

## Fruit Processing in Ghana

An analysis

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# List of abbreviations and acronyms

1D1F . . . . .	One District One Factory
CAGR . . . . .	Compound Annual Growth Rate
FPMAG . . . . .	Fruit Processors & Marketers Association of Ghana
GEPA . . . . .	Ghana Export Promotion Authority
GGL . . . . .	Ghana Green Label
GRA . . . . .	Ghana Revenue Authority
MoFA . . . . .	Ministry of Food & Agriculture
MoTI . . . . .	Ministry of Trade & Industries
MSEs . . . . .	Micro and Small Enterprises
NFC . . . . .	Not- from-concentrate
PERD . . . . .	Planting for Exports & Rural Development
PET . . . . .	Polyethylene terephthalate

## 1. Introduction

### 1.1 Objective of the study

The HortiFresh programme had carried out a scoping study of the fruit sector in Ghana. This study identified that the processing sector is in various states of operation. A couple of the larger plants have seized operations. On the other hand, the seasonal glut of fruit i.e. mango, offers opportunities for processing. Both the domestic market as well as the export market seem to have a high demand for processed fruit.

The objective of this assignment was to understand why fruit processors producing for the local and international market in Ghana have struggled to survive and develop into reliable off takers of local fruit.

This study primarily focused on citrus and mango for processing, but also studied pineapple, passion fruit, papaya and banana, which are used in fruit blends by local small and medium sized enterprises (SMEs), as well as in mixed tropical fruit smoothies by street vendors.

### 1.2 Limitations to the study

A major challenge encountered was that companies were not willing to provide financial details on their business operations. This information was needed to perform a financial analysis on the profitability of the finished products. Limited financial data were given while some vital information remained undisclosed. Due to limited availability of data, the financial analysis to determine profitability was done for the following two companies for which sufficient information was available:

- Toll processing of orange juice concentrate for exports (Fairtrade certified) between two orange farmer group associations in the Ashanti region, Onyame Akwan Citrus Farmers Association and Ahafo Ano South Citrus Farmers Association and PINORA, a processing company located in Adeiso in the Eastern region;
- A processing company which produces pasteurized and freshly squeezed fruit juice for the domestic market. The company is seeking to expand its processing unit and operations.

Furthermore, production data from FAOSTAT seemed unreliable for the selected tropical fruits, because data on total land size cultivated and productivity were not updated yearly. However, field data gathered from key informants (farmer groups, SPEG, processors, etc.) combined with export data obtained from MoTI provided more reliable data.

### 1.3 Structure of the report

The report consists of six parts. Following this introduction, Chapter 2 describes the methodology used in conducting the study and limitations. An overview of the fruit sector in Ghana is presented in Chapter 3, including government policies that stimulate or hinder operations in the fruit processing sector. Chapter 4 looks at fruit processing companies in Ghana, as well as key challenges in the fruit processing industry and SWOT analysis of the fruit processing sector. Chapter 5 presents a financial analysis to indicate the profitability of selected products by two entities. Chapter 6 presents the overall conclusions and key recommendations, providing a way forward in developing and promoting the fruit processing industry in Ghana.

## 2. Methodology

A combination of desk study and field visits was adopted for the study (see Figure 1). Relevant literature (see section on references) on the fruit processing companies in Ghana and other countries were reviewed to obtain considerable up-to-date information on the fruit processing sector and identify any information gaps that need to be filled.

Relevant data collection instruments and questionnaires (see Annex 1) were designed and administered to collect primary data from key respondents. Semi-structured questionnaires were designed for the various target groups, namely:

- managers and supervisors of existing processing companies;
- managers of local Start-up processing companies (under the One District One Factory Program);
- managers and staff of defunct fruit processing companies;
- executives of Fruit Processors Association and Marketers Association of Ghana;
- focus group discussions with fruit suppliers (including farmers/farmer groups);
- fruit importer;
- institutions (i.e. Ghana Export Promotion Authority, GCNet);
- Ministry of Trade & Industry (MoTI);
- juice importer.

In each of the processing companies visited, individual interviews were conducted with managers of the companies and key selected staff using a questionnaire. Focus group discussions involving selected farmers were also held and moderated using a check list with open questions.

Field visits were conducted to hold discussions with key processing companies (both existing and defunct), as well as and farmers and suppliers in the major fruit producing areas. This took place in the Eastern, Central, Bono, Bono-East and Greater-Accra regions between March and August 2019. During these field visits, basic data and information on production, marketing, constraints, and future expansion were collected using a questionnaire.

