

Repairing Fractured Systems for Farmers



Nigeria

Without a doubt, cassava occupies a place of honor in the agricultural and economic portfolio of Nigeria, as well as on the tables of its people. The country produces 59 million metric tons of the starchy root tuber every year, making it the largest producer of cassava in the world. Rich in carbohydrates and drought-tolerant, cassava is

mainly grown by small-holder farmers in the southern part of Nigeria, and consumed in homes across the country every day. Unfortunately, **up to 40% of this massive investment is spoilt even before it leaves the farms where it is grown because of its remarkably short shelf life.**



King of the tubers: Cassava is a prized ingredient in many industrial food products



Besides its dietary significance, cassava is a prized ingredient in many industrial products, such as beverages, glucose syrup and food flavoring to pasta, baked goods and even toothpaste. In 2015, the Sustainable Trade Initiative (IDH) and Grow Africa commissioned a study to improve understanding of the potential to industrialize cassava by identifying the market size for industrially processed cassava products in Nigeria, determining barriers to opportunities for industrializing cassava production, and making recommendations on how to overcome these constraints. The study showed that Nigeria accounted for approximately 21 per cent of the total output worldwide, grown by 30 million farmers. **Of the 53 million metric tons produced in 2013, less than 2 per cent went to commercial use, yet the country held great potential for industrialization of its cassava sector.** Constraints to development of the sector were identified as limited access by farmers to quality inputs, high cost of mechanization, therefore keeping production small-scale and inefficient, transportation logistics and fluctuating prices.

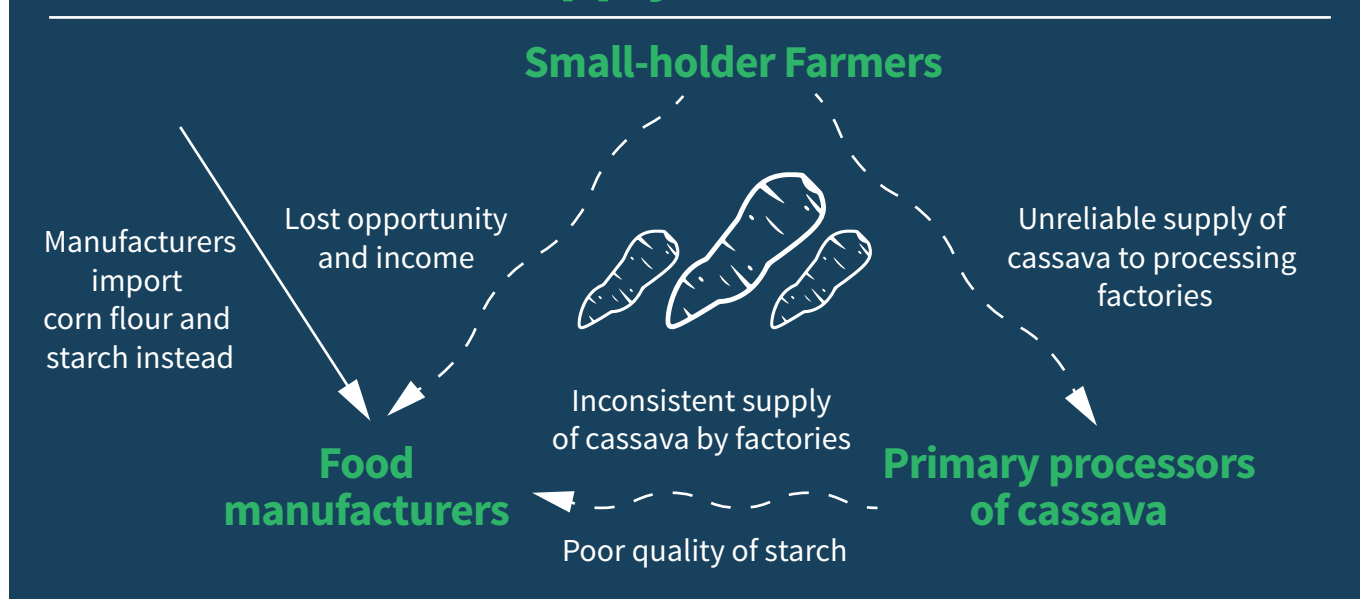
Throughout the 2000s, there was a lot of sensitization by the Nigerian Government around production of high-quality cassava flour, with the hope that it would replace wheat and be used for industrial purposes. Despite being the

