Ministry of Foreign Affairs

Ghana Vegetable Market Flow Mapping

Commissioned by the Netherlands Enterprise Agency

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Vegetable Market Flow Mapping Ghana

For:

Netherlands Enterprise Agency (RVO) & the Embassy of the Kingdom on the Netherlands (EKN)

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Sense
Economic | Business | Development

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Executive Summary

The Ghanaian horticultural sector holds significant promise for farmers, processors, input suppliers, and investors, for a diverse array of vegetables deeply ingrained in the nation's cuisine. With an emerging middle class, rapid urbanisation, and a growing population, there is a rising demand for high-quality vegetables, presenting ample opportunities for growth and investment.

Despite the diversity of Ghana's vegetable sector, local farmers struggle to capitalise on opportunities within the market. They face stiff competition from neighbouring countries like Burkina Faso and Niger, particularly in the production of onions and tomatoes. Despite the implementation of numerous development interventions over the past decade, there has been a slow uptake of good agricultural practices. In addition, investment in equipment that would greatly increase the quality and yield of farmer's production is limited (such as small-scale irrigation). Addressing these challenges requires concerted efforts from both public and private sectors, focusing on value chain optimisation, quality control, and market promotion.

Tomatoes and onions are staples in Ghanaian cuisine, yet their trade systems are quite complex and pose challenges for potential investments. Onions lack immediate prospects, so exploring new ideas in other sectors appears more promising. The professional production of tomatoes outside Burkina Faso's main production period, primarily for use as salad tomatoes, stands out as a viable opportunity in the otherwise constrained tomato value chain.

Expanding the export market for fresh and dried peppers emerges as a lucrative opportunity. In addition, indigenous vegetables like okra and garden eggs boast competitive advantages, while salad greens hold significant growth potential, especially given the rising trend of incorporating salads into meals. Promoting the cultivation and consumption of "new vegetables" (like zucchini, green beans and butternut) represents a promising avenue for diversifying agricultural production and meeting evolving consumer preferences.

To fully capitalise on these opportunities, various interventions are needed. These range from large-scale investments that will require significant investments to initiatives tailored for entrepreneurial farmers and youth employment. A crucial opportunity lies in establishing a comprehensive market data system to equip stakeholders with real-time information for effective decision-making, though challenges in data sharing and transparency must be addressed for successful implementation. Additionally, accessible, and cost-effective farming techniques, particularly through youth involvement, and enhanced farmer-trader linkages offer promising avenues for sectoral growth and professionalisation.

To leverage these opportunities, Ghana must prioritise value chain professionalisation, quality control, infrastructure investment, capacity building, research, and market access. Specific steps for introducing new vegetables involve market education, import infrastructure improvement, quality control measures, local production support, and fostering partnerships.

Private companies can play a pivotal role by providing technical expertise, investing in infrastructure, offering financing solutions, facilitating market linkages, promoting sustainable practices, providing innovative technology solutions, and engaging in research and development.

By aligning efforts across the public and private sectors, Ghana can unlock the full potential of its vegetable sector, ensuring sustainable growth and food security for its population.

1 Introduction

At first glance the Ghanaian horticultural sector should provide ample opportunities for farmers, processors, and input suppliers, as well as foreign investors. Ghanaian cuisine boasts a rich diversity of vegetables that form an integral part of everyday meals. These include traditional staples like tomatoes, onions and peppers to indigenous varieties such as garden eggs, okra, and cocoyam leaves, The country has a steady population growth, rapid urbanisation, and growing middle-class that are increasingly health conscious. This should drive the demand for high-quality vegetables.

On the production side, the country has multiple climatic zones and soils, significant rainfall and many lakes and rivers that can supply irrigation schemes. It has a youthful population interested in modern technology, and as one of the few English-speaking countries in West Africa it can easily access knowledge, expertise and investors.

Over the past decades development aid projects have invested a lot of resources in the development of the horticultural sector in Ghana, and specifically the vegetable sector. Modernisation of the production systems with the support of the private sector has been a particular focus. Many suppliers of seed, greenhouses, pesticides, agricultural implements and other specialised equipment and inputs have tried to develop business in Ghana.

However, despite all these efforts, progress has been slow. Many companies find it challenging to develop meaningful businesses in Ghana. Meanwhile Ghana seems even more dependent on neighbouring countries for tomatoes and onions, while Togo has developed into an important supplier on other vegetables. There has been some individual success with, for example, people producing in greenhouses, or developing a dried pepper export business. But there has not been a large-scale modernisation of the sector. Hence the question remains: where are the real opportunities for development of the sector in Ghana? And where are the opportunities for businesses to contribute?

As part of the various projects many specific studies in the Ghana horticultural sector have been done, and many reports written. Yet there is no recent study that provides an overview of the horticultural sector in Ghana or that provides people with a clear overview of what gets produced where, and how it reaches the market. Most studies tend to focus on issues at production level.

The goal of the Netherlands Embassy in Ghana was therefore to have a report that provides a concise overview of what happens in the sector for private sector actors who are considering investing in the sector. The report should help domestic and foreign investors to see what the opportunities are, and to estimate the size of the opportunity. This report aims to do just that.

The budget and time frame for this study was limited, while the scope can be vast. While there is talk about the horticultural sector being one value chain, they can be 10 or 15 different value chains. Meanwhile there are few reliable statistics available. This forced the team to make bold choices with regards to where to focus resources. This included firstly focusing on vegetables and not fruit. Secondly by focusing on stakeholder interviews and the consumer and trading part of the value chain which receive far less attention. The methodology will be discussed in more detail in chapter two.

Chapter three will discuss the results of the consumer research and market visits, and paints a picture of the consumer, who drives the value chain. Chapter four will provide a further overview of

the sector, and more specifically the different types of vegetables and the specific vegetable value chains.

Chapter five, six, and seven will discuss in greater detail the three biggest vegetable value chains in terms of volumes, being tomato, onion and hot peppers. Chapter four discusses the remaining vegetable groupings, being traditional vegetables (garden egg, okra and various leafy vegetables), salad greens (cucumber, cabbage) and Asian vegetables for export.

Chapter 9 discusses the issues and opportunities in the sector, followed by the conclusions and recommendations.

2 Methodology

2.1 General methodology and context

Data collection in Ghana presents a formidable challenge. Farmers generally maintain no records of their costs and revenue, while stakeholders along the value chain are often reluctant to disclose vital data, especially concerning volumes and profit margins. Furthermore, data provided by governmental agencies such as the Ministry of Food and Agriculture (MOFA) and the Ghana Statistical Service (GSS) is often outdated and lacks accuracy. Access to reliable data is primarily facilitated through paid platforms like the Ghana National Tomato Traders and Transporters Association (GNTTTA), which collect and disseminate market information.

Getting reliable and accurate data essentially requires one to dispatch enumerators to all the major border crossings and wholesale markets to count trucks for one year. This is essentially what was done in 2017 IFPRI study. This was not an option given the limited time and budget available, so an alternative approach was needed. Some hard choices had to be made with regards to the approach.

Firstly, it was decided to focus mainly on vegetables and leave out fruit. Most interest from stakeholders is on vegetables, and Sense has done a detailed mapping on the fruit sector for IFC in 2018. Most effort was directed to the biggest vegetable chains, being tomato, onion and hot peppers, and determine what other vegetables could be relevant, looking at a maximum of 5 to 8 vegetables.

Secondly, it was decided to take older data available that is deemed by stakeholders to be reliable, and through expert interviews determine how much has changed. These opinions were then triangulated through market visits and interviews with traders, wholesalers, and retailers. These actors were asked about the volumes they trade on a regular basis.

Thirdly, the focus of primary data collection was mostly on markets and consumers. The challenges at producer level have been extensively documented by the various projects and are known in detail by experts in the sector. However, the trading channels have been less documented. There is also considerable anti-trader sentiment in the sector, as is the case in most development circles across Africa. Traders are often portrayed as taking advantage of farmers and making huge profits of the back of them. However, the challenges, costs, risks, and losses at their level are not often documented. This means there is a need to separate fact from fiction.

Finally, scarce resources were devoted to consumer research because consumers drive the whole value chain. Their choices and buying behaviour determine the flow of goods, prices, and purchase criteria from traders and thus ultimately what is farmed. However, consumer research is seldom done in the agri-development industry. People assume that retailers know what consumers think, but within the profession of marketing it is well known that retailers can only tell you what they sold yesterday, but not why, and they certainly cannot tell you what will happen tomorrow.

2.2 Description of activities

The methodology employed in this study aimed to address the challenges posed by the lack of reliable and up-to-date official data on vegetable production, trade, and consumption in Ghana. To achieve this, a multi-faceted approach was adopted, consisting of the following components:

1. *Review of existing reports and data:*

A comprehensive review of existing reports was conducted to gather insights into the state of the Ghanaian vegetable sector. Key sources included the IFPRI Competitiveness of Tomato, Onion, Carrots, and Scotch Bonnet Pepper Production in Ghana Report 2017, along with various reports associated with the Hortifresh programme. Additionally, data from the Ghana Living Standards Survey (GLSS7 2017) served as a baseline for vegetable consumption and expenditure analysis.

2. *Expert and Stakeholder Interviews:*

Telephonic interviews were conducted with a 23 experts and stakeholders to gather current insights and perspectives on the Ghanaian vegetable sector. The interviewees included:

- Members of the former Hortifresh and Ghana veg teams.
- Researchers and academics specialising in the field.
- Representatives from value chain organisations such as the Ghana National Tomato Traders and Transporters Association (GNTTTA).
- Exporters and private trading companies.
- Seed and input companies.

3. *In-country consumer interviews and market visits:*

In-country research was conducted between February 5 and 16 February 2024. A total of 15 wholesale and retail markets were visited in 6 towns or cities. In these markets, market queens, retailers, wholesalers, traders and consumers were interviewed. In addition, the trading behaviour was observed. A total of 22 wholesalers or market queens were interviewed.

A lot can be learned from looking at how many retailers sell certain vegetables, what consumers are seen to be buying, and the quantities for sale at retailers or wholesalers. From looking at the quality of vegetables one can also see how old they are and thus if they are sold or not. Trucks of certain produce arriving indicates important trade volumes.

In addition, a total of 6 hotels and restaurants were interviewed. The hotel and restaurant trade are an important consumer of vegetables with their own purchase criteria, but also often with a different supply system.

Finally, a total of 6 consumer focus groups were held in 5 locations, with about 6 participants per group. Consumer focus groups are semi structured discussions with consumers in an informal setting, such as a quiet restaurant. They normally take between 1 to 1,5 hours. They allow us to really understand consumers purchasing behaviour, selection criteria, attitudes and decision-making system. The informal interaction between participants is encouraged to get authentic answers.

The cities were chosen to get a blend between urban & rural, and different areas of the country. Because of the limited budget the number of cities were limited. Accra and Kumasi were chosen as the major hub for vegetable trade and having the largest amount of middle-class consumers, but also proving a blend between all socio economic classes. Techiman, Sogakope and Ada were taken as being representative for smaller towns. Togo was visited to understand this relatively new trade route.

2.3 Limitations of the study

This study provides a global picture of the vegetable sector in Ghana, with rough estimates of volumes and prices. The data presented are mostly estimates formed by the authors based on third-party estimates and reports and stakeholder interviews.

The consumer research was qualitative and conducted with limited groups due to time and budget constraints.

The geographical representation in the visits of markets and consumer focus groups is not fully representative for Ghana, as only a few regions could be included. Most notably the North was left out due to budget constraints.

The detailed information is mostly available for the three main crops, while estimates for other crops are scarce due to a lack of existing reports and budget to collect primary data.

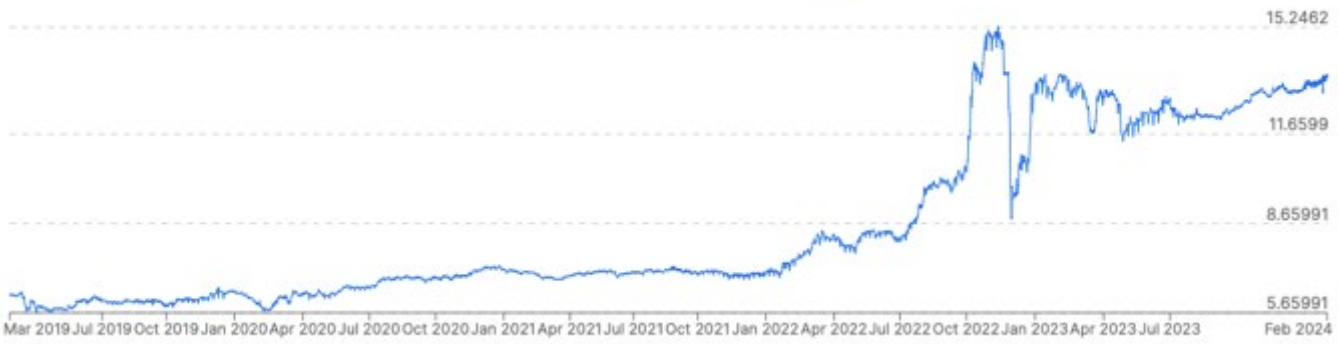
Information regarding the regulatory environment is scant. Despite efforts to explore this aspect during interviews, it did not emerge as a prominent discussion point, suggesting it is not that relevant in the daily operations of the sector.

