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to overcome poverty

Increasing Performance of the Cassava Industry in West and Central Africa Region (IPCI)

High Quality Cassava Flour (HQCF) Case Study Report for Nigeria – follow up report

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Executive summary

During the period of January to March 2016, a joint NRI and FUNAAB team conducted a follow up on Quality and Operations Management training across four out of the twenty four cassava producing States in Nigeria namely (Ogun, Osun, Delta and Kwara), with two main objectives:

- (1) Assess the quality of product being produced and the quality management systems in place; and,
- (2) Gain insight into their levels of success as measured against their target markets, factory operations, management and technology.

HQCF was the main focus of the case study as this cassava sub-sector had been struggling to take off for almost 15 years, with a significant number of processing plants not functional despite a variety of government incentives and donor interventions. Furthermore, most SMEs were struggling to meet defined HQCF quality specifications (Annex 2). In summary, no quality management systems or quality control tools were found during the baseline study. Many of the quality issues observed were due to lack of scheduling within the flour production process, lack of planned equipment maintenance, insufficient skilled labour, high staff turnover, lack of supervision on the coordination of operations, and availability of labour. Only one of the seven SMEs had a product which conformed 100% to HQCF specifications. As a consequence, the following recommendations were made in 2016:

1. Further training and capacity building in quality and operations management. This is essential if SMEs are to increase efficiency, reduce variability in product quality and optimise potential profits
2. Assistance with the procurement of quality control tools alongside further capacity building in quality management
3. A review of individual company constraints (particularly on key financial variables such as raw material) and thus longer term viability
4. An assessment of potential market opportunities (including value addition in-house), in their localities. This exercise required further field studies, and may later involve the development of business plans related to identified investment requirements. Assistance with end-user demonstrations and marketing may thereafter be delivered
5. Monitoring of fabricators/equipment manufacturers for the quality of equipment supplied and service, with periodic training for SME staff, and maintenance perhaps built into the equipment supply contract for a specified period

Operations and quality management

In 2017 with equal financial support from both the CAVA II and IPCI projects, the following quality control equipment were provided to five of the seven SMEs (two had last minute technical issues and were unable to participate), at a cost of ~\$500 per SME:

- Microwave oven
- Digital scale
- pH meter
- pH buffer (4 and 7)

- Analogue scale
- Grease gun
- Spring balance
- 200 micron sieve
- Automatic voltage regulator
- pH strips

The purpose of providing the above equipment was to assess the adoption of quality control tools when available to SMEs, and the impact of improved product quality on the business in general. The grease gun is the most easily acquired and easy to use tool for basic equipment maintenance, so was deemed useful in preventing downtime which often negatively impacts end-product quality. For example, a delay in grating peeled roots may lead to fermentation. Likewise, a delay in peeling or drying will also lead to reduced quality.

A final follow up on this intervention is expected in the latter part of 2018 under the CAVA II project, whereby impact can be assessed, and lessons shared, with opportunities for scaling out or promoting wider adoption of these quality control tools formulated. Recommendations 3, 4, and 5 above are still being worked on under CAVA II Nigeria activities and reporting structure.



Figure 1: Set of equipment provided to seven SMEs

In summary, only five of the original seven SMEs could be followed up. However, from the first field, followed by two subsequent visits, the following may be deduced:

- The production of HQCF was, in the main, not economically viable for most of the selected SMEs targeting its use as a partial substitute for wheat flour. Only two of the seven SMEs were more or less consistently (but still periodic) producing HQCF during the two/three years of contact.
- Though there have been some improvements, such as knowledge on tools available (including practices) for quality control, adhering to HQCF specifications appears to be an issue-even

with the provision of quality control equipment. This is partly owing to staff training/retraining/mentoring/incentives and lack of structure and supervision within cassava processing operations.

- Good management in general continues to be a key issue and is related to the above. The owners of the SMEs do not invest sufficiently in their staff. This is partly due to the low profits accrued by the companies with only HQCF to market. Thus a cycle of lack of incentives, high staff turnover, poor quality, is reinforced.
- The PPP with IITA on agronomy and good agricultural practices yielded some interesting results and generally had the positive impact of increasing cassava yields (by 20 and 30%) for Open Door Ltd and Whan Foods Ltd., respectively. Production costs overall remained largely unchanged. However, the availability of implements for land preparation, including authentic inputs such as fertilizers poses a problem in continued or wider adoption of these improved practices.

