



Vegetables Business Opportunities in Ghana: 2014

*Yeray Saavedra, Youri Dijkxhoorn, Anne Elings, Josh Glover-Tay,
Irene Koomen, Edwin van der Maden, George Nkansah, Peter Obeng*



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The GhanaVeg Program

GhanaVeg believes in healthy and quality vegetables from Ghana through new ways of doing business. GhanaVeg supports frontrunner companies in the vegetables sector with business information, contacts and can provide hands-on assistance in setting up or expanding your company.



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Foreword

Ghana's Agricultural sector has gone through a checkered history. There have been periods of significant growth with spin-off impacts on other sectors, shoring up the entire economy. Admittedly, the sector has also seen periods of reduced growth, arising from factors that are both structural and systemic.

Traditionally, the cocoa subsector has spurred the export performance of the agricultural sector. However, during the last two decades, the narrative has been changing, with the emergence of other sectors including those in horticulture. A number of reasons are responsible for this. Firstly, Ghana's local climatic conditions are ideal for the production of tropical fruits and vegetables. Secondly, the country is in close proximity to many European countries.

Importantly, Ghana's growing middle class with a heightened health awareness of consuming vegetables, coupled with the rise of the supermarket industry, is fueling the gradual growth in the domestic market for vegetables.

Sadly however, these positive developments have been challenged by three key bottlenecks that are threatening the growth of the vegetable subsector: the lack of adaptive production technologies to optimize yields and quality production; the increased incidences of food safety violations and the limited collaboration in the chain between input suppliers, producers and buyers.

It is in this light that I am delighted to see the efforts of GhanaVeg; boldly addressing these challenges, and supporting new public-private arrangements where possible. Obviously the challenges are interlinked, and the integrated approach taken by GhanaVeg is one that excites the Ministry of Food and Agriculture, and the Government of Ghana.

I acknowledge the emphasis on private sector-led development, which permeates through this Business Opportunities Report, as a welcomed development for Ghana's vegetables sector. This is something the horticultural business community will find opportune, and they will hopefully take advantage of the numerous opportunities outlined in the report.

In particular, the section on greenhouse technology is educative and timely. Educative because it provides an independent assessment of greenhouse technology and it provides a strong basis for the design and technology that is suitable to Ghana's production systems. Timely, because with the increasing concerns on limiting land and water resources, population pressure, and the effects of climate change, protected cultivation offers answers today, for tomorrow's challenges.

At the policy level, and particularly as it relates to the findings of the SPS study, a number of recommendations are made that we at the Ministry of Food and Agriculture, through the PPRSD, are committed to resolving to promote the growth of the vegetable sector.

Finally, I have no hesitation in recommending this report to the vegetable business community, financial institutions, development partners, government ministries, departments and agencies, and indeed to the general public. I expect the coming years will bring growth and prosperity to everyone involved in Ghana's vegetables sector.

*– Mr Fiji Fiavi Kwetey
Minister of Food and Agriculture*

Acknowledgements

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The Ministries of Food and Agriculture (MoFA), and Trade and Industry (MoTI) were particularly helpful in providing key information on the policy direction of the Government of Ghana, with respect to the vegetable subsector. The Plant Protection and Regulatory Services Directorate (PPRSD), Water and Food Research Institutes (WRI & FRI), Food and Drugs Authority (FDA), Ghana Standards Authority (GSA), Ghana Export Promotion Authority (GEPA), Environmental Protection Agency (EPA), Ghana Airport Cargo Centre (GACC) and the Ghana Irrigation Development Authority (GIDA) provided useful platforms for technical consultations and inputs during the studies; they deserve our sincere gratitude. In addition, a number of research institutes and universities have been extremely helpful in providing us the state of the art insights on technical and economic developments in the country.

In particular we would like to thank: University of Ghana (Forest and Horticultural Crops Research Centre in Kade), Kwame Nkrumah University of Science and Technology (KNUST), CRI and SARI. We are also grateful to the Ghana Association of Vegetable Exporters (GAVEX), the Vegetable Exporters Association of Ghana (VEPEAG), Federation of Associations of Ghanaian Exporters (FAGE) and the Ghana Agro Input Dealers Association (GAIDA) whose members provided useful inputs during field visits and the stakeholder workshops to validate findings.

Lastly, we would like to sincerely thank Agri-Impact Consult and the EMQAP (AFDB) program for sharing with us their findings in the context of the 'Potential regional and local markets for Ghanaian horticultural produce'.

Finally the coordination role of the GhanaVeg team in continuously providing feedback, arranging appointments with key informants, and organizing the workshops were an invaluable support we received before, during and after our studies in Ghana.

Abbreviations & Acronyms

AfDB	African Development Bank	IECD	Import and Export Control, Department of the
AgDevCo	Africa Agricultural Development Company	IPPC	International Plant Protection Convention
BMGF	Bill & Melinda Gates Foundation	ISO	International Organization for Standardization
CAC	Codex Alimentarius Commission	IWMI	International Water Management Institute
CBI	Centre for the Promotion of Imports from Developing Countries	KIA	Kotoka International Airport
CDI	Centre for Development Innovation, Wageningen UR	LEI	Agricultural Economics Research Institute, Wageningen UR
CPDM	Diseases Management Division	MEST	Ministry of Environment, Science and Technology Innovation
CSIR	Council for Scientific and Industrial Research	MoF	Ministry of Finance
DEFRA	Department for Environment, Food and Rural Affairs, UK.	MoFA	Ministry of Food and Agriculture
ECOWAS	Economic Community of West African States	MoH	Ministry of Health
EDAIF	Export Trade, Agricultural & Industrial Development Fund	NACOB	Narcotics Control Board officials
EKN	Embassy of the Kingdom of the Netherlands	NPPO	National Plant Protection Organization
EMQAP	Export Marketing Quality and Awareness Project	PPRS	Plant Protection and Regulatory Services Directorate
EPA	Economic partnership agreement	PQD	Quarantine Division and Crop Pests
EPA	Environmental Protection Agency	SPS	Sanitary and Phytosanitary
EU	European Union	SWOT	Strengths, weaknesses, threats and opportunities
FBO	Food Business Operators	UK	United Kingdom
FDA	Food and Drugs Authority	VEPEAG	Vegetable Producers and Exporters Association of Ghana
FFV	Fresh Fruits and Vegetables	Wageningen UR	Wageningen University & Research centre
FRI	Food Research Institute	WTO	World Trade Organization
GAIDA	Ghana Agro Input Dealers Association	WUR	Wageningen University and Research Centre
GADEX	Ghana Association of Vegetable Exporters		
GCAP	Ghana Commercial Agriculture Project		
GDP	Gross Domestic Product		
GEPA	Ghana Export Promotion Authority		
GSA	Ghana Standards Authority		
HACCP	Hazard Analysis and Critical Control Points		
HS	Harmonized system		

1. Introduction

1.1 Country profile

Ghana lies at the shore of the Gulf of Guinea in West Africa and occupies a total area of about 24 million ha. To the North, it borders Burkina Faso, Togo to the East and Ivory Coast to the



West. The country is divided into ten administrative regions and six ecological zones, dominated by semi-deciduous forest and Guinea savannah. Rainfall ranges from 600 mm/year in the coastal zone to 2200 mm/year in the southwestern rainforests. In most parts of the country there is one distinct rainy season and one dry season lasting longer in the Northern parts of Ghana than in the South. Ghana's population stands at about 25 million and its distribution is varied across the 10 administrative regions and eco-zones of the country with 68 percent and 32 percent living in the rural and urban areas, respectively.

Ghana's economy has been strengthened by a quarter century of relatively sound management, a competitive business environment, and sustained reductions in poverty levels. Ghana is well-endowed with natural resources and agriculture accounts for roughly 22% of GDP and employs more than half of the workforce, mainly small landholders. About 52 percent of the labor force are engaged in agriculture, 29 percent in services and 19 percent in industry.

1.2 Agriculture in Ghana

The food and agriculture industry plays a major role in Ghana's economy. Agriculture in Ghana is predominantly smallholder, traditional and rain-fed and recognized as the mainstay of the economy with a greater impact on poverty reduction than other sectors. It is a

source of livelihood to individuals who are engaged in it right from cultivation to the final consumer. It is also critical for rural development and associated cultural values, social stabilization, environmental sustainability and buffer during economic shocks. There are however regional variations in the proportions engaged in this activity. In the Northern and Upper West regions for instance, more than 70 percent of the economically active population is engaged in agriculture activities.

Small-scale farmers in Ghana's poor rural areas have limited access to the assets that would facilitate a shift from low-productivity subsistence farming to modern, commercial agriculture. Major constraints to their livelihoods include lack of infrastructure and insufficient access to equipment – such as agricultural inputs and technology, and facilities for storing, processing and marketing products.

1.3 Ghana's vegetable production

Some characteristics

Vegetable cultivation in Ghana provides an excellent source of employment for both rural and urban dwellers as it is grown in many rural areas as well as in the outskirts of towns and cities to be supplied fresh to the urban markets and for exports. The industry has been found to have three distinct components – Commercial/market gardening, medium scale production for contractors/middlemen and small-scale domestic / backyard gardening. Most of the farmlands in Accra, the capital city of Ghana are used for commercial cultivation of vegetables (tomatoes, okro, cabbage, lettuce) and maize.

Still, vegetable consumption in Ghana is still relatively small compared to other African countries like Kenya, but is expanding rapidly. Apart from local vegetables like coco yam, the most important vegetables are tomatoes, peppers (both sweet and hot chillies), onions and okra.

Table 1. *Production of key vegetables in Ghana, 1986-2011*

Production (t)	1986	1991	1996	2001	2006	2011
Chillies & peppers, dry	23.000	24.684	44.539	45.000	78.000	88.000
Chillies & peppers, green	137.000	140.000	265.000	191.049	277.000	270.000
Eggplants (aubergines)	7.500	6.900	11.160	13.098	5.630	4.800
Okra	146.000	135.000	208.376	122.956	105.000	80.000
Onions, dry	28.000	20.189	29.500	44.322	42.500	48.000
Tomatoes	38.900	91.700	182.000	175.076	176.264	340.000

Source: FaoStat, 2013

Especially the market for tomatoes and peppers has boomed recently, as seen in Table 1.

Tomato production in particular has increased significantly in the last five years, almost doubling from 176.000 metric tons in 2006 to 340.000 tons in 2011. In the overall production of crop and livestock products, vegetables represent a value of around US\$675 million out of a total US\$6.4 billion. Five vegetables rank in the top-20 of crop and livestock products: taro (cocoyam), dried chillies, green chillies, tomatoes and okra (Table 2). In addition, both fresh and dry onion imports from Togo and Burkina Faso are high and anecdotal evidence indicates these amount to more than US\$120 million for the Accra and Kumasi markets alone.

Traditionally, vegetables are mostly eaten processed or cooked both as a spicy tomato paste (Shitu) as well as 'soups' with banku or fufu. More recently, the urban population is turning to fresh salads. This is mainly a result of Ghana's sustained economic growth that has led to the emergence of a middle class of consumers demanding higher quality fresh produce. Production of fresh vegetables takes place all around the country and is strongly related to the specific weather conditions and market windows. In addition, irrigated agriculture is on the increase leading to new production areas around the Volta River and Lake Volta, as well as specific irrigated areas in and around Accra. The increasing upper middle-class is demanding better quality products, including more emphasis on food safety. In turn this will lead to greater market segmentation among specialized retail markets, wholesale bulk markets, and local production-consumption systems.

Table 2. *Value and production of Ghana crop and livestock products*

Value & production of Ghana crop & livestock products	Value (US\$1000)	Production (tonnes)
1 Yams	1,605,617	6,295,450
2 Cassava	1,487,647	14,240,900
3 Plantains	747,343	3,619,830
4 Cocoa beans	726,942	700,000
5 Taro (cocoyam)	275,639	1,299,650
6 Maize	220,046	1,683,980
7 Groundnuts, with shell	196,951	465,103
8 Game meat	161,667	74,300
9 Chillies and peppers, green	127,105	270,000
10 Rice, paddy	126,265	463,975
11 Tomatoes	125,652	340,000
12 Oranges	102,427	530,000
13 Chillies and peppers, dry	96,398	88,000
14 Indigenous chicken meat	77,469	54,387
15 Indigenous cattle meat	75,126	27,810
16 Meat nes	59,470	45,000
17 Palm oil	52,207	120,000
18 Okra	51,159	80,000
19 Sorghum	43,778	287,069
20 Indigenous goat meat	38,231	15,955

Source: FaoStat, 2011

In terms of exports, Ghana's vegetables show increased potential. While traditionally fruits like pineapple, bananas and mangoes were the main horticultural export crops, recently chilies (*capsicum*) and Asian vegetables (different types of gourds and okra), have become popular. In addition, baby corn and butternut squash are picking up significantly since the arrival of the multinational VegPro. VegPro has begun starting the production of baby corn, and is planning to include chili peppers and butternut, on more than 1,000 hectares, working in parallel with more than 800 outgrowers. In general, exports of peppers are believed to have a comparative advantage over competitors like Kenya, given climatologic conditions and relative distance to the EU market (WB, 2011).

