

West Africa Trends

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The Hidden Potential of Cassava

The future of West Africa's most undervalued crop

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Introduction

Cassava has been derisively called “the poor man’s crop”. But anyone with the slightest insight into its remarkable value as both a food and industrial crop knows the story should be different. Cassava could very well be “the poor man’s key to a transformed life”.

Cassava is the most important staple in the region, grown and eaten across all countries. It is also the cheapest source of carbohydrate for households. Cassava can grow and produce dependable yields in places where cereals and other crops fail due to its ability to resist drought. It will thus increasingly become important as the impact of climate change become more pronounced. The future of the region’s food security is very much intertwined with cassava prospects.

Beyond providing food, cassava also has immense industrial potential. Cassava can be used to produce starch which is an input for many industries including textiles, pharmaceuticals, and adhesives. Cassava can also be used to produce alcohol and fructose. Yet only 5-15% of West Africa’s cassava output is used for industrial purposes. Considering its ease of cultivation, weather resilience and massive foods and multi-industrial utility, cassava is probably the most undervalued and under-exploited crop in West Africa.

In this issue, we explore the story behind this unrealized potential and more importantly prospects for unlocking it. The first article looks at prospects for “revolutionizing” cultivation, yields and markets access for the region’s cassava farms. The second article tells the story of how local and regional processed foods markets are building up around cassava-based dishes, with opportunities for women. The final article explores how cassava could be a base crop for an industrial transformation■

The purpose of this newsletter is to monitor trends across the West Africa region for policy makers, researchers and other decision makers in the international community.

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Editorial

The future of the region's and indeed Africa's food security has been a matter of concern over the years. Fears that climate change could impact negatively on food security have heightened this concern as high temperatures and erratic rainfall become the norm. Given these concerns, drought resistant and hardy crops like cassava will thus become more and more important in the future.

It is back to the future story again as cassava has traditionally functioned as a "food bank". Not only is it drought resistant, it can be left in the ground for two to three years without harvesting thus, serving as a "bridge" when more vulnerable annual crops are not available.

Apart from being a strategic crop for the future of food security, cassava is also being seen as basis for transforming the economies of the region. Cassava requires to be processed immediately after harvest and this creates opportunities for development of local fabrication industries to provide the simple machines needed. Indeed having these simple machines is critical to increasing productivity as labor requirements for harvesting and processing cassava are huge and are mostly provided by women whose labor is demanded for other chores. However, experience has shown that it is men who tend to capture benefits of mechanization. This underscores the need to empower women to acquire machinery and also train women in use of machinery. It is heartening to see that there are initiatives on the ground doing this.

Cassava can be a feedstock for many industries. Cassava can be used to produce starch which is an input to many industries including textiles, pharmaceuticals, adhesives etc. Cassava can also be used to produce alcohol and fructose. However, only 5-15% of West Africa's cassava output is used for industrial purposes (mainly for animal feed) in contrast with about 50% of Brazil's. Countries in the region, led by Nigeria, are starting to implement aggressive policies to capture this opportunity.

Despite its importance, cassava suffers from "an image problem" among the local population. Traditionally, it has had the perception of being a poor man's crop; probably because its ease of propagation and its ability to grow with little inputs make it easily affordable for the poor to cultivate. This image has seen cassava not given as much support as other crops like maize and rice with the consequence that cassava yields have remained low.

Placing cassava at the center will require a rethinking of how cassava is produced and related infrastructure needed to unlock its inherent value. There is need to move cassava from a subsistence crop to a cash crop and this requires a model of supply that can deliver to markets consistently and at a price that is affordable. This at the minimum means doubling of yields.

In the food markets there are positive entrepreneurial developments that are helping to commercialize cassava-based food products. As such cassava products now compete effectively with other food products in terms of both convenience and price; two qualities that are important especially in urban markets. Regional markets are also emerging as some cassava dishes gain regional appeal. In some countries cassava is now outcompeting rice. However the emergence of bigger market for cassava has attracted formal processors who have resources to package and distribute cassava products better. The informal traders are thus likely to lose out in the long run. Indeed, domination of these markets by integrated food multinationals is now inevitable.

Therefore if small scale processors and especially women are to reap the benefit of the expanding cassava market, they will need support to scale up operations, including packaging and quality standards, in order to meet the demand of mature consumer markets. However capturing the industrialization opportunity will require well thought-out and consistently implemented policy. This should ensure that needed investments by farmers, cassava processors, industrialists and other value chain players are made to ensure a strong cassava value chain; one that is able to support a cassava-driven industrial base. At the moment the political environments in the region are such that policies are prone to capture by various interests. The experience with cassava-led industrialization "presidential initiatives" has so far been a mixed bag with failure in Ghana and some success in Nigeria. As we will see in the articles these clearly underscore the challenges ahead.



Cassava in West Africa: A Look at the Prospects

Cassava means a lot to the people and economies of West Africa. It is a major staple in the region, consumed by millions of people every day. Rich in carbohydrates, it provides a significant part of calories for households. The per capita consumption of cassava is high at 115 kg/capita. This is higher than all the other root and tuber crops. It also plays multiple roles as a famine reserve, as well as a food and cash crop. The region is a significant producer of cassava with Nigeria currently the biggest producer of cassava in the world.

