and the global market in the medium and long term.

Effective cassava development in West Africa requires a coalition of private–public partnerships, with the private sector investing in market development and procuring needed machinery. The public sector has to provide the needed policy environment, improve competitive technology, and physical infrastructure, in particular.

Market diversification will also require the strengthening of the presently weak links among industrial processors, fabricators, and those engaged in cassava product development in Africa.

A more structured capacity strengthening scheme should be organized in various regions in Africa to disseminate effective approaches for research, development, and marketing systems for the cassava industry.

References

- Abass, A.B. 2008. Small-scale cassava processing and vertical integration of the cassava sub- sector in Southern and Eastern Africa—Phase I. Paper presented at the inception workshop of CFC-WA, 13 and 17 April 2008, IITA, Ibadan, Nigeria.
- Dixon, A.G.O. and G. Tarawali. 2007. IITA-CEDP Annual report to USAID. Cooperative Agreement No. 620-A-00-03-00144-00. Section B. Abuja, Nigeria.
- Dixon, A.G.O., M.O. Akoroda, R.U. Okechukwu, F. Ogbe, P. Ilona, L.O. Sanni, C. Ezedinma, J. Lemchi, G. Ssemakula, M.O. Yomeni, E. Okoro, and G. Tarawali. 2007. Fast track participatory approach to release of elite cassava genotypes for various uses in Nigeria's cassava economy. *Euphytica* DOI 10.1007/s10681-007-9487-2.
- Dziedzoave, N.T., A.B. Abass, W.K.A. Amoa-Awua, and M. Sablah. 2006. Quality management manual for production of High Quality Cassava Flour. (edited by G.O. Adegoke and L. Brimer). IITA, Ibadan, Nigeria. 68 pp.
- Ezedinma, C., I.A. Ojiako, R.U. Okechukwu, J.R.Lemchi, A.M. Umar, L.O. Sanni, M.O. Akoroda, F. Ogbe, E. Okoro, G. Tarawali, and A. Dixon. 2007. The cassava food commodity market and trade network in Nigeria. IITA, Ibadan, ISBN 978-131-200-5. 296 pp.
- Essers, S., F. Goossens and W. Verzijlenberg. 2005. Mission report by Rabo International Advisory Services (RIAS) BV to CFC, The Netherlands. 24 pp.
- FAO. 2007. FAO database: Crop production. Retrieved on 19 July 2007 from <http://www.faostat.fao.org>
- Kuye, A.O., D.B. Ayo, L.O. Sanni, A.O. Raji, E.I. Kwaya, O. Obinna, W. Asiru, B. Alenkhe, and B. Abdulkareem. 2008. Design, fabrication, installation and testing of an improved flash dryer for producing 500 kg/hour of High Quality Cassava Flour. Poster presented on behalf of the Team by E.I. Kwaya at the Global Cassava partnership (GCP-I); the first scientific meeting at Ghent, Belgium, 21 and 25 July 2008.
- Maziya-Dixon, B. and O.O. Onadipe. 2007. Cassava industrial market study in Nigeria. IITA. Ibadan, Nigeria.
- Nweke, F.I. 2003. New challenges in the cassava transformation in Nigeria and Ghana. Conference Paper No. 8. Paper presented at the INVENT, IFPRI, NEPAD, CTA conference. Successes in African Agriculture, Pretoria, 1 and 3 December 2003.
- Phillips, T., D.S. Taylor, L. Sanni, and M. Akoroda. 2004. A Cassava industrial revolution in Nigeria: the potential for a new industrial crop. IFAD/FAO, Rome, Italy. 43 pp.
- Sanogo, D. and O. Adetunji. 2008. Presidential initiatives on cassava in Africa: case studies of Ghana and Nigeria. NEPAD Pan-African Cassava Initiative, IITA/NEPAD, Malawi, 73 pp.
- Sanni, L., B. Maziya-Dixon, J. Akanya, C.I. Okoro, Y. Alaya, C.V. Egwuonwu, R. Okechukwu, C. Ezedinma, M. Akoroda, J. Lemchi, E. Okoro, and A. Dixon. 2005. Standards for cassava products and guidelines for export. IITA, Ibadan, Nigeria. ISBN 978-131-2483. 93 pp.
- Sanni, L.O., C. Ezedinma, R.U. Okechukwu, M. Patino, M.O. Akoroda, B. Maziya-Dixon, J. Lemchi, P. Ilona, E. Okoro, G. Tarawali, T. Awodeyi, B. Bamkefa, N. Nnaji, F. Ogbe and A.G.O. Dixon 2006. Catalog of postharvest equipment for cassava processing. IITA, Ibadan, Nigeria. 113 pp.
- UNIDO (United Nations Industrial Development Organization). 2006. Master plan on cassava development in Nigeria. Federal Ministry of Commerce and Industry, Abuja, Nigeria.