largest producer of cassava in the world, Nigeria was not using the crop industrially. Yet countries like Brazil and Thailand produced less than half of what Nigeria did and converted it for industrial use.

The fragile nature of cassava means that once harvested, it must be eaten or processed within 24 hours, otherwise it begins to deteriorate and can no longer be used. It cannot be harvested and stored, but must be processed within those 24 hours. Thus, unless they have a sure market, farmers do not harvest more than they can eat; the rest is left in the ground, where roots can stay for up to three years, beyond which they become fibrous and inedible, or are attacked by pests. Some farmers choose to harvest it at this point, sometimes creating a glut with the influx of produce, or they simply leave it in the ground and plow it in with the soil as fertilizer for another crop. Whichever way, the farmer bears the loss.

Every three to four years, cassava production has experienced a glut in Nigeria, followed by a period of scarcity. For instance, in 2017 and 2018 there was a shortage, during which a metric ton of cassava fetched between N35,000 to N40,000 (US\$89.9 to 102.7). Encouraged by the high prices, farmers planted more cassava, and by 2019 there was a glut, causing prices to fall to N8,000 to N9,000 (US\$20.5 to 23.1). During the glut, processors were unable to absorb all the produce, leading to significant wastage and lost incomes for farmers, yet in the periods of scarcity, the processors struggled securing enough raw material to meet their needs. Efforts had been made by various players to mitigate the situation, including creation of bags that could store cassava, although produce could only be stored for a week. But while the bags may have helped at household level, they were impractical for factories purchasing 250 metric tons or more in a day.

Imbalanced supply-demand of cassava



The fluctuation in production created an imbalanced supply-demand relationship between small-holder farmers, primary processors of cassava and industrial food manufacturers. The processing factories could not get a reliable source of cassava; in turn, food manufacturers could not rely on local processors given the inconsistency in the production of the inputs they needed, including high-quality cassava flour, starch and glucose. The manufacturers had resorted to importing corn flour and corn starch, which are of lower quality than similar cassava derivatives. Paradoxically, there were close to 100 small- and medium-sized cassava processors in the country, but there was no market for their flour as it did not meet manufacturers' standards. High-quality cassava flour has low microbial contamination, good flavor and color retaining ability, and is rich in antioxidants, flavonoids and starch content. The flour produced by these SMEs just did not measure up. This fractured system continually resulted in losses for all involved.

For the processors whose products did meet the standards of the manufacturers, the greatest hurdle to meeting their supply targets was

inconsistent supply of raw material from the farmers.

To address this challenge, IDH in 2016 partnered with the Rockefeller Foundation's YieldWise Initiative, which seeks to reduce post-harvest loss by at least 50% in various food value chains in Africa and to increase the incomes of small-holder farmers by 15%. The Initiative targeted the maize value chain in Tanzania, mangoes in Kenya, and tomatoes and cassava in Nigeria. With a grant from Rockefeller, IDH set out to deepen industrialization in the cassava value chain in Nigeria by supporting processors to integrate smallholder farmers into their supply chain through a block farming model. By giving processors access to a consistent and reliable market, and providing training, input and financing, YieldWise aimed to reduce loss of cassava and ultimately turn produce that would have been wasted into revenue for farmers. In addition, by connecting small-holder farmers and processors, there would be more stability in the supply chain on account of consistent and sufficient supplies of quality raw material.

