



**Challenges and Opportunities for MSMEs
in the Vegetable Value Chain in Ebonyi State:
—Results from a Rapid Reconnaissance Exercise—**

Dr. Robert Ugochukwu Onyeneke¹, Mark Umunna Amadi¹ and Chukwuemeka
Chinonso Emenekwe¹ Ayala Wineman² and Lenis, Saweda O. Liverpool-Tasie²

¹Alex Ekwueme Federal University Ndufu-Alike, Abakaliki, Ebonyi State, Nigeria

²Michigan State University, East Lansing Michigan

Table of Contents

1. Introduction.....	2
2. Methods	5
3. Experiences of the MSMEs along the Tomato and Green Leafy Vegetable Value Chains.....	7
3.1. Producers	7
3.2. Input Suppliers.....	8
3.3. Wholesalers (Traders).....	10
3.4. Third-Party Logistics Providers.....	12
3.5. Retailers	13
4. Cross-Cutting Issues: Environment, Food Safety and Gender.....	14
4.1. Environment	14
4.2. Food Safety	14
4.3. Gender	15
5. Conclusion	15

1. Introduction

Motivation

Agri-food value chains have grown rapidly in recent decades, a transformation fueled by the aggregate investment of many micro, small, and medium enterprises (MSMEs) in the midstream and downstream of these value chains, comprising the wholesale, logistics, processing, and retail segments. These MSMEs are instrumental in Nigeria's food supply, together determining the availability, affordability, and safety of nutritious foods like fish and vegetables. At the same time, they face significant challenges that can impede their operations, growth, and productivity. Furthermore, limited attention in research and policy has been paid to MSMEs in the midstream and downstream segments of value chains. The RSM2SNF project aims to fill this gap by working with MSMEs along the value chains for fish, tomatoes, and green leafy vegetables to understand the structure, conduct, and performance of these value chains and ultimately to support MSMEs to provide affordable, safe, and nutritious foods.

Objectives

We conducted a “lay of the land” or rapid reconnaissance study for the tomato and green leafy vegetable (GLV) value chains in Ebonyi State. Our objectives were:

- 1) to understand the structure of the value chain and how actors at different nodes are related to one another;
- 2) to understand what stakeholders perceive to be the key challenges and opportunities in the vegetable subsector;
- 3) to understand how patterns vary according to the scale of the enterprise; and
- 4) to develop insights that will inform the design of a micro-level survey instrument for a “stacked survey” of the vegetable value chain.

Brief description of the vegetable subsector in Ebonyi State

Ebonyi State is located in southeastern Nigeria. It lies between latitudes 5°40' and 6°45' north of the equator and longitudes 7°30' and 8°46' east of the Greenwich Meridien (Figure 1). The state belongs to the tropical rainforest agroecological zone with an average temperature, precipitation and relative humidity of 31.32°C, 1766.86 mm, and 77.74, respectively (Onyeneke et al., 2022). The state has an estimated population of 3,221,745 in 2020 (NBS, 2018), and most of the residents are involved in agriculture, especially crop production.

In 2020, about 6,785,753 metric tons (MT) of vegetables were produced in Nigeria (FAOSTAT, 2022), whereas tomato production was about 3,294,200 MT (NAERLS & FMARD, 2020). In 2020, tomato production in Ebonyi State was 55,360 MT, accounting for about 1.7% of the national tomato production. Tomato production in Ebonyi State has increased from 2016 to 2020 (see Figure 2). However, it seems this increase resulted from

changes in the cultivated area rather than productivity improvements (yield) (see Figure 2). Tomato supply has continued to lag behind demand, with the deficit narrowing in 2020 (21.9%) relative to the 59.31% level of 2016 (see Figure 2). The World Health Organization (WHO) recommends a dietary consumption of a minimum of 400 grams of fruit and vegetables daily (WHO and FAO, 2003), for which the vegetable part of consumption should account for 150 – 225 grams of daily diet (Mason-D'Croz et al., 2019). Tomato consumption values for Nigeria are far lower than this value (Table 1), though it should be noted that tomatoes comprise only part of Nigerians' vegetable consumption.

There is potential for high returns from vegetable production in Ebonyi State, especially in Ebonyi-North agricultural zone (Osuji et al., 2022). However, to ensure sufficient production of vegetables, there must be improvement along the entire value chain from production to processing, marketing, and consumption (FAO, 2020).

This reconnaissance exercise provides information on the background, trends, challenges, and prospects for the vegetable value chain in Ebonyi State. The purpose of the survey is to support a study that will proffer precise solutions and inclusive interventions.

The survey reveals that the vegetable value chain in Ebonyi State comprises nano-, micro- and small-scale enterprises, with the majority at the nano and micro scale. There is a gap in processing with a significant challenge in storage and product handling practices. Tomato remains a highly demanded produce, but environmental issues challenge its production. However, technological know-how to adapt is well-recorded within the State. There are strong indications of market organization within the green leafy vegetable (GLV) market to control the quantity and the price of vegetables (especially fluted pumpkin leaves). Food safety handling practices of the vegetable marketers are poor. In terms of gender, women dominate one of the most essential nodes (marketers) in the vegetable value chain of Ebonyi State.