Follow up observations

Open Door Systems International Ltd., Iju-Ebiye, Ota, Ogun State (28th June, 2017)

Open Door active businesses include HQCF, gari, odourless fufu, fish and bottled water. During the baseline study in 2016, the company cited 3 main constraints:

1. Inability to sell HQCF owing to low price (N85,000/t as opposed to N120,000/t desired) being offered
2. The sourcing of raw material from afar, thereby pushing up transport costs,
3. Frequent truck breakdowns

As at the time of the follow up in 2017, they were producing well and retailing HQCF at N230,000/t- N240,000/t (\$768), and gari at N350,000/t (\$1140)- a significant increase and incentive. The lack of forex within the country had forced up local wheat prices, thereby making the use of HQCF as a partial substitution, more attractive to some end-users. Furthermore, the demand for traditional foods such as gari has also increased, partly as a result of this product channelled towards the internally displaced camps across the country especially in the northern region of Nigeria. It is not clear though whether this situation will be sustained.



Figure 2: Demonstration of use of equipment at Open Door Systems, Iju-Abiye, Ota, Ogun State

Quality

Product quality was assessed for gari. No HQCF was in stock for testing. The company had a moisture meter which they used for measuring flour. However, this meter (G-Won, GMK-308, Korea) is not suitable for assessing moisture in cassava wet cake. Two methods were demonstrated to assess percentage moisture in the gari- a microwave oven, and a OHAUS moisture meter. Results gave 10.6% and 9.14%, for microwave and meter, respectively (mean of 3 replicate tests).

With regards to technology, ODS maintained they have no problems. However, transportation remains a key issue as their truck frequently breaks down- partially owing to poor roads.

Raw material supply

The company was being supported on cassava production under the Public Private Partnership (PPP) component of the programme-in partnership with IITA. The PPP is focused on a selection of SMEs in Ogun and Kwara State, Nigeria with improved cassava varieties and Good Agricultural Practices (GAP), in order to reduce production costs and increase cassava yields. The company's costs of production were higher than was expected from the IITA promoted model- higher during the dry season, which the company say wasn't factored into. However, they did obtain higher yields as a result of the GAP employed. The initial yield per hectare of cassava was 10-12 tonnes within their locality. The SME has enjoyed a strong partnership with IITA, CAVA I and II, Africa Cassava Agronomy Initiative (ACAI). The interventions through, IITA, CAVA II Nigeria- ACAI areas are:

- Entrenchment of Scheduled and staggered planting for small holder farmers (SHFs)
- Good planting and agronomic practices (GAP)
- Advocacy for fertilizer application on spent lands
- Adoption of high starch yielding cassava varieties
- Use of herbicides in weed management
- Establishment of cassava demonstration plots
- partnership in land clearing(mechanization)



Figure 3: Farmers training on GAP. Source: African Cassava Agronomy Initiative (ACAI, IITA)

With the above mentioned interventions, their yield per hectare has increased by 20%. They currently use out-growers for procuring raw material, but still need to enlarge their farm and the farmers' clusters. They cite the lack of modern equipment, such as a tractor as hampering sustainable management of the scheme, along with improved practices that give rise to higher yields. They have established another field, locally, ~23 Ha in Ijoga-Orilen , they planted 7Ha of cassava farm. However, cattle trespassing is an issue, and ~15Ha of the crop was lost as a result of herdsmen

activities. They complained cassava was expensive this year (2017) N15,000/t (as opposed to N6,000/t in 2016). Thus, they are not able to currently meet market demand for their end products (insufficient cash flow). They are doing well with gari (both volume and profitability). The local cassava variety 'oko iyawo' has good dry matter content.

Matsol Farms Ltd., Siun, Ogun State (29/6/2017)

Matsol's businesses include HQCF, gari, starch, confectionery making. During the baseline study in 2016, the company cited three main constraints:

1. Inability to sell HQCF owing to low price (N85,000/t as opposed to N120,000/t desired) being offered
2. The sourcing of raw material from afar, thereby pushing up transport costs,
3. Water supply challenges as the SME buys water for processing.