Through YieldWise, IDH worked with ten processors on a block farming model, in which

the processors acquired farmland close to the factories and contracted clusters of farmers to grow cassava on the land. Farmers were allocated plots of about two hectares each on average and planning was done together. Ideally, cassava should be in the ground for at least twelve months in order to produce good quality yield, so it was possible to calculate when each group of farmers needed to plant and how much of it in order for the processors to meet their supply targets.

Under the **block farming arrangement**, the processing company has full control of the land management to guarantee, not just the quantity, but also the quality of the produce. In addition, the processor provides financing and agronomic training to the farmers and surrounding communities to ensure food security. Having a ready market for their produce gives the farmers a predictable source of income translates to financial security, and enables them to improve their standards of living. The processing companies are able to continuously supply food manufacturers with the required volumes of input, stabilizing demand and supply in the

value chain. It is a win-win-win situation for the farmers, the processor, manufacturers and the reliant ecosystem. In addition, the percentage of post-harvest loss is negligible because once the cassava is harvested, it is taken straight to the processing plant, using a just-in-time approach. Each hectare produces 25 metric tons, and the two parties agree on a price for the cassava that is above the market price. The processor buys the cassava at the agreed price, say of N13,000 (US\$33.4) per ton, while cassava from anywhere else is bought at the prevailing market price – about N7,500 (US\$19.3). **IDH helped the processors to set up agricultural units consisting of crop researchers, extension officers, project coordinators and monitoring and evaluation officers who work closely with the farmers, guiding and supporting them every step of the way.**

The processors train the cassava farmers and support them in the farming process by providing mechanized plowing, high-yielding hybrid stems and fertilizers, as well as extension services. They provide them with credit facilities for inputs and when the produce is ready, it is



Margaret Awolere shows off her crop at the Psaltry Cassava nucleus estate in Ade Awaye. The block farming model has encouraged more women to go into cassava farming.

harvested, aggregated and transported to the nearby factory. For food, the farmers grow cassava on their own farms using the techniques and training they receive from the processors. Community farmers also receive extension services so that they can increase their productivity, thus ensuring food security and stabilizing the price of cassava. And, in the case of a shortfall with the block farm, the extra cassava from farmers' lots can be easily absorbed by the processors.

It was important for YieldWise that the processors had complete control of the land and the farming process to avoid the pitfalls experienced in outgrower schemes, whereby farmers sign supply contracts with the processors, but grow the crop on their own land. With the regular outgrower schemes, the processors have no control over how the cassava is produced or the volumes delivered to them once it is harvested. Farmers may use some of it for food or may end up selling it to other buyers if they are offered better prices, inhibiting the ability of the processor to supply their clients.

The quick deterioration of harvested cassava leads to massive losses if the farmers do not have a ready market for it. If it is being

transported to distant markets like Lagos, which is four hours away by road from Ade Awaye, its quality keeps falling as the starch content reduces, even before it is processed. Small and medium-sized processors have set up shop in the cassava-producing areas, but many end up shutting down again as their products fail to meet the standards required by the food industry. IDH is also working with Nestle to help these small and medium enterprises (SMEs) to raise their standards of production of high-quality cassava flour. Investing in high-quality outputs is critical because it can then be added directly to the final product, requiring no further processing by the manufacturer. On investigation, the reason for the sub-standard SME products was found to be poor equipment and too many manual processes, including peeling and washing by hand, which exposed the cassava to microbial contamination. If the quality improved, Nestle undertook to buy their products.

Process challenges



Cassava deteriorates
quickly after harvest.



Quality of cassava starch
reduces during transportation

An Insight to Opportunity

Private sector investment was critical for the success of the YieldWise model for the cassava value chain. By March 2020, the private sector had contributed US\$270,000 and committed up to US\$847,000 by 2021. One of the large processors that YieldWise worked with was Pсалtry International, located in Oyo State. Established in 2005, Pсалtry produces food-grade starch, high-quality cassava flour, laundry starch, sorbitol, glucose and animal feed. It supplies these to a host of national and global firms including Nestle, Unilever, Pepsi Cola, and Fanmilk for yogurt and ice cream, and also exports to the US and East Africa.