3 The consumer

3.1 The Ghanaian economy and the effect on consumers

The population growth rate in Ghana stands at 2%, reflecting a steady increase in the number of potential consumers. Over the past 5 years, the Ghanaian Cedi has devaluated from 6,2 to the Euro to 13,61 to the Euro, a devaluation of about 117%. The devaluation has picked up pace, particularly since 2022.
The figure underneath shows the development:

- *Figure 1: The GHS – Euro exchange rate over the past five years (Source: xe.com)*

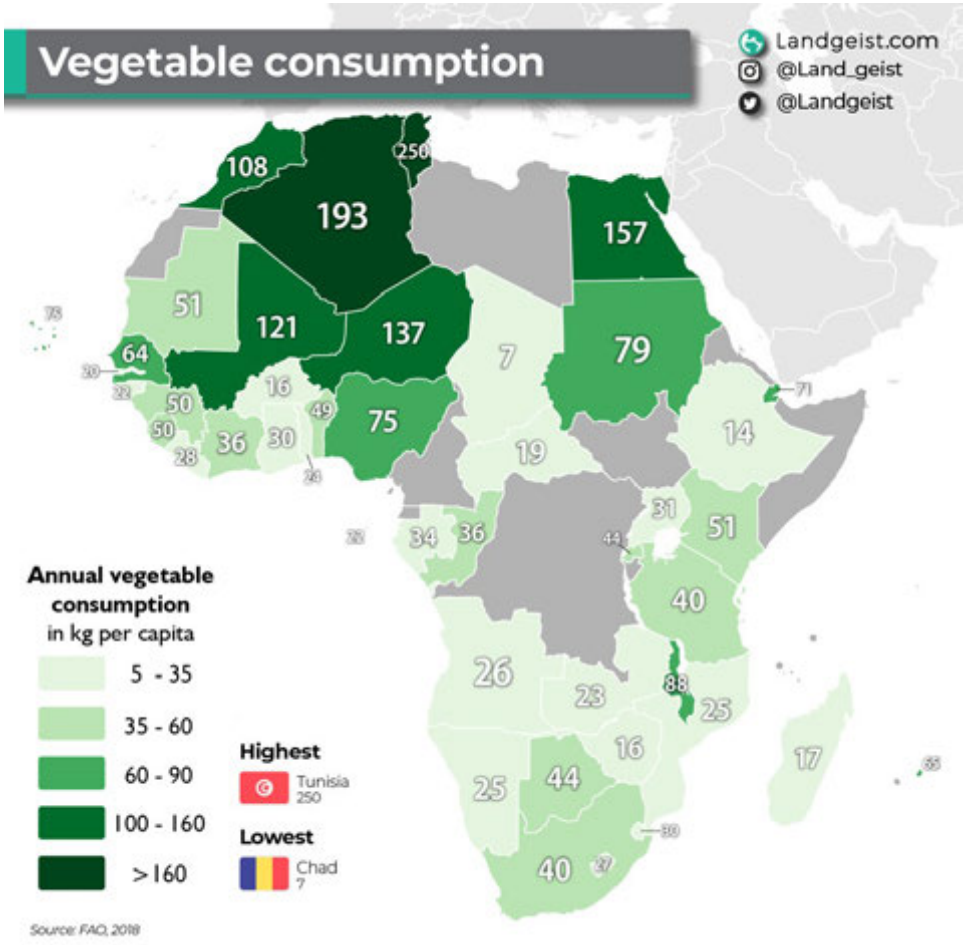


In addition, during 2022-2023, there was severe hyperinflation (inflation at 33%) with a doubling of prices since 2017. The currency pressures significantly impacted Ghana's food sales, constraining real growth. However, in 2024, there is expected to be a noticeable improvement in the outlook due to the stabilisation of macroeconomic fundamentals and easing pricing pressures. With the currency stabilising, the economy is expected to recover slightly, especially as households in the low- and mid-income categories experience an improvement in their spending power.

There is expected to be consistent growth in food and beverage sales in Ghana up going into the future. This upward trend is bolstered by favourable demographics, increased urbanisation, and rising incomes. However, potential commodity price shocks and global geopolitical challenges pose downside risks to the forecast, as they could subject the economy to another round of shocks.

Despite these economic challenges, there is a burgeoning middle class in Ghana, presenting promising opportunities for the introduction and cultivation of new and emerging vegetables to cater to evolving consumer preferences and demands.

3.2 Vegetable consumption in Ghana



- *Figure 2: Vegetable consumption in Africa*

Data from FAO (2018), as shown above, shows that Ghanaian vegetable consumption is at 30kg per year (equivalent to 82g per day). While that is on the lower end of the scale compared to other countries (Algeria at 193 kg per year), it is more than a lot of countries in sub-Saharan Africa, notably low vegetable consumption in Ghana's neighbours, Burkina Faso and Togo.
Other sources estimate Ghanaian consumption as higher, between 240 – 323 g (3 – 4 portions) per day[1], while Azupogo (2018) study on vegetable consumption of rural Ghanaian women of fertile age was 324g per day. WHO recommends 400g of fruits and vegetables per day for optimal health and the prevention of certain non-communicable diseases. Considering that this includes fruit consumption, which is beyond the scope of this report, it could be that Ghanaian are optimally consuming vegetables (if considering the higher estimate).

Urban populations reportedly consume more vegetables. Average percentage of income spent on food is estimated at 30% of which 6% is spent on vegetables (GHS 163.79). 60% is spent on staples. (Ghana Living Standards Survey 7, 2017). In the current inflationary climate, poor households may reduce spend on vegetables and meat, which are considered expensive.

[1] https://doi.org/10.1093/nutrit/nuaa032

3.3 Insights from consumer / household research

In Ghana, vegetables hold a central role in daily dietary habits, being consumed very frequently. Staples such as tomatoes, onions, and pepper form the foundation of many meals, complemented by favourites like okra and garden eggs, prized for their taste and nutritional value. These vegetables are integral components of traditional dishes, such as okra soup or garden egg stew.

Indigenous green leafy vegetables, such as Ademe (Jute leaves) and Kontomire (Cocoyam leaves), are also highly valued. Additionally, cabbages, carrots, lettuce, cucumber, spring onions and to a lesser extent, sweet green pepper contribute to a diverse vegetable consumption pattern. While vegetables are essential, they tend to be relatively expensive compared to starches like cassava and corn dough (used for traditional foods Fufu and Banku).

Salads are increasingly popular and typically consist of cabbage, lettuce, carrots, tomatoes, and cucumber. These ingredients were found in abundance in the markets and points to the consumer acceptance of these vegetables.

Freshness is paramount, with consumers showing a preference for fresh vegetables over canned or frozen varieties. While this is the case, concerns about chemical fertilizers' impact on quality persist among some consumers.

As discussed, vegetable consumption in Ghana is relatively low in comparison but is increasing rapidly (Hortifresh, 2019). The assumption is that the figure of 6% vegetable consumption has increased since 2017. Despite the relatively high cost of vegetables compared to starches or porridges, consumers allocate a portion of their budget to ensure access to vegetables, underscoring their integral role in meals. However, fluctuating prices, particularly during off-seasons, impact purchasing behaviour, with consumers adjusting their buying patterns accordingly by buying less vegetables. In the case of tomato, they often substitute with canned tomato paste.

Most consumers purchase their vegetables from local markets due to pricing and freshness considerations, as other retail options largely source their produce from these markets.
The quality of the vegetables is important when purchasing. The determination of the quality is a sensory experience, beginning with visual inspection for deformities and colour, followed by tactile examination to gauge firmness and detect signs of spoilage.

Vegetable	Quality requirements
Tomato	Hard, vibrant red colour, no visible defaults, no blemishes Long shelf life
Onion	Light purple colour, large bulbs, not spicy (“sweet”)
Leafy vegetables	Fresh vibrant colour without wilting leaves. However, due to no cold storage options, the vegetables are often sold with wilting leaves
Chilli peppers	Without obvious blemishes. Hard to the touch. Smooth to the touch (garden egg). Consumers prefer local varieties (for e.g. okra they like to be very slimy)
Okra / garden egg	
Cucumber	
Carrots	
	Large carrots with a sweet taste. From market visits, there seems to be quite a few traders who wash and peel the carrots, obviously to increase the appeal of the carrot (since they can often look dull or are dirty)

There is a perception that chemical fertilizers may affect vegetable quality, leading some consumers to believe that they cause vegetables to spoil more easily. It is important to note that pesticide residues are a major quality concern in Ghana, but this is not unique to Ghana and the Burkina farmers tend to use excessive pesticides (Project Hortifresh Interview, 2024). Fresh vegetables from Ghana are believed to be high in agro-chemical residues which sometimes leads to a preference for imported vegetables.

Regarding sourcing preferences, opinions vary between prioritising local produce for perceived freshness and reduced chemical use versus opting for imported varieties, often associated with higher quality despite longer transport times. In research groups consumers seemed to realise that certain vegetables were imported and had a slight preference for imported vegetables due to higher quality although they were aware that this sometimes would come with an increased price.

Consumers in Ghana express various reasons for consuming vegetables, including taste, colourful appearance in dishes, and the perceived health benefits associated with nutrition. While there is widespread awareness of vegetables' positive impact on health, there is a feeling that the spontaneous mention of the health benefits of eating vegetables may be a post-rationalisation. They eat vegetables because they always have, it is part and parcel of the Ghanaian cuisine, and they enjoy it. In fact, the growing prevalence of cabbage, lettuce, cucumber and carrots indicates the easy adoption of vegetables that they might not have known before. This is quite different from consumers from other countries who don't eat many vegetables at all. Eating a variety of vegetables is deeply ingrained in Ghanaian cuisine and that is a great place to start.

While Ghanaians consume vegetables regularly, there is curiosity about less familiar vegetables like cauliflower, broccoli, zucchini, green beans, butternut and beetroot. While these vegetables can be found in markets and retailers, they are not prevalent at all and are not eaten regularly. Consumers do not really seem to know how and what to cook with it. Also, the quality of these vegetables is not the greatest, as can be seen in the quality of the cauliflower on sale in markets:

- *Figure 3: Cauliflower in Agbogbloshie market, Accra*

This presents an untapped market and opportunity to grow this sector of vegetables and further diversify dietary options. Efforts to improve the quality and availability of such vegetables could further enhance consumer interest and participation in vegetable consumption in Ghana.

These observations highlight the diversity and importance of vegetables in Ghanaian cuisine, presenting an opportunity for businesses to capitalise on this existing demand, such as the emergence of salad greens. Additionally, consumer curiosity about less familiar vegetables like cauliflower, broccoli, pumpkin / butternut, zucchini suggests an untapped market for introducing new or better-quality varieties into the Ghanaian diet.

3.4 Hotel, Restaurant and Café / Catering

The hotel, restaurant and café / catering (HoReCa) sector in Ghana commonly offer a blend of continental and local dishes, with vegetables serving as integral components in various recipes, from okra stew to jollof rice. Mirroring the individual / household trend, the growing popularity of salads is evident, typically featuring cabbage, lettuce, carrots, tomatoes, spring onion and cucumber. There's also a desire to include new veg such as cauliflower and zucchini in menus, highlighting the potential for diversification.

In terms of sourcing, hotels often procure vegetables from local markets or farms, with larger establishments having procurement teams for this purpose. While weekly or bi-weekly purchases are typical, frequency may vary based on kitchen requirements or occupancy rates.

Vegetables feature prominently across hotel menus, appearing in both local and continental dishes, either as part of à la carte options or buffet spreads.
Selection criteria prioritise freshness, appearance, and price, ensuring that only the highest quality produce is utilised. Cabbage and carrots are among the most popular vegetables among guests and frequently feature in signature dishes. However, challenges such as seasonal variations, high prices, and inconsistent availability of certain vegetables are encountered.

When evaluating meal options when adjusting their menu, hotels seek to explore new and emerging dishes based on food trends in the market. This presents an opportunity to leverage the hospitality industry as a platform for market testing of new vegetables and their application in interesting and diverse dishes.

4 Overview of the Ghana Vegetable Sector

4.1 The key vegetables

The main vegetable value chains in Ghana are:

- Tomatoes
- Onions
- Peppers
- Emerging vegetables:
    - Indigenous Vegetables
    - Salad Greens
    - Asian Greens

Tomatoes and onions stand out as the two most widely consumed vegetables in Ghana. Despite their significance in the Ghanaian diet, these commodity crops are subject to highly politicized internal and international trade systems, posing challenges for potential investments or interventions by companies.

Peppers hold a universal appeal in Ghana, accounting for 9% of household vegetable expenditure, trailing closely behind tomatoes and onions. Peppers, known as chillies in other parts of the world, can be categorised into two main types: dry red chillies destined for export and fresh Scotch Bonnets for the local market.

Indigenous vegetables, salad greens, and Asian greens collectively represent the category of ***emerging vegetables***. These offer new opportunities for farmers, off-takers, and exporters. Given their connections to trading companies and exporters, these value chains present avenues for professionalisation that are conducive to the involvement of input suppliers, trading companies, investors, and development initiatives.

Indigenous Vegetables, also referred to as *Traditional Vegetables*, encompass a diverse range of produce, including garden eggs and okra, which, while not originally indigenous, have become integral components of traditional Ghanaian dishes. This category boasts a lengthy list of leafy crops, many of which are lesser known in Western cuisine. Their significance in Ghanaian diets is significant as they are part and parcel of Ghanaian cuisine.

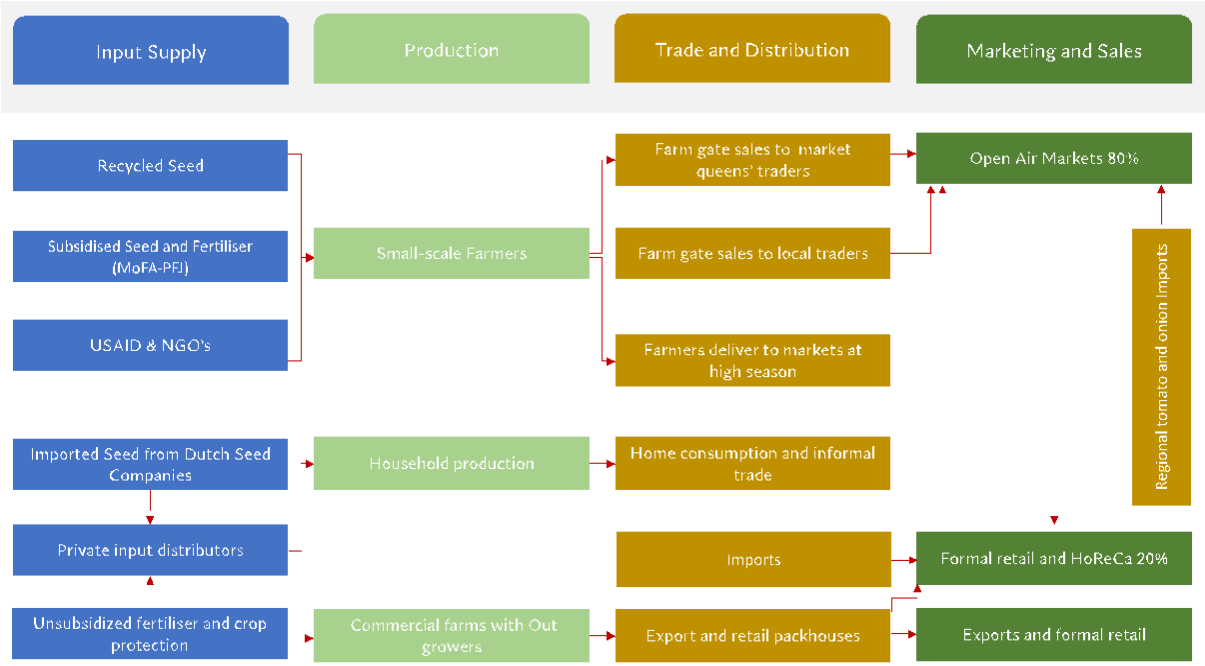
- *Figure 4: Ademe and Cocoyam leaves (Kontomire)*

These vegetables are notably nutrient-dense and serve as vital accompaniments to low-nutrient starch crops like maize, rice, and cassava, prevalent in impoverished rural areas. Consumption of indigenous vegetables typically occurs in-season, with availability dictating specific choices. Moreover, these vegetables present a promising export opportunity, particularly to diaspora communities in Europe and the United States. However, intra-Africa trade in these speciality vegetables is constrained by prohibitively high airfreight costs within the continent.