The rest of the report is structured as follows. Section 2 discusses the data collection and analysis methods in the report. Section 3 presents a synthesis of the experiences of participants in the vegetable value chain in Ebonyi State across each node. Section 4 presents a discussion of cross-cutting issues, including gender, environment, and food safety. Section 5 concludes with a summary of the survey findings.

(a) Ebonyi State

(b) Study sites within Ebonyi State*

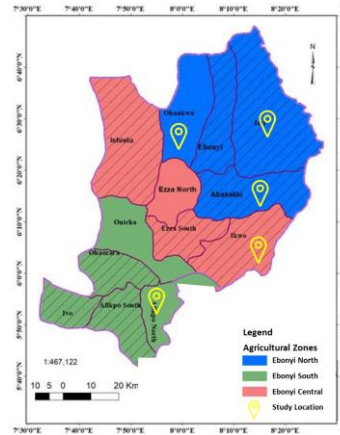


Figure 1. Map of Ebonyi State showing the areas covered

*Source: Authors' graphic based on Onyeneke et al. (2021).

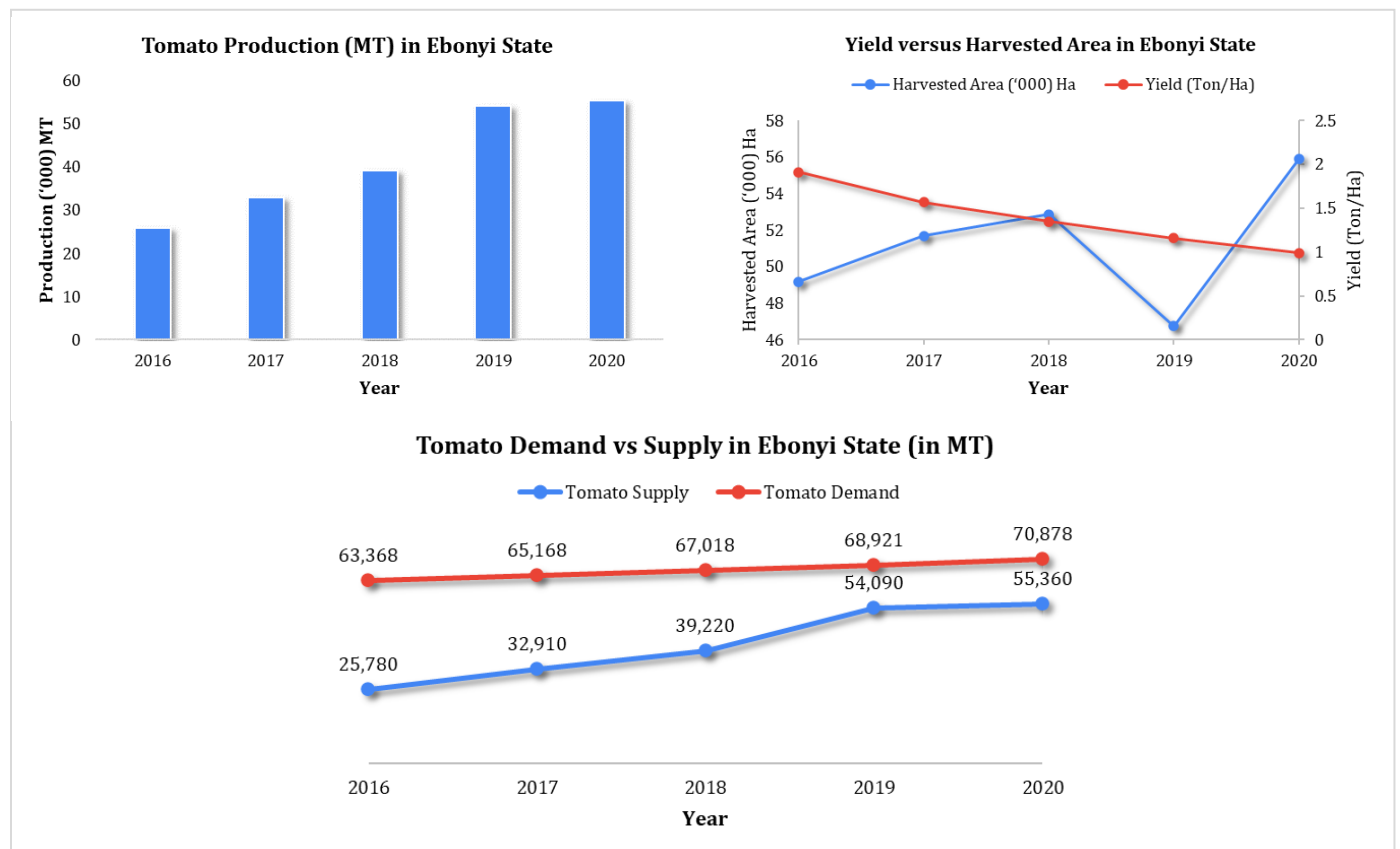


Figure 2. Tomato production and consumption statistics for Ebonyi State

Source: Authors' compilation based on data from the Agricultural Performance Survey of Annual Wet Season in Nigeria (NAERLS & FMARD, 2017, 2018, 2019, 2020)