Cassava has many advantages that are particularly beneficial to poor farmers. It has low input requirement; it has high tolerance to low rainfall and poor soils; and ease of propagation by use of vegetative stem cuttings. Cassava can grow and produce dependable yields in places where cereals and other crops fail. Also, the risk of crop failure is much lower than other crops.

Further, cassava can be harvested all year round and on piece-meal basis which means that farmers can harvest when it is most convenient; say when good prices are offered by the market, or labor is available, or processing capacity or other conditions are more favorable.

The wide flexibility in planting and harvesting enables farmers to allocate their spare time to cassava after attending to more season-bound crops.

When measured on a caloric basis, it is one of cheapest sources of carbohydrate and therefore suitable for the urban poor to match their food budgets.

Cassava functions as a “food bank” because it is drought-resistant and can be left unharvested in the ground for two to three years; thus serving as a “bridge” when more vulnerable annual crops are not available, particularly in lean seasons.

Cassava is thus important for livelihoods of many people in Africa and the region. This has inspired NEPAD (the New Partnership for African Development) to adopt the slogan of “Cassava: A Powerful Poverty Fighter in Africa” for its Pan African Cassava Initiative. Also, the Abuja Declaration 2006 identified cassava as one of the crops with the greatest potential to combat poverty and food insecurity. As climate change takes its toll it is expected that cassava will become more and more important as it will become more productive in hotter climates. It has been refereed as the “Rambo” crop (an analogy to the ever-resilient Hollywood film character Rambo) to underscore its hardiness.

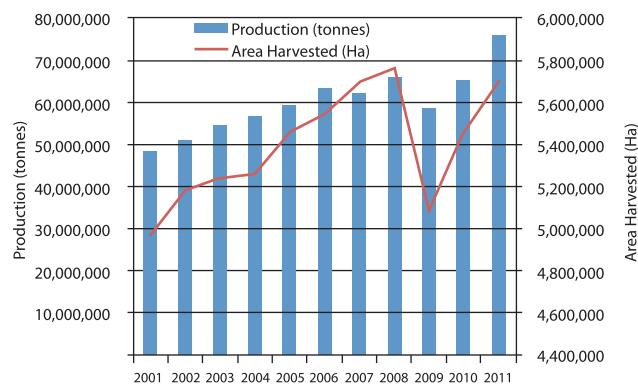
Beyond providing food, cassava also has a significant Industrial potential. Cassava can be used to produce starch which is an input for many industries including textiles, pharmaceuticals, adhesives etc. Cassava can also be used to produce alcohol and fructose. However, only 5-15% of the region’s cassava output is used for industrial purposes (mainly for animal feed). In contrast about 50% of Brazil’s cassava output is used for animal feed.

Success of countries like Brazil shows that development of cassava as an industrial feedstock can provide an important avenue for value addition and job creation.

Trends

The growth of cassava production in the region has risen by about 60% between 2001 and 2011, mainly driven by both area expansion and also yields. The yields have risen by about 37% over the period to reach 13 tons per hectare in 2011. While this is commendable, yields are still way below potential. Indian yields, at 26 metric tons per hectare, are double the region’s. Indeed various varieties developed by research institutions in the region have yields that range from double to triple the yields being achieved currently.

Cassava Production Trends (2001 - 2011)



Source: FAOSTAT

Cassava can play a significant role in the region's future as a continued provider of calories but also as base for transforming the economies (see next article). However the crop faces many challenges that need to be addressed before it plays that role. The challenges are: lack of yields improvement, market access and diseases.

Yields

Cassava is mainly grown as a food crop and thus seen as a subsistence crop rather than as a cash crop. As a result, it is not given much attention. Cassava also has a bad image as a crop for the poor which has led to further marginalization.

As a result cassava yields tend to be low and thus expensive for processors; food and especially industrial processors. Finding a way to achieve increasing yields of cassava may perhaps be that singular action which could have the biggest impact on cassava farmers. A number of initiatives to enable this have been undertaken. The Unleashing Power of Cassava in Africa (UPoCA) initiative IITA has helped farmers in Nigeria double the yield of cassava through distribution of improved cassava varieties. Nestle Nigeria is providing cassava cuttings to networked farmers and also facilitating on farm experimental trials on resource use efficiency.

A critical factor to raising yields is availability of processing technologies. Cassava needs to be processed within 24 hours of harvesting, otherwise it spoils. These are labor-intensive activities and raising yields just means more labor requirements. Harvesting and processing and marketing of cassava is mostly done by women whose supply of labor is limited (given other chores). Therefore it has been found that the presence of high-yielding varieties has not necessarily led to adoption without the necessary investments to reduce the labor burden of increased yields. The success of uptake of higher yielding varieties in Nigeria has been complementary increasing in

processing capacity. For instance the success of UPoCA in Edo state could not have been sustainable without the intervention by BAT Foundation (BATF) donation of processing centres.

The critical link between improving cassava output and having the processing technologies in place has now been appreciated and there are now initiatives being implemented that are putting processing technologies in the hands of farmers. The Songhai Center is leading one such effort to help improve post-harvest quality and packaging of rice, sorghum/millet and cassava products to enhance marketability. The initiative aims to strengthen capacities of target groups to enable them adopt efficient processing techniques, whilst facilitating processors' access to the acquisition of simple processing equipment through linkages to relevant institutions. Target countries for cassava processing are Benin, Togo, Nigeria and Ghana.