In the case of processing companies, information on key areas influencing competitiveness was also collected. This included:

- fruit supply, to determine availability of raw material for production throughout the year;
- production capacity in the processing factories;
- marketing of the finished products.

The following stakeholders were interviewed to better understand the Ghanaian fruit processing industry:

- Ministry of Food & Agriculture (MoFA)
- Ministry of Trade and Industries (MoTI)
- Fruit Processors and Marketers Association of Ghana (FPMAG)
- Ghana Export Promotion Authority (GEPA)
- Ghana Green Label (GGL).

A validation workshop was organized with key actors and stakeholders in the Ghanaian fruit industry to review and validate the findings of the study and to solicit any additional input. A total of 92 participants participated in the validation workshop which was held on 31 July 2019 in Accra.

Figure 1. Overview of the study methodology

INCEPTION	FIELD WORK DATA ANALYSIS	OUTPUT REPORTING
Review relevant project documents	Hold meetings with project partners/key stakeholders	Field survey preliminary findings
Desk review of literature	Field visit to the processing companies and farmers groups	Conduct validation workshop
Develop survey instrument	Field visit to institutions and importers	Draft study report
Selection of companies to visit and sampling method	Conduct interviews and focus group discussions	Final report
	Field data analysis	

Figure 2. Interview with farmers





## 3. Overview of the fruit sector

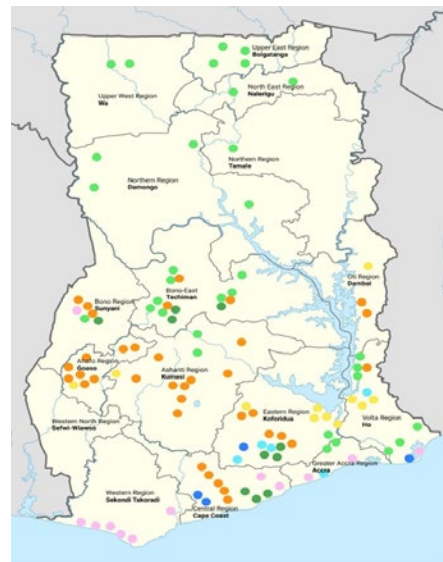
Fruit production plays a crucial role in Ghana's economy and it is one of the major sources of export earnings. Fruits fall under the non-traditional exports, which is the third most important export earnings for Ghana, contributing about 17.25% of the total value of all non-traditional exports (GEPA, 2018). The major crops are pineapple, mango, banana, citrus papaya, passion fruit and coconut. To increase trade on the domestic, regional and export markets the value added products, such as juice and dried fruit provide opportunities. However, few local companies have taken advantage of this. Currently, fruit are mainly exported fresh as whole fruit, and to a lesser extent as dried fruits, concentrates and single strength juice. These products are also consumed fresh or processed on the domestic and regional market. Orange is most widely consumed, followed by pineapple and mango.

Considering the economic importance of fruit, the Government of Ghana has over time implemented programs and policies to promote the fruit industry. For example, under its "Planting for Export and Rural Development (PERD)" program, the government seeks to promote the production, export and value-addition of crops such as mango, coconut, citrus, cashew, shea and other tree crops to increase export earnings, provide sources of income for farmers in the rural areas, and generate employment for youth and rural people.

### 3.1 Production areas

The agroecology of Ghana provides favourable conditions for the cultivation of tropical fruit and its proximity to EU market gives it a comparative advantage over other countries outside the West African sub-region. Although tropical fruit can be found all over Ghana, commercial production is mainly found in eleven of the sixteen regions stretching from the Middle Belt to the south (Figure 3). It is worth mentioning that mango is also cultivated in five regions in the northern part of Ghana.

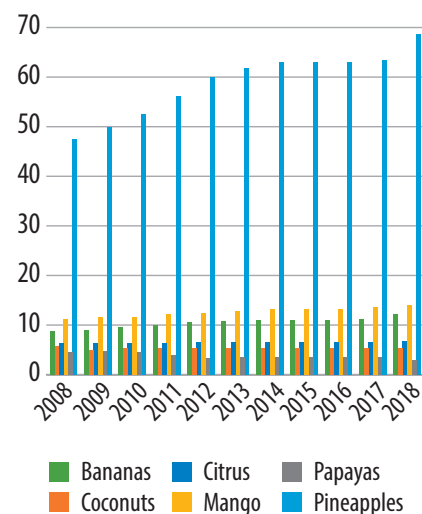
**Figure 3.** Map of the major production areas of selected fruit