Table 1. Tomato demand and supply for Ebonyi State

Year	Projected Population (persons)*	Per Capita Tomato Consumption (kg/year)**	Estimated Tomato Demand (tons)	Tomato Production in Ebonyi State (tons)	Tomato Supply Deficit (tons)***
2016	2,880,383	22	63,368	25,780	37,588
2017	2,962,173	22	65,168	32,910	32,258
2018	3,046,286	22	67,018	39,220	27,798
2019	3,132,788	22	68,921	54,090	14,831
2020	3,221,745	22	70,878	55,360	15,518

Sources: Authors' compilation

* Demographic Statistic Bulletin (NBS, 2018)

** Demand for tomato in Nigeria (PWC, 2018). Note that this estimate of demand in Ebonyi State assumes that residents of the state consume the average value for all of Nigeria.

***Agricultural Performance Survey of Annual Wet Season in Nigeria (NAERLS & FMARD, 2017, 2018, 2019, 2020).

2. Methods

This rapid reconnaissance survey entailed identifying the actors or nodes in the tomato and GLV value chain, followed by field visits to capture the modalities and routine organization of enterprises all along the value chain. For this purpose, key informants in the tomato and GLV value chain were contacted directly or indirectly through their unions or market associations. The field visits ensured that a tomato or GLV business is actively involved in the value chain irrespective of the scale of the business enterprise (nano, micro, small and medium). The key informant at each node was the business owner or the operational manager of the enterprise.

The survey was done by interviewing some key informants in each node of the tomato and GLV value chain in Ebonyi State. Field visits were conducted by targeting (where applicable) key informants from major vegetable markets in the state and also tracking the vegetable farmers through the marketers. Information on the activities of the enterprises was obtained from the key informants through observations and interactions using semi-structured interviews.

The nodes identified within the tomato and GLV value chains of Ebonyi State are:

- Vegetable producers (Tomato and GLV farmers);
- Vegetable wholesalers (Tomato and GLV wholesalers);
- Vegetable retailers (Tomato and GLV retailers);
- Input suppliers (seeds/agrochemicals/fertilizer); and
- Vegetable transporters.

Though vegetable processors were considered, the team could not find vegetable processors for interview. Table 2 shows the distribution of key informants according to value chain nodes and enterprise scale. Figure 3 shows the percentage distribution of

the key informants according to the scale of enterprise across the identified nodes of the vegetable value chain in Ebonyi State.

Table 2. Distribution of the vegetable value chain key informants (number of interviews)

Scale	Nano	Micro	Small	Total
Production	0	4	1	5
Marketing	22	6	0	28
Input supplier	1	11	0	12
Transporter	2	1	0	3

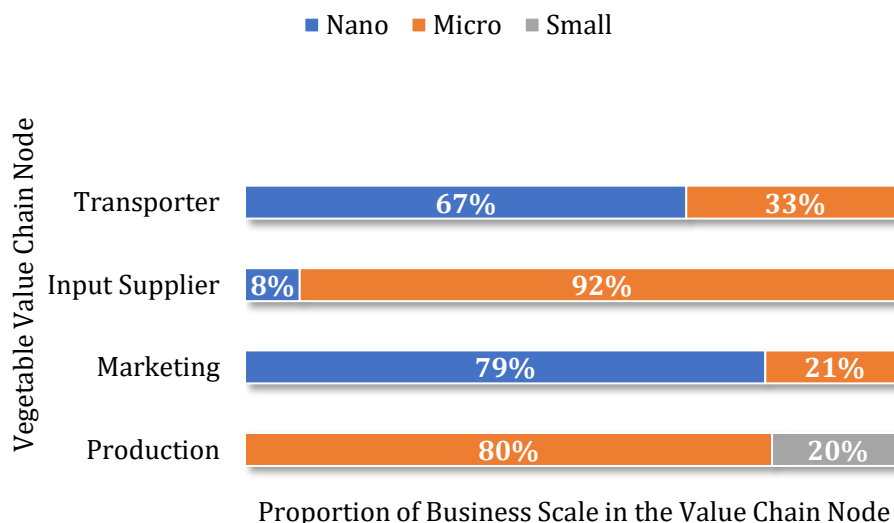


Figure 1. Vegetable value chain and the proportion of business scales in Ebonyi State

Source: Authors' compilation from field survey

The key informants provided information on their enterprises such as the number of persons working in the enterprise, the assets owned, the production and handling activities, the procurement of inputs, and the marketing of outputs. The enterprises provided historical information on the enterprise based on recall of significant changes over time in its business assets and activities.