Salad Greens represent an emerging category tailored to the evolving needs of a growing middle class, a thriving hospitality sector, and the expatriate market. This category encompasses crops such as cabbage, carrots, lettuce, cucumbers, spring onions and green peppers. Notably, certain items like carrots are primarily imported from the Netherlands due to unsuitable climatic conditions in Ghana and the high-tech requirements, including cold chain logistics. The value chain associated with Salad Greens is characterised by a higher degree of professionalism and market orientation compared to indigenous vegetables and commodity staples like tomatoes and onions. Salad greens, especially those targeting formal retail and the HoReCa (Hotel, Restaurant, and Café) sector, present a promising avenue for vegetable exports, capitalising on the growing demand for fresh and diverse produce in Ghana's evolving consumer landscape.

Export vegetables and Asian Greens constitute a distinct category within Ghana's vegetable sector, encompassing crops that may overlap with other categories such as hot peppers and indigenous vegetables but also include additional varieties cultivated specifically for export, including Asian greens. These vegetables cater to diaspora communities and niche markets in Europe and Asia, leveraging Ghana's favourable climate and geographic location to maintain a competitive edge. The companies engaged in exporting these vegetables often trace their origins to recent initiatives such as the Ghana Veg and Hortifresh programs. Interestingly, these companies are undergoing rapid professionalisation, presenting opportunities for the integration of technology, inputs, and off-takers to further enhance the efficiency and competitiveness of Ghana's export vegetable industry.

4.2 Description of the value chains and main actors



- *Figure 5: Flow diagram of the value chain (in general)*

Production: vegetable farming is mostly done by small scale and medium scale **farmers.** There are no large-scale producers in Ghana. The vegetables that come from small to medium scale farmers in Ghana are supplemented with farmers from neighbouring countries Burkina Faso (mostly tomatoes), Niger (onions), Nigeria (Onions), Togo (vegetables supplying mostly the east, but also reaching Accra).

Distribution: The movement and sale of vegetables to markets across Ghana are managed by **Market Queens**. These women are large scale wholesalers who manage the huge route to market of all the different vegetables The market queens are divided into tomato, onion (in this case, it is men), salad greens (cabbage, lettuce) and traditional veg (okra, garden eggs, ademe).

The **route to market** is as follows:
The market queens organise themselves in groups of 8 – 10 hire trucks who go to the various farm areas. When dealing with farmers in Ghana, the **truck drivers** or market queens or their associates do the negotiation on price. When they have to deal with French or Hausa farmers, they bring in **interpreters**. Once the price is fixed, the harvested vegetables are loaded into the trucks by hired loading men.
The trucks move to the various markets where they are offloaded in specific "wholesale" areas next to markets. The vegetables are sold in crates (in the case of tomatoes), or sacks (in the case of onions), or bags / sacks in the case of other vegetables.

At these "wholesale" areas next to the big markets, the market queens sell to other **traders** (such as market queens for smaller markets), or **market sellers** who in turn sell in smaller quantities to **consumers**.

The market queens, traders, truckers, some farmers, and crate suppliers belong to the various vegetable associations such as the Ghana Tomato Association, In the case of onions, there are 6 associations at Kotoku (the central onion market outside of Accra) who control the flow of onions from surrounding countries, into Ghana.

These associations hold significant sway over both imported and domestic value chains, exerting control over retail, wholesale, and farm gate prices. They also regulate the volumes of vegetables distributed to major market hubs across Ghana, including Agbogbloshie and Tudu in Accra, Abinkyi and Bolaho in Kumasi, and Techiman and Market Circle in Takoradi.

While there are local and regional **markets** scattered throughout the country, the bulk of trading activity occurs at these main market hubs. Local traders typically visit farm gates to procure produce, or farmers may directly deliver their goods to these markets. However, farmers often receive lower prices at local markets compared to those offered by traders at the main hubs, prompting most farmers to await the arrival of major traders.

The **retail** landscape predominantly revolves around open-air markets, which command 80% of all vegetable sales, including tomatoes. market queens and wholesalers wield significant influence in these markets, dictating prices. Retailers, in turn, have little control over pricing and must adjust their prices according to fluctuations dictated by market queens and wholesalers. High-end retailers like "The Farmer's Market" (in Accra) procure their vegetables directly from local markets, ensuring top-notch quality as their products command premium prices, or import from Europe. Conversely, major retailers like Shoprite offer a diverse selection of vegetables, often imported from South Africa. For the procurement of traditional vegetables, their sourcing remains undisclosed, although it is probable that they also acquire from market vendors – ensuring that they purchase the best quality produce. Subsequently, these stores package the vegetables to enhance the perceived quality of there products.

4.2.1 A note on imports from Togo

(The majority of tomato imports originate from Burkina Faso, whereas onions predominantly come from Niger. These dynamics are extensively discussed in the value chain sections dedicated to these specific vegetables. However, unexpectedly, a notable increase in vegetable imports from Togo has been observed. This section looks briefly at the situation in Togo, as there is insufficient data to delve deeply into it within the context of individual value chains.).

Vegetable sourcing from Togo involves a combination of farming methods, including both irrigated and rain-fed practices, with farm sizes typically ranging from 0.5 hectares to 10 hectares. Major vegetable farming areas in Togo include Aneho, Ramatu, and Bagida, supplemented by sourcing from neighbouring countries such as Burkina Faso, Niger, Mali, Benin, and Nigeria. A diverse range of vegetables are grown in Togo, including tomatoes, onions, various pepper varieties, okra, sweet potatoes, garden eggs, cabbage, cucumber, lettuce, carrots, beetroot, radish, cauliflower, zucchini and indigenous vegetables like bitter leaf, and broccoli.

The movement of vegetables from Togo to Ghana involves various stakeholders, including individual traders, market queens, intermediaries, and aggregators. These entities purchase vegetables from markets within Togo and transport them across the border to Ghana. Credit systems within Togo allow traders and aggregators from neighbouring countries to conduct transactions based on sales and return basis. Seasonal variations in vegetable volumes and prices

are significant, with dry seasons marked by increased pricing and reduced volumes across all vegetable types.

Overall, Togo serves as an important hub for vegetable sourcing, offering a wide variety of produce sourced from both local farmers and neighbouring countries. The quality of vegetables from Togo is generally considered to be better compared to other regions, with seasonal timing playing a crucial role in vegetable sourcing.

4.3 The regulatory environment

Government of Ghana is the national authority in charge of legislation, administration and implementation of policy in the country.
The government ministries responsible for regulating the agriculture and specifically the vegetable sector in Ghana are:

- Ministry of Food and Agriculture (MOFA)

The Ministry of Food and Agriculture (MOFA) serves as the primary governmental authority and central entity in Ghana, tasked with formulating and implementing policies and strategies to advance the agriculture sector in line with the broader national socio-economic growth and development agenda. MOFA runs various programmes in collaboration with various development funds for example, the "European Union Ghana Agriculture Programme (EU – GAP)[2].

- Ministry of Trade and Industry (MOTI)

The Ministry of Trade and Industry serves as the primary policy advisor to the government on matters related to trade, industrial development, and private sector growth. It is entrusted with formulating and executing policies aimed at fostering the promotion, expansion, and advancement of both domestic and international trade and industry.

- Ghana Standards Authority

The Department is responsible for the development and maintenance of Food, Agriculture, Materials and Chemistry Standards through Technical Committees (TC).
The Technical committee responsible for the vegetable sector in Ghana is the Food and Agricultural Standards Bureau.

4.3.1 Food quality, safety, and labelling

Ghanaian vegetable exports are required to meet the food safety standards set by the European Commission. The European Commission publishes a list of crop protection products and their Maximum Residue Limits (MRL) allowed to enter the European Union. Imports are subject to inspection at Border Control Point (BCP's) in all member states.

As an integral component of food safety measures, the European Union (EU) has established the Rapid Alert System for Food and Feed (RASFF). This system enables swift communication among food safety authorities regarding potential health hazards associated with food products, facilitating prompt actions to mitigate risks and ensure public safety. This has proven to be very effective, for e.g. in early 2024, two Ghanaian mango shipments with high levels of pesticides were stopped at the EU border[3].

[2] https://mofa.gov.gh/site/programmes/european-union-ghana-agriculture-programme-eu-gap

[3] Information from Dutch embassy

In 2015, Ghana faced a ban on pepper and vegetable exports due to inadequate phytosanitary standards, particularly concerning the presence of the false codling moth, as well as elevated maximum residue levels (MRLs) of chemical residues.
Fortunately, in 2018, this ban was lifted, marking a resurgence in pepper exports. Presently, the pepper export sector has experienced significant growth, with an estimated 120 small and medium-sized enterprises (SMEs) actively engaged in the export of peppers and other vegetables.

Food destined for the EU market must meet the legislation on food labelling[4]. Trade packages and cartons of fresh fruit or vegetables must mention the following particulars:

- Name and address of the packer or dispatcher;
- Name and variety of the produce (if the produce is not visible from the outside of the packaging);
- Country of origin;
- Class and size (referring to the marketing standards);
- Lot number for traceability or GGN if certified GLOBALG.A.P. (recommended);
- Official control mark to replace name and address of the packer (optional);
- Post-harvest treatment; for example, anti-moulding agents added in a post-harvest treatment of citrus fruits must be mentioned on the trade package;
- Organic certification, including name of inspection body and certification number (if applicable).

[4] https://www.cbi.eu/market-information/fresh-fruit-vegetables/buyer-requirements#:~:text=Food%20placed%20on%20the%20EU,outside%20of%20the%20packaging

5 Tomato Value Chain

- *Figure 6: Tomatoes in crates at Agbogbloshie market, Accra*

5.1 Production

5.1.1 Production volumes, areas, seasonality and yields

Domestic tomato production in Ghana comprises 200,000 tons commercially and 120,000 tons household production (GNTTTA 2024).

The primary source of imports is Burkina Faso, accounting for approximately 300,000 tons. Remarkably, Ghana imports 90% of Burkina's tomato crop, representing 80% of the dry-season fresh tomatoes consumed within Ghana. Additionally, imports from Togo contribute to the tomato supply chain.

Moreover, Ghana imports 100,000 tons of processed tomato products, including pastes and canned concentrates, constituting 13% of the total African imports of processed tomato products, including pastes and canned concentrates. These imports mainly originate from countries such as China, the USA and Italy, often at low prices.

IFPRI's 2017 report indicated that tomatoes were cultivated in 15 out of Ghana's 16 regions, with the Northern Region being the sole exception. However, several northern regions have since transitioned away from tomato cultivation and toward onion production due to various factors:

- Direct competition from higher-quality Burkinabè tomatoes
- Deteriorating irrigation infrastructure

- Pest and disease issues, including nematode infestations
- Low yields and the use of inappropriate tomato varieties

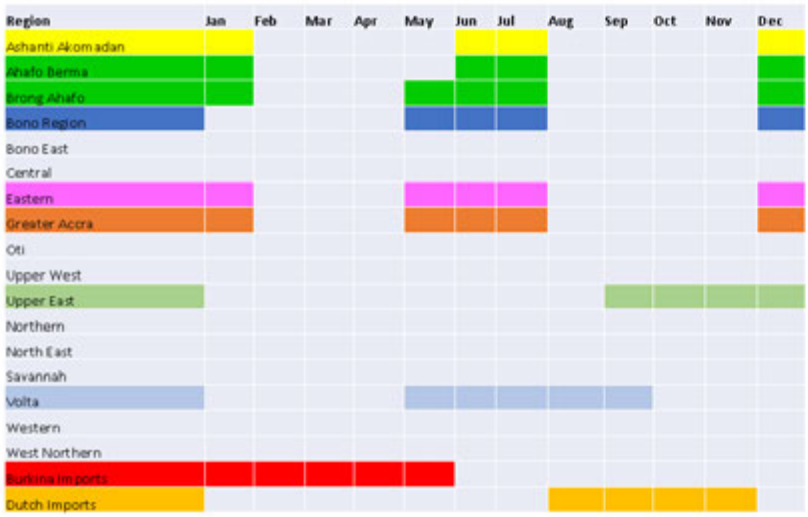
Presently, tomatoes are primarily grown in significant quantities in central and southern regions of Ghana. However, recent data suggests that only eight regions continue to produce tomatoes in commercially viable volumes, as indicated in the table below:

- *Table 3: Tomato Production Practices, prices and margins in Ghana*

Region	Rainfed	Irrigation	Seasons	Yields	Farm Gate Price	Cost / ha	Gross Profit (GP)	GP adjusted for 20% PHL
Ashanti Akomadan	Yes	0	June-July Dec-Jan	12	500	8325	43342	34673
Ahafo Berma	Yes	0	June-July Dec-Jan	12	300	13300	15450	12360
Brong Ahafo	Yes	0	May-July Dec-Jan	8	600	12595	24905	19924
Bono Region	Yes	No	May-July Dec-Jan	12	700	14400	52683	42147
Bono East						0	0	0
Central						0	0	0
Eastern	Yes	Yes	May-July Dec-Jan	8	500	13150	18100	14480
Greater Accra	Yes	No	May-July Dec-Jan	10	450	14400	24038	19230
Oti						0	0	0
Upper West						0	0	0
Upper East	Yes	Yes	Sept-Dec	10	1575	14400	110288	88230
Northern						0	0	0
North East						0	0	0
Savannah						0	0	0
Volta		Yes	May-Sept	11	2100	19825	165675	132540
Western						0	0	0
West Northern						0	0	0
Ghana Average				10		13799	56810	45448

Key insights from Table 3:

- Northern Regions have largely moved out of tomato production and into onion, as mentioned above.
- Upper East and Volta produce in the off-season receiving farm gate prices three to four times higher than peak season region. This makes them far more profitable per ha.
- There is a gap in tomatoes from September to November when Burkina is out of production. This is available to farmers in Volta and Upper East.



- *Figure 5: Tomato production seasons and regions*

Most farmers are small-scale commercial farmers with 1 acre (0,46 ha) under tomato cultivation. Use of irrigation is still very low (5% to 20%); therefore most farmers only produce one crop per year. Farmer reported yields are 8 to 14 tons/ha (Hilarion Nyarko & African Farmer 2024), which is nearly double the yields reported by IFPRI (2017). This data is highly optimistic, and the reality is probably closer to the bottom of this range. This is extremely low for international standards, but higher than Burkina Faso that is often at 4 to 5 tons per ha. 30-50t per ha is normal for open-field production with open-pollinated determinate varieties (bush plants). Hybrid, determinate varieties can yield 50t to 80t per ha, while hybrid indeterminate varieties can yield 60-100t per ha. Low-tech greenhouses can produce 120t/ha on indeterminate varieties (pots, simple tunnels, drip irrigation). Finally, high-tech greenhouse farming can produce 350t/ ha (temperature & moisture & co2 controlled, hydroponics etc.).