### 3.2 Production

Production of banana, citrus and coconut production have been growing steadily over the last 10 years (Figure 4; FAOSTAT, 2018). In the case of pineapple, the replacement of the smooth cayenne variety by the MD2 variety caused a temporary dip in production in 2007 and 2008. Since then production of pineapple has increased over the years. Mango production also increased from 6,800 t in 2007 to 80,000 t in 2010, and has stabilized at about 99,000 t since 2014. The economic drivers for the Ghanaian fruit and vegetable market is a growing middle class with a heightened health-awareness, coupled with the rise of supermarkets (source: Ghanaian Fruit & Vegetable Market: Growth, Trends, And Forecast, 2020–2025). The proximity to the European markets and increasing irrigation facilities are also affecting the increased production in a positive manner. The potential for growth in the fruit industry is still high as fruit consumption continues to increase with the growing growing middle class with heightened health awareness of consuming fruits and vegetables,

**Figure 4.** Production for the major fruit ( $t\ ha^{-1}$ ) for 2008–2018. Source: FAOSTAT



coupled with the rise in fruit processing units, is fueling the market growth for fruits and vegetables.

There are also seasonal variations in the supply of these tropical fruit (Figure 4). There are two seasons for crops such as mango and citrus. For mango, there is a short season in December to February in the southern part of Ghana, which complements the traditional May to July season. In the case of citrus, the harvest season ranges from October to March and from April to July, depending on the varieties. Pineapple is, however, grown all year round, as is the supply of bananas which is ensured through drip irrigation.

The production of fruit is done by a mix of small-holder, large and commercial farmers. With the large and commercial farms having higher yield per hectare as compared to the smallholder farms (Table 1).

**Table 1.** Farm type, total land area and average yield ( $t\ ha^{-1}$ )

Fruit	Type of farm	No of producers	Total land cultivated (ha)	Average yield ( $t\ ha^{-1}$ )
Citrus	Large farms	4,200	20,000	20
	Smallholders	2,800	5,000	12
Pine-apple	Commercial*	13	2,800	60
	Smallholders	4,922	1,880	40
Mango	Commercial	7	2,160	10
	Large farms	1,520	13,445	7.5
	Smallholders	1,973	3,040	3
Banana	Commercial	3	2,400	35
	Smallholders	350	1,000	12

Source: Field data collected in 2020 by the authors and Sea Freight Pineapple Exporters of Ghana (SPEG).

Note: No data for papaya, passion fruit and coconut were not readily available

\* Commercial refers to mango, banana and pineapple plantations with acreages of over 300 ha, under huge mechanised farming, high export volumes and over 500 employees)

**Table 2.** Production seasons for selected fruit and varieties

Crop/Variety	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Mango</b>												
Keitt	Major	Major				Major	Major					Major
Kent	Major	Major			Major	Major						Major
Palmer	Major	Major				Major	Major					Major
Jaffna					Major	Major						
Haden	Major	Major										Major
Amelie				Major	Major							
<b>Pineapple</b>												
MD2	Major	Major	Major	Major	Major	Major	Major	Major	Major	Major	Major	Major
Sugar loaf	Major	Major	Major	Major	Major	Major	Major	Major	Major	Major	Major	Major
Smooth cayenne	Major	Major	Major	Major	Major	Major	Major	Major	Major	Major	Major	Major
<b>Citrus</b>												
Late Valencia	Major	Major	Major	Major			Major	Major				Major
Mediterranean sweet						Major	Major					Major
Orthanique	Major	Major					Major	Major				Major
Blood orange					Major	Major	Major			Major	Major	Major
Mandarins (sasumandarin)				Major	Major			Major	Major			
Tangerines				Major	Major			Major	Major			
Local (cloned)						Major	Major			Major	Major	Major
Ponkan mandarin				Major	Major			Major	Major			
Pineapple orange					Major	Major	Major	Major	Major			
<b>Banana</b>												
Cavendish	Major	Major	Major	Major	Major	Major	Major	Major	Major	Major	Major	Major
<b>Coconut</b>												
Vanity top	Major	Major	Major	Major	Major	Major	Major	Major	Major	Major	Major	Major
Sri Lanka Green Dwarf	Major	Major	Major	Major	Major	Major	Major	Major	Major	Major	Major	Major
Vanuatu Tall	Major	Major	Major	Major	Major	Major	Major	Major	Major	Major	Major	Major
Ghana yellow Dwarf/local variety	Major	Major	Major	Major	Major	Major	Major	Major	Major	Major	Major	Major
<b>Passion fruit</b>												
Purple colour	Major	Major	Major	Major	Major		Major	Major	Major	Major	Major	Major
Yellow/Orange colour	Major	Major	Major	Major	Major		Major	Major	Major	Major	Major	Major
<b>Papaya</b>												
Solo	Major	Major	Major					Major	Major	Major	Major	Major
Golden	Major	Major	Major					Major	Major	Major	Major	Major
Large papaya	Major	Major	Major					Major	Major	Major	Major	Major