Desperately Needed: Technology for peeling cassava

While many aspects of cassava processing can be mechanized, peeling has yet to be mechanized. This is due mainly to shape of cassava which is so irregular. As a result peeling is done manually; a process that can be very wasteful and can lead up to 15% losses. To reduce waste the GRATITUDE project in Ghana is experimenting with making compost from cassava peels to produce mushrooms.

Market Access

The key to commercializing cassava is product development. A number of initiatives to develop support for cassava processors have also been undertaken:

- The Common Fund for Commodities (CFC) initiative has focused on increasing market access and developing cassava processing centers in Nigeria, Republic of Benin and Sierra Leone. These centers serve cassava growing clusters and provide a market outlet for farmers. At the centers, several products are produced and packaged for the market. The centers also offer training on product quality improvements. This project has also provided farmers with high-yielding and pest-resistant cultivars and knowledge transfer.
- Ghana Good Practice Centres (GPCs) is an intervention targeting processors so that they can enhance their products and thus increase market access. Processors are trained in quality control, packaging and labeling. They are also provided support in installation of equipment. The intervention has seen demand for products go up and new markets in Benin, Mali and Burkina Faso.

- IFAD cassava programs in Benin, Ghana and Sierra Leone seek to improve yields coupled with a region wide effort to address processing and marketing challenges. In Ghana it has established 35 farmer schools focused on teaching groups of farmers (mainly women) how to plant new varieties and at the same time getting commitment to the participants that they will pass on their knowledge to other farmers in the community. Through the program 760,000 farmers have planted new varieties. The programs have also helped farmers diversify their incomes by training cassava processors including bakers and pastry makers on different uses of cassava. 40 demonstration centers equipped with stoves and modern processing equipment have been established. Through the program eight recipes have been developed and market-tested.

However increasing yields and providing processing equipment and product development support is not a panacea for commercialization. The success of Ghana's Good Practice Centres (GPCs) implementation saw many entrepreneurs invest in processing equipment; however the increasing supply in response to demand saw prices fall and farmers in return cut back supply leaving many investors with unused processing capacity. Balancing supply and demand is thus critical. Farmers need guaranteed market and price to supply a consistent amount. The Cassava+ initiative, aware of this has taken a more holistic approach. Cassava+ is a public-private partnership financed by the Netherlands government and implemented by the Dutch Agricultural Development and Trading Corporation (DADTCO), IFDC. It aims to shift cassava from its current status as subsistence crop to a cash crop. It is doing so by creating stable markets to reduce uncertainty and thus induce farmers to produce more. It is also deploying Autonomous Mobile Processing Units (AMPU's) to reduce the processing burden that comes with increased output. AMPU can move to areas where cassava is being harvested, reducing the distance farmers need to travel to reach a processing centre. The project has created a guaranteed purchase program for farmers who process their cassava through the local AMPUs. Farmer education and involvement of input suppliers increasing access to quality inputs yield are also expected to rise from 13 metric tons per hectare to at least 23 metric tons per hectare. This will translate to about a 62% rise in incomes.

Disease

The cassava crop is increasingly being threatened by diseases. There is fear that the virulent Cassava Brown Streak Disease (CBSD) is spreading to the region from East Africa. This rapidly proliferating plant virus is feared

could cause a 50 percent drop in production of a crop. Other diseases that are causing concern include Cassava Mosaic Disease (CMD). Efforts to control them have included encouraging farmers to use disease-free planting materials; there are also efforts to develop disease-resistant varieties.

Despite the many initiatives, farmers have tended to still be risk-averse. Farmers are likely to adopt low-cost innovations like proper spacing and ridging in planting but not high cost changes like use of fertilizers and improved varieties as trust has not been fully established especially in respect of guaranteed markets and price. New initiatives are now looking at implementing incentives to increase inputs including mechanization vouchers (similar to fertilizer vouchers) and pre-packed planting materials of improved varieties.

Impact on the poor

Increasing yields of cassava and increasing processing will impact the poor in two main ways: it translates into increased incomes for farmers as well as increased food supply. As food supply however, cassava is relatively inferior as provider of proteins and other critical nutrients. A typical cassava-based diet provides less than 30% of the minimum daily requirement for protein and only 10%–20% of that for iron, zinc, and vitamin A. In areas where cassava is a staple food and the diet is not balanced with other supplementary foods, people (especially children under five) are at risk of developing kwashiorkor, a severe health condition brought on by malnutrition. This deficiency can however be partly mitigated by consuming the cassava leaves. Cassava leaves are good sources of vitamins A and C, iron, calcium, and protein. Notwithstanding this it is important that other sources of protein foods such as beans, fish and meat should be used to balance the diet of people who use cassava as a staple food.

To overcome some of the challenges of cassava especially lack of key nutrients and increasing susceptibility to disease, there are efforts to produce genetically modified varieties of cassava. Scientists in the region have expressed confidence in the technology but consumer sentiment is still one of caution. The BioCassava Plus (BC+) program has employed modern biotechnologies intended to improve the health of Africans through the development and delivery of genetically engineered cassava with increased nutrient (zinc, iron, protein, and vitamin A) levels. Additional traits addressed by BioCassava Plus include increased shelf life, reductions in toxic cyanogenic glycosides to safe levels, and resistance to viral disease. The program also provides incentives for the adoption of biofortified cassava. Proof of concept was achieved for each of the target traits.