The information obtained from the survey was recorded in Qualtrics. The data collected were subjected to analysis to inform a summary of characteristics and trends in the value chain. The qualitative data was analyzed by identifying the themes and patterns generated from the responses of the key informants. Through the qualitative analysis, we created a narrative of the status, organization, relationships, and interactions within and between the nodes of the tomato and GLV value chain in Ebonyi State. The results of the thematic analysis are expressed in the report.

3. Experiences of MSMEs along the Tomato and GLV Value Chains

3.1. Producers

- a. Tomato farmers: Commercial tomato production is not common in the state. While tomato producers exist, they require considerable capital to operate. The tomato farms are largely micro-enterprises, using mainly casual labor to augment family labor and capital at various stages of production. There are few commercial farms, some of which are known to offer training courses.

These tomato farms have the ability to produce all year round using environmentally micro-managed technologies, which was observed in about two-thirds of the producers. The farms are also in the business of producing other agricultural commodities. Their engagement in tomato production is recent, often within the last 5 years. These farms use foreign tomato cultivars (cultivars from Thailand, the USA, Benin Republic, etc.). The level of production by the farms is far from adequate to meet the demand of consumers in the state. Nonetheless some of these tomato farms sell their produce outside the state. The survey revealed that some farms make contractual agreements with supermarkets as their major off-takers and prefer to sell their tomato produce online on e-store platforms.

- b. Green Leafy Vegetable (GLV) farmers: There are various types of GLVs produced and consumed in the State (fluted pumpkin/Ugu –*Telfairia occidentalis*; Waterleaf - *Talinum triangulare*; Oha - *Pterocarpus mildbraedii*; Uziza - *Piper guineense*; Utazi - *Gongronema latifolium* ; Bitter leaf - *Vernonia amygdalina*; Scent leaf - *Ocimum gratissimum*; Garden egg leaf - *Solanum melongena*; African spinach leaf – *Amaranthus* spp.). The most commonly consumed GLV is the fluted pumpkin, a major vegetable constituent in most delicacies in the state. It is a well-marketed vegetable across southern Nigeria. Although some vegetables tend to propagate naturally or grow continuously after the first cultivation (water leaf, utazi, oha, etc.), the fluted pumpkin is a water-loving plant that must be cultivated, staked, and routinely attended to for it to grow and develop adequately. The plant's water needs at various growth stages affect its production in a state that largely practice rainfed agriculture. Commercial GLV farming in Ebonyi State is not widespread. Hence, there are different groups among the GLV farmers in the State, including:
 - Farmers practicing rain-fed agriculture. They engage in rainy-season cultivation and supply of fluted pumpkin. These groups are located in the upland, less swampy areas of the state (Izzi and Ezza local government areas). They practice intercropping of the GLV with other major crops such as yam, cassava, pepper, etc.
 - Farmers practicing dry season cultivation of GLV by riverbanks around Ikwo and Afikpo local government areas; and
 - Farmers practicing irrigation farming on smaller patches of land all year round.

Historically, the Izzi and Ezza LGAs were known to produce the GLVs predominantly sold in the local markets. Recently, there are supplies of fluted pumpkin GLV from Cross River State (Ogoja area), which neighbors Ebonyi State. The fluted pumpkin farmers in Ebonyi State were said to have faced stiff competition from the vegetable farmers from Cross River; hence they diverted their farming efforts to other crops (such as yam, rice, cassava). The Cross River farmers produce deep-green soft-leaf fluted pumpkins during the rainy season using rain-fed agriculture.

Commercial GLV farmers cultivate farmlands of 2 hectares (ha) and above; they also employ casual labor to assist in staking, weeding, and spraying agrochemicals on farmland. In contrast, most GLV farmers operate at the micro-scale of production.

Key challenges faced by tomato and GLV producers

- Tomato production, especially in commercial quantities, is rarely practiced in most parts of the state. The tomato plant needs specific temperature, precipitation, and soil conditions to thrive. The state's agroclimatic conditions do not adequately support the cultivation of tomato.
- Commercial tomato production is cost intensive. It requires a well-conditioned environment whereby all the weather conditions, including humidity, temperature, and precipitation, are ideal for cultivation. In other words, to guarantee successful production, a suitable 'micro-climate' must be created. This is often achieved using greenhouse/screen-house structures. The greenhouse/screen-house structure is quite expensive, making commercial tomato farming out of reach for most farmers in the state.
- Tomato production in the state is constrained by pests and diseases (e.g. thrips, white flies), which destroy the plant and produce and affect profitability.
- Commercial fluted pumpkin farming requires painstaking efforts, large expanses of land, and adequate water supply. Most GLV farmers in the state lack adequate land and irrigation facilities/equipment to produce on a large scale and improve their profit margins. Some of these farmers instead rely on less-input demanding GLVs (waterleaf, green, bitter leaf, etc.), which are in less demand than fluted pumpkin.
- The relatively higher demand for the fluted pumpkin vegetable variety produced in Cross River State puts the GLV farmers in Ebonyi State at a disadvantage. The stiff competition puts most of them out of business for long periods of the year.
- Seasonality in production and low profits make the GLV business an unsustainable enterprise for most farmers.