The issues at stake

Moving from 'business as usual' to more commercial vegetable production requires serious efforts. Currently, the vegetable chains are characterized by: (1) low availability and knowledge of improved inputs; (2) limited agronomic skills and practices; (3) poor food safety for both the domestic and export market; (4) limited postharvest management systems; and (5) inadequate linkages between input suppliers producers and buyers.

Input supply

One of the major bottlenecks for the take-off of Ghana's vegetable sector is the availability of well-adapted seeds and seedlings; specialized horticultural fertilizers and pesticides; irrigation equipment and greenhouse equipment. For example, in the seed sector, there is currently an overdependence on a relatively low number of older open pollinating varieties (e.g. for tomato, peppers and onions) while few new domestic and international varieties enter the market. The last two years some progress has been made thanks to the market entry of East-West Seeds (Asian vegetables, pepper and tomatoes), but overall availability of quality seed of superior varieties is limited. Some promising signs are seen in protected horticulture, where a small number of farmers are adopting greenhouse (tunnel) technology for vegetable production.

Agronomic practices and production

Knowledge and skills of vegetable production (both greenhouse and open field) are still relatively rudimentary in Ghana. This is also demonstrated by the low yields per hectare; e.g. tomato yields have remained flat over the last decade at 6 t/ha, while Kenyan farmers produced 22 t/ha and neighboring Burkina farmers 9 t/ha (FaoStat, 2011). This is partly due to the inputs available, and partly to the agronomic practices. During field visits, tomato varieties were observed with low shelf-life; other observations include the limited use of: adequate irrigation and proper water quality; specialized fertilizers (K, Ca/Mg, micronutrients); proper plant protection (chemicals) and crop rotation. The latter has led to the occurrence of numerous crop pests and diseases, amongst others: bacterial wilt (*ralstonia*), early and late blight, nematodes and white fly.

Pesticide use and food safety

There is little government capacity for pesticide registration, testing and enforcement of regulations. In addition, the judicious use of chemicals (both in type and quantity) is at a low level. This has led to high levels of unwanted pesticides on both domestic and export vegetables. So far, a very small group of farmers have introduced certification or quality control systems, though there some promising developments with respect to the Ghana Green Label initiative and some export farms applying for Gopal GAP certification.

Postharvest management, trade and logistics

Much vegetable production is lost after harvest, either in storage, during transport or at the market. The lack of cold storage and the inadequate packaging material (large 60 kg wooden crates) contribute to high postharvest losses, up to 50% by some estimates. Some cold storage projects, at strategic locations, have been introduced to facilitate better trade between the vegetable production and consumption areas, as well as at the airport. A few of these function well, while others lack a proper economic rationale or incentive system.

Different output markets

In the horticulture sector roughly four vegetable value-chains exist all with a different configuration of input suppliers, producers, middlemen, exporters and/or processors:

- **The export market** for peppers, Asian vegetables, butternut squash and baby corn. Most of these vegetables are exported to the UK and northwestern Europe (Netherlands, Belgium, Germany). Both specialized larger farms with outgrower schemes as well as small-scale individual farmers are targeting this market, focusing on good (physical) quality with some guidelines for Good Agricultural Practices. The current size is around 3000 tons, mainly capsicum.
- **Supermarkets, hotels and restaurant chains:** an emerging retail and high-level hospitality industry is developing, demanding high-quality vegetables. For example, Shoprite has 4 outlets, but will expand in the coming years to 13 outlets. The production systems require higher levels of agronomic knowledge and skills, as well as postharvest management, possibly supported by protected horticulture (greenhouse/tunnels). Current market estimate 3000 kg/day in Accra; 10,000 tons per year.
- **The primary market for vegetables**, at least for the coming years, will still be dominated by open markets and small street shops. The production systems will compete more on price and less on quality. These markets include the large Makola and Tudu markets of Accra where specific commodity associations manage the system. Price fluctuations are high according to the different production periods of Ghana (and Burkina Faso).
- **The processed vegetable chain:** especially tomato paste and canned vegetables, like eggplant. Though often seen as a last resort market (with low prices) the chain requires specific varieties and quality standards. Currently, most factories are idle due to the fact that imported products are cheaper and domestic supply of raw materials is expensive (the market prices for fresh produce are higher). It is estimated that (open field) yields

of 80 t/ha are necessary to develop a competitive tomato paste industry. The overall competitiveness of this sector is debatable, though for specific processed food products like shito a market exists (Robinson and Kolavalli, 2010c).

1.4 The Business Opportunities report

We are aware that reviving and professionalizing Ghana's vegetable sector is not an easy task. A full understanding of the reality of the sector was deemed necessary to meaningfully contribute to a long-lasting change. Put simply, a comprehensive grasp of the current situation sets a solid foundation for new collaborations, innovations and investments in the sector.

Therefore, providing evidence-based information ranks high among GhanaVeg's objectives; of which more integrated value-chains, innovations that lead to increased productivity, and the improved coordination between public, private and knowledge institutions are just a few. To this end the GhanaVeg Secretariat commissioned three studies to further probe current systemic challenges and opportunities for growth in the sector. The three are: Opportunities in Ghana's Vegetables Exports, Sanitary and Phytosanitary Issues and Greenhouse Technology.

This Report tries to flesh out a number of Business Opportunities in each of these areas; e.g. in terms of opportunities for certification and quality assurance systems, greenhouse technology and promising export crops and markets. Specific opportunities for the domestic sector are also included in Annex 2, providing a summary of the already published 'Potential regional and local markets for Ghanaian horticultural produce' of the EMQAP – Agri-Impact study.

Vegetable exports

The vegetable sector in Ghana is endowed with a huge export potential. A reinforced vegetable sector in Ghana should see the export sub-sector thrive and further realize its potential, ultimately stabilizing employment and increasing fiscal revenue for the country (World Bank, 2010). Over the last twenty years, vegetable exports have seen periods of growth and decline.

Currently, the sector is in decline and competition of Africa's fresh produce to Europe is fiercer than ever before. The chapter on vegetable exports analyzes the opportunities and constraints for Ghana's export sector and identifies a number of recommendations both at institutional and company level.

Sanitary & phytosanitary (SPS) issues

One of the key issues in Ghana's vegetable sector is the Sanitary and Phytosanitary situation. If treated improperly, food products entering the national and international markets can compromise the health of both humans and the ecosystem. In Ghana, the recent steep decline in vegetable exports is directly related to SPS compliance. While at the same time alarming levels of pesticides are being found on domestically marketed vegetables. The study assesses the present food safety and plant health system with specific attention to pesticides, microbial hazards and Phytosanitary issues, and provides recommendations to improve them.

Greenhouse sector study

Protected horticulture can offer a higher level of crop protection against adverse weather conditions pests and diseases; as well as some form of temperature control and protection from rain. With prudent management, improved production and product quality, and efficient use of resources can be achieved. The study seeks to review the sector in Ghana and recommends viable designs and business opportunities in the country. Overall, low and medium cost greenhouses can have a promising future in the production of quality and year-round vegetables for the domestic market.

1.5 GhanaVeg

The results of the studies presented also inform the GhanaVeg program on the activities it should undertake. GhanaVeg has a broad portfolio of activities and instruments to facilitate this. The portfolio consists of support to strong business-led initiatives through co-financing of business opportunities (amongst others in chain integration, protected horticulture and the seed sector), and R&D related innovations, supporting collaboration between the private sector and knowledge institutes. In addition, GhanaVeg hosts 3-monthly Business Platforms and facilitates discussions between the organized private sector associations and the government on key systemic bottlenecks.

The overall mission of GhanaVeg is to establish a sustainable and internationally competitive vegetable sector that contributes to inclusive economic growth and has the capacity to continuously innovate in terms of products and services. The initiative is driven by a strong belief in healthy and quality vegetables from Ghana through new ways of doing business.

The objectives include improving productivity in the vegetable sector; facilitating more efficient markets – linking vegetable producers and other value chain operators with foreign private sector; improving the business climate and further professionalizing the value chain for vegetable production and consumption in Africa. The program seeks to develop the sector by attracting and/or supporting frontrunner companies (both for domestic and export markets) in all elements of the chain: input supply, production, processing, retail and logistics. The program is supported by the Netherlands Embassy and implemented by a consortium of Wageningen UR, IFDC and NABC.

2. Export Vegetable Sector

Yeray Saavedra Gonzalez, Youri Dijkxhoorn, Peter Obeng

2.1 Introduction

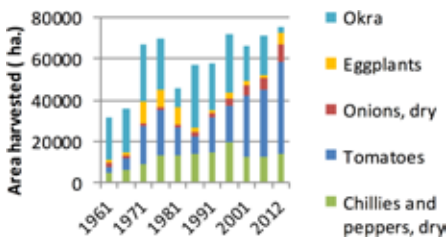
GhanaVeg requested Centre for Development Innovation (CDI) and the Agriculture Economics Institute (LEI), of the Netherlands, to: (1) conduct a review of the vegetable export sector; and (2) identify viable business opportunities to sustain and scale-up the vegetable sector. The followings sections are extracted from the full export sector report.

Vegetable production in Ghana

The area of vegetable production accounts for about 78,000 hectares. Main products are tomatoes, green chillies and onions. The production of vegetables increased in the mid-1990s and dropped after 2003.

Figure 1. Area (ha) of vegetable production in Ghana.

Source: FAO STAT.



Asian vegetables

In Ghana, the Asian vegetables and chillies were introduced by Indian immigrants in the early 90s. Among the most important Asian vegetables produced in Ghana are hot chillies, okra, ravaya, bitter gourd and garden egg. These products are consumed by Asian communities overseas and this is referred to as the ethnic market. The total production in 2012 of chillies accounted for 110,000 tons (Table 1).

The most commonly produced hot chili is the Ghana green chili (Legon 18 variety). Also Scotch Bonnet and Bird-Eye chillies are produced, but in small quantities.

Table 1. Area of selected Asian vegetable production (in ha) and production (tons)

	2001	2001	2011	2011	2012	2012
	Area	Prod	Area	Prod	Area	Prod
Chillies & peppers	81,105	191,049	13,400	95,000	13,700	110,000
Okra	16,692	122,956	2,800	55,000	3,000	60,000
Eggplants (aubergine)	2,730	13,098	5,500	42,000	6,000	46,000

2.2 The export value chain

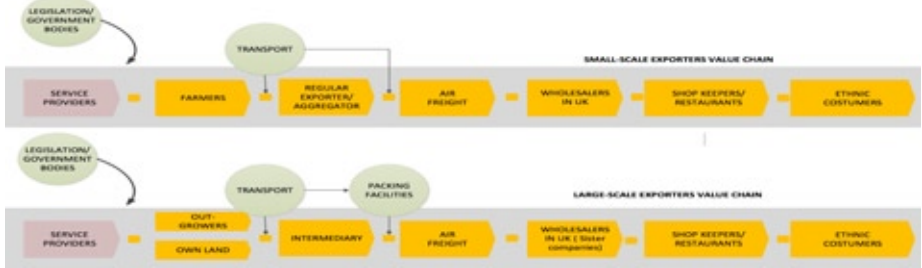
Harnessed by four large exporters with a long track record in exports from Ghana, the vegetable export sector has faced ups and downs. These exporters have an integrated set up by which they grow vegetables locally and market them in UK through consolidated sales networks. Figure 2 depicts the overall organisation of the vegetable chain characterized by two models.

Actors & activities in the chain

Vegetable farmers

Smallholder farmers cultivate most of the traditional agricultural production in Ghana. About 90% of the farms are less than 2 ha in size (MoFA, 2010). Since access to technology and irrigation schemes remain absent for most of the smallholders, crop production varies with the amount and distribution of rainfall. In this regard, Ghana has two cropping seasons: wet and dry season. The first stretches from March to September and the latter from October through February.

Table 2 indicates an estimation of the cost price and margin for a typical Ghanaian smallholder producing green chili, okra and bitter gourd.

Figure 2. Vegetable export chains in Ghana.**Table 2.** Average cost prices of 3 main irrigated crops per box of 4.5 kg

Item	Chilli pepper	Okra	Bitter gourd
Farm gate price per box (GHS)	7.0	8.0	12.0
Total costs per box (GHS)	5.0	4.3	3.9
Seed costs share (%)	2	8	21
Water and irrigation (%)	13	21	17
Labour (%)	65	45	42
Other costs (%)	20	26	19
Farmers margin in GHS	2.0	3.7	8.1
Margin share (%)	28	47	67

As emerges from the table above, farmers producing okra and bitter gourd earn a better margin as compared to green chili.

Traders

We considered two basic models:

- Large exporters with own land and, often working with a large number of growers under simple, (in)formal seasonal production contracts.
- Small-scale exporters with no land and reliance on smallholders' produce gathered through informal trading relationships.

Transport

Once the produce has been harvested (early in the morning), sorted, graded and packed (if applicable),

open, non-cooled trucks carry the fresh produce to the Kotoka International Airport (KIA), Accra. It is worth emphasising the limited capacity of cold chain infrastructure for vegetables in Ghana to this day. While exporters realise the potential value of vegetable cooling, they point out the financial investment needed as a major factor hampering the introduction of such technology in vegetable chains.