The yield is determined by:

1. Fertilisation
2. Water usage & irrigation
3. Disease control
4. Planting distance/ density
5. Pruning & trellising/ staking

Higher yields are not always more profitable; the cost can increase very fast per ton. The optimal system depends on the local market, cost of labour, inputs, land, climate. For example, yields for indeterminate varieties are much higher, but labour and input costs are also much higher.

With the exception of Volta and Upper East, all other production areas have the option of two seasons, May to July and December to January.

5.1.2 Varieties per crop

There are two ways to classify tomato varieties. The first way is to look at the growing habit, and the second at size, shape and utilisation. Looking at the growing habit, there are determinate and indeterminate varieties. Determinate varieties grow in the form of a small bush and tend to have one big harvest, spread out over a 2-week period. Indeterminate varieties are like a vine that continues to grow, and fruits over a 2-to-3-month period. Indeterminate varieties have a much higher yield because of the long harvesting period, but require more labour because harvesting is continuous but at lower rates. It also requires trellising and regular pruning.

The other classification is processing tomatoes, salad tomatoes and cherry tomatoes. The latter are small, sweet tomatoes for salads/ fresh consumption. Processing tomatoes have a lower water content than salad tomatoes and a stronger flavour. They tend to be used for tomato paste and canning production, and ultimately end up in sauces. Because the dominant usage of tomatoes in Africa is in stews, processing tomatoes tend to be the dominant type. Even in salads, processing tomatoes tend to be used and preferred.

Processing tomatoes tend to be determinate varieties, because they are farmed in large scale for industrial use. It is more economical to have one or two large harvests instead of a range of smaller harvests. This means that most tomatoes farmed in West Africa, including Ghana are determinate processing tomatoes. Most salad and cherry tomatoes are indeterminate.

For African farmers, the choice between determinate and indeterminate varieties is also dependent on the rainy and dry seasons and rotation crops. Often farmers only have a 4-month window to plant and harvest, because after this the rains start which drives up disease pressure. In other cases, the land needs to be utilised for cereals, most notably rice when the rains start. This is also likely the case in Northern Ghana, as in Burkina Faso.

The predominant tomato varieties in Ghana include Konko, Petomech, Cobra, and F1 hybrids, with some farmers also utilising local seed.

Burkina Faso grows mostly F1 hybrids, with better varieties that are bred for shelf life, taste, colour and water content. The drier climate definitely contributes to the better-quality Burkina Faso tomatoes.

5.2 Pricing in the chain

Cost of production has also more than doubled, averaging GHS 13,700 per ha compared to IFPRI (2017) estimates of GHS 300per ha – GHS 4000 per ha.

Farm gate prices vary from GHS 450 per 120kg crate in the peak season to GHS 3000 per 120kg crate in the Volta off-season when it is the only region in production (estimates based on multiple sources – Nyarko, farmer). Farm gate prices used are at the lower end of the reported range as rainfed farmers are forced to plant and harvest around the same time (peak rainy season).
The exceptions are Volta and Upper East where tomatoes are cultivated in the off-season under irrigation. Harvest is May to September and September to December respectively, finishing before the Burkina season.

Tomato farming in Ghana is profitable, with the estimated profit per ha ranging from GHS 12,340 in Ahafo Berma to GHS 132,540 in the Volta off-season.

Post-harvest losses to the farm are estimated at a conservative national average of 20% amounting to GHS 45,448/ha. Losses through the value chain may be as much as 50%. Further losses in transport are determined by delays in transportation. A delay of four days or more can result in the total loss of a truck load. Post-harvest losses are managed by traders who bring in only as much as they can sell quickly. This is to make up for a lack of cold chain or storage facilities. Post-harvest losses are blamed on farming practices such as excessive fertiliser and pesticide use and poor handling of product on farm.

Burkina farm gate prices reported by the National Tomato Traders Association of Burkina range from GHS 250 in January and February to a high of GHS 400 at the end of the Burkina season in May.

The price, at the time of the interviews in Ghana (Feb 2024, at Agbogbloshie) for a tomato crate was GHS 1600. The price of tomatoes for consumers is GHS 5 for 280g. For a 120kg crate, at that price, the margin is GHS 457 per crate or 25%.

- *Table 6: Margin of tomatoes*

	Margin
Farm Gate	
Wholesale margin	18%
Retail margin	16%

Price surveys conducted at Kumasi and Techiman (February 2024) suggest that wholesale margins are set according to supply demand at the market and may be as high as 50% in peak season, when farm gate prices are at their lowest. The saving is not necessarily passed on to the retailers.

5.3 The trading environment

Tomatoes are sourced directly by the market queens from the various production areas, including Burkina Faso, Togo, and Ghana, throughout the year. They use hired trucks to transport them to the main wholesale markets, such as Agbogbloshie Market in Accra or Kumasi Central Market. There are "wholesale" areas at the bigger markets, such as Graphic Road under Bridge "wholesaler" tomato market, as shown in the picture below, where the trucks arrive, and the tomatoes are sold in crates.

- *Figure 6: Tomato trucks and crates at the "wholesaler" section at Agbogbloshie market, Accra*

The market queens from the smaller markets either source the tomatoes directly from farmers, or they buy from the bigger markets. Typically, a truckload carries 100 to 120 crates of tomatoes, with each crate weighing approximately 120 kg.

At the markets, the tomatoes are sold in crates directly to market queens from smaller markets or to individual stall sellers or retailers, who then sell them in smaller quantities to consumers.

Market queens often provide prefinancing to farmers in Ghana but not to those in Burkina Faso. They also do not extend prefinancing to traders or transporters.

It was found that across the chain, the various actors deal exclusively with tomatoes i.e. market queens, aggregators and traders deal exclusively in tomatoes. Even some market sellers only sell tomatoes. This is due to the huge size and importance of tomatoes.

5.4 Import and export

During the period from December to April, the majority (about 80%) of tomatoes entering Ghana are imported from Burkina Faso. Import estimates fluctuate between 300,000 tons to 400,000 tons during this period. (Burkina National Tomato Traders Association February 2024).

Traders and market queens exhibit a preference for Burkinabè tomatoes due to their superior quality, extended shelf life, and lower prices compared to domestic alternatives from January to April. This is the main production window in Burkina Faso because this is the dry season where disease pressure is low. In April the rains tend to start and that bring diseases, while fields can be too waterlogged in August and September to plant tomatoes.

However, recent security challenges and obstacles in cross-border trade have prompted traders to seek alternatives within Ghana, provided that local tomatoes can match the quality, volume, and pricing of those from Burkina Faso. Presently, local production falls short, meeting only 50% of overall demand and a mere 20% of the demand during the dry season.

Importers encounter various challenges, including bandit attacks on traders and trucks along the route to Burkina Faso, necessitating police escorts. Additionally, loaded trucks often face delays at the border, leading to increased post-harvest losses. Language barriers further complicate matters, as negotiations with Burkina farmers and traders must be conducted through intermediaries who may not be trusted by all parties involved. With the deteriorating security and political situation in Burkina Faso, the cost may increase further.

In addition, as discussed, tomatoes are also grown and imported from Togo, although it seems that the numbers are quite small.

5.5 A note on tomato paste

- *Figure 8: Tomato paste imports available in Ghana*

Tomato paste is a significant import for Ghana, with the country bringing in 78,000 tons annually from China, Italy, and the USA. About 12,000 tons is re-exported to landlocked countries within the region while Ghana utilises around 66,000 tons, about 13% of total imports to Africa (Volza.com 2024). However, actual consumption is likely to be higher, because part of the imports is so called triple-concentrate tomato paste imported in bulk that is diluted and packaged in Ghana.

Most consumers prefer fresh tomatoes even in sauces, but they resort to paste to reduce the cost, particularly when tomatoes are not in season and expensive.

Like most African countries Ghana has tried to set-up processing of tomatoes into tomato paste and failed. Techiman and Sunyani both have plants set-up for tomato paste production that have not operated for a long time. The logic is usually the same: “we are importing vast amounts of tomato paste, we have lots of tomatoes that are very cheap, and we should make paste ourselves”. The reality is usually that the season is too short, the tomatoes are the wrong variety, the prices too high

and the logistics too costly. It is virtually impossible to compete with the tomato paste producers in Italy and China.

However, trade agreements such as AGOA restrict Ghana to a challenging 10% import duty on these products, effectively hindering the development of a processing industry within Ghana itself.

5.6 Issues and opportunities

The tomato value chain is an extremely important one in Ghana due to its importance to Ghanaian cuisine and food security however is beset with challenges.

The opportunities seem large:

- Strong and growing demand for fresh tomato for sauces
- Growing demand for salad tomatoes
- Strong demand for tomato outside the main domestic and Burkina Faso production seasons
- High demand for tomato paste

However, it will be difficult for Ghana to take advantage of any of these opportunities, due to the many challenges:

- Inferior varieties and growing conditions compared to Burkina Faso; the wetter, humid climate makes tomato farming more difficult
- Poor and scarce irrigation infrastructure causes cycles of glut and scarcity on the market, and makes the dryer north difficult for farming.
- Northern areas who do have irrigation are switching to onions, which also raises questions about the profitability of tomato farming in Ghana
- Tomato is a geo - political crop, making modernisation efforts challenging – AGOA prevents the development of their processing sector due to large sectors in other countries like USA, China and Italy
- Willingness to invest in better seed is low - tomato seed in Ghana is subsidised and distributed by MOFA or NGOs. If farmers cannot access this, or it arrives too late for planting, farmers revert to recycled seed, considering commercial seed is too expensive.
- Farmers do not record costs and profits, leading to insufficient funds for inputs and poor uptake of seed varieties and Good Agricultural Practices (GAP)
- With interest rates at 40%, farmers are not bankable
- Market queens and the GNTTTA dominate the market by controlling information and communicating market information to their truckers/buyers. Farmers are disconnected from the market and don't have access to market prices, demand forecasts etc. Traders and market queens control this information to dominate the value chain from farm gate to retailers.
- Competition from processed tomato products: cheap imports of tomato paste and canned concentrate make a processing sector impossible

The activities that have to be undertaken to improve tomato farming are not easy, and many have been tried before without much success:

- Training youth, farmers, and extension agents in farming as a business and the use of appropriate seed varieties; training has been done, but the impact remains limited
- Developing or rehabilitating irrigation schemes through PPPs.

- Exploring options for repurposing mothballed processing plants into more viable business models.

The list of programmes that MOFA is working on, sometimes in collaboration with the EU, shows many of these initiatives. While there may be opportunities for private companies to impact in those areas, there is nothing novel or unique about these. At the end of the day, Burkina Faso is simply more competitive with better skills and climate and a higher willingness of farmers to adopt new varieties.

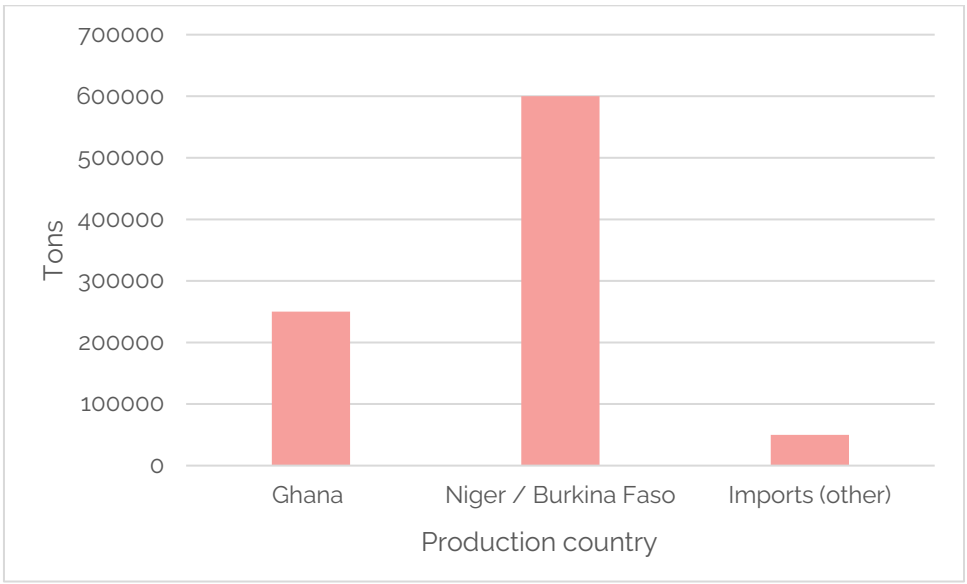
There are few opportunities in the tomato value chain. The only opportunity is to further explore the professional production of tomatoes in southern Ghana outside of the main Burkina Faso production period for use as salad tomatoes (the discussion on the growing prominence of salads in the Ghanaian sector is in Chapter 8.3).

6 Onion Value Chain

- *Figure 9: Onions at Kotoku onion market, outside of Accra*

6.1 Production

6.1.1 Production volumes, areas, seasonality, and yields



- *Figure 7: Ghana onion consumption by place of origin*

Domestic onion production in Ghana amounts to approximately 250,000 tons annually, while imports from Niger and Burkina Faso (other) contribute an additional 600,000 tons, valued at GHC 1.5 billion or USD 120 million. During the low season, which spans from September to November, small quantities are sourced primarily from The Netherlands, along with supplementary imports from Morocco, Egypt, and Italy. Estimated annual onion consumption in Ghana ranges between 850,000 to 900,000 tons, as projected by the IFPRI MOFA Ghana Onion Market Report 2020.

With the exception of Accra and Volta, onion cultivation is predominantly practiced with irrigation in the northern regions of Ghana. Many northern regions have shifted away from tomato farming and into onions. The shift from tomato to onion farming among northern Ghanaian farmers is driven by challenges such as irrigation issues, nematode infestations, and the inability to compete with high-quality Burkinabè tomatoes.

Onion farmers in the North of Ghana compete head on with Nigerien and Burkinabè onion prices. In Niger, onions are cultivated under optimal hot and dry conditions, facilitated by irrigation sourced from the Niger River or shallow wells tapping into abundant groundwater resources. The Galmi variety, akin to the variety commonly grown in much of Ghana, yields between 20 to 30 tons / hectare in Niger. This can be considered a good yield for African farmers. Characterised by large bulbs, mild flavour, and excellent shelf life, these onions are crucial for meeting demand in the Ghanaian market.