3.2. Input Suppliers

The input suppliers of the vegetable value chain include suppliers of fertilizer, seed, agrochemicals, tools, and other equipment. This group of actors in the vegetable value

chain broadly serve a wide range of crop producers. The input suppliers are involved in a cost-intensive aspect of the value chain. Their business is dominated by men, though there are a fair share of women engaging in sales, cashier, and clerical duties.

The input suppliers engage in different combinations of agro-inputs supply. The fertilizer dealers are highly needed as virtually all crop farmers apply fertilizers to improve soil fertility and crop yield. The agrochemical suppliers' sales volumes have increased because of recent adoption of herbicides and other pesticides by farmers in the state. This was not the case about 15 years ago, and the increased adoption is related to increased awareness and improved knowledge of agrochemicals, as well as the marketing activities of company sales representatives at rural locations. The seed input dealers' sales activities are relatively less for the vegetable value chain. Hence, we could not find an input dealer involved in only seed sales. The input supplier business requires good warehousing.

Micro-scale enterprises dominate this node. The input suppliers control a large amount of capital. However, their sales activities are also seasonal, primarily occurring in the rainy season/cropping season. The season of fertilizer sales is during the planting season (May-October) when the farmers are engaged in cropping activities. The sales season for agrochemicals is from the onset of the rains to the end of the cropping season (March-August), while the season of seed sales is before planting (April-June). Sales representatives from the inputs manufacturing/distribution companies engage in activities such as distributing flyers and advertorials, distribution of sample inputs, and demonstration of input use, which helps in marketing the inputs across broader and more remote areas of the state.

Key challenges faced by input suppliers

- High input cost occasioned by exchange rate volatility and import difficulties affects inputs' sales. Some of the inputs' manufacturers, especially for agrochemicals, are foreign companies, and importation challenges affect supplies. Exchange rate fluctuations affect domestic companies because they source some raw materials from abroad.
- Shortages in the supply of raw materials for agro-inputs' production challenge the input suppliers' business. The COVID-19 pandemic was a challenge, with shortages attributed to China's slowdown of agrochemical production. Access to raw materials for fertilizer production, faced by manufacturing companies since the Russian-Ukrainian war, has also been a challenge.
- Input suppliers in Abakaliki, the Ebonyi State capital (the hub of the distributor outlets), are currently facing the challenge of market relocation and private reconstruction of warehouses in new settlements without government aid. The problems are compounded by the actions of the constituted task forces charged with ejecting them at short notice.

3.3. Wholesalers (Traders)

- a. Tomato wholesalers involve groups of marketers coordinating the large-scale supply of tomatoes in the state. The continuous availability of tomatoes in the state can be attributed to the wholesalers. The tomato wholesale business is dominated by nano-scale enterprises, and women dominate ownership of wholesale tomato businesses. The wholesalers establish contacts with tomato dealers in major tomato markets in the country, from where they transport or waybill baskets of tomatoes supplied to the various parts of the state. These supplies are largely aggregated at the biggest market in the state (the Ebonyi State International Market in the capital city). Tomato wholesalers in Ebonyi State maintain a good supply of tomatoes by purchasing the products in bulk from established producer markets in Plateau, Benue, Enugu, and Cross River States. Tomatoes from Cross River State are supplied from Cameroon. The tomato supplies are seasonal, and the seasonality is related to the production timelines of the different regions. The Plateau State variety, also known as the 'UTC' or Jos tomato, has its season from November–April. The Benue State tomato season is May–September. The Enugu State (Nsukka) tomato variety season is April–September. The tomato variety from Cameroon, aggregated and sold in Cross River State (Ikom area), is considered non-seasonal. It is grown all year, but its sales in Ebonyi State are seasonal.

The tomato wholesalers provide credit facilities (trade credit) to tomato retailers. A tomato wholesaler's business entails regular trips to aggregate tomato supplies (up to 3-5 times weekly). Hence, the tomato wholesalers primarily work alone. Some wholesalers also engage in tomato retail to sell off leftovers from bulk (baskets) purchase. There are indications that tomato retailers also engage in bulk buying; this is often the case for short-distance trips (e.g., Nsukka market) during the peak of season sales.