Freight/cargo forwarding at KIA

At the airport, truck driver conveys the cargo to the scanner with all pertinent documents in hand. Once goods have gone through, the Narcotics Control Board (NACOB) officers inspect the shipment thoroughly. Often the inspection at this point has caused an important clearance delay. From there, ground handling operators will handle the product from the cargo premises through a second scanner and into the airplane.

Often, the time to clear the shipment exceeds that of the airlines to load the cargo. This causes airlines to depart without the shipment. On these occasions cargo is stored in the open air under plastics and forwarded in the next day's flight. By contrast, Air Ghana, manages the only cold chain facility which usually remains unused. Another problem the exporters face is the lack of cargo space available. Table 3 reviews the airline and tariffs available for export of vegetables.

Exporters report that the limited available and affordable cargo space on the regular passenger flights causes uncertainty on the supply of good, and hence timely delivery to UK retailers. According to exporters, available space has become limited due to high cargo

Table 3. Airlines and tariffs available for export

	Day of the week for departure	Freight rate per kg in USD	Destination
Passenger Planes			
KLM	Daily	1.25-1.45	Amsterdam
British Airways	Daily	1.00-1.10	Heathrow
Lufthansa	Daily	1.30	Frankfurt
Turkish Airline	Daily	1.15	Istanbul
TAP Portugal	Mon-Fri	1.20	Lisbon
Alitalia	Mon-Fri	1.20	
Cargo Planes			
Cargo Lux	Tue	0.98-1.00	Luxemburg
Turkish Airlines	Sat & Mon	1.10	Istanbul

handling prices. It is mentioned that some cargo handling companies are buying cargo space and then selling it at substantial higher prices to exporters.

Wholesaler/importers in UK

Fresh horticulture produce from all over the world can be found in any of the three major wholesale markets in London: Western International Market, New Spitalfield Market and New Covent Market. Of all those vegetables, we can normally find from Ghana: green chilies, yams and, to a lesser extent, ravaya, okra, turia and bitter gourd. The major importer of Ghanaian vegetables by volume in the UK, Dhillon Farms, holds also the largest variety of products.

Other importers/exporters of similar size and business models are Shrigam farms and Param farms. Differing from these three exporters is Joekopan farm, in which out-growers and nucleus farm (said to come into production in late 2014) produce vegetables, meeting the demands of independent importers in UK. Other importers with weaker commercial ties with Ghana have, in the best case scenario, only green chilies (often sourced through Dhillon farms).

End-product

Large exporters sort, grade and pack the produce in carton boxes of 5 kg (4.5 kg of fresh produce) each. A common complaint by exporters was the lack of

a dominant company in carton packing equipment in Ghana. This makes exporter less competitive due to quality decline (inadequate packaging) and higher production costs (little carton available for all exporters).



Boxes of Ghanaian chilies & bitter gourd on display at one of the stalls in the Western International Market, London, UK.

2.3 The vegetable market

The domestic market

The domestic market is segmented into supermarkets, local markets and corner-shops. Asian vegetables, due to their prominent role in the ethnic market in the UK, are more of secondary crops in the domestic market (with the exception of chilies).

The regional market

Currently there is limited export of vegetables to neighbouring countries. Main reasons are the high demands in the local market, poor facilities for regional export (i.e. deficient road infrastructure) and low demand for the type of vegetables successfully grown in Ghana.

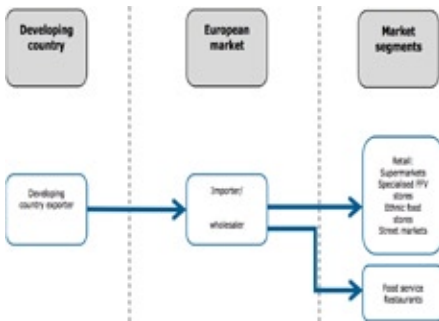
The EU market for vegetables

The European market has different market segments (see figure 3). About 60-90% of produce is sold through supermarkets, depending on the product and country (CBI, 2013). Supermarkets have a dominant position, and put in place a large number of requirements to

suppliers (e.g. Global G.A.P.) that causes disruption in the flow of products from the farm (developing country) to consumers in Europe.

The ethnic market in Europe is highly informal and certification is not required. Small size importers supply ethnic wholesale traders and grocery shops with an assortment for the ethnic communities.

Figure 3. Market segments in the European market



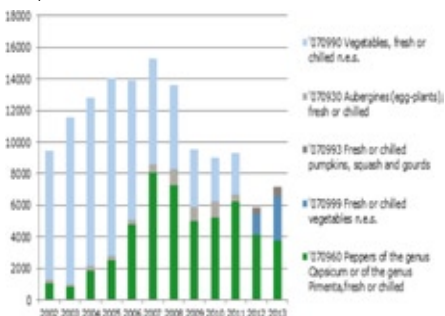
Source: CBI Market Channels and segments

In the United Kingdom and in the Netherlands specialised importers focus on the ethnic market. Located in wholesale markets, importers display the fresh produce in stalls. Shopkeepers buy fresh contingents every 3 or 4 days, although this depends largely on the season and final users' needs.

Vegetable trade between Ghana & the EU

Total vegetable trade between Ghana and the EU accounts for USD 7m (Figure 4). The majority of the products are shipped to the UK (91%). Chili represents

Figure 4. Import of Ghana's vegetable produce by the European Union (USD x 1,000)



the largest share with a total value of USD 3.7m. Over the years, amount of chillies exported varies between 1,500 and 3,000 tons per annum.

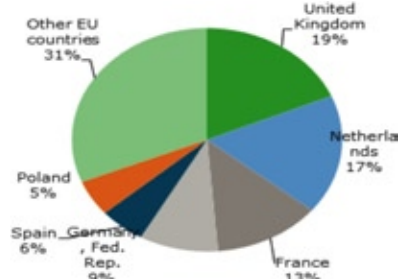
Vegetables like okra and bitter melon are included in the Harmonized System (HS) code 070990 (vegetables, fresh or chilled n.e.s.) prior to 2011 and HS 070999 (fresh or chilled vegetables n.e.s.) from 2012 onwards.

Chili pepper trade in the European Union

A large demand for chillies comes from several chili consuming communities as it is a genuine part of cuisines and is also used as a colouring agent. The import of fresh chilli pepper in the European market decreased from 96,700 tons in 2009 to 85,600 tons in 2013. This includes import from outside the EU (32,464 tons), as well as from other EU countries (53,112 tons).

The United Kingdom, France and the Netherlands are the main importing countries in the EU (Figure 5).

Figure 5. Share of import per country



Source: Eurostat

Traders that supply the mainstream retailers often source from Spanish, French and Israeli producers since they produce the common consumed Spanish chillies under Global G.A.P. certified conditions. Importers that supply the ethnic market often source green chillies, Scotch Bonnets, Jalapeños and Habaneros. Green and red chillies are often processed in countries like India, Uganda and Ghana. Scotch Bonnets, Jalapeños and Habaneros are produced in Kenya, Uganda and the Dominican Republic.

Table 4 gives an overview of the different peppers and the key characteristics. In the Netherlands more and

more speciality chilli peppers like Scotch Bonnet are produced in modern greenhouses. They are produced as an alternative for the traditional greenhouse crops like tomatoes, sweet pepper or cucumber in which margins are low. The chillies are mainly produced for the relatively small Dutch ethnic markets or to supply the Dutch fresh fruit and vegetables exporting companies.

Table 4. Selection of chili peppers & their characteristics

Type	Main markets	Main production areas	Spiciness	Size
Green and red chilli pepper	Ethnic market	India, Uganda, Ghana, Kenya	Medium hot	5-8 cm
Scotch Bonnet or Adjuma	Ethnic, main retail market	Uganda, Kenya, Dominican Republic	Exceptionally hot	3-6 cm
Habaneros	Ethnic market	Spain, Israel	Exceptionally Hot	2-6 cm
Jalapenos	Ethnic market/ retail market	Spain, Israel, Kenya, Egypt	Medium hot	5-9 cm
Spanish pepper	EU retail market	Spain, France, Israel	Medium hot	6-10 cm

The UK vegetable market

The United Kingdom has a large Asian community. The latest census from the government in 2011 revealed there are more than 4.4m inhabitants with Asian origins, which explains why the UK imports large quantities of Asian vegetables.

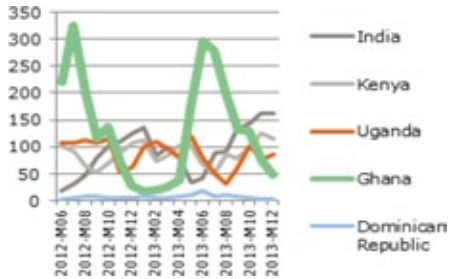
Imports from Ghana have reduced since 2008. Main products are chillies and products covered in the group not elsewhere specified (n.e.s.). This contains okra and bitter gourd.

Total imports of chilli in the United Kingdom is about 180,000 tons and Ghana supplies about 1,500 tons per year, with a total value of USD 3.8m. Put simply, Ghana is the largest exporter of chilli to the UK outside

Europe. Ghana has abundant chilli production during the wet season, ranging from March to September. As a result, the exported quantities are high in this period (Figure 6).

Detailed trade statistics are absent for okra and bitter gourd. However, observations at the UK wholesale import market indicate that most suppliers to the UK market are from Jordan, India and Kenya. Also Honduras is increasing exports of okra to the European market. Observations in the market tell us that there is great demand for okra and bitter gourd. In the United Kingdom, supermarket retailers like Tesco have included okra in their assortment. Especially good quality okra is in high demand after the Indian season ended (after February).

Figure 6. Volume of chillies exported per month to UK (tons) per country

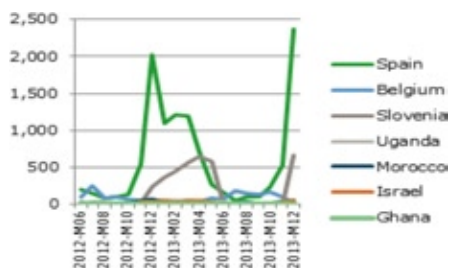


The Dutch market

The Netherlands is not a major market for the Asian vegetables, however in the Netherlands there is a large number of importers and wholesale traders that supply a variety of retail markets and channels throughout Europe and the United States. For example, from the Netherlands many retailers in Europe are being supplied.

The Ghanaian import quantity in the Netherlands is very small. The main products imported from Ghana are fresh chillies. After 2003 many Ghanaian exporters of vegetables stopped their exporting activities, and as a result export to the Netherlands decreased accordingly. Currently the registered import in the Netherlands accounts for only USD 50,000.

Figure 7. Volume of chilies imported per month (tons) per country



The Netherlands imports about 105,000 tons of chili. The main import originates from Spain (Figure 7).

Imports from Belgium are mainly re-exported from Belgian airports to the Netherlands. Imports from developing countries have a share of only 10%.

Detailed trade statistics are absent for okra and bitter melon. Currently the market for okra and bitter melon in the Netherlands is limited. Only a small number of wholesale traders buy this for the Dutch ethnic market, the market in the UK offers more opportunities.

2.4 Benchmarking

Benchmarking is a useful tool to help companies and countries understand their performance compared to others. In this study we benchmark various indicators such as the cultivation practices, market window, costs

of production, distance to market, freight availability and costs and the implementation of certification schemes.

Chillies

Chillies are produced all over the world. The world production of chillies sums up to around 31m tons, which is cultivated on approximately 1.9m hectares of land. China is the world leader in chilli production followed by Indonesia and Ethiopia. These countries do not supply the European market. The bulk share of chillies is produced by Asian countries.

Ghana exports mainly traditional Ghanaian chilli (red pepper) and some small quantities of Bird Eye chilli. However Bird Eye chillies are very labour intensive. Scotch Bonnet is also produced locally, but hardly exported since quality falls short of international standards. If we benchmark all countries and their performance we see that Ghana is not doing very well on most of the performance indicators compared to its competitors (Table 5).

The market window for Ghana (March-September) is less beneficial because it coincides with the European growing season in Southern Europe. In addition productivity of chillies in Ghana is relatively low due to the low quality of seed, lack of irrigation and poor agricultural practices.