However, in Ghana yields are less than half those of Niger and the quality is inferior i.e. bulbs are smaller, more spicy (which Ghanaians do not prefer) and have a shorter shelf life. In most of Ghana growing conditions are not ideal for onions, but in the North farmers are taking up onion farming. Yet as the table shows, yields in the North are as low as in the South, at about 8 to 9 tons per ha.

One of the main causes is likely to be the lack of irrigation. Farmers may have shifted from tomato to onion because irrigation is unreliable. While the onions survive better than tomatoes with less water they don't provide a great yield. The lack of water is also likely to lead to smaller bulbs that are more concentrated in flavour. In addition, the timing and type of fertiliser application may also affect yields and especially the bulb size in Ghana.

The table underneath provides an overview of the yields, production areas and production seasons.

- *Table 4: Production practices, and prices for onions*

Region	Rainfed	Irrigation	Seasons	Average Yields	Price / 120 kg bag	Cost / ha	Gross Profit
Ashanti	Yes	Yes	Dec-Jan	8	250	13150	3517
Ahafo				0		0	0
Bono				0		0	0
Bono East				0		0	0
Central				0		0	0
Eastern	Yes	Yes	Dec-Jan	9	250	14000	3708
Greater Accra	Yes	Yes	Sept-Nov	8	500	14000	20583
Oti	Yes	No	Dec-Jan	8	250	12650	4850
Upper West				0		0	0
Upper East	Yes	Yes	Dec-Jan	9	250	11900	6850
Northern	Yes	Yes	Dec-Jan	9	250	12000	6125
North East			Dec-Jan	0		0	0
Savannah				0		0	0
Volta	Yes	Yes	Sept-Nov	7	500	12875	16292
Western				0		0	0

West Northern				0		0	0
Ghana Average				10		12939	8846

Key insights from Table 4: Onion Production

- Onions are far less profitable than tomato averaging GHC 8,846 profit per ha compared to GHC 45,448 for tomatoes. (It might seem strange then that farmers are moving out of tomatoes into onions in the North, however, as mentioned in Chapter 5.1.2, the farming of tomatoes is beset with challenges)
- Central production regions Ashanti and Eastern are barely profitable, possibly due to unsuitable conditions for onion production
- Volta and Greater Accra produce in the Niger off-season (September to November), receiving higher prices and margins per ha.

- *Figure 8: Onion production zones and seasonality*

The primary mechanism used by traders of all vegetables in Ghana is referred to as just-in time logistics. To compensate for a lack of cold chain and storage facilities, traders buy only as much as they can sell before post-harvest losses mount up, preferring frequent shipments to large shipments. Post-harvest losses mount up quickly when there are any delays in transport. If a truck is delayed for more than 3-4 days the entire cargo can be lost (Fresh Plaza 2023, corroborated by stakeholder interviews). Therefore, according to the stakeholders, the post-harvest losses are minimal. However, based on experience around West Africa this is hard to believe. It is not uncommon to lose 30% of onions during storage and transport and subsequent retail sales, due to rough handling and limited shelf life of onions. If the onions receive a lot of water and fertiliser before harvest, this will reduce shelf life. Onions also need to be dried on field after harvest. Usually this is not done properly, leading to losses along the value chain as onions start to rot and sprout and are damaged in transit.

6.1.2 Varieties per crop

Farmers select onion varieties based on their perception of suitability for their respective regions. Reported varieties in Ghana include Bawku Red, Ares, Maravi, Prima and Galmi. The main variety grown in Niger is Galmi. However, the yields in Ghana of the same variety are much lower, and the bulbs are also smaller. This can either be the result of climatic or soil conditions or farming practices. It is also possible that the quality of the seed used in Ghana is lower than what is used in Niger. The fact that it has the same name doesn't mean it's the same genetics. Usually lower yields are the result of a combination of all of these factors.

6.2 Pricing in the chain

High production costs pose a significant challenge for farmers, leading to reduced profitability and financial strain. Farmers often face rock-bottom prices for their produce when everyone is harvesting and are frequently compelled to cover transportation expenses and resort to selling on consignment during peak seasons. However, despite efforts, the gross profit per ha in regions like Ashanti and the north ranges only between GHS 3,500 and GHS 7,000, indicating minimal profitability.

Onion farmers average GHS 8846.43 in returns. Reported yields stand at approximately 8 tons per hectare, nearly double the figures reported by IFPRI (2017). Moreover, the cost of production has more than doubled, reaching an average of GHS 12930 per ha.

Conversely, areas such as Volta and Greater Accra, where onions are sold at lower seasonal prices, offer slightly better returns, with potential earnings ranging from GHS 16,000 to 20,000 per hectare. Nevertheless, even in these regions, onion farming remains significantly less profitable compared to tomato cultivation, with returns amounting to only 30-50% of what tomato farmers can earn.

- *Table 6: Margin of onions*

	Margin
Farm Gate	
Wholesale margin	18% margin
Retail margin	25% margin

Onions from Niger and Burkina average GHS 250 per 120kg bag at the border. Transport costs GHS 20,000 per truck under normal conditions including freight and loading. In high season the cost per bag at the Kotoku market hub including is GHS 320. Onions are then wholesaled at GHS 500 giving Kotoku wholesalers a margin of GHS 180 per bag or a 36% margin. However, this excludes losses when onions are not sold or damaged.

Approximately six organisations, each with their own members, collaborate to ensure the smooth operation of the market.

On the retail front, onions command prices ranging from GHS 6 to 10 per kg, influenced by seasonal variations and market dynamics. This translates to 720GHS in the main season to 1200Ghs per bag, giving retailers a gross margin of 44%. Retailers in Africa typically have to re-sort their unsold fresh produce every day and remove goods that have spoiled during the day.

6.3 Import and export

Ghana heavily relies on imports for 60% of its onion consumption, primarily sourced from Niger. These onions are favoured for their larger size, sweeter flavour, and longer shelf life compared to onions from Nigeria and Ghana. The preference for Nigerien onions is attributed to both varietal differences and favourable climate conditions, as Niger boasts desert conditions with ample access to water for irrigation.

Upon harvest, onions in Niger are stored for up to four months, typically between April and August, awaiting sale. Agents operating in Niger and Burkina Faso play a pivotal role in aggregating, grading, and selling onions to traders who transport them to the Kotoku onion market hub. There they are wholesaled in 120 and 80-kg bags, catering to traders servicing markets throughout Ghana.

Onions from Niger follow two main routes. Firstly, via Burkina Faso, and secondly, crossing the Niger River into Benin, and then transiting through Togo to reach Ghana. who subsequently transport them southward to Kotoku. Transportation logistics often involve trucks coming from the port of Tema. Ghanaian trucks collect goods intended for Burkina Faso and Niger at Tema and return laden with onions for the local market on the way back. At the border, onions sourced from Niger and Burkina Faso typically fetch an average price of GHS 250 per 120kg bag.

- *Figure 9: Kotoku onion market, outside Accra*

Recent border closures and ECOWAS sanctions against Niger have disrupted the onion supply chain, leading to hundreds of trucks being stranded at the Niger border. However, borders have since reopened for perishable products like onions. Due to security concerns in Northern Burkina Faso, most Nigerien onions enter Ghana via Benin and Togo. Onions are often transported to Ghana in trucks originally destined to collect imported goods from the port of Tema.
Wholesale operations are centralized at the new national hub in Kotoku, located outside Accra, from where onions are distributed to markets nationwide.

Ghana also imports small quantities of high-quality onions from the Netherlands and Egypt.

It's noteworthy that Burkinabé onions are being exported to Ivory Coast due to high demand. Burkinabé farmers cross the border to sell their onions in Ivory Coast, facilitated by the common currency and language shared between the two countries. This situation contrasts with the tomato value chain discussed in the previous chapter. There are potential opportunities for Ghanaian traders to forge partnerships with onion farmers in Burkina Faso, potentially through initiatives like the Hortiplus project.

6.4 Issues and opportunities

Much like tomato, the onion value chain offers some clear market opportunities:

- Onions are a key part of the daily diet of Ghanaians and consumed in huge volumes. Unlike tomatoes that can be substituted to a large extend by paste, onions don't have a direct substitute. They are consumed year-round, even when prices are higher.
- Onions are sourced at great cost from far away in Niger, Nigeria and Burkina Faso, and the cost are likely to increase. Several borders need to be crossed, interpreters are needed, and the many roadblocks along the long route add a lot to the cost. The sourcing countries are increasingly instable, with terrorist attacks on the rise, and governments increasingly paralysed due to coups. With Niger and Burkina Faso leaving Ecowas, prices may increase further. This may provide scope for higher farm gate prices.
- Out of season production by using irrigation and specific varieties can increase revenue because higher prices can be fetched.

However, much like the tomato value chain the main challenges make it difficult to take advantage of the opportunities:

- The climate and growing conditions in Ghana, particularly in the south, are not optimal for onion farming.
- There is poor adoption of Good Agricultural Practices (GAP)
- Irrigation infrastructure in the north of Ghana is inadequate.
- Farmers assume that irrigation has to be delivered through large irrigation schemes financed by the government and are not exploring options for small scale private irrigation.
- As a result of poor GAPS and irrigation, Ghanaian onions are smaller, have poorer shelf life, and are spicier compared to the preferred sweet Niger onions, and yields in Ghana are less than half of those in Niger
- Similar to tomatoes, the onion value chain is very complex with multiple stakeholders and vested interests.
- The ECOWAS sanctions against Niger in 2023 highlighted the dependence of Ghanaian consumers on Nigerien onion imports. Ghanaian consumers bore the brunt of the ECOWAS sanctions.

Many interventions have been tried before with little success. These activities are:

- Conduct research to identify and introduce onion varieties that perform like the Niger Galmi which have large, sweet bulbs, under Ghanaian conditions
- Establish a Public-Private Partnership (PPP) to conduct research on Ghanaian onion Good Agricultural Practices (GAP) and provide training to farmers, extension agents, and youth to enhance onion cultivation.
- Increase onion production in northern Ghana by implementing initiatives such as the construction of dams to improve irrigation infrastructure.

A word of caution with regards to onion storage projects. Across Africa one of the standard interventions in the onion value chain from development organisations is to help farmers and cooperatives store onions harvested in the main season for 3 to 5 months when prices often double or triple. Most of these initiatives fail spectacularly for the following reasons:

- Farmers are not traders. Storing onions to sell at the right moment requires a real understanding of the market, lots of working capital, risk management, storage controls, maintenance of infrastructure etc. Farmers are not generally equipped with the skills needed to do this. Liquidity in the Ghana agricultural sector is notoriously low.
- Onion storage is not per definition profitable even when you can double or triple the sales price. In normal storage, storage losses can easily come to 30% or even 50%. Firstly all onions loose moisture and thus weight in storage. Secondly the shelf life of the onions is often poor because of the overuse of fertiliser, watering too close to the harvest, not letting the onion skin dry off and rough handling during transport. The condition of onions is difficult to establish. With modern climate-controlled storage, losses can be reduced but this comes at a huge cost. With the high interest cost in Ghana for working capital, it is not certain storage is profitable.
- The real onion traders who should be the ones using the facility are often not involved in the storage initiatives. As a result, they tend to be built in the wrong places, with the wrong capacity, layout and cost structure.
- The storage operational and business model is often not well developed. Therefore, it is often not clear who is responsible for maintenance, or who pays for usage, maintenance and operations.

The immediate opportunities for companies do not reside in the onion value chain, and therefore the recommendation is to rather look for big, new ideas in other sectors that can be acted on quite quickly.

7 Chilli Peppers Value Chain

- *Figure 10: Fresh Scotch Bonnet and dried chilli peppers*

7.1 Production

7.1.1 Production volumes, areas, seasonality and yields

Chilli pepper cultivation is widespread across Ghana, with nearly a million farmers and households engaged in pepper production. Only the Northeast, West Northern, and Savannah regions do not commercially produce peppers. Peppers are harvested continually through a 2-to-3-month harvest season, with different areas in Ghana cultivating at different times of the year, ensuring that peppers are available throughout the year. However, production is the lowest in the January-March period when only 1 area is in production.

Peppers offer a more financially rewarding option compared to onions and rice, which are the primary horticultural crops in the northern regions.

While pepper farmers are far more numerous than tomato or onion farmers, plot sizes are smaller averaging 0,25 to 0,5 ha. This has to do with the large labour requirements, notably for harvesting. During the harvesting phase, peppers need to be harvested every other day for several weeks.

Farmers produce both rainfed and irrigated peppers, with similar yields. Rainfed peppers are obviously only produced during the rainy season. Though the ideal production system is an irrigated dry season system, peppers are not nearly as susceptible to the moulds and other diseases that spread in wet conditions as tomatoes. But it will require more pesticides and fungicides, thereby increasing production cost. Pesticide and fungicide use is high mainly to combat False Codling Moth and Anthracnose.

Some peppers are produced specifically for drying, which allows farmers to store produce until market prices become favourable. Dried peppers can also be exported. A few companies are exporting dried peppers to Europe.

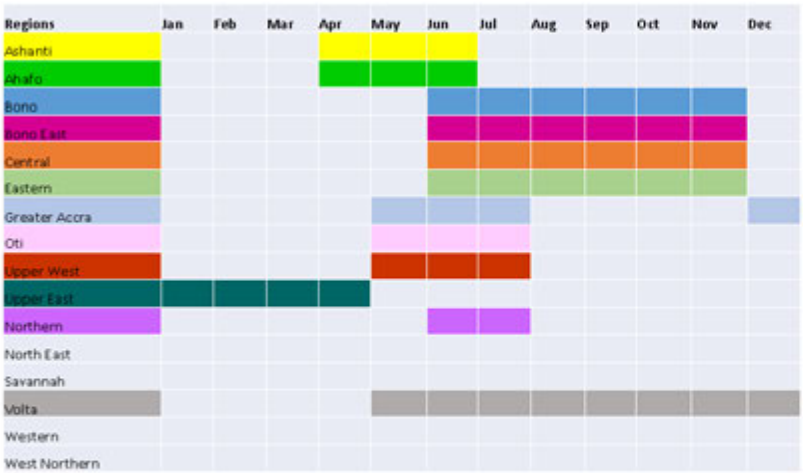
Local production volumes reach an estimated 120,000 tons.