- b. Green Leafy Vegetable wholesalers are dominated by women, and they are mainly of the nano- and micro-scale of business. While GLV production is mainly small-scale, the wholesalers provide the service of supplying GLV in larger quantities. These wholesalers aggregate GLVs at the major markets where retailers within and outside the market obtain needed quantities for sale. Given the nature of the GLV business in the state, the wholesalers can be categorized into two groups:
 - GLV wholesalers that aggregate vegetables from various farms, communities, and large vegetable markets in the northern parts of Cross River State. The GLV so aggregated are then supplied to the Ebonyi State major market. This group of market women act both as wholesalers and transporters in discharging their function in the value chain. They package the vegetables in bundles of over 100 heads/bunches wrapped in soft bags or cloth. Then they pay the commodity

transporting vehicles to bring the product down to the major markets in Ebonyi State, where the products are delivered to the next group of wholesalers.

- The second group of wholesalers are those in the Ebonyi State major market. This group off-takes the GLV directly from the suppliers from Cross River State, then immediately distributes the GLV in smaller sizes to the waiting retailers within the market and from other markets. This group of wholesalers are also known to make retail sales from the leftover GLV after the bulk sales.

The GLV marketers (wholesalers and suppliers) organize themselves into unions to coordinate GLV supplies and wholesale activities. This controlled wholesaler/supplier market system emerged within the last five years.. One distinguishing feature is that the practice ensures a major aggregation of GLV from most suppliers within and outside the state to the Ebonyi State major market, increasing supply over long periods. The system was contrived to put checks on the quantity of GLV supplied in the markets.

Key challenges faced by wholesalers

- Shortage of funds: This adversely affects regular bulk purchases by tomato wholesalers due to delayed debt repayments by the retailers. Tomato wholesalers are often constrained by funds tied down in the hands of the retailers whom they granted tomato supplies on credit. This situation inadvertently increases the cost of operations for the tomato wholesalers who must make extra trips to meet with necessary bulk purchases.
- Insecurity: Security challenges on the highways owing to banditry, terrorism, and communal conflicts, are prevalent. This is especially the case on routes leading to the country's northern region, where large quantities of tomato are purchased during the dry season. This factor increases the direct cost on tomato wholesalers, which is then passed along to the market prices and consequently leads to a reduction in sales for the marketers.
- Transport delays: This is encountered in transporting the tomato produce, leading to an increase in its spoilage before landing, thus reducing the probability of bulk sales by wholesalers. The delays are attributed to poor road networks, over-exploitation by highway security agents, and the breakdown of vehicles and/or low-quality vehicles used for transport.
- Extortion: The GLV wholesale suppliers complain of over-exploitation in transit by highway security agents, increasing their production costs in a trade with minimal profit margins.
- Low prices: The GLV wholesalers also experience low market pricing of the product, which prevails due to the high perishability of the vegetables.
- Seasonality: Seasonal challenges of the vegetable produce affect the market sales and wholesaler profit margins.

3.4. Third-Party Logistics Providers

Third-party logistics providers in the vegetable value chain are regular food commodity transporters who travel to the state to deliver products. These logistics providers do not own the products; hence, the wholesaler suppliers often contract them. The logistics providers are found at designated vegetable (tomato and GLV) supplier markets where the produce is aggregated in bulk. Hence, they plan their trips daily with the wholesale suppliers, after which they aggregate the vegetable products and deliver them to the predetermined destination markets. These logistic providers are the organized commodity transporters from all the major supply routes for the tomato and GLV produce from Cross River, Plateau, and Benue States, as well as from Nsukka.

They provide the services of loading, transporting, and offloading the produce from supplier markets to designated markets. These services are dominated by men, given the physically-demanding nature of some activities. The charges are per bag or basket of the commodity (based on the sizes). Standardizing the GLV produce charges is more difficult for the transporters (due to size variations). They also help transport the wholesale suppliers. Their contractual arrangement ends as soon as they offload the products at the delivery market. The third-party vegetable logistics providers also offer credit services for transporting the produce, receiving payments soon after the wholesales are made. This is more common in the GLV transportation business.

Over the years, some of these transporters have increased the number of vehicles used for the trade. Some of the transporters operate on hire-purchased vehicle arrangements. The logistics providers operate most often at nano and micro-scale levels. Due to the nature of the business, these transporters primarily work alone or with help. The more common logistic providers are transporters who solely drive their commodity supply vehicles and handle most loading and offloading activities or use available casual workers. Hence, the workforce of this category of persons is small, and just a few possess the capital to own more than one delivery vehicle.

Key challenges faced by third-party logistics providers

- The logistics providers sometimes offer credit services to transport/deliver the perishable produce. However, wholesale marketers often delay in repayment, which affects the transporters' business. The GLV transporters sometimes have to delay other activities to wait and prevail on the wholesale suppliers while making sales to recoup their funds.
- The transporters experience over-exploitation by highway security agents. These security agents capitalize on the excessive luggage (above the carrying capacity of the vehicles) to collect excessive fees/fines from the transporters.
- The logistics providers face a high cost for vehicle maintenance as they frequent the highways with excessive cargo. The physical and mechanical conditions of the

vehicles depreciate rapidly with the poor road networks, and their lifespan is shortened.