Table 5. Benchmark of chili pepper

	India	Uganda	Ghana
Varieties	Red pepper, Bird Eye	Red pepper, Scotch Bonnet	Red pepper, Bird Eye
Market window	November – December	September – May	March-September
Average yield	8.5 ton per ha	2 ton per ha	8 ton per ha
Strength of exporters	Well organised	Well organised	Weak
Cost of production	Low cost price per acre	Low cost price per acre	High
Distance to market	Estimated 9 hrs Low costs	Estimated 8.5 hrs High costs	6.5 hrs Low costs
FOB price per kg (2012)	USD2.0	USD2.1	USD2.6
Certification and market segments	Some farmers have Global.G.A.P. Ethnic market and mainstream supermarkets	Some farmers have Global.G.A.P. Ethnic market and mainstream supermarkets	None

Table 6. *Benchmark of okra*

	India	Jordan	Ghana
Varieties	Hybrid varieties for export market	Hybrid varieties for export market	Mainly African type of okra not suitable for export. Small area with hybrid seeds.
Yield	12 ton per ha	4.5 ton per ha	20 ton per ha
Strength of exporters	Well organised	Well organised	Weak
Distance to market	9 hrs Low freight costs	Estimated 5 hrs Low freight costs	6.5 hrs Low freight costs
Price	Comparable	Comparable	Comparable
Certification and market segments	Some	Some	None
	India	Dominican Republic	Ghana
Varieties	The Indian type	The Indian type, Chinese type	The Indian type
Market window	November – December	Year-round with peaks between May and July	March-September
Strength of exporters	Well organised	Well organised	Weak
Distance to market	9 hrs Low freight costs	9.5 hrs High costs	6.5 hrs Low freight costs
Price	Comparable	Comparable	Comparable
Certification and market segments	None Ethnic market	None Ethnic market	None Ethnic market

Okra

Okra is mainly produced in tropical, subtropical and warm temperate regions around the world. The world production of okra sums up to around 8.4m tons, which is cultivated on approximately 1.1m hectares. India is the world leader in okra production followed by Nigeria and Ivory Coast. Also Honduras is an upcoming producer of okra, though limited data is available.

All the above comes to suggest that while okra is not grown at commercial scale, higher yields than those of main producing countries and comparable prices make the crop an interesting and strategic opportunity to explore further.

Bitter gourd

Bitter gourd (also called ‘karela’ or bitter melon), comes in a variety of shapes and sizes. The cultivar common to China is 20–30 cm long, oblong with bluntly tapering ends and pale green in color, with a gently undulating, warty surface.

Bitter gourd produced in Ghana is competing with bitter gourd from India and the Dominican Republic. In these countries the Indian type bitter gourd is produced. Table 7 shows the benchmark used for bitter gourd.

Ghana is mainly on the market from March to September. Indian bitter gourd is on the market from October to February therefore does not coincide with Ghanaian bitter gourd. The Dominican Republic has a more constant supply to the UK market, with peaks between May and July.

Ghanaian companies see bitter gourd production as a promising business opportunity that would fetch good prices in the international market provided that the right variety and good agricultural practices are introduced in the country.

It is expected that main producing countries incur lower costs of production than those of Ghana. At the market end, prices for bitter gourd would be comparable

Table 7. Benchmark of bitter gourd

	India	Dominican Republic	Ghana
Varieties	The Indian type	The Indian type, Chinese type	The Indian type
Market window	November – December	Year-round with peaks between May and July	March-September
Strength of exporters	Well organised	Well organised	Weak
Distance to market	9 hrs	9.5 hrs	6.5 hrs
	Low freight costs	High costs	Low freight costs
Price	Comparable	Comparable	Comparable
Certification and market segments	None	None	None
	Ethnic market	Ethnic market	Ethnic market

(when quality and size are similar). Discussions with importers and wholesalers in the UK also tell us that the bitter gourd from Ghana shows great variation in size. Improved sorting and grading could benefit the presentation of bitter gourd produced in Ghana.

Unlike okra production, where the market opportunity is based on the high farm productivity achieved so far, Ghanaian bitter gourd is characterized by having a favorable market window and low freight costs.

2.5 Opportunities

Strategic directions

Note: tentatively, we envisioned for this section concrete business opportunities for the sector. However, given all structural challenges encountered we decided to provide a 'containment plan' to address the burning issues of the sector.

The following Action plan is intended to address the key challenges of the export vegetable sector in Ghana. Plan contains 4 steps classified according to the degree of urgency.

(1) Facilitate efficient use of available cargo space, handling and use of cold storage

No discussion with stakeholders left out the issue of air freight. This includes handling, forwarding and the phytosanitary checks. We propose a thorough analysis of the situation and bind legal entities to more optimized terms in the handling airfreight situation.

(2) Dedicate efforts to apply good agricultural practices to the production of vegetables with special attention for okra and bitter gourd. In addition, recognize the importance of, and assign resources to, the sanitary and phytosanitary status of (export) crops

Lack of good agricultural practices hamper the export of vegetables from Ghana. As a consequence of limited crop and postharvest management, DEFRA rejects shipments at the UK border for reasons of thrips or fruit fly infestations. Better crop and postharvest management in the growing areas must work towards a reduction of pest and disease incidences.

(3) Develop essential post-harvest management skills which will lead to desired product uniformity and minimum quality. Both aspects become important when targeting EU supermarkets. Global G.A.P. becomes the minimum entry requirement to penetrate these markets.

The consultants see good opportunities for uniform and good quality produce in high-end supermarkets. In a visit paid to some of the largest supermarket chains in the UK, the consultants came across a wide variety of chilies and other Asian vegetables like okra. Needless to say, exporters dealing with supermarkets like Tesco or Sainsbury are required to present at least Global G.A.P. certification.

(4) Promote public-private partnerships with clear accountability and reliable use of irrigation schemes to supply all year round volumes.

Ghana is well endowed with water resources. In theory, the use of irrigation schemes can provide year-round production and therefore supply the market with constant volumes. High production through the dry season would provide exporters an opportunity to expand the market boundaries and therefore explore new buying relations with importers from UK or elsewhere (i.e. the Netherlands).

2.6 Business opportunity

The consultants are certain that the export sector can become a professional sector with solid business prospects. To pursue this objective, exporters should move from ‘business as usual’ to market-driven export schemes. Elements to focus on are: high quality and uniform production of Ghanaian green chillies, okra and other vegetables in rotation.

Also, the farm model (acreage around 25 ha. and above) should include best seeds available, crop protection, efficient irrigation management and must comply with Global G.A.P. requirements. Once harvested, fresh

produce must be sorted, graded, packed and transported in cooled trucks. Fresh produce would then target the larger supermarket chains in the UK.

When all conditions are in place, exporters could make upwards of €100,000 per year from the 25 hectare farm. At the time of writing, the consultants are working towards more evidence-based figures to support the shift from business as usual to professionalized export schemes.

2.7 Conclusions

In the past, Ghana developed a strong presence in EU’s fresh market for vegetables. EU importers welcomed the export of chillies and other Asian vegetables from Ghana. Today, unfortunately, Ghanaian fresh produce has fallen out of favour as a significant revenue source. However, actors in the sector are committed to reverse this trend.

The present sector report dissects the current situation of the export sector and advocates for a ‘system change’, both in the enabling environment and the way business is done.

Along the lines outlined above, we foresee a number of activities in order to stay in business and to strengthen Ghana’s export vegetables sector. ■



New cargo facility at Accra Airport.

3. Food Safety & Plant Health: an Analysis of the Sanitary & Phyto- sanitary Status of the Vegetable Sector

Edwin van der Maden, Josh Glover-Tay, Irene Koomen

3.1 Introduction

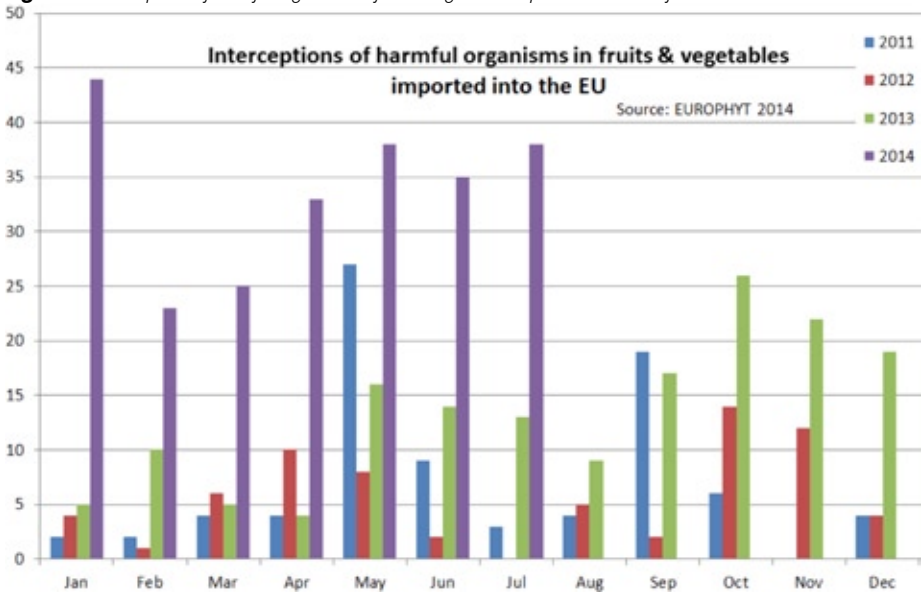
Ghana is a signatory of the WTO agreement on Sanitary and Phytosanitary (SPS) measures. This international agreement sets out a framework for food safety as well as plant health. While food safety is important for both national as well as international trade, phytosanitary compliance can especially be a big obstacle for international trade. The general 'view' is that vegetables produced in Ghana have been excessively treated with pesticides, however since 2012 only for four notifications have been published by the European Union (EU), these involved okra, yam (2x) and bananas. .

Exports of vegetables from Ghana to the EU are at times rejected due to the presence of organisms that occur on the EU list of harmful organisms (Figure 1 and Table 1). In 2014 this resulted in a voluntary export ban of several high value vegetables..

3.2 The SPS framework

A framework based on the value-chain provided a structure for the analysis and insight to what extent actors, functions and responsibilities are involved in (Figure 2). The current sanitary and phytosanitary status of the vegetables sector in Ghana was analyzed based on this value-chain framework approach. given for each of the value chain elements.

Figure 1. *Interceptions of harmful organisms in fruits & vegetables imported into the EU from Ghana.*



Source: EUROPHYT, 2014

Table 1. *Interceptions of harmful organisms in fruits & vegetables imported into the EU from Ghana.*

Vegetable	Interceptions	Organism	Interceptions
Ridged gourd	128	Thrips	156
Eggplant	57	Silver leaf Whitefly	37
Jute mallow	13	Fruit fly	27
Sweetpotato	12	Others	116
Clove basil	4		
Bottle gourd	3		
Cassava	3		
Bitterleaf	3		
Others	13		

Source: EUROPHYT, 2014

This analysis is based on interviews with stakeholders across the value chain, both in Accra as well in the vegetable producing regions. Findings and recommendation are based on this qualitative information which has been validated in a series of workshops. The

findings and recommendations are hence qualitative by nature since the stakeholders could provide very little quantitative data.

3.3 Vegetable producers

Smallholder farming households cultivate most of the traditional agricultural production. About 90% of the farmers have less than 2 hectares. Unawareness about pesticide use and other SPS related issues was found to be highest among the many smallholder farmers. While exporting companies of fruits and vegetables are implementing quality and safety assurance in various degrees and are increasingly complying to international requirements, as such proving to have the capacity to comply to international requirements, domestically a demand driven compliance to standards is not yet operational. The majority of farmers are practicing preventive/ calendar spraying with often too high dosages and mixing of several pesticides together. It was observed that there is limited use of protection equipment during pesticide application, pre-harvest intervals are not adhered to and counterfeit, banned or unregistered pesticides are reported to be used

Figure 2. *Conceptual framework SPS.*



Source: Day et al., 2012

by farmers. Most of the problems of excessive and improper use of pesticides results from the lack of knowledge or awareness among farmers, which in turn is a result of lack of sufficient training, advice and provision of information. Furthermore, the use of pesticides appears to be increasing as there is less availability of labour and overall labour costs are rising. Peri-urban farmers often have to make use of low quality (waste) water sources for irrigation, which is likely to lead to microbial contamination.

Recommendations

Farmers producing for export and exporting companies are increasingly complying with quality and safety standards due to international market requirements, this system can be used as a good example for the domestic market. It is advised that farmers will have to deal with pesticides in a more responsible manner, making use of Integrated Pest Management (IPM) and Good Agricultural Practices (GAP), however they need to be supported in this. Introduction of a traceability systems designed so it can include the smallholder farmers would assist in quickly identifying the source of problems related to food safety and plant health compliance. Opportunities should be explored for a national demand driven quality standard (like the Ghana Green Label). More detailed recommendations are:

- Link companies to the Ghana Green Label initiative, test the green label on applicability & feasibility for both smallholder as well as commercial farmers and set-up a mechanism where feedback from both farmers and consumers feed back into improving the Ghana Green Label;
- Support the larger vegetable producers with compliance to international SPS standards and to obtain Global GAP certification for export;
- Training of farmer groups on responsible and reduced pesticide use;
- Explore the development and implementation of traceability systems for vegetable products;
- Connect farmer groups to the responsible authorities to obtain clean water supplies for irrigation.

3.4 Input suppliers & service providers

Besides the official registered and licensed input dealers, there seems to be quite a number of unlicensed dealers active, especially in rural areas and on open markets, where fewer inspections take place. Especially, the unlicensed dealers appear to sell a number of counterfeit, banned and unregistered products. Furthermore, the marketing and advertisement of pesticides in Ghana is forceful, strongly promoting the advantages of pesticides for improving yields. Presently government extension services have difficulties in reaching substantial numbers of farmers regularly and extension staff lacks regular (refresher) trainings on GAP and the safe and judicious use of pesticides. Furthermore, agricultural research and education in Ghana are not in line with the demands from the market or needs from practice.