Legend: Major season (blue), Minor season (orange), All year round (green)

### 3.2.1 Citrus

Citrus production in Ghana is primarily oranges, but also includes limes, lemons and tangerines. The Late Valencia variety is the most common orange variety grown on about 85–90% of the citrus orchards. The three most preferred varieties for processing are late Valencia, Sweet Mediterranean and the local variety which are harvested twice a year in the peak and minor seasons. This offers opportunities for early varieties to be introduced into the sector.

Based on field data, it is estimated that about 7,000 farmers cultivate about 25,000 ha of citrus farms in the southern and middle belt of Ghana (Table 1). Production is highly concentrated in the Central, Eastern, Ashanti, Volta, Ahafo, Bono and Bono-East regions. Productivity is low, however, with 20 t/ha (source: field data) compared to 28.4 t/ha<sup>-1</sup> and 26 t/ha<sup>-1</sup> in Brazil and Spain respectively (source: FAOSTATS, 2018). Poor farm maintenance, extended drought periods, high temperatures affecting flowering induction and disease infestations (i.e. *Pseudocercospora* or fruit & leaf spot) have resulted in low yields on most farms.

In terms of marketing, farmer associations interviewed indicated that about 60% of the harvested oranges are sold on the domestic market and to itinerant traders from Côte d'Ivoire, Burkina Faso and Mali.

The remaining 40% is sold locally to two main citrus processing companies producing orange juice concentrates and about eight processing companies producing dried citrus peels for exports. Out of this amount, about 51,500 t is processed by the processing companies into mainly concentrates for exports and pasteurized juices for the local market. It is estimated that about 20,500 t is processed as dried orange peels for exports.

### 3.2.2 Mango

Based on data gathered from the field, mango is grown in three ecological zones in Ghana, namely the southern belt, middle belt and the northern regions. About 90% of mango orchards grown are Keitt variety and the remaining 10% is Kent. A projected total of 3,500 farmers cultivate about 18,645 ha (Table 1). In terms of productivity, Ghana produces 13 t/ha<sup>-1</sup> whilst productivity in Brazil and Peru are 21.7 t/ha<sup>-1</sup> and 12.8 t/ha<sup>-1</sup> respectively. A look at productivity in the West African sub-region shows Ghana ranks the second highest in terms of yield/ha, followed by Burkina Faso and Senegal (Table 3).

Currently, Bacteria Black Spot (BBS) disease is a major issue in the mango sector leading to significant crop losses and impacting the income of farmers. This disease affects the crop at all stages. This could attract international fresh exporters to Ghana because of the extended season.

**Figure 5.** Harvested citrus and containers with citrus concentrate



**Table 3.** Mango productivity in West Africa

Country	Yield (t ha <sup>-1</sup> )
Mali	17.9
Ghana	13.9
Burkina Faso	10.2
Senegal	6.7
Côte d'Ivoire	6.0
Benin	4.4

Data for mango, mangosteen and guava for 2018, retrieved from FAOSTAT



Mango is among the key processed fruits. It is mainly processed as dried, pre-cuts and juice (fruit blend and smoothies) and a little bit of pulp. About 18,650 t of fresh mangoes was processed into pre-cuts and dried fruits in 2019 for exports mainly to the EU market (pre-cuts 5,023 t and dried mangoes 10,000 t). In addition, a total of 3,628 t of fresh mangoes was processed into freshly squeezed, pasteurized mango juice and pulp for local consumption. Currently, there are three large companies producing pre-cuts and dried mangoes for exports, two companies producing freshly squeezed mango juice and over fifty small scale companies producing mango and other fruit blends for the local market. A detailed description of processing companies is presented in section 3.3 below.

It is imperative to note that negotiated prices for fresh mangoes sold on the local market are much higher than the ones sold for processing. For instance, in 2019 processors bought fresh mango at GHC 1.65 per kilo whilst 1 kg of a fresh mango was sold at a retail price of GHC 3.50. However, the local market capacity to absorb fresh mango is very limited due to lack of sufficient storage infrastructure.