3.5. Retailers

The retailers of tomato and GLV are similar in their activities in the markets. They work in close contact with the wholesalers and help break down the bulk to amounts suitable for consumers. Retailers usually have market spaces (market stores or stands) where they display vegetable products for sale to prospective buyers. Sales are usually made either to other retailers or directly to the consumers. The retailers have particular wholesalers they deal with; however, they also work with other wholesalers when their preferred one is unavailable. The vegetable retailers sometimes combine to pool together resources to off-take products from the wholesalers. The vegetable products are highly perishable, yet these retailers lack proper storage facilities to preserve the vegetables. The tomato and GLV retailer markets are dominated by women operating at the nano-scale of business enterprises. The business of these retailers is such that they have to sell off the products and make regular purchases in a few days.

- a. Tomato retailers: The main sales activities of the retailers include arranging/sorting the tomatoes in groups by quantity and quality. They also arrange their products according to the different varieties, based on the source and tomato type. Tomato retailers sort their products daily into 3–4 categories before sales. These categories are based on the grades of firmness/injuries on the tomato fruit (levels of deterioration). Excessive moisture affects the tomato fruits; hence the retailers do not wash them. However, under increasingly dry conditions, the retailers sprinkle the tomato with water to improve the appearance for prospective buyers. The retailers have no storage facilities; hence they extend the shelf-life of the tomato by simply spreading it on baskets kept in well-ventilated places.
- b. Green Leafy Vegetable retailers: The retailers lack proper storage facility. They improvise by standing vegetable bunches by the wall, spreading them out in well-ventilated places and sprinkling them with water (during very dry conditions) to slow down deterioration. The GLV is covered with porous bags in storage to reduce wilting (except when humidity is high). The retailers avoid washing or putting the GLV in water if it is to be stored overnight, as excessive moisture deteriorates the vegetables. The GLV, especially fluted pumpkin, is sprinkled with water to reduce wilting during dry weather conditions. GLV retailers also chop the vegetable leaves into tiny pieces for the buyer (on demand) at no extra cost.

Key challenges faced by retailers

- Retailers face challenges of storing and preserving their unsold produce. This forces them to sell at giveaway prices and limit their purchases. Hence, the

retailers incur some produce losses owing to this difficulty and regular spoilage of GLVs in their possession.

- The structure of the market store space is also a challenge for the vegetable retailers. Most of the retailers either stay in enclosed spaces with no proper temperature regulation or market their products in exposed spaces, which are prone to weather vagaries. The vegetable produce is highly perishable and deteriorates faster in poorly ventilated conditions.
- Retailers are affected by the activities of wholesalers who also engage in retail sales at wholesale prices. This gives the wholesalers a competitive advantage to divert sales. These wholesalers can quickly put the retailers out of business.

4. Cross-Cutting Issues: Environment, Food Safety, and Gender

4.1.Environment

- The agroclimatic conditions in Ebonyi State make cultivating tomatoes and GLVs (especially the fluted pumpkin) difficult. Tomato production is supported by good climatic conditions with well-aerated soils and moderate precipitation. Flooding in various parts of the state is a major challenge for GLV and tomato production. Also, rising temperature and scorching sun lead to increased evaporation from the soil. Without proper irrigation, tomato and fluted pumpkin can hardly survive. Some farms cultivating tomatoes have used plastic mulching of the soil to adapt the planted tomato to harsh weather. There may be issues of environmental degradation with this practice. It was reported that more than a decade ago, a community (Effium, located in Ohaukwu Local Government Area (Ebonyi-North)) had a very productive tomato farm employing the technology. This community has recently declared that they can no longer boast of tomato cultivation due to land degradation and soil fertility challenges.
- The major GLV farmers in the state adapt by cultivating the fluted pumpkin at the end of the rainy season/beginning of the dry season beside water bodies to avoid both floods and scorching heat.

4.2. Food Safety

- Issues of poor food handling: In the marketing of GLV, there seems to be a total disregard for the cleanliness and hygiene. The vegetable leaves are carelessly dumped on the ground in direct contact with dirt and sometimes beside the old deteriorating vegetable leftovers at the marketplace. Unsold GLV are kept outside, exposed in the open to all possible unknown unhygienic conditions, before the resumption of sales the next market day. These unchecked practices pose a significant threat to the safety of the consumption of the GLV by humans, with worrisome health implications.

- GLVs are usually chopped and bagged for buyers when demanded. The usual buyers who demand such services are said to be restaurant operators as they aim to quicken meal preparations. However, GLV marketers often move straight into chopping leaves without first washing the leaves or washing their hands. The practice is a routine occurrence with most GLV retailers.
- Poor handling of tomatoes: Unsold tomatoes are left uncovered in baskets within the exposed market stalls and open places, which are often exposed to houseflies and rodents before sales the next market day. Some of the tomatoes often have flesh cuts (injuries). The marketers also sort these exposed tomatoes with bare unwashed hands. Despite the high chances of contamination, deteriorating tomatoes with flesh cuts are displayed by the marketers and sold.
- These poor food safety practices in the vegetable value chain, left unchecked, jeopardize consumers' food safety and health.