A positive development is that GhanaAir and the airport authorities in Accra are investing in new premises including inspection facilities. This opens up opportunities for traders as well as for the inspection services.

Recommendations

Input suppliers and service providers are an important link in the value chain as with respect to the provision of inputs and knowledge. It is recommended that these stakeholders receive support so that they can take their responsibility in promoting the safe and judicious use of pesticides. Especially the extension needs to be strengthened for this purpose as they can play a positive role in this supporting farmers with knowledge and advice on and GAP. In addition, the government will probably need to inspect the agrodealer shops more frequently so that the products sold are in line with the regulations (types, expiration date, and packaging). Lastly, research needs to be linked up with practice. More detailed recommendations are:

- To discuss with the agro-dealers the strengthening of CroPLife Ghana, the global association for agro-dealers, so they can jointly take their responsibility in safe and judicious use of pesticides;

- Introduction of regular (refresher) training programs for extension staff on GAP, and responsible and reduced pesticide use, including need assessment, manual development and Training of Trainers program development can contribute to an increased service delivery to farmers;
- Involve research institutions in demand driven research and teaching with a major emphasis on GAP and pesticide use;
- It is advised that traders together with the relevant authorities seize the opportunity that the new export facility at the airport offers by pro-actively designing the facilities that are needed for border inspections.

3.5 Markets, traders & consumers

The domestic retail food market in Ghana consists of traditional open-air markets (65%), small convenience stores and groceries (30%) and supermarkets (5%). At the moment there is limited demand from the domestic market for safe food. As no national food safety monitoring plan is in place for vegetables, and no domestic food safety standards are defined, the consumer currently has no source of information to verify if the food they buy and consume is safe. There appears to be limited market differentiation, as consumers are not given the option to distinguish and choose between cheaper but potentially unsafe food or more expensive but certified safe food. With regard to phytosanitary inspections, there are differences between the export inspections at the Ghanaian border and the import inspection in the EU.

Recommendations

In the absence of a domestic demand driven compliance to quality and safety standards, supermarkets can take the lead in demanding for qualitative and safe food, with additional awareness raising campaigns for their customers. With regard to phytosanitary issues, the study proposes to further capacitate the phytosanitary inspection also stimulating the collaboration between PPRSD, fresh vegetable producers and traders. A first step could be made through organizing a public-private

dialogue between the major public and private stakeholders. More detailed recommendations include:

- Stimulate supermarkets to take an active role in domestic demand for qualitative and safe food, and to differentiate and introduce 'safe-food' labels as a marketing opportunity for customers;
- Creation of awareness among consumers on food safety issues in order to enhance a domestic demand driven compliance system such as Ghana Green Label, and in this respect to strengthen the Consumer Protection Agency (CPA) in Ghana;
- Stimulate collaboration between PPRSD and the producers and traders to comply with international phytosanitary compliance;
- Facilitate a public-private dialogue between producers, exporters and the authorities.

3.6 Legislation, policy & governance

Currently the legislative framework for food safety and plant health is partly outdated and partly overlapping. In addition it was found that the institutional framework, especially for food safety, is relatively fragmented, there appears to be limited coordination and communication between the responsible institutions, and there are overlaps and gaps in institutional responsibilities and mandates, reducing the overall efficiency and effectiveness of the system. The situation could be ameliorated through the development of an agreed national SPS strategy and policy. Although on paper a Food Safety Action Plan and National Food Safety Policy are described, so far these have not been implemented.

Recommendations

It is suggested that the legislation, policy and governance framework is reviewed, renewed and adapted to the current situation, with definition of clear roles, mandates & responsibilities between the various institutions, and possibilities for mutual collaboration, communication and coordination. In addition, more detailed recommendations are:

- Review the legislative framework and make adjustments according to the present situation to come to a common agreed national SPS strategy and policy;
- Appointment of institutions with the ultimate mandate, responsibility and coordination for the themes of plant health (PPRSD) and food safety (FDA) and the necessary framework to implement this mandate (as a follow-up of the action points from the Revised Food Safety Action Plan and the Draft National Food Safety Policy);
- To establish a platform and framework for collaboration, coordination and communication among institutions and with sufficient involvement of the private sector;
- To make adjustments in the governance framework in such a way that there is a clear separation between standard setting and advisory roles vs. standard enforcement, and risk assessment vs. risk management functions.

3.7 Institutions & regulators

Government funding for public sector institutions that have SPS related responsibilities and mandates has been insufficient in recent years. Capacity is lacking both in number as well as in knowledge level of staff. Limited operational resources are hampering execution of duties. Especially at regional level it is challenging for government staff to adequately perform their duties and responsibilities with the limited resources available. There are significant challenges with respect to the food safety, disease and pest surveillance control systems as well as the related capacity for risk analysis, especially with regard to on-farm production, processing and distribution. Importantly, no annual food safety monitoring plan is in place for monitoring microbial or chemical contamination of fresh produce and no domestic food safety standards for vegetables are defined. Capacities and resources for physical inspection of food items at border posts are inadequate, and inspection and sampling procedures at border posts are weak. Visual inspection is mostly the only way consignments can be checked.

Recommendations

A national food safety monitoring plan should be put in place, along with national food safety standards. Correspondingly, there is a need for a realistic and prioritized budget so that key mandates, responsibilities and tasks related to SPS can be adequately executed. Especially with regard to the on-farm inspections of producers of fresh vegetables on good agricultural practices and pesticide residues. Furthermore, the study recommends to support the capacity of staff through regular refresher training programs. Other recommendations are:

- It is advised that a national monitoring plan for food safety based on national food safety standards (i.e. the translation of the Codex Alimentarius into national standards) is designed and implemented;
- The responsible authorities have to look into budget for carrying out prioritized, key food safety and plant health mandates, responsibilities and tasks, including investment in equipment, facilities and capacity building of staff;
- In the short term, assistance of PPRSD in developing a detailed action plan to overcome the issues with compliance to the EU phytosanitary requirements. This plan should include elements such as technical support of inspectors of PPRSD in phytosanitary inspections at border posts and regular (refresher) training programs for PPRSD and (border) inspection staff.

3.8 Conclusions

The current limitations in the sanitary and phytosanitary compliance system for Ghanaian vegetables could hamper the growth of the sector in the years to come. This relates both to the trust of domestic consumers in the food safety situation of the vegetables sector as well as the trust of the EU market in compliance to SPS standards. Public and private sector stakeholders will need to work together to regain this trust. ■

4. Greenhouse Technology

Anne Elings, Yeray Saavedra, George Nkansah

4.1 Introduction

GhanaVeg requested Wageningen UR Greenhouse Horticulture, in collaboration with the Wageningen UR Centre for Development and Innovation and the Forest and Horticultural Crops Research Centre, Kade, to conduct a quick scan on greenhouse horticulture in Ghana, also investigating business opportunities. The following findings and recommendations are extracted from the mission report.

Advantages of a greenhouse

A greenhouse offers a crop protection against adverse weather conditions such as hard winds and rains, and against pests. Combined with good management, this results in improved production and product quality, and better resource use efficiency.

The physical environment

The physical environment in Ghana is hot and humid, nevertheless, it shows some geographical differences. Night temperatures are relatively high in Accra, and relatively low in Kumasi and Wenchi. Relative air humidity is relatively low in Kumasi, Wenchi and Tamale. Rainfall is relatively low right along the coast (Accra) and intermediate at Tamale (Table 1).

Table 1. Temperature, humidity & rainfall in Ghana

Location	Temp night (°C)	Temp day (°C)	RH night (%)	RH day (%)	Rainfall (mm y-1)
Accra	24.5	31.3	89	66	891
Kade	23.7	33.1	92	66	1461
Kpandu (Volta)	22.6	32.6	92	64	1275
Kumasi	21.0	30.2	83	58	1484
Wenchi	20.9	29.8	80	55	1288
Tamale	22.5	33.3	47	44	1090

The enabling environment

The Ghanaian entrepreneurial environment is good: both domestic and foreign greenhouse construction and supplies companies can operate relatively easy. However, supplies are not easily available at all locations in the country, and maintenance of existing greenhouses is a matter of great concern. The knowledge level on protected cultivation in Ghana is low, resulting in mismanagement of the greenhouse and the crop inside.

4.2 Greenhouse designs

The limited differences in temperature and relative air humidity among locations should not lead to great difference in greenhouse design. Location-specific dimensions of ventilation openings may vary, depending on wind speed, wind direction and temperature. Neither do the various crops require very different greenhouse designs.

Crop sanitation requires a double-door sluice that prevents pests from freely entering the greenhouse, and certain mesh sizes of the nets (that should at all times be closed!).

Net house. A net house with soil cultivation and drip irrigation by gravity is the simplest and cheapest. The greenhouse requires a construction that supports the net, a water tank that is filled for instance once per day, and some tubes and valves to supply water to the plants. Even cheaper would be a greenhouse in which the plants are watered by hand. Disadvantages of a net house are permeability for rains, and the low light transmission and therefore reduced crop growth. Cultivation in the soil introduces the considerable risk for soil borne diseases. A simple net house would be suitable if investment funds are scarce but if growers want to make a first step in protected cultivation nevertheless.

Plastic house, no electricity. A plastic house with fixed window openings offers better protection against rains and makes more light available to the crop. Yields are potentially higher. However, good ventilation is necessary. A plastic house with not-automated fertigation is suitable for regions where electricity is not (always) available. Because of the tank that must be filled periodically, amounts of water and therefore the acreage will need to be relatively small.

Plastic house, with electricity, automated drip irrigation and mechanic ventilation, possibly with screens. Automated drip irrigation on the basis of radiation, temperature and/or soil moisture content requires electricity, and provides optimal amounts of water and nutrients to the crop. Mechanical ventilation moves around the indoor air. Screens, provided they are retractable, can reduce light intensity when needed (e.g., cucumber, young plants, and flowers). Flexible window openings are optional: they are useful if the need for ventilation varies. However, as ventilation requirements in Ghana are fairly high, windows are likely to be open all the time. Automated fertigation enables better application of water and nutrients, on the basis of the needs of the crop. A plastic house with automated fertigation is suitable for regions where

electricity is guaranteed, where acreages are larger, and where knowledge is guaranteed.

Ventilation. As temperatures in Ghana are high, good ventilation is a must. This may be achieved through:

- Sufficient side ventilation that allows the entrance of fresh air. A compromise has to be made between a small mesh size that blocks the entrance of insects, and a larger mesh size that allows good ventilation.
- A tilted side that realizes a greater ventilation surface.
- One-sided top ventilation if winds come predominantly from one direction. Two-sided top ventilation if winds come from various directions.
- A good transpiring crop that reduces air temperature. This is only possible if water supply is continuous and sufficient.

Soil or substrate. If continuous water supply is guaranteed, either manually or mechanically, then it is recommended to grow on substrate, as this greatly reduces the risk of soil-borne diseases such as bacterial wilt. The frequent power cuts in Ghana play a role in this decision. Possible substrates are: disinfected soil,



Tunnel greenhouse being built in Ghana.

cocopeat, perlite, carbonated rice husk, biochar and compost. If continuous water supply is not guaranteed, then the grower must grow in the soil. Soil has much higher buffering capacities for especially water, but also nutrients. However, then the soil must be disinfected.

Greenhouse size. The size of a greenhouse with natural ventilation in a hot and humid climate is limited. If the greenhouse becomes too wide, then the air entering from the sides does not reach the centre of the greenhouse. Only in relatively cool areas (e.g. the highlands of East Africa), greenhouses can be larger. Active cooling on the basis of fossil energy would be very expensive. A crop can be grown in a larger greenhouse if the season is restricted to the wet season with lower levels of radiation that heat the greenhouse.

4.3 Costs and benefits

Potential investors need thorough economic analyses for assessing the economic viability of greenhouses in Ghana. A cost and benefit analysis of an Amiran-type greenhouse dedicated to tomato production shows that if the farm gate price is 4.5 GHc kg⁻¹ and fresh yields are 40 kg m⁻² then investments will start yielding

Table 3. Opportunities for horticultural production

#	Tomato price (GHc (kg ⁻¹))	Tomato price* (€ (kg ⁻¹))	Solar panel with pump	Financing term (year)	Cum. gross profits (€)	Cum. net profits(€)
1	2.5	0.625	no	3	26 261	10 406
2	4.5	1.125	no	3	47 270	31 415
3	2.5	0.625	yes	5	26 261	6 658
4	4.5	1.125	yes	4	47 270	28 315

benefits after the 3rd year (solar panel and pumps factored in; if not then potential gains occur from the 2nd year). By contrast, if prices are close to those of open markets (2.5GHc kg⁻¹) then potential investments are financially less attractive.

