Oxford Global Challenges
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Tomato Value Chain in Sierra Leone
Research Findings

1. Introduction

Despite sufficient arable land, Sierra Leone imports the majority of the food consumed in the country, particularly processed food. For example, tomato paste is a key ingredient in staple dishes such as Jollof rice. While Sierra Leone grows an estimated 20'000 metric tonnes of tomatoes annually it imports all of its tomato paste, mainly from China and Italy.

After a decade of civil war and the recent Ebola pandemic, Sierra Leone' economy has been export-led of minerals, particularly diamond and iron. The local economy is weak and nascent compared to the large aid economy dominated by different aid agencies. We want to understand the gaps and complexities of tomato value chain in Sierra Leone, with goals to identify opportunities to improve farmer's livelihood and boost the local economy.

Smallholder farmers in Sierra Leone face a number of challenges, including relatively low productivity. While it might seem that a lack of appropriate inputs or agricultural expertise are the cause for low yields, it is important to note that there are some disincentives for farmers to make the investments necessary to increase their output. Firstly, underdeveloped distribution networks result in a large portion of crops being wasted before reaching the market. In the case of tomatoes which are quite fragile and have a short shelf life, this waste is estimated to be as high as 60%. Secondly, in the absence of processing facilities such as tomato paste manufacturers, farmers do not have buyers with the capacity to absorb large amounts of produce. This leads to strong price fluctuations caused by the seasonal supply of vegetables such as tomatoes.

With a small-holder farmer centred approach, we looked at the current tomato production value chain and tried to understand how the following challenges can be addressed, namely;

1. How can smallholder farmers achieve higher productivity?
2. How can fresh produce be brought to markets or buyers more efficiently?
3. How can local processing take place to produce value-added goods?

Achieving the above goals would positively impact smallholder farmers and the Sierra Leonean economy in several ways;

1. Increased productivity can help smallholder farmers to achieve higher incomes and thus improve their livelihoods.
2. More efficient logistics helps to reduce food waste.
3. Processing delivers goods with a long-shelf life and can replace imports, thereby strengthening food security and contributing to local economic development.

We interviewed, visited and researched on the existing players and initiatives that try to solve the three problems above, and their successes are varied. A number of projects by local government, established regional conglomerate, NGOs and startups have attempted to solve these problems in Sierra Leone, Nigeria and Ghana. We also draw on examples in Malawi and Swaziland from desk research.

We used four types of research methods to learn more about agriculture in West Africa in general and tomato paste production in particular;

1. In-person and phone interviews with food processors, NGOs, agriculture investors
2. On-site visits to Sierra Leone, Nigeria and Ghana (January and April 2016)
3. Work with external collaborators in Oxford (food research network at the Department of Geography) and local partners (Koinadugu Women Vegetable's Cooperative, Barefoot Women, Africa Felix juice processor) in Sierra Leone
4. Desk research and literature review

2. Research Insights

Our main insights regarding the different parts of the tomato / tomato paste value chain are shown below;

Tomato production:

- Yields achieved by farmers in West Africa around 7 metric tonnes per hectare, which is magnitudes below the productivity of the world's leading producers such as California, where yields of up to 150 metric tonnes are achieved.
- In Nigeria a company called TomatoJos, which aims to produce tomato paste for the local market is struggling to achieve yields of 20 metric tonnes per hectare.
- Tomato production is very water intensive – ideally a river is available as water source as pumping from boreholes is costly and prone to disruption (e.g. if the borehole collapses)
- Tomatoes are best grown in somewhat cool areas (e.g. higher altitudes) as hot and humid climate makes the crop prone to diseases.
- Production in greenhouses can potentially achieve higher yields and crops achieving a higher price when sold fresh – but for tomato paste production the greenhouse production is too costly.
- Expertise in the form of an experienced agronomist is critical for farming ventures.
- Most of tomato production in Sierra Leone are in the north mountainous Kabala region, done by small holder farmers, who organize into cooperatives to sell their produce.
- Three varieties are currently grown in Sierra Leone, one local and two imported varieties from Senegal. Farmers estimate at least 50% of post-harvest waste of tomatoes.

Cold-storage / Logistics

- So far we are not aware of logistics firms specialised on transporting fresh produce in Nigeria or Sierra Leone. The producers we met in Lagos (EnviroGro) have their own truck to supply to their buyer Shoprite, a supermarket chain. The Koinadugu Women's Cooperative has a truck sponsored by FAO, most smallholder farmers hire their own trucks if they can afford it.
- The lack of appropriate logistics and storage facilities results in a large percentage of produce going to waste. This is particularly relevant for smallholder farmers, who don't have the volumes / funding required to organise their own transportation.
- In Sierra Leone, FAO and IFad has supported the Koinadugu Women'S Vegetable Cooperative by supporting them with a big cold storage container, however, they did not supply the generator that would power the container, so it remains unused.
- Successful example of a logistics network is a rice company in Sierra Leone, Mountain Lion Agricultures. They have an extensive network of 5000 small holder rice farmers that supply them with rice. MLA relies on trusted local middle men to reach out to the remote farms all across the central and north Sierra Leone.
- Farmers are used to sell tomatoes in big baskets, the baskets are irregular in shape and cause a lot of the spoilage in transportation. Changing baskets into standard crates in transportation can already reduce wastage.