- *Table 5: Pepper production practices, and prices*

Region	Rainfed	Irrigated	Season	Average yields t/ha	Average price per 70kg bag	Average cost /ha	Farmgate profit per ha
Ashanti	Yes	<5%	April-June	7,00	875,00	12495,00	75005,00
Ahafo	Yes	<5%	April-June	8,65	775,00	12225,00	83542,86
Bono	Yes	No	June-Nov	7,83	900,00	11555,00	89052,14
Bono East	Yes	<5%	June-Nov	7,35	775,00	11360,00	70015,00
Central	Yes	<5%	June-Nov	6,95	750,00	12500,00	61964,29
Eastern	Yes	<5%	June-Nov	6,85	825,00	9650,00	71082,14
Greater Accra	Yes	Yes	May-July Dec-Jan	7,80	875,00	14000,00	83500,00
Oti	Yes	No	May-July	7,40	725,00	10100,00	66542,86
Upper West	Yes	No	May-July	7,00	765,00	10250,00	66250,00
Upper East	Yes	Mostly	Jan-April	7,50	675,00	10100,00	62221,43
Northern	Yes	No	June-July	7,60	700,00	10225,00	65775,00
North East							
Savannah							
Volta	Yes	Yes	May-Dec	8,25	725,00	10325,00	75121,43
Western	Yes	<5%	May-July	8,50	700,00	11075,00	73925,00
West Northern							
Ghana Averages				7,59		11220,00	72615,16

Key Insights from Table 5 (Pepper production)

- *Peppers are very profitable having similar yields to tomatoes but a much higher farm gate price averaging GHC 10,75/kg compared to GHC 6/kg for tomato.*
- *Peppers are produced in 13 out of 16 regions, possibly providing better opportunities for northern farmers than onions.*



- *Figure 11: Hot pepper production zones and seasonality*

7.1.2 Varieties per crop

Farmers grow different varieties for fresh and for drying. Scotch Bonnets are sold fresh, while red chilli pepper varieties such as Legon 18, Cayenne and Birdseye can be sold fresh or dried. The domestic market consumes both fresh and dried peppers.

7.2 Pricing in the chain

In Ghana, higher production costs are primarily attributed to labour expenses, land costs, and the humid climate, which necessitates increased crop protection measures.

Reported fresh pepper yields average 7.5 tons / ha.
Farm gate prices for fresh peppers average GHS 800 per 70kg bag, translating to GHS 11.5/kg.
Despite the average profit per hectare being GHS 72,600, the smaller farm sizes limit the overall profitability.

- *Table 6: Price evolution of chillies*

Price evolution of chillies		
	Price: GHS / kg	
Farm Gate	11,5	
Wholesale	13,57	18% margin
Retail	15,20	12% margin

Please note: Price Data on dried chillies and conversion rates from fresh to dry need further research.

7.3 The trading environment

In the domestic market value chain, farmers sell approximately 80% of peppers at farm gate, while the remaining 20% is sold by farmers either fresh or dried in local markets.
As per other value chains, the market queens and traders facilitate the movement from farm to market. They act as the wholesalers who sell to retailers in the open market. The market queens for peppers usually also work with other vegetables such as garden eggs and okra. Most peppers are sold through the open market. Pepper exporters tend to have an own farm in combination with outgrowers.

7.4 Import and export

Export volumes, although growing, seem relatively small in comparison to the estimated 120,000 tons produced annually in Ghana. Currently, exports to the UK market are valued at USD 5.7 million, equivalent to 2,850 tons of peppers. The resources indicate that mostly fresh is exported (GAVEX and VEAPEAG 2024). However, it is estimated that this is equivalent to 19,000 tons of fresh chilli (assuming that fresh chillies have 85% humidity which need to be dried to 11%, and impurities and stems account for 5%). There is very little if any data on the dried pepper value chain. Further research is required to understand the conversion rate of fresh to dried, the price per kg of dried and the volumes of dried peppers sold and exported.

Despite the modest export volume, the significance of the export market lies in its role in driving the professionalisation of the pepper industry in Ghana. Efforts are underway to develop new markets in the Netherlands, France, Germany, and Spain. Additionally, Ghana imports small volumes of peppers, primarily from the Netherlands and Ivory Coast.

Participation in export markets offers chilli farmers opportunities for contract farming, as exporters often demand specific varieties that meet phytosanitary and Maximum Residue Limit (MRL) standards. Export companies engage with outgrowers, offering training, inputs, and desired seed varieties while adhering to MRLs and phytosanitary standards. However, controlling pests with pesticides poses a dilemma as it risks high MRLs in continually harvested crops.

European importers have encouraged farmers to adopt non-chemical pest control methods such as growing under nets to mitigate this risk. Exporters collect produce from farmers, grade and pack the peppers, and utilise cold facilities for storage before exporting them via airfreight to Europe and the UK.

7.5 Issues and opportunities for peppers

The big opportunity is the growth of the export value chain, since it is already Ghana's primary horticultural export product and is experiencing rising demand from markets such as The Netherlands and other EU countries. This can be both a fresh-airfreight product or reefer container, dried product. The local market is already supplied throughout the year.

The main opportunity for dried chilli in the EU market are whole dried bird's eye chillies, that tend to be used in oils and sauces where physical peppers are added. Because of their small size birds eye's chillies can be added in. There is demand for organic and conventional. This is a small niche market, but competition is limited because Asia does not produce bird's eyes chillies. Prices for this product range from 6-7 EURO/ kg CIF Rotterdam for conventional to 8.8 EURO/ kg for organic. Regular dried chillies and chilli flakes and powder average about 2,6 EURO/ per kg. There are no real price differences between these products.

There is a potential to foster vertical integration among offtakers, input companies, and farmers to cultivate export-oriented pepper varieties,

The pepper value chain also has a few challenges, notably:

- Maximum Residue Limits (MRLs) for export to the EU as dried and fresh product.
- Pre- and post-harvest diseases such as anthracnose and False Codling Moth.
- There is limited market access and intelligence for farmers not connected to exporters.
- Availability of good, standardised bird's eye chilli seed, because this is difficult to purchase in bulk. Currently all the suppliers of hot pepper seeds only have varieties that are much larger, while there is no small hybrid variety that resembles the African bird's eye.
- Exporters must consistently meet European Union (EU) import standards to avoid rejections and potential bans on exports.

8 Emerging Vegetables

8.1.1 Introduction

Emerging vegetables, encompassing ***Indigenous Vegetables, Salad Greens, and Asian Greens*** are less visible compared to onions and tomatoes. Vested interests are smaller, and there seems to be more space for innovation. Production is increasing, particularly through the increased consumption of salads by urban middle classes, and restaurants looking for new items on the menu. These vegetables have strong appeal, not only for consumers, but also for the HoReCa and export markets.

With the professionalisation of these value chains, there are opportunities in supplying technology and inputs, as well as export opportunities.

8.2 Indigenous vegetables

Indigenous vegetables should perhaps be called traditional vegetables as they are widely used in Ghanaian cuisine. Vegetables such as okra, garden eggs, a type of aubergine, and traditional green leafy vegetables are deeply ingrained in local culinary traditions, where they are mainly incorporated into stews and soups.

- *Figure 12: Garden Eggs and Okra*

While some of these vegetables were introduced to West Africa centuries ago, they have become integral to the region's cuisine being seen almost weekly in consumers home meals, but also featuring quite significantly on restaurant and catering menus.

A myriad of indigenous vegetables enjoyed in Ghana and across Africa are now experiencing heightened demand from diaspora communities in Europe and the USA. Ghana boasts a distinct competitive edge in cultivating these vegetables, benefitting from a favourable tropical climate, close proximity to Europe, and cost-effective airfreight options.

The most popular traditional vegetables in Ghana are the following:

- *Table 7: Most popular traditional vegetables in Ghana*

Traditional name	English name
Nkuruma	Okra
Nyaadewa, Ntrowa	Garden Eggs, African Eggplant
Kontomire	Cocoyam leaf
Ademe, Ayoyo	Jute mallow
Aleefu, Nantwikasee	Amaranth
Adua, Asedua, Bemto (Upper East)	Cowpea leaf
Bitor	Kenaf
Luffa, Sapor	Luffa
Suaka, Bitter leaf	Bitter leaf
Moringa	Moringa
Kwaunsusua, amadwiri	Turkey Berry
Sobolo	Roselle Leaf
Ugu	Pumpkin Leaf
Salu	African Spider Plant
Borkorborkor	Water Leaf
Kuka	Baobab Leaf
	West Indian Nettle
Atomo, Abrodwoma	Sweet potato / sweet potato leaves

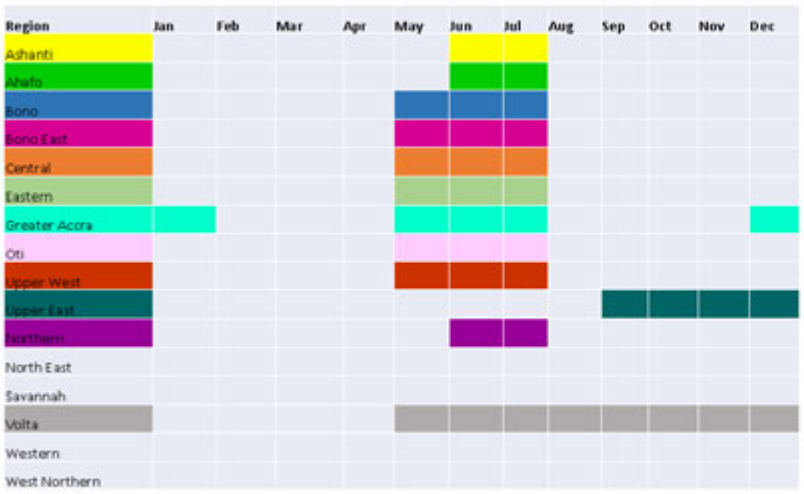
Of these, the most popular indigenous vegetables are okra, garden eggs and cocoyam leaves:

- *Table 8: Production of Garden Eggs, Okra and Cocoyam leaves*

Indigenous Veg	Yields / ha	Production	Value (GHS)	Exports
Garden Eggs	10-20t/ha	52,684 t	180,630,000	Small-but growing
Okra	10t/ha	68,145 t	224,362,500	20,000t
Cocoyam Leaves	10t/ha	No data	No Data	No data

The varieties planted depend on the market. Generally, local consumers of Okra for example prefer the local variety (grown from recycled seed), however exporters specify the seed varieties preferred by the importing country.

Indigenous vegetables are highly seasonal. If out of season prices are too high or if a particular crop is unavailable, consumers substitute with other vegetables (Shiela Yeboah, Hortifresh).



- *Figure 13: Garden Egg production zones and seasons*

There is limited production data available on these vegetables, many of which are foraged rather than commercially cultivated. However, the report "Distribution and consumption patterns of indigenous vegetables in Ghana" by Djah et al. (2020) provides valuable data on consumption trends within the country. The article states that 45% of respondents reported consuming indigenous vegetables daily, with an additional 45% consuming them more than once a week. This is also consistent with the market research done to inform this report.

Considered to be nutritionally rich and with a wide range of health benefits, indigenous vegetables play a crucial role in Ghanaian diets, averaging 325g per capita per day. This places them on par with staple vegetables like onions, peppers, and tomatoes. Notably nutrient-dense, indigenous vegetables serve as vital accompaniments to low-nutrient starch staples such as maize, rice, and cassava, particularly prevalent in impoverished rural regions. Consumption depends mostly on what is available locally at the time of year.

Local production is supplemented by imports from neighbouring countries like Togo, Benin, and Ivory Coast. Despite their potential for intra-Africa trade, high airfreight costs within the continent limit such transactions. However, for diaspora communities in Europe and the US there is a growing demand for indigenous vegetables.

8.2.1 Issues and opportunities for Indigenous Veg

Challenges to the Indigenous Veg value chain are:

- Extinction of indigenous vegetable species through climate change and deforestation
- Diseases such as Talo leaf blight that threaten production
- The trade is informal and seasonal
- There is little research into cultivation and distribution within Ghana
- There is very limited training on good agricultural practices.

Consumption of indigenous vegetables locally will increase naturally with population and income growth. If consumption is to be driven further, one would have to work on availability and affordability. This requires professionalising the production. Ghana has a strong competitive advantage (the indigenous vegetables are already well appreciated in Ghana, and the climate is suitable for large scale farming). Activities that can be undertaken to develop the sector are:

- Plant breeding to improve varieties and combat diseases
- Professionalising the value chain on the back of export demand and demand from local upmarket retail and restaurants
- Developing farming areas in the north where farming opportunities are scarce

8.3 Salad Greens

- *Figure 14: Cabbage, Cucumber, green pepper and imported carrots*

Salad greens, comprising cabbages, cucumbers, spring onions, lettuce, carrots, spring onions and sweet green peppers, represent a substantial portion of the vegetable value chain. This segment is experiencing growth as it has become quite an important range of vegetables in the markets.

During consumer interviews and focus groups, respondents frequently mention one or two of these vegetables, indicating their growing significance in the diet. There is a trend to incorporate salads into daily meals. Consumers appreciate the taste, colour and variety. It seems to indicate that salads have transitioned from occasional to commonplace in consumer homes, aligning with changing consumer preferences and lifestyle choices. In addition, the growth is spurred on by professional off-takers serving formal retail outlets, which target the emerging middle class, expatriate community, and the hospitality sector (HoReCa).

What is interesting is that where in many African countries cabbage is popular in stews because it is cheap and filling, they are considered as a salad ingredient in Ghana. This is probably why the demand is for small cabbages and not for large ones.

8.3.1 Production

The production of spring onions, lettuce, and cucumbers is concentrated in well-organised peri-urban farms and greenhouses strategically located near market centres. These facilities allow for efficient supply chain management and timely delivery to meet market demand. Cabbages, cucumbers, and sweet green peppers are produced in open fields for the mass market.

While carrots are an essential component of salad greens, they are predominantly imported from The Netherlands because of their quality. It is difficult to grow the large and perfectly straight carrots in the soils and climate in Ghana. On the other hand, cabbages, cucumbers, and sweet green peppers are cultivated in open fields to cater to the mass market demand, reflecting a more traditional approach to production and distribution within the value chain. These vegetables are also grown in Togo, which services large parts of the East of Ghana.

Producers are most likely focused on green peppers because red and yellow peppers are much more difficult to farm. Though there are specific green and yellow pepper variety, the colour for sweet or bell peppers gets determined by the time of harvest. Green peppers left longer on the vine turn red or yellow when they are fully ripe. However, this is also when they tend to get attacked heavily by insects. Hence to produce red or yellow peppers requires diligent pest and disease control. Consumers worldwide however tend to prefer red and yellow peppers, and these are sold at much higher prices, often double.

Premium market segments provide opportunities for increased investment in Good Agricultural Practices (GAP) to ensure product quality and compliance with stringent standards.

Cabbage is a profitable crop for all value chain actors:

Crop	Yields / ha	Farm gate price (GHS)	Profit / ha (GHS)	Retail price (GHS)	Value / ha
Cabbage	30,000 heads	2,5-5 per head	92,500	5-10	225,000

Cucumbers are a small but growing sector estimated at 134,5 metric tons in 2021.