Results from field trials in Puerto Rico, the first confined field trials in Nigeria to use genetically engineered organisms, and ex ante impact analyses support the efficacy of using transgenic strategies for the biofortification of cassava.

A more practical approach being adopted in Sierra Leone is the fortification of cassava using locally available animal and plant protein sources e.g. cassava egg roll. IITA has produced a booklet on recipes and also trained processors on developing these products.

Another challenge is the sharing of benefits of increased yields and market access. Cassava has traditionally been a woman's crop; however it has been seen that as processing technologies are adopted, men tend to get more involved and capture a disproportionate share of increased benefits. So it is important that processing technologies are gender sensitive. Also, traditional perceptions that tend to associate equipment operation with men should be changed so that women can capture the benefits that come with processing.

Cassava Revolution in Cote d'Ivoire

Cote d'Ivoire has seen a kind of green revolution in cassava production. Use of improved varieties has led to a rise in cassava output. Yields have risen from 5 tons per hectare using local varieties to between 32-34 tons per hectare using improved varieties. Women, who mostly grow and process cassava, have benefited as a result. Women could benefit even more from this "revolution" but they face traditional constraints – mainly access to land; and they are fighting so that their husbands and parents can grant them more rights.

As cassava production has risen with introduction of new varieties, new markets have been developed in the sub-region especially in Mali and Guinea. Cassava processing has become a permanent job for many women. It is rapidly replacing coffee on farms.

However, it is not all rosy for cassava. In Southern Cote d'Ivoire Cassava is being replaced by rubber which has better returns and more regular income flow than cassava: rubber can be harvested 10 months in a year for 40 years. The political instability of the country has also prompted people to invest more in perennial crops. However this is having a negative impact on women as cassava is a "women's crop" while rubber is a "men's crop". Even more women – beyond those in farming and processing – are suffering for this because women traders also dominate the cassava supply chain; and are having to bear higher transportation and search costs to locate cassava suppliers. The result is that price of cassava balls have risen from \$0.5 to \$0.8, impacting negatively on farmers.

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The Emergence of the West African Cassava Dish

There are several ways to prepare cassava into household dishes. Some of the simpler ways include: boiling, roasting and baking. However, across the region various traditional processing methods have resulted in localized cassava dishes that have unique taste. Even within a country, processing and preparation methods can vary greatly, creating unique regional recipes resulting in highly localized processed cassava markets. The Table below shows some of the common dishes in various countries.

| Country | Traditional cassava food variety |
|---------------|----------------------------------|
| Ghana | Fufu, Kokonte, Banku, Gari |
| Nigeria | Gari, Eba, |
| Cote d'Ivoire | Attiéké and Attoukpou |
| Togo | Tapioca |
| Sierra Leone | Garia |
| Liberia | Dumby |

At the same time cassava suffers from an image problem as it is seen as the poor man's food. In some countries cassava-derived food have derogatory names. For instance in Ghana Kokonte, a common food derived from cassava, is also called "Face the Wall" to denote that people eating it (in local restaurants) sit facing the wall so that they cannot be seen as it is a lowly food.

These two "problems" of cassava can mean that commercializing cassava could be a challenge. However, cassava seems to be overcoming these barriers and regional cassava dishes that are consumed across the socio economic spectrum are emerging.

Gari which is the quintessential Nigerian cassava dish is rapidly becoming the default cassava dish across the region. It is now well established across the region. Attieke, the Ivorian way of preparing cassava,

is also becoming a West African dish. Some of the drivers of this trend include the following:

- *Urbanization and regional travel* has seen dishes travel with various peoples and new tastes introduced in new places to gain popularity.
- *Convenience*: Gari has proved to be particularly resilient in both rural and urban areas, competing effectively with rice and maize – the key growth staples. The success of gari has been mainly due to its convenience, storability and price. Gari is pre-cooked so it requires very little final preparation. As such it has proved popular in urban areas where time for preparation of meals is limited. In rural areas where fuel is becoming expensive due to scarcity of firewood it is also becoming popular as a saver of fuel. Tapioca, which is common in Togo, is also making strong inroads into Accra markets in Ghana. The tapioca sold in Accra comes from the Volta region which borders Togo. This product is popular with boarding school students as it is easy to prepare (just mix with water, milk, and sugar and it is ready to eat) and can also be stored for long without spoiling.
- *Entrepreneurship*: A "gari enterprise" is emerging with huge trade in gari being recorded. Gari entrepreneurs have been very savvy in developing Gari varieties that meet emerging needs and seeking markets outside the localities. Regional trade in Gari has been growing. Sierra Leone's monthly gari exports to Guinea exceed 1,000 tons. 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.
- *Commercialization Innovations*: New models for commercialization are also keeping the cassava dishes competitive. In Cote d'Ivoire, Attieke processing units are being set-up. These are shops that are organizing along the different operations needed to prepare the dish.