### 3.2.3 Pineapple

Pineapple, one of the leading horticultural products in terms of both production and exports, has been at the forefront in terms of juice production in Ghana.

**Figure 6.** Fresh mango just before harvesting and processing of mango



Most processors rely on pineapple to ensure year round production in their factories. Varieties commonly grown are MD2, smooth cayenne and sugar loaf.

Commercial pineapple production is concentrated in the eastern region, Nsawam and Samsam enclave, and Central region, Gomoa, Bawjiase and Swedru areas. The total land area cultivated is estimated based on data collected in the field to be about 7,000 ha with about 5,000 farmers. Out of this figure, about 2,800 ha of land is under cultivation of fresh pineapple for export by the Sea-Freight Pineapple Exporters of Ghana (SPEG). Productivity is low, however. Whereas Ghana produces 69 t ha<sup>-1</sup> compared, Costa Rica produces 75.95 t ha<sup>-1</sup> of pineapple with a much higher quality. This is due to better application of good agricultural practices as compared to Ghana. The pineapple export sector has been affected by the shift in demand from the Smooth Cayenne variety to the MD2 variety. This has resulted in a decline of fresh exports to Europe. A comparison of Ghana's pineapple productivity with a few other West African countries is indicated in Table 4 on next page.

In terms of marketing, fresh pineapples are sold as fresh whole to the EU market and also to processing companies for production of juice concentrate, dried fruits and pre-cuts for both exports. Substantial volumes are also sold on the local market for processing smoothies for domestic consumption.



**Figure 7.** Fresh pineapple packed for the market (photo credits Irene Koomen)



**Table 4.** Pineapple productivity in West Africa

Country	Yield (t ha <sup>-1</sup> )
Ghana	69
Côte d'Ivoire	64
Cameroon	38

Data for 2018, retrieved from FAOSTAT

**Table 5.** Banana productivity in West Africa

Country	Yield (t ha <sup>-1</sup> )
Côte d'Ivoire	45
Cameroon	14
Ghana	12

Data for 2018, retrieved from FAOSTAT

A total of 36,331 t of fresh pineapples was exported mainly to the EU market in 2017 (GEP Export Data, 2017). Data gathered on the field revealed that 5,119 t of fresh pineapples were processed as pre-cuts and dried pineapples for exports. Of this amount, pre-cuts constituted 1,719 t, followed by 3,400 t as dried pineapples. Furthermore, 8,000 t was processed as pineapple concentrate for exports. Approximately 12,000 t was also processed into pasteurized and freshly squeezed juices for the domestic market.

### 3.2.4 Banana

Banana production in Ghana is currently mainly undertaken on a large commercial scale by three major producers and exporters into the European Union under the preferential access basis. Production takes place through drip irrigation and ensures commercial

availability year-round. The three producers and exporters are Golden Exotics Limited and the Volta River Estates Ltd, located in the Eastern Region, and Musahamat Farms Ghana Ltd located in the Volta Region of Ghana. Total land area cultivated by the three companies is about 2,400 ha.

Apart from these three companies, the coastal, south and middle belt areas are endowed with good soils and climatic conditions ideal for cultivation of banana. Cavendish is the main variety grown on the plantations and smallholder farms. In Ghana, the estimated yield on the large plantations are 35 t ha<sup>-1</sup> and smallholder farms are 12 t ha<sup>-1</sup>, compared to 40 t ha<sup>-1</sup> in Ecuador and 15 t ha<sup>-1</sup> in Brazil, and ranks low compared to neighbouring countries (Table 5).



**Figure 8.** Harvested bananas and packaging of bananas before export (photo credits Irene Koomen)



Compared to mango and pineapple, banana is processed on a limited scale (80 t) by one fruit drying company for exports. A total of 91 t is also processed as smoothies and sold by restaurants and street vendors on the local market.

### 3.2.5 Papaya

Papaya thrives well in different areas of Ghana and commercial production developed due to the vibrant export sector some years ago. There is a high demand for the commodity in the local market, but production is inadequate to serve the demand of both the domestic and export market. The Solo and Golden varieties are the most preferred papaya varieties by the export market and for processing. An estimated 500–1,000 farmers cultivate about 360 ha of land in the Eastern, Central and Volta regions. Productivity at  $2.9 \text{ t ha}^{-1}$  is very low compared to  $90 \text{ t ha}^{-1}$  in Indonesia and  $39 \text{ t ha}^{-1}$  in Brazil respectively (FAOSTAT data for 2018). Poor farm maintenance, extended drought periods, and mealy bugs infestations have resulted in low yields.