Crop	Yields / ha	Farm gate price (GHS)	Profit / ha (GHS)	Retail price (GHS)	Value / ha
Cucumbers	6 tons per ha	8000 /70kg bag	40,000	10-12 per unit	120,000

8.3.2 The trading environment

Cucumbers and cabbages are in high demand and are usually purchased on farm by traders who hand select the vegetables they want. While farmers report no difficulty in accessing markets because the “buyers come to the farm”, farmers of emerging vegetables are advised to:

- Establish market contacts before planting
- Ensure they are growing the varieties demanded by their specific market
- Choose production sites close to major access roads

The prevalence of these vegetables is pronounced in the markets, and the quality of the vegetables are improving. They are now competing with imported goods in markets across Ghana, however in formal retail (for e.g. the “Farmers Market” premium retail store in Accra or Shoprite), there are more imported vegetables for sale.

8.3.3 Issues and opportunities for salad greens

There is a significant opportunity to grow the Salad Greens value chain. It comes off the back of a growing market. This can be seen through increasing penetration of salad greens, consumer stated preferences, and a growing market within households, HoReCa and middle class and expatriates. The opportunity is not only for the existing vegetables, but also new vegetables as consumers and HoReCa are interested in variety.

Whether there is a real opportunity depends on the vegetable. Cabbages are relatively easy to produce, and different varieties can be added such as red cabbages. Carrots on the other hand are difficult to produce in Ghana and are likely to remain imported from the Netherlands. What plays a role here is the long shelf life of carrots that makes imports in bulk per reefer container possible. Other salad greens will require a more controlled and high tech environment.

The main challenges to growing this sector are:

- Apart from cabbages, the climate is not ideal for these introduced vegetables: hot and humid means high diseases pressure, particularly along the coast where the biggest market is
- Investment in crop protection, irrigation and infrastructure including greenhouses are required, but the willingness to invest tends to be low
- Limited technical knowledge
- Cold chain is required for these vegetables
- Strong competition from imports from EU, Morocco, Egypt and the Netherlands
- Food safety standards

What is important to recognise is that although salad greens face competition from imported vegetables from the EU, Morocco, Egypt and the Netherlands, this is mostly limited to the high-end segment that can afford the huge price premium for imported product. Carrots which can be imported by sea freight are possibly the only exception here.

Prices for imported fruit and vegetables are often 3 to 5 times as high as those of local products, unfortunately, they also tend to look 3 to 5 times better than their local competitors. Hence there should be an opportunity in the middle and lower market segments for locally produced affordable salad greens of a decent quality. They don't need to be as nice as imported goods, as long as the quality is acceptable, and they are affordable.

8.4 Asian Greens

Asian greens are predominantly cultivated for export to specialised Asian importers in Europe, Additionally, there exists a secondary market catering to Asian communities residing in Ghana. Crops include:

- Curry Leaves
- Bitter Gourd
- Tinda, and various other potential crops.

Asian greens tend to be produced by a number of specialised exporters, sometimes on their own farms and sometimes in combination with outgrowers. The value chains tend to be short with a farmer and exporter being involved. The exporter washes and packages the vegetables and organises the export, often by airfreight.

AB Farms emerges as a key player in this sector, serving as the largest exporter of Asian Greens to Europe. In 2023 alone, AB Farms exported 600 tons of produce to the UK, Germany, and France, totalling a value of €2.5 million. According to estimates provided by AB Farms, the total value of Asian Greens exports to Europe amounts to €5 million, underscoring the significant contribution of this sector to international trade.

AB Farms showcases modern agricultural approaches aimed at maximising productivity and quality: They operate a 75-acre nucleus farm, of which 30 hectares are under irrigation, enabling efficient water management and consistent crop yields. The farm extends its impact through the support of 160 out-growers, providing them with essential training, inputs, and access to irrigation facilities, fostering community engagement and rural development.

In terms of supply chain management, the implementation of a cold chain system and strategic location near the airport's "Free Trade Zone" is deemed crucial for preserving product freshness and ensuring timely delivery to international markets. Efforts are underway to obtain Global GAP certification, reflecting a commitment to meeting rigorous international standards for agricultural production and enhancing market competitiveness.

8.4.1 Issues and opportunities for Asian Greens

Although there is a clear market opportunity with the Asian communities in Europe and Ghana itself, grabbing the opportunity has proven to be difficult. Over the past decade the Ghana Veg and Hortifresh projects have put considerable efforts in building this value chain, but the development seems to have stagnated.

Phytosanitary controls seem to be the main stumbling block. There have been numerous import bans, related to pesticide residues and pests. A lot of effort has been put in developing regulations and control systems, in cooperation with the government. The import bans have made it difficult for exporters to survive and have discouraged new companies to enter the business. Covid 19 also paralysed air traffic, wiping out nearly the entire market overnight.

The main challenges to the sector remain:

- Asian greens as a fresh export crop requires a cold chain and efficient logistics.
- Exporters need to meet EU import standards or risk losing markets.
- If there are any disruptions to export trade, this sector will be severely disrupted, as shown by COVID 19 disruptions from 2020 to 2022.
- Lack of technical skills combined with poor controls and high disease pressure leads to high pesticide residues that lead to trade bans.
- Removing trade bans requires enormous investments of all the stakeholders in the sector.
- Little local consumption to absorb non-export grade produce.
- High investment costs in production systems
- Small-scale farmers need to be linked to off-takers who support with input costs and certification.
- Packaging materials are all imported.
- Accessing supermarkets directly requires prepacking facilities in Ghana and logistics in Europe, which is another high investment.

It would make sense for the exporters in this chain to re-orient themselves to the production of salad greens for which there is a domestic (premium) market, at least to diversify the risk.

This sector will require technical expertise and technology and inputs to develop, which is an opportunity for businesses.

8.5 Conclusion: Emerging Vegetables

Many of the vegetables in this emerging vegetable group present interesting opportunities, because the domestic market is growing, and there is an interest in more variety. However, it will be important to pick a few crops to focus on. In several crops such as cabbage, Okra and garden eggs Ghana holds a distinct competitive edge or can be at least competitive with neighbouring countries. For salad greens there is potentially the biggest growth potential. Asian greens for export however remain challenging.

There is a clear need for the professionalisation of this sector, where companies can potentially play a large role.

9 The opportunities in the value chains

9.1 Introduction

In the previous sections, the opportunities in specific value chains of the vegetable sector was discussed. In this section, a more holistic level is examined regarding the value chains to invest in. The next chapter looks at cross-sector opportunities. Specific options for sector development and the role that can be played by the private sector will also be proposed.

9.2 Broad overview of the main issues and opportunities in the sector

Ghana is a country with a relatively low vegetable consumption however there does seem to be a large variety of vegetables consumed, particularly by West African standards. With a growing middle class and growing population and vibrant hotel, restaurant and catering sector demand will continue to grow. The more premium segments are looking for variety and quality. Of particular interest is also the strong trends towards inclusion of salads in every meal. This offers a good opportunity for the sector.

However domestic farmers largely fail to take advantage of this opportunity. For onions and tomato, they are outcompeted by Burkina Faso, Niger and Nigeria, while Togo is a competitor on many other vegetables. This is despite all the development interventions over the past decade. Chilli pepper and traditional vegetables okra and garden egg are the exceptions, and to a certain extent the salad greens.

One would think that the strong devaluation of the Ghana Cedi over the past years would have made Ghana more competitive. However, it seems to have driven up the cost of production just as hard. Production costs have surged significantly, with on-farm expenses per hectare soaring up to four times since 2017, using the IFPRI 2017 report as a benchmark. While reported yields have shown increase ranging from 50 to 100% compared to the IFPRI 2017 findings, this improvement is not uniform across all sectors. Furthermore, there is no certainty that these reported yield improvements are true.

Experts with a long history in the vegetable sector in Ghana also point out that the uptake of new technologies and inputs from companies has been very slow, and the market for suppliers remains small. The adoption of good agricultural practices by small scale farmers remains low, despite training efforts. Good quality seed is used when it is provided for free by development programs through NGOs or government but stops once payment is necessary. Investment in equipment for small scale irrigation etc. remains very low. Most innovation in the sector is driven by educated professionals who are not originally farmers but moved into the sector at a later age.

In addition, importers of fresh produce will struggle to find sizable sourcing opportunities in Ghana, perhaps except for chillies and niche products such as the Asian greens and okra.

There are also clear question marks with regards to the competitiveness of Ghana in the tomato and onion value chains. Though Northern Ghana should be able to compete with imports based on the climate, it is not the case. Tomato farmers have changed to onion farming, but they achieve lower yields and quality than their competitors. There is no data to suggest that Burkina Faso or Niger have more public operated irrigation schemes or better soils and climate for tomato and onion than Northern Ghana.

The growing North/South divide is evident, particularly with the decline in tomato production observed in northern regions. Northern farmers are consequently transitioning to onion cultivation or are opting for migration, either to Europe via the Sahara Desert or to southern regions of Ghana. Limited economic opportunities exist in the northern areas, with rice and onions being the predominant sectors. Developing indigenous vegetable production and marketing could serve as a potential solution to address this growing disparity and fill the void in the region's agricultural landscape.

Asian vegetables for the EU market have been long regarded as an interesting development opportunity, but this development seems to have stagnated. Supplying fresh produce to the EU that meets the strict phytosanitary standards seems a hurdle that is too large to overcome. It remains a niche market for the few professional companies that really manage to control production.

There does seem to be a clear opportunity in dried and fresh chilli export from Ghana to Europe, and perhaps even neighbouring countries. Ghana producers are certainly more advanced than their Burkinabé counterparts. The crop is more pest and disease resilient in a humid climate than for example tomato. The fact that the product can be exported dried can resolve a lot of phytosanitary issues.

Finally, the biggest opportunities are in the traditional vegetables and the salad greens. These may be smaller and more scattered producers, but at least they seem more competitive. Many crops in this group are far more resilient to the humid conditions in most of Ghana, for example green bell peppers, lettuce and cabbage. The fact that there are fewer vested interests in this sector makes change also easier.

A particular challenge in the salad greens space is to find the right production system that delivers the right product for the right market at the right price point. The market for perfectly straight English cucumbers may be too limited if they are produced at high cost in greenhouses. Producing the indigenous cucumber in an open field system at a lower price may be commercially more viable.

Carrots however do not offer a real opportunity, because it is difficult to compete with Dutch imports on quality. Ghana does not have the right growing conditions for carrots, and carrots can easily be stored and imported by sea-freight.

9.3 Discussion of development opportunities & interventions in the sector

When evaluating the opportunities for sector development, it is important to look at several aspects:

- The status quo: what is the current state of the value chain and feasibility of instigating change
- Previous experience: has a specific intervention been attempted previously, and if it did not succeed, what were the reasons behind it? Was is the idea or the execution that resulted in failure?
- Risk-reward balance: assessing the level of risk in comparison to the potential benefits.
- Consumer / market orientation: determining whether the opportunities stem from market demands, including consumer preferences, trends, and potential areas for growth.

Using the above as criteria to assess the big opportunities, extensive work in the tomato and onion sector have been excluded, for the following reasons:

- They are geopolitical crops with many key actors who might not want to change the status quo. Tomato is affected by AGOA constraints, while both tomatoes and onions are affected by ECOWAS sanctions / fallouts from coups d'état / regional instability.
- The trend has indicated a decrease in local tomato production despite quite a few interventions to encourage more tomato production.
- Except for the North, the climate is not that suitable for onion production, and even where it is better in the North there is a distinct lack of irrigation facilities to ensure that onions production and yields are higher. At the same time Ghanaians do not have a habit or culture of developing their own mini or private irrigation systems, and this mentality will be difficult to change in a farming population with an advanced age.
- To move the needle, there needs to be a highly organised working relationship between the government of Ghana, the tomato value chain sector and private companies. And that seems like an almost impossible task (i.e. the risk of failure outweighs the rewards).
- Most vegetable development projects have worked on tomato and onion, but we do not see much improvement in the field. Some experts argue that these chains are dominated by older traditional small-scale farmers who are resistant to change and are not that willing to invest a lot of money in inputs and other production means. If anything, the various development initiatives from government and NGOs seems to have increased the dependency of farmers on donations and assistance and lowered their willingness to invest. For example, they prefer to wait for government to distribute free or subsidised seed and will recycle seed if this does not materialise.

The only exception seen is the professional production of tomatoes outside the Burkina Faso window by professional farmers, mainly aimed at the salad market. This leads to the first opportunity.

9.3.1 Off season salad tomatoes

It is known from consumer research in West Africa that by far the biggest usage of tomatoes is in sauce, and that consumers respond to increasing prices by substituting fresh tomatoes for tomato paste. However, in salads this is not possible. In this study it was noticed that there is a growing consumption of salads, and thus tomatoes in salads.

What is not known is whether consumers are likely to accept salad tomatoes instead of processing tomatoes. The advantage of salad tomatoes is that they are available as indeterminate varieties that deliver much higher yields, because they have a much longer harvest season.

Another option that is worthwhile exploring is the potential for cherry or mini tomatoes for the same market, and potentially the luxury restaurant market. Again, these tomatoes are indeterminate varieties. In addition, some types of mini tomatoes are much more disease resistant than larger tomatoes and can be farmed in humid areas.

The suggestion is to aim this opportunity at (emerging) commercial farmers and urban professionals moving into farming, as well as farmers currently producing other salad greens close to Accra or Kumasi where the biggest opportunities for salad tomatoes are.

To develop this opportunity, companies would need to do more detailed market research to establish the specific demand for salad tomatoes, and the type of tomatoes. Furthermore, the right production system would need to be determined.

Opportunities for companies would be to help with variety selection, market research & market testing and developing relatively low-cost production systems.

9.3.2 Expanding the export market for fresh and dried peppers

One promising opportunity lies in ***expanding the export market for peppers, both fresh and dried***. Ghana currently exports peppers and is witnessing increasing demand from key markets like The Netherlands, Germany, France, and Spain. Given extensive import into Europe, there is significant potential for importers to facilitate the growth of Ghanaian pepper exports to Europe. However, realising this opportunity will necessitate the professionalisation of the value chain to meet the stringent import standards set by European markets when it comes to fresh peppers. Dried peppers are slightly easier because the drying process can get rid of many types of contaminants, though pesticide residues would remain an issue.

The Netherlands is a large importer of both fresh peppers which go into the fresh vegetable channels, and dried peppers purchased by spice companies. Work that would need to be done is to link importers to exporters, and help exporters obtain certification, drying and fresh produce packing facilities and manage farmers. Finding the right varieties and farming systems is another area of expertise required.