Tomato processing / Paste production

- Countries such as USA (California), China and Italy grow tomatoes and produce paste at a massive scale and at low margins, making tomato paste a commodity and the market difficult to enter for small players
- Even the 'small' processing machines which are commercially available require large amounts of tomatoes to run, typically around 2-3 metric tonnes per hour
- Paste production requires the evaporation of large amounts of water and is therefore only economical if electricity is not too expensive
- In Sierra Leone and Nigeria, fresh tomatoes achieve relatively good prices in the market. Purchasing tomatoes on the market for paste production is therefore not economically viable. Rather, own or contract production would be required at much lower that market cost per tonne of tomatoes
- Almost all the industrial scale paste productions in Nigeria and Ghana, including Dangote's tomato paste factory, and the GINO factory in Ghana, are importing Chinese paste in bulk to repackage and sell locally. Regional tomato production in West Africa is not yet enough to feed these factories.
- Successful examples in small-scale tomato processing to produce canned tomatoes or tomato sauce exist in Malawi and Swaziland. These products are jarred on-site by the farming cooperatives, some export to fair trade stores in the UK and US.

Marketing and Distribution

- Currently import traders control the market distribution of tomato pastes to retail vendors. They form very powerful networks that can significantly influence the market. There was a case where importers collectively lowered the price of imported rice to put a local rice brand out of business. Therefore, it is crucial to work together with them rather against them.
- Marketing channels of new products include radio, TV advertising and promotional events. Sierra Leoneans are very active on social media and love posting selfies, new experiences.

Consumption

- Currently all consumption of tomato paste in Sierra Leone are imported. The most popular brand is GINO, a West African distributor of the China-based company.
- Some imported tomato pastes are expired and may contain additives and food colouring, but there is very little consumer knowledge or protection
- A local cereal brand, Benemix is a popular local favourite, as an alternative to Nestle and Tesco brands. Their price is competitive, and cereal is more nutritious.

Policies

- In Nigeria, the government restricts the import of some agricultural produce and processed food to i) reduce the outflow of USD currency and ii) boost local producers. We are not aware of similar plans in Sierra Leone.
- In the ECOWAS region, there is no tariff to import/export raw agricultural products or processed goods between the West African countries. Thus increase in regional processing could mean a demand in tomato import from neighbouring countries.

3. Preliminary Conclusions

From these insights, we were able to draw some **preliminary conclusions**:

- **Farming**

Farming in West Africa is challenging as there is a lack of local expertise (e.g. agronomists) and infrastructure (e.g. laboratories to test water and soil). Given the demand for fresh produce, particularly in larger cities, it is financially more attractive to produce tomatoes for fresh consumption than for the production of paste.

- **Tomato paste production**
  Tomato paste is a commodity and its production is an extremely high volume, low margin business. Unless massive scale can be achieved it is unlikely that paste produced in Sierra Leone can compete against imports which are very cheap. We would therefore like to explore the production of related but alternative products, such as tomato sauce, which might have more attractive economics.
  Two other key challenges that affect almost all food processing is that of energy cost and packaging options. If there could be a way to find sustainable energy supply such as solar or biomass, it can significantly reduce cost. Most businesses in Sierra Leone outsource their packaging to Chinese suppliers, making packaging and printing locally would also solve a key pain point for processing businesses.
- **Logistics**
  The lack of logistics infrastructure leads to large amounts of wastage which reduces the earnings potential of smallholder farmers and provides a disincentive for investment to achieve higher yields. We would like to understand if there is a viable business model for Sierra Leone which connects smallholder farmers to markets and buyers in a more efficient way.
- **Import Substitution**
  Import Substitution is difficult but not impossible. The import trader networks include the Fuller Tribe from Sierra Leone and Lebanese Sierra Leoneans. It is crucial to build relationship with the importer and distributor networks and understand their incentives and not put the distribution of a local product against their interests.

We need to strengthen or build relationships with the following key stakeholders:

- **Farmers Cooperatives**
  Currently we are connected to the Koinadugu Women's Vegetable Cooperative, we understand some of their previous struggles with aid agencies and NGOs such as FAO. We will continue to explore avenues that improve the livelihood for farmers as well as build more connection to other farmers cooperatives.
- **Current Logistics Network**
  Although there isn't a formalized logistics company, there are private truck hire services and middlemen who use motorcycles and bicycles to transport on the village level. We want to better understand how this extensive network works and its inefficiencies.
- **Successful food processing companies**
  We have partnership with Mountain Lion Agriculture, a successful local rice processor, Benemix, a local cereal processor and a spices processing company in Nigeria. We are trying to establish contacts with small scale tomato processors in Malawi and Swaziland.
- **Funders**
  We will need to connect to aid organizations that administer the post-Ebola funding to make sure it helps boosts the local economy rather than going to foreign-led initiatives. We are also establishing contacts with investors interested in the region so that there will be more confidence into investing in Sierra Leone.

Meanwhile, the regional trend in the ECOWAS region is that more food processing businesses are emerging, especially in Nigerian and Ghana, which might gradually change the tomato value chain landscape in Sierra Leone.