Opportunities

Opportunities are grouped in two ways: (1) opportunities for the greenhouse sector versus opportunities for

Table 2. Cost-benefit analysis for four greenhouse scenarios

	Greenhouse	General horticulture & agriculture
Business	<ul style="list-style-type: none"> A greenhouse design specific for Ghanaian local conditions that has sufficient natural ventilation capacity and that enables indoor production during (part of) the dry season. A local industry that produces greenhouse equipment and materials. Implementation of solar energy. Sensors that help growers to measure climate parameters. Variety trials. Hybrid varieties with good yield potential, pest and disease resistance and tolerance to high temperatures. Integrated Pest Management. 	<ul style="list-style-type: none"> Country-wide availability of a wider selection of varieties. Supply of fertilizers and other agro-inputs. A laboratory for quickly analysis of soil samples. Cold stores to reduce post-harvest losses and decline of quality. Cleaning, sorting and packing practices to reduce product loss and increase value of produce.
General	<ul style="list-style-type: none"> An improved sanitary system in greenhouses. Strategies for soil / substrate sterilization. Establishment of direct linkages between potential buyers and producers. Cost-benefit analyses for a wide variety of production systems to make opportunities for commercial investments more transparent. 	<ul style="list-style-type: none"> A good water infrastructure. Collaboration between private breeding companies and the Ghanaian research sector. A comprehensive greenhouse training programme for growers and students. Improved management practices. Experienced growers in an advisory role. Improved book keeping at farms.

the broader horticultural & agricultural sector, and (2) business versus general opportunities. Business opportunities are most interesting for the private sector, while general opportunities are more the domain of the public sector (although collaboration with the private sector is often much desired).

4.4 Summary

The climate in Ghana is hot and humid, and therefore, a greenhouse needs to have high ventilation capacities. This is best achieved through, amongst others, a one or two-sided top opening and netted sides. A double-door sluice is required for crop protection against insects.

It is strongly recommended to grow on substrate as otherwise soil borne diseases, e.g., bacterial wilt, will pose a serious threat to the crop. If electricity is not (always) available, then gravity-based fertigation can be used to frequently supply the crop with water and meet its demands for transpiration. If electricity is available, and if investment funds allow, then an automated fertigation system can be installed. Interrupted power supply can be avoided by a back-up generator or by solar energy, whereas soil-borne diseases are difficult to avoid. Financial benefits depend on various factors, however, greenhouse production can be profitable. ■

5. Conclusions

5.1 Summary

In summary, the report addresses the current performance, overall business climate of the vegetable sector and tries to come up with a number of business opportunities. These include business opportunities for high-quality exports, greenhouse technology, and healthy food for the domestic market. It equally advocates for a 'system change', both in the enabling environment and the way business is done, both in the export and domestic sectors: shifting from business as usual to new ways of doing business.

The overarching challenges facing the industry's players are: quality production technologies and knowledge to use them; weaknesses in the Sanitary and Phytosanitary (SPS) systems, and little collaboration between actors in the chain. All together these issues are causing: reduced exports, food safety problems, and high losses in the chain. For a true transformation to occur, serious efforts are needed.

In vegetable exports for instance, there are a number of challenges which need to be resolved to really have the sector take off: (1) dedicated efforts to apply good

agricultural practices for production, (2) developing essential post-harvest management tools for desired product uniformity and minimum quality; as well as (3) the efficient use of available cargo handling and cold storage space (and more competitive pricing).

To improve food safety and phytosanitary conditions, there is a shared responsibility by producers, input suppliers, and service providers to ensure safe and judicious use of agrochemicals. Consumers, traders and end markets also play a key role here. Increasing the awareness of consumers on safety standards to demand quality and safe food and also a public-private dialogue between traders/exporters and the authorities are needed.

The market for protected horticulture technology is not yet very well developed. In particular specific structural designs which are adaptive to the tropical climate in Ghana are limited. It is seen as a business opportunity for local industry players to take up the promotion, construction and technical assistance for adapted greenhouse technology. Technical assistance is key in here, ensuring right varieties, inputs and practices are employed to ensure high quality and productivity.

The recommendations outlined in the report are a first start for the transformation of Ghana's vegetables sector from business as usual to new ways of doing business. A number of issues require high level policy interventions (like in the field of SPS and the airport), while others can be picked up by the private sector (certification and greenhouses). This report is a rolling

document and will be adjusted yearly to new findings and developments. GhanaVeg is committed to provide the sector with the latest information on market and business opportunities. It is expected that the public and private sector will jointly take advantage of these opportunities to ensure more, better and healthier vegetables from Ghana. ■

5.2 SWOT analysis

Study	Strengths	Weaknesses	Opportunities	Threats
Market & Consumer Preferences	<ul style="list-style-type: none"> • Huge local demand for fresh vegetables • Emergence and rapid growth of big supermarkets • An increased consumption rate of vegetables 	<ul style="list-style-type: none"> • Quality of vegetables is not top priority for consumers • Seasonality of availability due to rain-fed production resulting in price fluctuations 	<ul style="list-style-type: none"> • Growing middle class with an appetite for vegetables 	<ul style="list-style-type: none"> • There is a growing demand for onions and tomatoes from the sub-region
Vegetable Exports	<ul style="list-style-type: none"> • There is a demand for vegetables from Ghana • Ghana has a comparative advantage in terms of airfreight and distance to the EU 	<ul style="list-style-type: none"> • Limited cold, cargo space at airport; efficiently managed • Unnecessary delays at the airport causing quality problems for produce • Major SPS problems (both phyto and food safety) 	<ul style="list-style-type: none"> • Market opportunities exist for sub-regional markets • Global GAP certification, aiming for EU supermarket segment 	<ul style="list-style-type: none"> • Strong competition with produce from other parts of the world
Sanitary & Phytosanitary Issues	<ul style="list-style-type: none"> • There are certified (ISO 17025) laboratories present (GSA) and being developed (FDA) • A (revised) Food Safety Action Plan and a (draft) National Food Safety Policy are available • There is a sense of urgency to act (at least for phyto) 	<ul style="list-style-type: none"> • Little coordination and communication among the different government agencies responsible for SPS • Lack of awareness on food safety by consumers • Hardly any inspections, both at producers and market outlets • No domestic food safety standards (for vegetables) are defined • Failure to implement food safety action plan 	<ul style="list-style-type: none"> • There is a growing concern of consumers on food safety and health, and a Ghana Green Label is being developed • Experience from the (more successful) fruit export sector can be used for vegetable sector 	<ul style="list-style-type: none"> • Domestic & International competition from markets who comply with quality & safety standards • EU ban due to high number of notifications
Greenhouse Sector	<ul style="list-style-type: none"> • Good enabling environment for greenhouse business to thrive 	<ul style="list-style-type: none"> • Limited maintenance expertise • Low knowledge on protected horticulture 	<ul style="list-style-type: none"> • More vegetable businesses willing to invest in greenhouses 	<ul style="list-style-type: none"> • Bad experiences for pioneer users may affect future investment decisions • Availability of support structures for the sector

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Chilies and fresh produce at a supermarket.

Annex 1. About GhanaVeg

GhanaVeg's mission is to establish a sustainable and internationally competitive vegetable sector that contributes to inclusive economic growth and has the capacity to continuously innovate in terms of products and services.

GhanaVeg is driven by a strong belief in healthy and quality vegetables from Ghana through new ways of doing business. The initiative targets the high-end domestic and international markets (high-end supermarkets, hotels, restaurants and exports).

Our objectives include improving productivity in the vegetable sector; facilitating more efficient markets, including: linking vegetable producers and other value chain operators with the Dutch private sector; improving the business climate and further professionalizing the value chain for vegetable production and consumption in Africa.

To this effect, GhanaVeg supports strong business-led initiatives through: a Vegetable Business Platform; Business Opportunities Fund and an R&D Innovation Fund.



Bitter melon arriving at the UK market.

Business platform

The Business Platform consists of all the key service providers, producers, processors, traders and wholesale/retailers in the vegetable sector and representatives from public institutions such as MoFA, MoTI, and GEPA. Together the companies advice on the Agenda of the GhanaVeg Program in terms of: themes for the Calls for Proposals of the Business Opportunities Fund and R&D Co-Innovation Fund, as well as for the issues that need further investigation through the Consultancy Fund. The Business Platform meeting is held every quarter within the year, usually with prior notification and invitation sent out to key stakeholders within Ghana's vegetable sector.

Funds

The GhanaVeg Initiative supports businesses financially through the Business Opportunities Fund and the R&D Innovation Fund. These funds are announced through a Call for Proposals on a quarterly basis. Applications for the Calls are published at www.ghanaveg.org/call-for-proposals. Both funds require 50% co-financing from the applicant (private sector) and the other 50% is provided as a grant by the GhanaVeg Program. In addition Wageningen University and Research Centre provides additional technical assistance with training modules and applied research.

Business opportunities fund

The Business Opportunities Fund is a 50% matching fund aimed at mobilizing innovations and investments in the vegetable sector. The fund can be used for different thematic areas that currently hamper the growth in the vegetable sector ranging from seed supply to certification, and from greenhouse technology to setting up outgrower schemes. Grantees are expected to share their accomplishments during the Business Platform meetings to trigger further uptake and upscaling of their investments.

R&D co-innovation fund

The R&D Co-Innovation Support Fund is a 50% matching fund to provide applied research for companies and businesses to address specific agronomic or technical bottlenecks in the vegetable sector. The private sector, again, is the lead in the partnership, with research or knowledge institutes as service providers to collaborate in the implementation of the proposal. Results from the implementation are being shared during the Business Platform meetings.

So far (November 2014) four projects have been approved, supporting: (1) a vegetable seed company

in expanding its portfolio and reach; (2) a high-end vegetable retailer in directly working with more than 100 farmers on certified vegetable production; (3) a large input supply company starting vegetable seed production; and (4) a greenhouse company testing small-scale drip and greenhouse technologies.

- You can find more information on: www.ghanaveg.org
- If you want to subscribe to our newsletter please send an email to info@ghanaveg.org



Imported vegetable seeds of different fruits and vegetables.



Export chilies in locally made carton boxes.



Shade netting for herbs and lettuce production.

Annex 2. Potential & regional domestic markets for Ghanaian horticultural produce

The present synthesis report is a summary of a larger report published by the Export Marketing Quality and Awareness Project (EMQAP) under the Ministry of Food and Agriculture (MOFA) with funding from the African Development Bank (AfDB). Full-fledged script was put together by Agri-Impact Consult:

“Agri-Impact Consult, 2013, Potential and regional domestic markets for Ghanaian horticultural produce, EMQAP/AfDB”

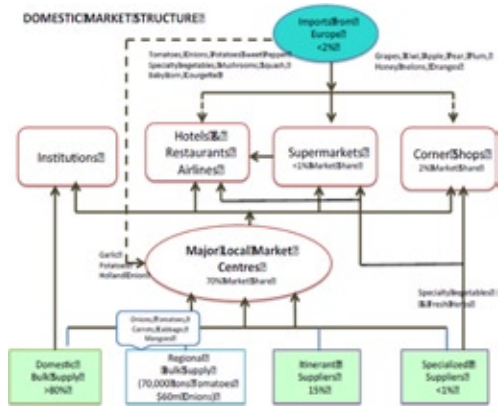
1. Introduction

Overall, Ghanaians and the international community praise the economic progress of the horticulture export sector over the last twenty years. Not only has the sector grown during these years, but also it has been able to attract public and private investments in turbulent days. However, due attention should be paid to the role of the domestic/regional market at a time when export of Africa’s fresh produce to Europe is fiercer than ever before. The study gives a response to this need. It analyses opportunities and constraints for horticultural produce, identifies its potential to serve the domestic market and investigates consumer preferences.

1.1 Domestic market analysis

For the purpose of the study, the domestic market was segmented into local markets, supermarkets, corner shops and the hospitality industry (hotels and restaurants). The local market (mass market) constitutes over 70% of the fresh fruits and vegetables’ market in Ghana typical of which are Makola, Techiman, Agrabobloshie and Abinkyi markets. These markets are operated mostly by market women and serve as a point of sale for most buyers who operate corner shops, hotels and restaurants.

Figure 1. Domestic market structure.



These central market centres are supplied with fruits and vegetables from domestic bulk suppliers, itinerant traders, regional bulk suppliers and specialized (contract) suppliers and imports from Europe as shown in Figure 1.

The domestic-bulk suppliers account for over 80% of traditional fruits and vegetables that are supplied to the local market centres. Most of the bulk suppliers have supply contracts with the Market Queens; their supplies are regular and volumes are large. Regional-bulk suppliers are made of aggregators and traders who normally bring onions and tomatoes from Burkina Faso and Niger as well as cabbages, green peppers, carrots and other specialty vegetables from Togo and Benin during Ghana’s off-season production period.

2. Consumer preferences & choice for specific markets

Responses from over 2,000 consumers show that the local market is the most patronized market segment for fruits and vegetables and 47% of the respondents

buy from this market. More than 26% of consumers interviewed buy their fresh produce from corner shops currently springing up along major roads, middle class and expatriate communities of the metropolitan areas. East and West Legon, Cantonments, Airport Residential Area, Spintex Road, Osu in Accra are some of the areas where corner shops are predominant.