The different units will take care of cassava peeling, grinding, fermentation, wringing, grain making, pre-drying, cooking and packaging. A unit can produce at least 500 kg of attieke per day. The attieke produced can be stored for a month. The Common Fund for Commodities is also helping establish cassava processing centres in Nigeria, Sierra Leone and Benin. This is helping boost utilization of cassava. In Sierra Leone gari is now competing with rice and to the extent that WFP is now also purchasing Gari for its school feeding program.

■ *Knowledge diffusion:* The trend towards regionalization of cassava dishes is being accelerated by the diffusion of skills across the region through regional exchanges. For instance the Kobinkalé association in Burkina Faso has initiated cassava processing training for the members of the association. For two weeks more than 150 women from 16 villages were trained by an expert from Côte d'Ivoire to transform cassava into attieke, gari, tapioca and cassava cake. Similar training has also happened in Mali and women who used to go and buy attieke in Côte d'Ivoire for resale in Mali are now able to manufacture it themselves.

■ *Rise in food prices:* The recent spates of food price inflation in world markets has also influenced the spread of regional dishes. In Guinea attieke is becoming popular as people look for alternative to rice that is becoming unaffordable. Similarly in Mali attieke is growing popular, especially as a breakfast cereal due to its lower cost compared to other cereals.

■ *Innovation in Recipes:* New recipes that combine different cassava processing traditions are also emerging. In Benin a dish that combines methods of attieke and gari has been developed and a new dish known as Attieke-Gari is gaining popularity.

Looking Ahead

These trends are likely to accelerate and ultimately create regional markets for processed cassava. Indeed companies that are packaging cassava pre-cooked meals are emerging. So we now have instant fufu-flour and packaged gari etc.

While in the short run, the trends bode well for women and small traders who are capturing most of the market it is likely that as regional cassava dishes are established the formal (cassava) sector which is small for now will become more aggressive and capture a larger share of the market on account of

better logistics as well as packaging and marketing support. Indeed instant fufu flour is exported to the USA, UK, Ireland, and Italy by the more formally established enterprises to serve the West African diaspora.

It is also likely that as the market for pre-prepared cassava dishes becomes bigger, they will attract greater regulation due to health concerns (especially in urban areas). Many of the traders will be hard-pressed to comply with stringent health requirements that guide food trade. Indeed the quality of products in Sierra Leone and Bénin are low limiting their public acceptance.

There is little or no product quality control or standards to ensure consistency in product quality. Attention to standards and establishment of regional standards will be important in further growing the regional trade. Equally important will be the support of small traders to meet the standards.

Interventions to help informal food traders and especially women food traders to comply with regulations and also to upgrade their products – especially packaging and developing of distribution systems – are needed if the emerging opportunity is to be captured by these groups.

Unless the informal cassava processors/traders and especially women traders/processors are able to organize themselves in a manner as to be able to compete with formalized and well capitalized food processing firms, they will lose out on this emerging opportunity which will only grow bigger with urbanization.

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Cassava

The Industrial Transformer?

The nature of cassava provides two important paths for economic transformation. On the one hand, cassava needs to be processed rapidly once it is harvested. Therefore a vibrant cassava sector requires complementary cassava processing equipment. Cassava processing thus provides a base for developing a local equipment fabrication sector. On the other hand, cassava has numerous industrial applications meaning that it can be a base for many industries. Industries that utilize cassava feedstock include adhesives, pharmaceuticals, paper industries, wood industries, textile, ethanol, breweries among others. These two levers can be a basis for industrial transformation led by cassava.

I. Homegrown cassava processing machines industry

Cassava requires immediate post-harvest processing to preserve it; and turning it into food and industrial products requires even more value-adding processing. The key processing equipment for cassava are graters, pressers, fryers, grinders, dryers, millers, boilers and fermenters.

These are fairly simple machines which render themselves easy to fabrication by local craftsmen, given the right support. A study by IITA in Nigeria found that 66% of the enterprises fabricating machines were small scale. Being a sole proprietor and the availability of spare parts had the greatest influence on production of cassava processing machines.

There are a number of interventions being undertaken in the region to catalyze the growth of cassava processing equipment fabrication industries.

- In Ghana, International Fund For Agricultural Development (IFAD) has been training local equipment manufacturers to make, sell and repair equipment for local processors at a low cost.
- In Sierra Leone, International Institute for Tropical Agriculture (IITA) is training would-be processors in

trouble-shooting and using locally available processing equipment

- In Nigeria IITA has pushed for formation of a Cassava Equipment Fabricators Association to serve as a platform for advocacy for the nascent industry

Experience in Nigeria which has a vibrant and competitive equipment manufacturing sector shows that this is an opportunity that is available. Indeed Nigerian manufacturers have become so competitive that they are starting to export cassava processing equipment. The epitome of Nigerian growing expertise in this area is a 10 tons per day mechanized Gari plant designed at Federal Institute of Industrial Research (FIRO) and now licensed to Newell Dunford, UK, for the purpose of commercializing its production for sale in Brazil, Ghana, Sierra-Leone and royalties paid to the federal government.