According to the founder and Chief Executive Officer, Ms. Oluyemisi Iranloye, Pсалtry has






Dr Foluke Adeleke, Head of Agriculture, Psaltry International in the company’s laboratory. Processors invest in research on high-yielding cassava stems.

always put small-holder farmers at the center of its business, providing them with inputs and training them on good agroeconomic practices with the aim of transforming them into commercial farmers. With the entry of YieldWise, Rockefeller supported Psaltry to further strengthen its agricultural unit, which provides extension services, mechanized support for

plowing and transport, and laboratory facilities for research and multiplication of cassava stems.

Before YieldWise, Psaltry had been working with 1,000 outgrower farmers within a radius of 20-30km from its main factory. With support from Rockefeller in partnership with IDH, the processor was able to purchase 1,000 hectares,

Outcomes at a processor level

Before YieldWise	After YieldWise
 <p>Psaltry had been working with 1,000 outgrower farmers</p>	<p>Psaltry now working with 6,500 outgrower farmers</p>
 <p>Daily intake of raw materials was 100 tons in 2017</p>	<p>Daily intake increased to 400 tons in 2019</p>
 <p>Working with farmers within 20 - 30kms from the factory</p>	<p>Now working with farmers as far as 100 kms from the factory</p>



Race against time: Cassava is offloaded in preparation for processing. The delicate crop is best processed within 24 hours of harvest.

and by early 2020, was working with 6,500 farmers, increasing daily intake of raw material from 100 tons in 2017 to 400 tons in 2019. Some of these farms are 100km from the factory and so Psaltry has introduced mini-processing plants which peel the cassava, wash, mill and dehydrate it to make cakes that are then transported to the main factory for final processing. The cakes are easier to pack and transport, as one trailer-load of cake is equal to two of cassava tubers. The partnership also gave Psaltry the impetus to open a sorbitol plant, the first in Africa and second in the world.

“We get a lot of cassava coming in every day. YieldWise has given us confidence to expand our operations because we have done a lot of work with the farmers, and we know that the volumes of cassava that we need will always come. When other processors are wondering where to get produce, we have enough the whole year

through. Our plants are working at full capacity and there is no waste of cassava because we buy all the produce that is grown by our farmers. It is especially gratifying that the support we give to the farmers has encouraged many community members to go into farming, especially women and young people.”

Increased productivity with the resulting higher income has motivated farmers to grow more of the tubers. The expanded capacity of the factory to take in more cassava, the improved farming techniques that have increased their yields (from 10 tons per hectare in 2017 to 23 in 2019) and a ready market for their produce has dramatically and positively changed the lives of farmers.

“The impact we have created in this economy is great,” remarks Oluyemisi. “The villages have power and water. In 2018, we supported 200 eye tests and cataract operations, and we gave



Psaltry Oluyemisi Iranloye: The YieldWise Project has given us confidence to expand our operations.

computers to children to encourage them to keep going to school. Rockefeller did not give money for these activities, but the grant it gave us freed resources from Psaltry for these activities in the community. More children, especially girls, are going to school, and families have food on their tables. It is deeply gratifying.”

And so, with end users of cassava derivatives now focusing more on local sourcing, sustainable industrial growth is expected to grow exponentially within the cassava value chain and to the benefit of all those who are part of it.

Rockefeller Foundation YieldWise initiative was launched in 2016 with the goal of reducing post-harvest loss in select countries and value chains by up to 50 percent. More than 40 percent of fruits and vegetables in developing regions spoil before they can be consumed.

Using a multi-pronged strategy, YieldWise sought to improve millions of rural lives by increasing incomes, increasing the availability of food and protecting finite environmental resources.

The initiative targeted tomato and cassava production in Nigeria, mangoes in Kenya and maize in Tanzania.

YieldWise Initiative in the cassava value chain in Nigeria was implemented by IDH. IDH, The Sustainable Trade Initiative brings governments, companies, CSOs and financiers together in action driven coalitions.