9.3.3 Growth of the indigenous vegetable and salad greens sector

The third opportunity lies in ***the expansion of the indigenous vegetable and salad greens sector***, promoting the cultivation of vegetables such as garden eggs, okra, cabbage, lettuce, cucumber, green pepper, spring onions, and others.

Indigenous vegetables already have a strong presence in Ghanaian cuisine, providing a solid foundation for further development. However, the local sector requires professionalisation of the value chain to maximise its potential. For diaspora communities in Europe, Ghana holds a competitive advantage in cultivating these vegetables thanks to its favourable tropical climate, proximity to Europe, and cost-effective airfreight options.

For **salad greens**, there is a growing trend of incorporating these vegetables into Ghanaian diets, highlighting the opportunity for concerted efforts to expand the sector and increase vegetable diversity in households across Ghana.

Activities that are needed where the private sector can play a role are again the linking of niche importers for the indigenous vegetables with exporters and supporting export chains. Secondly for the national market of salad greens the need for support is the same as for salad tomatoes: market research, variety selection and developing the right production models that can produce salad greens of acceptable quality at an affordable price for middle class consumers.

9.3.4 Introduction and growth of "new vegetables"

The fourth opportunity lies in the ***introduction and growth of "new vegetables"*** - those that pique the curiosity of Ghanaian consumers but do not feature in regular meals in their households or in restaurants. Examples include zucchini (courgette), green beans (haricots verts), butternut or gem squash which can be grown in Ghana's hot and humid climate.

10 The opportunities for sector development across value chains

This chapter explores development opportunities that cut across the vegetable sector. These opportunities range from significant, ambitious prospects to smaller initiatives tailored for entrepreneurial farmers or geared towards creating employment opportunities for youth.

10.1 A comprehensive market data system

An important opportunity lies in the development of a comprehensive market data gathering and dissemination system as exists in all developed agricultural economies. Such a system would provide real-time, reliable market data, offering several benefits:

- Equipping farmers with crucial information to cater to market demands effectively, thereby securing better prices through timely cultivation of appropriate crops. They should also be able to decide to which market to send their crops.
- Empowering traders and wholesalers to anticipate fluctuations in supply and demand.
- Facilitating informed economic decisions regarding infrastructural investments such as packhouses, cold chains, and storage facilities.
- Improve access to finance for the horticulture sector by allow banks to make data-based decisions and financials products for the sector.
- Providing governmental bodies, including the Government of Ghana (GoG), Ministry of Food and Agriculture (MOFA), and development and commercial institutions, with dependable data to shape policies.
- The system could extend to other agricultural sectors including grains, roots and tubers and animal protein.

Implementing a real-time market data system similar to those in South Africa and other developed nations would be complex, costly, and time intensive. It would require the cooperation of all stakeholders most notably the wholesalers and government. If for example at any stage the government would use the data for tax collection, the system will collapse. Another challenge is if volumes estimated are not in line with the official government statistics, will there be political pressure to bring the numbers in line with the official government narrative?

This system necessitates a network of data collectors stationed across all major markets. These agents would provide daily reports on wholesale and retail prices for key crops, ideally including the volumes supplied to each market. A user-friendly IT system would be essential for agents to upload data and for users to access it easily. For instance, it could present a straightforward list of the top 10 markets for okra, along with daily and previous day prices. Additionally, an editor would be needed to verify the accuracy of the data.

Securing cooperation from wholesalers is paramount, as they must be persuaded of the benefits this system offers to them.

10.2 Finding the right production business models

In the field of agricultural development, it is important to make sure that the agricultural practices recommended are economically sound and improve the income of farmers. This is only the case if it helps farmers to:

- produce the same product at lower cost.

- produce a better product for the same cost that can be sold at a higher price.

If for example the recommended practices increase yields but drive-up costs even further, they will not work. Or if they result in an expensive product for which there is no market.

A question that needs to be explored further is what products will be produced for which market with which technologies and production model?

What has been observed frequently is small scale farmers using very low input and low technology models to produce for a local market, alongside several attempts at high end production with greenhouses for a premium market. Based on the various interviews and experiences in horticulture, it is felt that there could be a role for middle-of-the-road models that can produce vegetables cheaper throughout the year. And these are probably still based on open-field production.

For example, instead of transitioning directly from open-field tomatoes to greenhouses with drip irrigation and special pots, a shift to open-field tomatoes under shade cloth with drip irrigation may be considered. Instead of moving from the spiky indigenous cucumbers to perfect English cucumbers grown in a greenhouse, the focus may need to be on producing better quality indigenous cucumbers at a lower price.

For these farmers, a crucial question arises: "What is the optimal production or business model that can yield high-quality vegetables at competitive prices?"

This work requires some additional research based also on what is happening in other African countries and economic modelling of various production systems. Once one or more systems have been chosen, practical pilots are needed to confirm whether the model works and gives the economic results needed.

10.3 Shift the focus to young and emerging farmers

Most development efforts have been focused on traditional small holder farmers, often in the tomato and onion value chains. However, the low uptake of improved agricultural practices despite all the training has been mentioned by many stakeholders. Like in many other African countries, the profile of the average small holder farmer is a man above 45 to 50 years of age. This is not a demographic that is famous for embracing change in most parts of the world. Part of the reason that the age is so high is that the youth is opting out of this traditional farming system.

To promote more professional and more economic farming systems, a different demographic need to be targeted. It has been noted by suppliers of equipment and input that most of their clients are younger people with a higher education level that come from a professional background, and not from a farming background. Agricultural programs should consider focusing more on these entrepreneurial farmers who are willing to invest in technology.

This means that instead of focusing on training large amounts of traditional small-scale farmers there would be programs developed to focus on younger farmers that have a real interest in modernisation and professionalisation. Modern farmers around the world are entrepreneurs that need to make complicated investment decisions. They are no longer simple labourers.

10.4 Development of professional farmer services

Another opportunity for professionalisation is the further development of professional services to farmers. The large number of older farmers that are not willing or able to invest in technology is also a business opportunity for the youth. Farmers who are no longer able to prune their own trees or till the land will require services or mechanisation. But for most it is not practical to invest in power tillers or chainsaws. This leaves services as the only option.

From a development perspective it is easier to train 200 professional service providers than the 4000 farmers they can service. Equipment can now be shared between all the farmers. And these business models with technology are more attractive to the youth.

Ghana already has many working examples of professional and informal service providers. The Hortifresh project for example supports professional orchard maintenance services for mango, and the so called 'spray-gangs'. These are groups of young contract sprayers for crop protection. Most mango trees in Ghana are pruned by informal contract pruners who charge per tree. There are many tractor drivers who make a living from land preparation for farmers. And in the irrigated rice sector there are people with combine harvesters who offer harvesting services.

The further development of these services requires specific support to business owners. These include:

- The development of business models to understand the main cost drivers and sales volumes needed.
- Access to finance to purchase equipment.
- Support with the identification of the right equipment.
- Technical training, e.g. pruning techniques, spray techniques, tractor driving, basic repair, equipment maintenance.
- Business training and coaching, e.g. sales and marketing of services, HR management, financial management, operational planning.

10.5 Enhancing farmer-trader linkages

Like elsewhere in Africa links between farmers and markets tend to be weak. To encourage farmer-trader linkages, there are notable opportunities for traders to offer input packages geared towards supporting modern farming practices. These packages may include initiatives such as outgrower schemes or drip irrigation kits, crucial for cultivating high-quality vegetables within the sector. Such efforts not only contribute to improving the quality of produce but also play a significant role in advancing the professionalisation of the agricultural sector.

Moreover, these collaborations can extend beyond national borders, fostering cross-border trade opportunities. For instance, within Project Hortiplus, initiatives targeting crops like tomatoes provide an avenue to engage with tomato farmers and establish effective connections with market queens. While this endeavour may not directly benefit Ghanaian farmers, it greatly enriches the existing cross-border trading landscape, ensuring trade stability, and fostering economic resilience for participating countries.

10.6 Alternative small scale irrigation systems

The importance of irrigation in Ghana is widely accepted. However, farmers and other stakeholders share two main beliefs: irrigation has to happen in large scale irrigation schemes, and it is up to

donors and the government to invest in those schemes. However, the past decades have shown that this is wishful thinking. Only a fraction of the irrigation schemes in Ghana are operational.

In many African countries it is common for farmers to develop their own small scale irrigation schemes, often using mobile petrol pumps to pump from nearby rivers, dams or from tube-wells or boreholes. However, in Ghana this does not seem to be very common, which is a missed opportunity.

11 The task ahead

11.1 What needs to be done?

For the above opportunities to be exploited, several key steps need to be taken in Ghana:

- **Value Chain Professionalisation:** the various value chains require a significant level of professionalisation throughout the value chain. This includes improving farming practices, post-harvest handling, processing, packaging, and distribution to meet international standards and consumer preferences.
- **Quality Control and Compliance:** Ghanaian producers and exporters must ensure strict adherence to quality standards and compliance with European import regulations. This involves implementing proper farming practices, post-harvest handling, and processing methods to meet European quality and safety requirements.
- **Investment in Infrastructure:** There should be investment in infrastructure, such as irrigation systems, cold storage facilities, processing plants, and transportation networks, to maintain the freshness and quality of vegetables throughout the supply chain. Improving infrastructure will also enhance quality, efficiency and reduce post-harvest losses.
- **Capacity Building:** Training programs and technical assistance should be provided to Ghanaian farmers and exporters to enhance their skills and knowledge in production, handling, and export management. This will help improve productivity, quality control, and compliance with international standards.
- **Research and Innovation:** Research and innovation play a vital role in driving the growth and competitiveness of the vegetable sector. Investment in research and development initiatives, breeding programs for high-yielding and disease-resistant varieties, and technology adoption can lead to improved productivity, quality, and resilience in vegetable production.
- **Market Access and Promotion:** Efforts should be made to facilitate market access for exports to European countries through trade agreements, market access initiatives, and promotional activities. Building relationships with European buyers and participating in trade fairs can help raise awareness and demand for the various vegetables.
- **Access to Finance:** Access to affordable financing options is essential for farmers and agribusinesses to invest in modern technologies, inputs, and infrastructure improvements. Financial institutions and government agencies should provide tailored financial products and support mechanisms to facilitate investment in the vegetable sector.
- **Government Support:** The Ghanaian government can provide support to the pepper industry through policies that promote agricultural development, export promotion schemes, and incentives for investment in the sector. This may include providing financial assistance, infrastructure development, and regulatory support.

For **the growth of new vegetables** specifically, over and above the steps mentioned above, the following steps need to be taken:

- **Market Education:** Increase consumer awareness and educate consumers about the nutritional benefits and culinary uses of new vegetables through marketing campaigns, cooking demonstrations, and partnerships with retailers, restaurants and chefs.
- **Import Infrastructure:** Improve import infrastructure to facilitate the importation of new vegetables that cannot be grown locally due to climatic constraints. This includes streamlining customs procedures and ensuring efficient logistics networks.

- **Quality Control:** Implement rigorous quality control measures to ensure that imported vegetables meet safety and quality standards. This includes inspections at ports of entry and collaboration with international suppliers to maintain consistent quality.
- **Local Production Support:** Provide support to local farmers who are interested in cultivating new vegetables that can thrive in Ghana's climate. This may involve offering training, access to seeds or seedlings, and technical assistance to optimize cultivation practices.
- **Partnerships:** Foster partnerships between government agencies, agricultural organisations, retailers, and international suppliers to coordinate efforts in promoting and distributing new vegetables in Ghana. This collaboration can help address logistical challenges and ensure a steady supply of high-quality produce to meet consumer demand.

By addressing these key areas, Ghana can unlock the full potential of its vegetable sector, capitalise on export opportunities, and contribute to economic growth, food security, and rural development.

11.2 What role can companies play?

Private companies can assist in any of the above by providing the following:

- Provide technical expertise and training to Ghanaian farmers and service providers on modern farming practices, post-harvest management, and food safety standards.
- Invest in infrastructure such as small-scale irrigation systems, cold storage and transportation networks in vegetable producing regions of Ghana.
- Offer tailored financing solutions to Ghanaian agribusinesses for investment in agricultural technology, equipment, and infrastructure upgrades.
- Provide technical assistance and training to improve chilli pepper cultivation and post-harvest practices.
- Facilitate market linkages between Ghanaian vegetable producers and international buyers, leveraging existing trade networks and market intelligence.
- Assist in meeting international quality and food safety standards through certification and compliance support.
- Explore value addition opportunities through product development and branding initiatives.
- Promote sustainable farming practices and environmental stewardship through initiatives focused on organic certification, climate-smart agriculture, and resource-efficient technologies.

Specific examples of the above are:

- Direct investment in Ghanaian vegetable farms, either through joint ventures with local partners or wholly owned subsidiaries
- Offering consultancy services to Ghanaian vegetable producers, processors, and exporters
- Establishing distribution networks and logistics services in Ghana to facilitate the efficient transport and export of Ghanaian vegetables to international markets.
- Developing and selling agricultural inputs and technologies tailored to the Ghanaian vegetable sector, such as seeds, fertilizers, irrigation systems, and post-harvest handling equipment.
- Engaging in trading and brokerage activities, acting as intermediaries between Ghanaian vegetable suppliers and international buyers.
- Investing in value-added processing facilities in Ghana to manufacture processed vegetable products for export or domestic sale, companies can invest in facilities for washing, sorting, cutting, and packaging vegetables for retail sale or food service.
- Establishing import and distribution channels for high-demand vegetables not currently available in the Ghanaian market. Companies can source these vegetables from international suppliers and distribute them to supermarkets, restaurants, and wholesalers across Ghana.

- Developing and selling agricultural technology solutions tailored to the Ghanaian context. This includes greenhouse systems, irrigation technologies, and post-harvest management solutions that improve crop yields and quality.
- Investing in research and development activities focused on improving vegetable varieties, cultivation practices, and post-harvest handling techniques can yield income opportunities. Companies can sell improved seeds, agronomic inputs, and knowledge-based services to Ghanaian farmers.

By undertaking these initiatives, private companies can contribute to the growth and competitiveness of the Ghanaian vegetable sector and fostering economic development and trade between Ghana and international markets.

Annex.

Annex 1: Interviews were conducted with Individuals from the following companies:

	Organisation
1	WUR
2	Hortifresh
3	Resilience
4	Advance Consulting
5	USAID
6	Burkina National Tomato Traders Association
7	BF Fluidite Agro-Betail (Onions and Tomato)
8	Osbroke Agro
9	The African Farmer
10	VEAPEAG/ Maflix
11	GhTTTA
12	Ghana Hortifresh Forum/Eden Tree
13	AB Farms
14	Holland Greentech
15	East west seed
16	IFPRI CGIAR
17	Stats Ghana
18	Bakker Brothers
19	Director Bakker Brothers
20	GNBCC
21	Enza Zaden

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