Other countries in the region can replicate Nigeria's success in developing cassava processing equipment manufacturing industries. But for this to happen, technology transfer will be critical. This challenge is being addressed by African Agricultural Technology Foundation (AATF) which is coordinating a new project known as Cassava Mechanization and Agro-processing Project (CAMAP). The project aims to negotiate access and transfer of cassava mechanization and agro-processing technologies for use by smallholder farmers and also build capacity of local entrepreneurs to design prototype machines, and manufacture, maintain and repair the necessary equipment for cassava planting, harvesting and processing. AATF has to date managed to negotiate and access cassava mechanization technologies from Brazil. It also plans to partner with government agencies responsible for cassava development as well as with private sector players in the respective countries in order to build strong public-private partnerships to ensure project sustainability.

Impact

The emergence of the Cassava processing equipment industry has had positive impact on the rural economy, by creating jobs and skills – skills that are transferable to other industries and thus useful for development of other light industries.

Beyond creating direct jobs and skills the utility of the machines is huge. Machines save processors significant labor. For example, compared to manual processing, use of machines can save \$92 per one ton of fresh cassava processed into gari. More significantly, they also free women from the drudgery of processing to focus on other activities.

Importantly, processing machines are key to improving cassava yields. The sustainability of adoption of improved varieties in Nigeria was significantly influenced by the availability of cassava processing machines especially graters. The payoff of adoption of both improved cultivators and processing technologies is also significant. An IITA study calculated the benefit at \$4090 per hectare compared \$1500 per ha for non-adopting farmers.

However, there is need for caution because the introduction of machinery – while lowering labor demand and increasing incomes – is not gender-neutral. Men tend to capture more of the benefits. This is due mainly to low purchasing power of female processors in the acquisition of the appropriate equipment (pressing machine, graters, grinders) and association of machines with men. In appreciation of this, some interventions are being undertaken to help women to participate more effectively in the industry:

- In Togo, the French government has financed the construction of production facilities, shops and other equipment such as presses and mill for women cassava processors. This has been combined with training sessions for women in technical production, processing and marketing of cassava. As a result, the women have doubled their production of Gari and Tapioca, and are now able to export to Burkina Faso and Benin.
- In Benin, the Intervention Centre for Development in collaboration with the Association Planet Emergency has set up a project to help increase cassava production and its mechanization. The project will directly affect hundred and forty (140) women cassava producers and processors.

II. Cassava Feedstock Powered Manufacturing

Governments in the region have embarked on ambitious programs to make cassava an industrial base. Ghana and Nigeria have been at the forefront of this with both countries having promulgated presidential initiatives on cassava to spearhead the transformation. These efforts have yielded different fortunes.

Ghana's inaugural effort under the presidential initiatives saw the launch of a number of cassava-based industries. Under the initiative the flagship Ayensu Starch Company (ASCO) was established in 2003. This factory has since ran into difficulties and is currently not operating. ASCO has been crippled by many challenges: unreliable electricity and numerous power outages have damaged machineries yet spare parts and expertise to repair the damaged machines needed to be imported from Denmark at cost which the company could not afford. Worse, farmers could not consistently supply the needed quantities of cassava required to keep the factory running at full potential; a problem that contributed to inefficiency and losses. IFAD is now working with farmers in ASCO area so that they can form outgrower schemes that can help farmers deliver larger quantities of cassava more efficiently.

Nigeria's presidential initiative has had a better outcome and is still being pursued under a third president (see box). However it has been impacted by inconsistency in policy which has made investors wary. Under the current drive to industrialize cassava, Nigeria is pushing for increased investment in the private sector. It has already succeeded in attracting an investor who is looking at investing 6 billion US dollars to set up ethanol plants that will use cassava (see box).

Areas that are attracting investor interest include High Quality Cassava Flour (HQFC), starch production and ethanol production.

High Quality Cassava Flour (HQFC)

Many countries in the region are now promoting inclusion of cassava in bread using High Quality Cassava Flour (HQCF). This is being promoted in Sierra Leone, Ghana, Benin and Nigeria. The expectation is that this will not only save countries substantial foreign exchange but will boost demand and help establish an industrial base to produce High Quality Cassava flour. The most noteworthy initiative is the Cassava: Adding Value for Africa (C:AVA) Project supported by the Bill and Melinda Gates Foundation. The aim of C:AVA is to link small scale producers and processors to growth markets for their products through small and medium scale enterprises. This project is being implemented in Ghana and Nigeria. To date the project has benefited close to 15,000 farmers

in Ghana, helping them earn over GHc1.5 million (about \$800,000) through access to new high value markets.

Starch

In Côte d'Ivoire Nestle is shifting to using cassava starch instead of imported maize starch for manufacture of its maggi seasoning product. In partnership with the International Institute of Tropical Agriculture (IITA) in Nigeria and the Suisse Center for Scientific Research in Abidjan (CSRS) a new variety of cassava has been developed which can yield 30 tons per acre and will be used by Nestle for its Maggi. To ensure sustainability, Nestle has set up a structure where 80% of their production goes to the company and 20% to the local market for attieke and Placaly (fermented cassava dough). This is having positive impact on 4000 farmers, most of them women.