As at the time of the follow up in 2017, the company were not, and had not been operational for some time-only making a few products to order. The biscuits firm (Temitope Biscuits Ltd.) they were previously supplying HQCF to have since closed down due to economic recession. The company are still having problems with water supply and still seeking a borehole. The the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) were at the time assessing Matsol's eligibility to obtain a grant and had conducted a baseline evaluation on 29/7/2017. Improving on their infrastructure was highlighted as being key in helping them to reduce their processing costs (by ~10%). Further, acquiring a pick-up truck for transportation of raw and finished goods will further decrease their costs (by ~30%).



Figure 4: Presentation of equipment and demonstration at Matsol, Siun, Ogun State

Quality

An old stock of flour was tested. The pH was 4.1%, whilst the moisture content was 11.4%. Thus the quality did not meet HQCF specifications.

Raw material supply

The company plans to engage in the government of Nigeria's new 'Anchor Borrowers' programme established by the Central Bank of Nigeria (CBN) offering 9% interest rates. Launched in 2015, the scheme is intended to create a linkage between anchor companies involved in the processing of cassava and other strategic crops, and small holder farmers. The Farmers are required to be in groups or cooperatives of between 5 and 20 members. In addition, farmers contribute less than 5% equity. Once the crop is harvested and delivered, the funds are paid direct into the farmers' account. Funds are released in tranches for clearing, weeding etc. The company believes this programme will be of benefit as cassava prices in their locality averaged N45,000/t (~\$145/t) this year. Through these linkages, they are expecting to buy the fresh roots at N18,000/t. At this price, they envisage being able to sell to flour millers at N150,000/t (\$490/t offered by FMN). The company estimates their cost of production per hectare is N250,000.

Wakilinmata Farms Ltd.. Old Jebba Road, Ilorin, Kwara State (6/7/2017)

Wakilimata processes cassava into HQCF. They have a bakery on site, Though utilizing 100% wheat flour. As at the time of the baseline study in 2016, the company cited two main constraints:

1. Inability to sell HQCF owing to low price (N85,000/t) being offered by the Flour Millers
2. The sourcing of raw material from far distances increases their cost of production,

The SME supplies HQCF to Flour Mills of Nigeria among other confectionery makers. Due to low profit recorded in the sales of HQCF, they have ceased producing HQCF and diversified into production of bread and odourless cassava fufu. This utilizes the same equipment as per HQCF processing. The odourless fufu is awaiting NAFDAC registration number. The major constraint cited was the lack of markets, owing to the delay in being issued NAFDAC certification. The SME was found to have a moisture meter donated to them by CAVA I. The moisture meter was calibrated and tested correctly. It was then commissioned for the use of the SME alongside with the additional control kits.



Figure 5: Presentation of Equipment at Wakilinmata, Ilorin, Kwara State

Wahan Foods Ltd., Afon, Kwara State (7/7/2017)

Lafun and fufu, were key products for the business as at the time of the follow up visit. The SME equally processes cassava into HQCF and industrial starch. The company cited the lack of sufficient fermentation containers as a constraint to increasing cassava fufu production. A profile of the firm is given below in terms of product volume and market importance.

Table 1: Value order of products products by Wahan Foods Ltd

Volume (mt)		Value (N)	
1	Lafun	1	Fufu
2	Fufu	2	Lafun
3	HQCF	3	Gari
4	Starch	4	Starch
5	Gari	5	HQCF

The company had since the baseline study invested in a borehole at a cost of ~ N3mil (\$9,800). The major constraint cited now was the lack of accessing formal markets, owing to the delay in being issued the necessary NAFDAC certification, required for all packaged goods. In the meantime they are serving informal markets.