4.3. Gender

- Women tend to participate the most in the vegetable marketing activities of wholesalers and retailers. The women are said to be better managers of the “dirty business,” i.e., the business of perishables. Generally, food commodity businesses are often related to domestic chores (especially cooking) where women are believed to be better experienced and positioned in decision-making.
- Post-production activities in the vegetable value chain are much less capital-intensive to start up (especially for the GLV groups), thus making it easier for women to delve into it. This is in contrast to the capital-intensive input dealer business within the value chain, where men dominate the business ownership. The general idea is that women are better managers in the business of perishable food products. Meanwhile, gender roles within the household mean that men must devote their time to high income-generating activities to meet up with the household expenses. In contrast, the women shoulder fewer financial needs of the household. Hence, women are more open to less lucrative business activities.

5. Conclusion

The vegetable value chain in Ebonyi State is challenged right from the production stages, increasing the state's dependency and exposure to external shocks of tomato and GLV supplies. The product demand can only be satisfied by adequate market supplies from other states. This has negative implications for the food security and welfare of the citizens of the state. This situation is compounded (especially for the tomato product) by the highly perishable nature of the vegetable produce with the non-existence of proper storage facilities and total lack of processing.

Continued availability and consumption of tomatoes in the state rest almost entirely on the activities of the wholesalers. Wholesalers ensure the supply of tomatoes aggregated from various major market locations to override supply deficits. Notwithstanding the activities of these wholesale suppliers, tomato availability and consumption is not secured in the state. This is due to inefficiencies in tomato's handling, processing, and storage, resulting in product losses and wastage. Also, the supply within the state lags behind demand; hence there is room for improvement. There is an urgent need to address the food handling practices of tomato and GLV marketers.

The marketing nodes of the tomato value chain are well connected, although it remains underdeveloped because there is no value addition or improvement in storage.

References

- FAO. (2020). Fruit and vegetables – your dietary essentials. The International Year of Fruits and Vegetable, 2021, background paper. In *Fruit and Vegetables – Your Dietary Essentials*. <https://doi.org/10.4060/cb2395en>
- FAOSTAT, (2022) <https://www.fao.org/faostat/en/#data/QCL>.
- Mason-D'Croz, D., Bogard, J.R., Sulser, T.B., Cenacchi, N., Dunston, S., Herrero, M. & Wiebe, K. (2019). Gaps between fruit and vegetable production, demand, and recommended consumption at global and national levels: An integrated modelling study. *The Lancet Planetary Health* 3(7): e318–e329. www.sciencedirect.com/science/article/pii/S2542519619300956.
- NAERLS & FMARD. (2017). Agricultural Performance Survey of 2017 Wet Season in Nigeria: National Report. National Agricultural Extension and Research Liaison Services.
- NAERLS & FMARD. (2018). Agricultural Performance Survey of 2018 Wet Season in Nigeria: National Report. National Agricultural Extension and Research Liaison Services.
- NAERLS & FMARD. (2019). Agricultural Performance Survey of 2019 Wet Season in Nigeria: National Report. National Agricultural Extension and Research Liaison Services.
- NAERLS & FMARD. (2020). 2020 Wet Season Agricultural Performance in Nigeria.
- NBS. (2018). 2017 Demographic Statistics Bulletin. National Bureau of Statistics.
- Onyeneke, R. U., Amadi, M. U., & Njoku, C. L. (2022). Climate Change Adaptation Strategies by Rice Processors in Ebonyi State, Nigeria. *Journal of the Institute of Landscape Ecology, Slovak Academy of Sciences* 41(3), 283–290. <https://doi.org/10.2478/eko-2022-0029>
- Onyeneke, R. U., Amadi, M. U., Njoku, C. L., & Osuji, and E. E. (2021). Climate Change Perception and Uptake of Climate-Smart Agriculture in Rice Production in Ebonyi State, Nigeria. *Atmosphere* (Vol. 12, Issue 11). <https://doi.org/10.3390/atmos12111503>
- Osuji, E. E., Onyemauwa, C. S., Obasi, I. O., Obike, K. C., Ebe, F. E., Tim-Ashama, A. C., Ibekwe, C. C., Obi, J. N., Inyang, P., Azuamairo, G. C., Chinaka, I. C., Ankrumah, E., Praise, C. N., & Ifejimalu, A. C. T. (2022). Food Sustainability and Security, Aftermath of Vegetable Production in Ebonyi State, Nigeria. *Journal of Agriculture and Crops*, 8(3), 122–130. <https://doi.org/10.32861/jac.83.122.130>
- Pricewater Cooper. 2020. X-raying the Nigerian tomato industry Focus on reducing tomato wastage. <https://www.pwc.com/ng/en/assets/pdf/nigeria-tomato-industry.pdf>.
- WHO and FAO. (2003). Diet, nutrition, and the prevention of chronic diseases. Report of a joint WHO/FAO expert consultation.