Cassava Ethanol

Cassava ethanol is the epitome of the cassava-based industrial cluster. One hectare of farmland cultivated with cassava is able to produce on average 6,000 kilograms of ethanol. The closest competitor in terms of efficiency is sugar-cane, which can produce 4,900 kg of ethanol annually per hectare while one hectare of corn only produces 2,050 kg of ethanol per year. Ethanol made from cassava costs US\$0.68/litre while molasses-based varieties cost US\$0.87/litre. Indeed experts estimate that cassava ethanol is commercially viable when oil is above \$38 per barrel. This opportunity is starting to interest investors and governments in the region are making efforts to capture it:

- On 23 November 2012, PANGEA (Partners for Euro African Green Energy), COTRAME, SAPHIR HM (and the Ministry of Environment and Sustainable Development of Côte d'Ivoire (DG Sustainable Development) signed an MoU to launch a public private partnership which will promote the production of ethanol from cassava.
- In Togo, the government has signed an agreement with banks to support Roots Plants and Tubers. This agreement will facilitate groups' access to credit as well as strengthen their production, processing and marketing capacity. This project aims to promote the cassava sector and improve the purchasing power of the groups in the village. The banks have already given to cassava producers a loan of one billion CFA francs. Farmers will sell at least 25,000 tons of cassava to the Sino Togo Company (Sinto) which will transform them into alcohol and biofuel.

- Caltech Ventures, an integrated industrial cassava estate has plans for production of 10 metric tons of cassava flour daily for production of ethanol. It plans to export 60 percent of the six million liters of ethanol to be produced yearly. It also has a cassava out-growers scheme to provide the needed raw materials. The project will provide up to 600 jobs when its ethanol plant comes to full production.

The Future

Developing rural light industries to support farmers and cassava processors is a good path for rural transformation. Skills in fabrication of simple cassava processing machines are likely to be transferable to developing tools for other rural needs including developing and maintaining other farm tools. More importantly, developing local skills demystifies technology and innovations, and creates a population that is more receptive to innovations. The fact that Nigeria is now becoming an exporter of cassava processing equipment is a testimony to the ingenuity that can be unleashed by supporting this sector.

The drive for industrialization based on cassava is likely to be a problematic journey. As the failure of Ayensu Starch Company in Ghana has shown, it takes more than investing in factories. First and foremost, a strong supply chain that can guarantee cassava supply is needed. Another key to success in manufacturing is keeping costs down and this inevitably means lowering input costs. For farmers to benefit, yields must go up and processing and logistic costs be lowered. Current farming models have not been able to do this and as a result investors are unlikely to put in the needed manufacturing infrastructure.

It is also important to develop skills in the area of complementary inputs. Factories require spare parts as well as skilled people to run and maintain them. Without these, factories can remain closed as they wait for some expertise to be imported to make minor repairs as has been the case of Ayensu Starch Company. Efforts at upgrading skills must be taken in tandem with any cassava strategy.

A good policy is not enough; policy consistency is critical because once investments are made, they are sunk costs. No country in the region has yet to demonstrate the ability to develop and consistently implement a strong industrial policy. The bane of Nigerian industrial policy has been inconsistency. Unless this capacity to formulate and implement policy and a political will to see it through is developed a cassava-based industrialization dream will remain just that; a dream.

Nigeria's Cassava Policy

Nigeria has been most proactive in trying to develop a cassava-based industry and has developed an industrial policy under two presidential initiatives. The opportunity for cassava-led industrialization is huge. For instance, Nigeria spends close to N635 billion (about \$4 billion) on importation of wheat for bread and other bakery products. A significant part of the wheat import can be substituted by cassava flour. Mandating use of cassava in bread has been the key plank of Nigeria's cassava-led transformation drives. Two presidential initiatives have been launched to facilitate this.

In the first iteration of this policy under the Obasanjo administration, the government mandated a 5% inclusion of cassava flour on bread to boost demand and processing of High Quality Cassava Flour (HQFC). The government also banned the importation of cassava products to encourage local sourcing.

This policy resulted in significant investment especially by small cassava processors. 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 the youth, technicians, professionals, and artisans. There were also substantial investments in new factories for the manufacture of glucose syrup, starch, and HQCF. However under the succeeding administration of Yar'Adua, the requirement for bread was reduced to below 5% and cassava import prohibition on cassava products lifted. The result is that many of the establishments suffered. However bread flour suppliers had complained that many of the cassava processors could not supply quality cassava flour and had reduced intake even before the reduction of the mandate.

There is a new round of effort to encourage inclusion of cassava in bread.

The current mandate requires bread makers to include at least 20% cassava flour in bread. However, this law has met stiff opposition from bread manufacturers citing inability to get quality and consistency in supply as key concerns.

The flour mill industry which operates as a cartel has been very resistant to mixing wheat with cassava flour. To break their power the government is also helping create new clusters of millers through facilitating the importation of cassava mills. 18 large plants are being imported and a further 700 compact mills for milling and mixing wheat with cassava. When installed, the mills will make Nigeria the biggest processor of cassava.

There is now a strong political support for a 40% cassava flour inclusion and government is developing incentives. This includes:

- Bakeries will have 18 months to make transition and enjoy a corporate tax incentive of 12% rebate.
- All equipment for processing cassava flour will enjoy duty free importation
- Cassava flour importation will be banned
- Wheat flour levy of 65%, bringing total tax to 100% while wheat grain will attract a levy of 15%, bringing effective tax to 20%
- Reduced taxes on cassava enhancing enzymes from 10% to zero
- Planning to use part of 65% levy charged on wheat imports to create a Cassava Bread Development Fund to support the cassava value chain development. The fund will be used to train over 400,000 master bakers to produce cassava bread and R&D and bring in new equipment.