Fresh cassava roots in the region, as at the time of the study, stood at N30,000 - N35,000/t (\$98-113/t). The company have 80Ha of their own land. As with Open Door Systems Ltd., they were also being supported under the IFAD PPP scheme, where 50Ha of land was allocated for management by a group of youths, but to be channelled to the SME. The manager expressed the poor management of the plantings by the group- they didn't harvest until the dry season, and also did not retain any planting material (stems), whilst the yields were low. The company want to continue to adopt the improved agronomic practices using spaced plantings. Last season, they were able to utilize a planter, which yielded good results- improving on planting populations, from 18t/Ha (before intervention) to 23.4t/Ha. The youth production scheme was set up to be monitored by both the SME and IITA. Within this scheme, N120,000 was estimated by IITA as being the cost of production per hectare. They are said to have spent more (N135,000) than this as weeding costs were higher than expected. However, they spent less than estimated in transportation and hiring the planter. Harvesting costs were lower-though this was only carried out with the variety TM419. The variety 30572 was less uniform, but higher yielding in starch and volume, but with lower disease tolerance. Within the PPP scheme, a number of agrochemicals were used. However, according to the company, these were subsequently difficult to get hold of, whilst alternatives did not always give the same performance.



Figure 6: Demonstration of equipment at Wahan Foods, Ilorin, Kwara State



Figure 7: Demonstration of the use of a grease gun in equipment maintenance

Quality

A stock sample of HQCF was tested. The pH was 5.7, particle size passed through 250mm sieve was 97%, moisture content was 10%. The product conformed to HQCF specifications.

Gonchuks Ltd., Mbiri, Delta State (3rd July, 2017)

Unfortunately, the company had not been operating at the time of the visit. Gonchucks normally produces HQCF for the flour mills and confectionery makers. The high cost cassava of tubers and the non-competitiveness of the price of HQCF by the flour millers was cited as responsible for the shut down of the factory. The factory plans to recommence operations as soon as the price of cassava drops down and the market price of HQCF is right. Also, the factory is considering diversification into other cassava products such as odourless fufu and gari. The factory equally needs running capital.



Figure 8: Presentation of equipment and training at Gonchucks, Mbiri, Delta State

Quality

A stock sample of HQCF was tested. The pH was 5.7, moisture content was 13%, slightly above tolerance, otherwise the product was acceptable.

Arogunjo Farms Ltd.(Kwara State) and Mury Murrison Ltd (Osun State)

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The other two SME's Arogunjo Farms Ltd. and Mury Murrison could not be followed up for various reasons. The former had management challenges and had temporarily ceased producing any cassava products, whilst the latter was awaiting some structural repairs to be undertaken before production could continue.

Annex I: Company contacts

No.	Company	Product range	Contact
1.	GONCHUKS AGRO PRODUCT LTD. Km 1, Agban Quarters, Off Umunede - Asaba Road, Mbiri, Ika North LGA, DELTA STATE.	HQCF	OJOBU GODWIN gonproducts@yahoo.com 08069800687
2.	OPEN DOOR SYSTEMS LTD. Km 12, Iju Abiye , Off Akinleye, Idi-Iroko Road, Ota	HQCF, Packaged Gari and Odourless fufu	Alhaji Mohammed Aderemi aderemi_1@yahoo.co.uk 08037202793
3.	MATSOL FARMS NIG LTD. Abeokuta Lagos Expressway, Siun, Ogun State	HQCF, Chin Chin, Odourless fufu and Gari	Mr. Femi Adegbite femi.adegbite@gmail.com 08068267124
4.	MURY MURRISSON LTD. Okuku, Osun State	HQCF, Odourless fufu and Gari	Pastor Olagunju 08088542047
5.	WAKILIN MATA LTD. Old Jebba Road, Ilorin, Kwara State	HQCF, Odourless fufu and Bread	Umar Kadiri umar781977@yahoo.com 08106102899
6.	WAHAN FOODS LTD. Afon Village Road, Afon, Asa Local Government, Ilorin, Kwara State	HQCF, Starch, Odourless fufu and Cassava flour	Alh. Daramola wahanfoods@yahoo.com 08033016572
7.	AROGUNJO FARMS LTD. Ogundele Village, Kwara State	HQCF, Cassava Bread and Gari	aogunjo13@gmail.com

Annex 2: Specification for HQCF

There is a specification for HQCF which has been developed and adopted by industry and the Standards Organisation of Nigeria (SON). Details below:

- ▶ Moisture 10-12%
- ▶ pH >5.5
- ▶ Cyanide (<10mg/Kg)
- ▶ Particle (<0.25mm)
- ▶ White colour
- ▶ Bland taste, not sour
- ▶ No odour that is not characteristic
- ▶ No foreign matter
- ▶ No mould, low microbial load