Figure 2. Consumer preferences and choice for specific markets



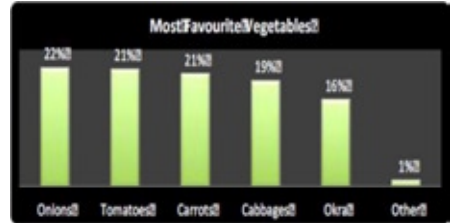
Though their prices are 30%–50% higher than the local markets, corner shops provide shopping convenience due to proximity, variety of produce, quality and their ability to sell specialty vegetables. Figure 2 provides an overview on the consumer preferences for specific markets.

The emergence and rapid growth of big supermarkets such as Shoprite, Koala and MaxMart and the community level supermarkets such as the gas station grocery shops within the urban cities are providing wider shopping avenues for the middleclass population. These shops have long opening hours (12–14hrs/day) and sell other groceries in addition to fruits and vegetables. Even though prices are higher than the other market segments, the supermarkets provide the convenience, variety and quality of fresh produce that

customers want. About 20% of the consumers interviewed buy their produce from supermarkets.

2.1 Major vegetables consumed on the domestic market

Figure 3. Major vegetables consumed on the domestic market



Onions, Tomatoes, Carrots and Cabbages are the most widely used vegetables in Ghana followed by Okra/ Garden Eggs as shown in Figure 3.

This result is consistent with the main ingredients used in the preparation of most Ghanaian dishes. Almost every dish prepared in Ghana has onions and tomatoes as components. It is therefore not surprising that these two vegetables account for 43% of total vegetables consumption in the country.

Carrots and cabbages have also become an integral part of modern Ghanaian diets especially food prepared in hotels and restaurants. Garden eggs and okra account for 16% of vegetable usage in most urban areas but their use could be higher than that of cabbage and carrots in rural and peri-urban areas.

2.2 Consumption growth rate of vegetables

Cabbages, onions and sweet potatoes have been experiencing consumption growth rates of 29–50% in the last 4 years. About 61% and 27% of the consumers interviewed predict consumption growth rate of vegetables to continue on the basis of their price insensitivity and increasing consumer taste respectively.

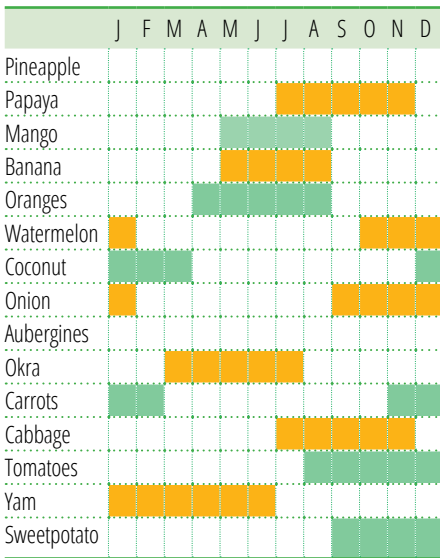
While increasing consumer taste was not a key factor in fruit consumption it is very significant for the growth of vegetables. Currently, consumers are likely to find sweet potatoes being sold along certain trunk

roads, market centres and corner shops due to their increasing market demand. Ghanaian consumers have begun adding sweet potatoes to their dishes especially when yam is in offseason.

2.3 Seasonality & price changes of vegetables

Even though Ghana has two major growing seasons in most parts of the country, prices of vegetables increase between 130 and 338% within a year. Figure 4 provides an account on the seasonality of some products.

Figure 4. Critical supply months of fruits and vegetables in Ghana



Ghana depends largely on regional imports for vegetables during the offseason. Ghana produces 30,000 tons of onions and imports about 83,000 tons valued at \$60 million from Niger and Burkina Faso annually. Ghana is known to be the second largest importer of tomatoes in the world after Germany. Fresh tomato import from neighbouring countries ranges between 70,000 and 80,000 tons per annum. It also imports about 10,000 tons of tomato paste and puree from Europe alone valued at about \$12.5 million and is projected to grow by 13% per annum. Carrots, green peppers, cabbages, cauliflowers, spring onions, and

other specialty vegetables are imported from Togo and Benin as a result of seasonality.

Price fluctuation is more critical in vegetables than in fruits. Prices of tomatoes in major market centres increased by over 300% followed by yam (233%) and finally to carrots where price increased by 130%.

2.4 Consumption pattern & frequency

About 56% of Ghanaians consume vegetables every day, reflecting the consistent use of mostly onions and tomatoes in the typical diet, and about 20% consume vegetables 3 times a week.

Most of the vegetables are consumed at lunch and supper for the preparation of stews and soups. Eating vegetables at breakfast has not become a major part of the Ghanaian menu and only 4% of consumers actually consume vegetables at breakfast.

2.5 Consumer perception & preferences

More than 2,000 consumers were interviewed in Accra, Tema, Kumasi, Obuasi, Takoradi and Cape Coast about their perception on locally processed fruits and vegetables. More than 90% of Ghanaian consumers perceive locally produced fruits and vegetables as “very good” in terms of their freshness and characteristic taste but more than 93% of the consumers are either indifferent or perceive “contamination” as a critical issue to address. Between 25% and 30% of the consumers are also concerned about hygiene in terms of production and point of sale conditions.

2.6 Consumer expenditure on vegetables

About 36% of consumers spend GHC 5.00–GHC 10.00 each on fruits and vegetables consumption every week. Over 22% spend GHC11.00–GHC20.00 each on fruits and vegetables and about 30% spend less than GHC5.00 every week on consumption.

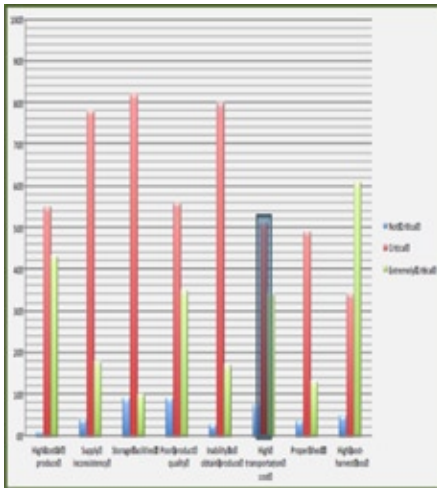
The responses show that oranges, pineapples, onions and tomatoes account for more than 50% of total consumer expenditure on fruits and vegetables. Domestic market size for fresh fruits, fresh vegetables and processed fruits in Accra alone is estimated at about US\$ 402 million per annum (US\$ 123 million fruit juice; US\$ 164 million fruit vegetables; US\$ 114

million fresh fruits). Consumption in Accra alone is 100% greater than the total horticultural export in 2011 and about 17% of the total NTE for 2011. This further demonstrates a huge domestic market potential for fruits and vegetables.

3. Analysis of domestic market issues

This chapter focuses on issues that confront the operations of various market actors of fresh fruits and vegetables. Figure 5 highlights key challenges by level of urgency.

Figure 5. Key supply challenges



3.1 Issues affecting local market operators

Most of the local markets lack basic infrastructure including: sheds, cold rooms and packing areas to offload and load horticultural produce. In major season, the market operators are compelled to buy all the produce delivered to the market by their suppliers and since there are no storage areas, more than 40% of the produce rot before they are sold.

Responses from interviews conducted among 500 market operators in major market centres in Kumasi, Accra, Techiman, Cape Coast and Obuasi show that:

- 61% of market operators consider post-harvest loss as an extremely critical challenge to their operations.
- 82% consider storage as a critical challenge to their business.
- 67% need post-harvest training but do not get it.
- 66% need training in food safety.
- 30% are not aware that these services can be provided.

3.2 Issues affecting corner shop operators

Unlike the local market centres, the corner-shops have a far better product quality, access to storage facilities and sheds under which they sell their produce. They also have wider variety of fruits and vegetables. The critical issues for Corner-shop operators are product shelf life and consistent supply of produce.

More than 70% of the operators indicated that fresh produce from suppliers especially bananas and mangoes seems to be of high quality at time of supply but deteriorates quickly (2-3 days) attributing it to inappropriate use of agro-chemicals and improper ripening methods. About 23% of the operators consider transportation as an extremely critical challenge to their business since they buy small volumes and have to transport goods almost every day to and from their shops. This is consistent with 28% of the respondents considering “high cost of produce” as a critical challenge since they buy high quality and small volumes.

3.3 Issues affecting supermarket operators

- a) **Product quality:** Quality of produce is one the major concerns of supermarket operators. Local suppliers do not SORT, GRADE and PACK produce according to specifications.

Green peppers and vegetables are supplied in sacks instead of boxes and are allowed to be in the sun for hours during transport. Onions and Potatoes supplied are not sorted, graded, cured or properly packaged. ShopRite for example rejects 50% of fresh horticultural produce supplied to it.

b) **Inconsistent supply and long supply chain:**

Most of the local suppliers are unable to meet the supply schedules of the buyers. They supply at will or as and when they are able to mobilize products. The supplies also do not conform to the volumes required by buyers. In most instances, supermarkets tend to have multiple suppliers but this has not been able to address the challenge of inconsistent supply.

Suppliers do not respect contracts especially varieties, volumes, quality specifications and delivery schedules. Aside inconsistent supply, most of the suppliers do not have direct contract with producers.

One of the supermarket operators indicated that produce normally run through 4-5 chain operators before it gets to the supermarkets.

c) **Import challenges:** The Supermarket operators are frustrated with the cumbersome clearing procedures and processes for imported fruits and vegetables. Most often, local suppliers are unable to supply these produce because they are not produced in Ghana, not in season and local quality is below their customers' requirements. Specifically,

- Terminals at the harbour are often congested
- It takes 13-14 days to clear 40ft container of fresh produce leading to deterioration. Very expensive reefer vessels (\$5,000/container).

d) **High cost of produce:** Due to the multiple supply chains of contract suppliers, their produce tend to be extremely expensive and higher than same product imported from Europe or South Africa. For example some suppliers quote \$3-4/kg for tomatoes while imported tomatoes could cost \$2-3/kg.

3.4 Issues affecting hospitality industry operators

The hospitality industry is one the fastest growing industry in Ghana. Hotels such as Golden Tulip, Holiday Inn, Movenpick, Novotel, La Palm Royal Beach, Labadi Beach, Best Western, Alisa among others require high quality fresh fruits and vegetables that meet European or Global gap quality standards.

Consistently some of these hotels have been frustrated

with the quality of fruits and vegetables being supplied by local suppliers. Over the years, they have been consistently disappointment by contract suppliers and have therefore resorted to purchasing their own vegetables at the local market centres or import from Europe.

4. Regional market analysis

West Africa is the largest consumer of vegetables in Sub-Saharan Africa and accounts for 60% of the total vegetable consumption in Sub-Saharan Africa (SSA). Even on a per capita basis, WA consumes two and a half times more vegetables than East Africa, and over twice the amount of kg per year (48kg) than any other region in SSA, although none come close to the WHO recommended minimum (73 kg/year).

Nigeria alone makes up 35% of total vegetable consumption in SSA, and 62% of the consumption in West Africa. While most of the vegetables consumed are produced locally, West Africa imports at least 4% of its consumption from outside of the region, mostly from Europe.

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Onions

Ghana imports 83,038 MT of onions annually valued at over \$44 million. Burkina Faso supplies an estimated 8,000 MT with Niger supplying over 74,000MT to augment the needs of the country (Source GAPTO and CEPS; Ghana & Burkina Faso Border). It is estimated that

between 16-20% of onions is re-exported out of Ghana mainly to Togo and the eastern coast of Côte d'Ivoire.

There are no imports from Burkina Faso from May to October with declining imports from Niger from July to September while supply into Ghana steadily increases after September. West Africa has been the main destination for much of the Dutch Onions exported due to high seasonality and major structural and organizational inefficiencies in the sub-region that hamper the ability of producers to fully satisfy sub-regional market demand throughout the year despite significant potential for local production (1.5 million tons in West Africa).

Fresh tomato & tomato paste

Many West African countries are importing tomato paste from Europe and Asia. In 2003, Nigeria and Ghana imported 46,000 tons (\$51M) and 31,000 tons (\$30M) of tomato paste, respectively. Though the local processing sector requires further development, there is an opportunity to source fresh tomatoes locally or regionally by providing the necessary interventions (irrigation, training etc) to producers.

Between 32,000 and 94,000 smallholder farmers can be assisted to increase their output and revenue by up to 700%. Tomato paste imports into Ghana currently

amount to over 78,000 tons of paste per year of which 12,000 tons are exported after being repackaged (FAOSTAT), suggesting a domestic tomato paste consumption in Ghana of around 66,000 tons in 2007 equivalent to over 500,000 tons of fresh tomatoes. It is estimated that Ghana produces about 230,000 tons of fresh tomatoes and imports about 100,000 tons from Burkina Faso.