To further stimulate demand, Nigeria has also agreed with the Poultry Association of Nigeria for the substitution of 10% of maize in poultry feed; the government hopes to raise this to 50% in the future.

Nigeria plans to produce 280,000 tons of modified cassava starch by 2015 to substitute imports.

Other potential opportunities are also being explored.

- The total sugar requirement for soft drink bottlers and juice manufacturers in Nigeria is estimated at 200,000 tons of sugar per annum. High Fructose Syrup (HFS) derived from cassava can meet part of this demand. DADTCO Nigeria and SABMiller are discussing the possibility to cooperate for the production of HFS to be used in Coca Cola products. (SABMiller is the largest franchiser of Coca Cola production in Africa). HFS is a derivative of glucose syrup production.

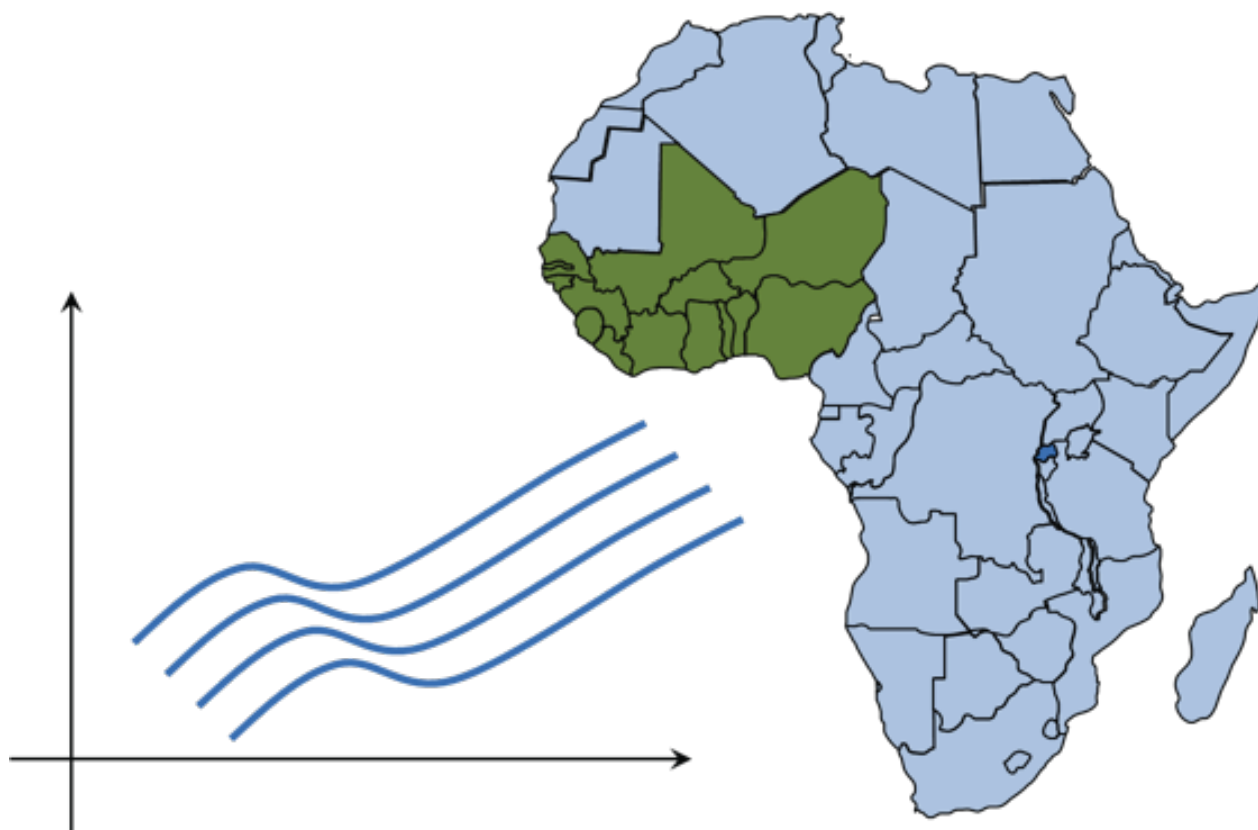
- Nigeria has adopted the policy of blending gasoline with 10% ethanol (the E-10 policy). This represents a potential one billion litres per year market of fuel ethanol; and, assuming 50% of feedstock comes from cassava, a raw material requirement of 1.7 million tons of dried chips would be required. According to the Nigeria Cassava Growers Association (NCGA), cassava-based ethanol could save Nigeria up to \$6.1 billion by 2012 by replacing imports.

While cassava has a big promise for Nigeria, the realization will be problematic as there still remains the problem of politicization of the issue. The policy inconsistencies seen in the cassava bread mandate is due to competition of various factions especially wheat importers, flour millers, and cassava processors. Corruption is also another problem. Currently there are fears that some bureaucrats are positioning themselves and their “fake” baker friends to access the cassava funds meant to help real bakers learn to make cassava bread. This is denying real bakers the opportunity to access the funds.

Beyond domestic demand, Nigeria is currently planning to export 1.1 million tons of cassava chips annually. This will earn about \$136 million. It is looking at the rapid demand for dried cassava chips in China as key driver of cassava exports.

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