4.1 Horticultural product flow in West Africa

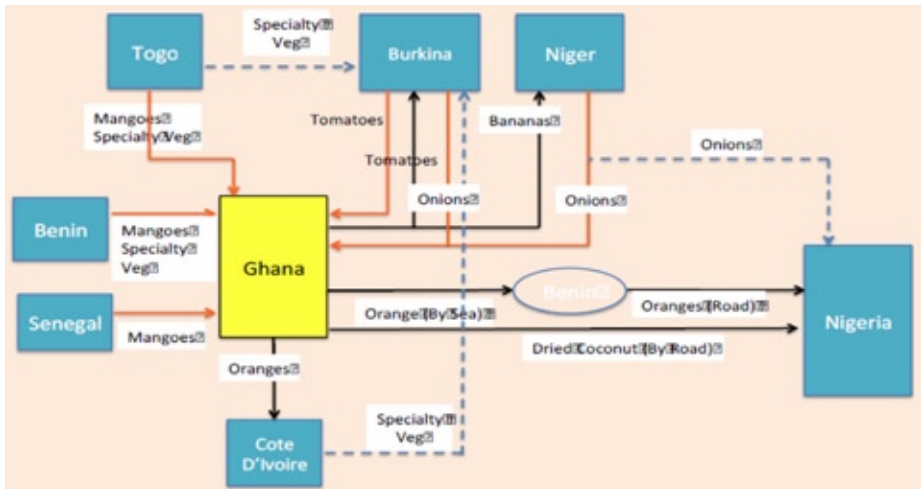
The West Africa regional market for horticultural produce is dominated by informal traders who buy produce from one country to the other without any documentation. Figure 6 depicts the horticultural trade from and to Ghana.

5. Analysis of main issues affecting competitiveness of Ghana's private sector in the ECOWAS regional market

5.1 Cross-border challenges

There is inconsistency of tariffs between ECOWAS countries and that of the WTO. For example ECOWAS

Figure 6. Intra-regional horticulture trade



tariff is 5% while that for WTO is 7% but in some countries they can quote as high as 9%. Koranco Farms, a key Ghanaian exporter of horticultural products, also indicated that though the West Africa market is huge, it is rather unattractive and a disincentive to exporters due to the delays in clearing goods (it takes hours in Europe but weeks in West Africa). Numerous border posts, unofficial border charges and delays in processing documents as well as extensive multiple inspections are a disincentive to trade in horticultural produce in the sub-region.

5.2 Presence of roadblocks & checkpoints

The problem of trade facilitation is compounded, especially in West Africa, by the presence of roadblocks that cause delays and increase costs. Evidence suggests that at these checkpoints drivers are subjected to a mixture of charges and bribes, and that this extortion serves to divert some goods away from their intended destination. In theory the trip from Bangui (Central African Republic) to Douala (Cameroon) should take three days but typically takes between 7 and 10 days.

5.3 Port facilities/infrastructure

Transporting fruits and vegetables within the West Africa sub-region is more challenging than exporting to Europe. While it costs less than \$1,000 to ship dry container from Accra, Ghana to Europe, it costs more than \$4,000 to transport goods in 20 footer container from Ouagadougou, Burkina Faso to Accra or Lome, Togo (neighbouring countries) and takes over a day's drive. Most of the companies including Dansa Foods (Nigeria) and Golden Exotics (Ghana) complain of high fuel prices and claims that poor road maintenance results in frequent vehicle breakdown and parts replacements leading to delays and making it very expensive to transport fruits and vegetables. It was also noted that transporting bananas in reefer containers to Nigeria is more expensive than transporting it to Europe.

5.4 Unstructured market

The West Africa market is not structured and does not comply with international trade practices. There are no strong formal linkages between the various value chain actors especially distributors/wholesalers, processors

and retailers. Contracts are not respected and enforced and it is very difficult to identify reliable and trustworthy business partners. There is frequent non-performance on the side of both buyers and suppliers but limited opportunities to redeem cost. Payments are mostly informal without letters of credit; agreements are easily adjustable and there are no strict enforcement of rules to ensure adherence and compliance.

5.5 Product volumes & mobilization

The West Africa market is not structured and does not comply with international trade practices. There are no strong formal linkages between the various value chain actors especially distributors/wholesalers, processors and retailers. Contracts are not respected and enforced and it is very difficult to identify reliable and trustworthy business partners. There is frequent non-performance on the side of both buyers and suppliers but limited opportunities to redeem cost. Payments are mostly informal without letters of credit; agreements are easily adjustable and there are no strict enforcement of rules to ensure adherence and compliance.

5.6 Skill set & productivity

Many of the companies interviewed expressed frustrations with the labour market. Though labour in most cases is readily available, attracting and retaining people with the right skills in high-level operations like commercial farming and processing is a challenge. Generally, labour is unskilled with low levels of education, making their training and development very expensive. Added to this is the fact that a good percentage of those trained, move on to other industries perceived to be more lucrative and prestigious than agriculture.

5.7 Product handling & grading system

Limited investment in harvest and post-harvest management systems across the sub-region coupled with the lack of cold chain facilities and poor road network often times results in poor product handling.

Additionally, low quality assurance and control especially at the production level means that the quality of fruits and vegetables are compromised from the farm gate before entering the supply chain thereby

leading to significant losses in intra and inter regional trade. There are also inconsistencies and differences in grading systems coupled with their non-observance in a good number of producer countries in the sub-region, making harmonization and aggregation across countries very difficult.

6. Trends & drivers of the horticultural industry in the regional market

6.1 Increasing presence of supermarkets

In recent years, there has been a rise in the presence of supermarkets in West Africa especially in Ghana and Nigeria. McKinsey Global Institute forecasts that the number of African households with annual discretionary incomes of US\$5,000 or more will rise from 85m at present to over 128m by 2020. Total consumer spending in Africa is projected by McKinsey to reach \$1.4trillion in 2020, \$540bn more than in 2010, with food and beverages accounting for \$175bn of the increase.

Shoprite is speeding up its expansion in Nigeria and expects to increase its retail stores to 700 in the near future. The CEO of the supermarket giant has indicated that Nigeria alone can support the same number of supermarkets as South Africa. The rise of supermarkets in West Africa will stimulate demand for high quality fresh fruits and vegetables and create formal market channels for domestic suppliers and regional suppliers.

6.2 Increasing concern for food safety & quality systems

While the regional market is mostly informal and quality requirements are not as stringent as exporting to Europe, product quality and food safety concerns are becoming critical in dealing with major buyers. Processing companies in Nigeria and supermarkets definitely require fruits and vegetables that meet their quality standards. The increasing middle class in the region, growing expatriate community and public education on food safety compel suppliers to be mindful of quality issues.

6.3 Increasing demand for convenience

Processors, wholesalers and retailers are demanding convenient product supply systems. Supermarkets, wholesalers and retailers require aggregation of produce rather than dealing with several suppliers. In addition, they demand supplies that require minimum additional work on its quality and packaging. They prefer suppliers who can supply the right quality, right variety of produce, volume, and consistent schedules with competitive price. Buyers will import fruits and vegetables from Europe if domestic and regional suppliers are unable to meet these requirements.

7. Domestic market opportunities

The domestic market currently accounts for over 95% of total vegetable production in Ghana. Over 90% of 300,000MT tomato and 49,000MT of onions produced annually are all consumed domestically and supplemented with imports of over 5,000MT fresh and 66,000MT Paste of tomatoes and 83,000MT of onions.

Demand for the products will continue to grow and may outstrip supply if efforts are not made to boost supply. Presently, Ghana imports about \$ 60 million of onions from Burkina Faso and there is a regional market opportunity of about \$134million per annum for the vegetable. Again, Ghana remains the 2nd largest importer of tomato in the world after Germany.

7.1 Domestic market opportunities for vegetables in the hospitality industry

There has also been tremendous growth in the hospitality industry in recent years. Movenpick, Holiday Inn, Best Western, Alisa, Africa Regency hotels, among others, have added to the existing 4-5 star hotels including La Palm, La Beach, Golden Tulip, Fiesta Royale and Novotel in Accra. The East Legon and Airport Residential areas are gradually becoming hubs of 3 star hotels in Accra. Several hotels are opening up in Kumasi, Takoradi, Cape Coast, Akosombo, Tamale and other tourist sites.

Similarly, the food service sector has grown tremendously. New restaurants including Captain Hooks, Rapsodys, KFC, Turkish Restaurant, Chicken Republic,

Chicken Inn, Noble and Buka are new additions to the existing restaurants in Accra. There is also the growing phenomenon of “outside the home” eating. The expatriate community and middle class often frequent gourmet and upscale restaurants with their families.

The use of Carrots, cucumber, cabbage, green pepper and carrots in this sector has increased by over 40%. Most of the 3 star hotels use 0.5-1bag each of these vegetables per day.

7.2 Domestic market opportunities for vegetables in supermarkets

Supermarkets are increasing in Ghana and there are plans by major supermarkets such as Shop Rite to increase the number of outlets in Accra and expand to Kumasi, Takoradi and Cape Coast. These expansions will have a corresponding increasing demand for fresh fruits and vegetables. Presently, ShopRite imports about two (2) containers of fruits and vegetables a week from Europe and Egypt to supplement local supply.

Besides the traditional cabbage, carrots, Iceberg lettuce, classic tomatoes and onions, exotic vegetable varieties like Fancy lettuce (lolo rosso, lolo bionda, butter, oakleaf, Tomatoes (round/salad and cherry), Table celery, Broccoli, Cauliflower, Peppers (all colours), Strawberries, Potatoes, Onions, Chillies, Herbs, Swiss chard, Red cabbage and Beetroot offer opportunity for new products development and market.

7.3 Strategic horticultural vegetables

Consumer interviews, perspectives from value chain actors and industry experts as well as observable trends within the horticultural sector have informed the classification of certain horticultural produce as strategic for the domestic market. The selection is also based on:

- a) Existing and growing market demand
- b) Recommendations and priority areas of market operators, processors and exporters
- c) On-going investments
- d) Potential for value addition
- e) Demand-supply gap
- f) Regional market opportunities

The above criteria and other important factors such as inclusiveness as well as the inelasticity of demand suggest Onions, Tomatoes and specialty vegetables especially cabbage, carrots and green pepper as strategic vegetables. ■

Annex 3. Business Directory

Organization	Contact	Email	Location	Website	Address
Plant Protection & Regulatory Services Directorate (PPRSD)	0302990404		Pokuase	www.mofa.gov.gh/site/?page_id=85	P. O. Box M 37 Pokuase Accra
Directorate of Agricultural Extension Services	0302662325/ 0302664217		Accra	www.mofa.gov.gh/site/?page_id=74	P. O. Box 199 Accra
Women in Agricultural Department	0302675920		Accra	www.mofa.gov.gh/site/?page_id=90	P. O. Box MB 37
Food and Drugs Authority	0302233200/ 0302235100	fdia@fdagh.gov.gh	Accra	www.fdagh.gov.gh	P. O. Box CT 2783 Cantonments Accra Ghana.
Environmental Protection Agency	0302664697- 8/0302662690	info@epa.gov.gh	Accra	www.Epa.gov.gh	P. O. Box M 326 Accra Ghana
Ghana Standards Authority	030250065/6	info@gsa.gov.gh	Off Tetteh-Quarshie Interchange, Legon-Madina Road. Near Gulf House Okponglo		P. O. Box MB 245 Accra Ghana
Centre for Scientific and Industrial Research	0302777651-4	headoffice@csiri.org.gh	Agostino Neto Road, Council Close, Airport Residential Area, Accra	www.csir.org.gh	P. O. Box M 32 Accra Ghana
CEPS	0224 427 2697				
Narcotic Control Board			Accra	www.mint.gov.gh/Narcotics/narcotics	
Ghana Airports Company Limited	0302776171		Accra	www.gaci.com.gh	KA PMB 36 Kotoka Int Airport Accra Ghana

Organization	Contact	Email	Location	Website	Address
KIA Aviance	0302778025	info@avianceghana.com	Accra	www.avianceghana.com	Aviance Ghana Ltd. PMB Accra Ghana
Ghana Association of Vegetable Exporters (GAVEX)	0244114474		C/O FAGE 1st Floor Addison House (AGI Building) Trade Fair Site, Labone – Accra		
Vegetable Producers and Exporters Association of Ghana (VEPEAG)		vepeag@yahoo.com			
GhanaVeg	0302780830	info@ghanaveg.com	F26/8 Abafun Crescent Labone, Accra	www.ghanaveg.org	PMB CT 284 Cantonment- Accra Ghana
Ghana Investment Promotion Centre (GIPC)	0302665125	info@gipcghana.com	Accra	www.gipcghana.com	P.O. Box M 193 Accra Ghana
Netherlands African Business Council (INABC)	+310703043618	info@nabc.nl	Prinses Margrietplantsoen 37 (WTC) 2595 AM den Haag	www.nabc.nl	P. O. Box 93082 2509 AB Haag Den Haag
Federation of Association of Ghanaian Exporters (FAGE)	030232554	fage@ighmail.com	Accra	www.ghana-exporter.org	P.O. Box M 124 Accra Ghana
Private Enterprise Federation (PEF)	0302974983/4/ 0289107020-3	info@pef.org.gh	No. 2 Second Freetown Link East Legon (near Okponglo Junc. Opp. New Legon stadium)	www.Pef.org.gh	P.O. Box CT 1671 Accra Ghana

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