Additionally, the few farmers producing papaya do not have access to the right varieties demanded by the export market. Seed sourcing of the Solo and Golden varieties is difficult since seeds are not readily available in Ghana.

Papaya from Ghana has a unique characteristic such as taste and freshness within the international community which gives the country a competitive advantage. There is a need to increase production volumes for Ghana to become more competitive. The demand for papaya by processors especially for dried fruits for the export market is also increasing gradually. Data gathered from the two major dried fruit companies indicated that a total of 1,011 t of fresh papaya was processed into dried fruits in 2019.

### 3.2.6 Passion fruit

The production of passion fruit is relatively new for Ghana, but the few existing farms have shown a promising yield potential and continuous production throughout the year. In Ghana, yield is estimated at  $12 \text{ t ha}$ , however, there is not available data of lead producing countries such as Brazil, Vietnam, South Africa, Kenya, Zimbabwe and Rwanda to assess productivity levels in these countries. The production of the purple colour passion (small size) by tissue culture is an opportunity for investors. This tissue cultured plants offer growers to get true to type varieties, uniformity of growth and also avoids the stress of going through nursery activities.

There is an increased demand of this tropical crop on the international, regional and local markets as fresh and processed commodity which provides many business opportunities.

**Figure 9.** Ripe passion fruit and bottled passion juice



Data gathered from the field indicated that the fresh export market demands especially the purple small fruit, whilst the hospitality industry has developed a great taste for the commodity, hence the increasing demand in the domestic market. The small-scale processors require juicy ones to process and blend with other juices. Processors engaged in the production of fresh juice and smoothies see it as a driving force of their business, because of the taste and flavour the commodity adds to their products. However, supply is seasonal (because production is rain fed) and hence inadequate to produce higher quantities to meet the demand. A total of 5,704 t of fresh passion fruits was processed as fruit blends for both freshly squeezed and pasteurized juices and sold mainly on the domestic market.

### 3.2.7 Coconut

Though not much data is obtained on the number of coconut farmers/producers, cultivation of the fruit is highly concentrated in the coastal belt of the western region. Although Ghana ranks as the third largest coconut producing country in Africa, yields are low, that is  $5.4 \text{ t ha}^{-1}$  compared to other major producing countries such as  $57 \text{ t ha}^{-1}$  in Indonesia and  $40 \text{ t ha}^{-1}$  in the Philippines.

Coconut farms along the coastal belt are being attacked by the 'Cape St Paul Wilt' disease which is reducing the cultivated acreage and yield. The sector requires

new and resistant varieties to combat this disastrous disease which is wiping away all the coconut plantations along the coast. The good news is that research has developed resistant, early bearing and high yielding varieties for the industry. However, the planting materials of these varieties need to be multiplied in mass quantities and supplied to farmers especially along the coastal areas. This offers an excellent opportunity for investors to invest in seed farms to produce more coconuts for nurseries for rapid raising of coconut seedlings for farmers.

The fruit has become an essential commodity in the international, regional and local markets in fresh, dried and processed forms, as well as the by-products. Field data revealed that 1,310 t of fresh coconuts was processed into dried coconut chips for exports to the EU market in 2019. Over the years, the export of coconut in dried form was common, but currently the international market demand for fresh coconut has increased significantly. The domestic consumption of fresh coconut has also increased drastically and the price per fruit ranges from GHC 1.00 at the production centre to GHC 2.50 and GHC 3.00 in Accra. The consumption of coconut virgin oil is increasing, hence the high demand of copra by coconut processors. Currently, the demand for copra in the regional market is high and offers an investment opportunity.

**Figure 10.** Whole coconut ready for export (photo credit Irene Koomen) and fresh packed coconut



**Table 6.** Installed and actual capacity utilization of fruit processing companies in Ghana in 2019. Source: Field data

Type of processing company	No of companies	Installed capacity (t/day)	Actual capacity used (t/day)	Underutilized capacity (t/day)
Large scale processing companies	6	1,610	923	687
Small and micro companies	60	330	188	147
Start-up processing companies	4	176	176	0
Revamped processing companies	2	104	80	24
Smoothies Vendors	100	20	5	15
Defunct processing companies	44	-	-	-
<b>Total</b>	<b>216</b>	<b>2,240</b>	<b>1,372</b>	<b>868</b>

### 3.3 Processing

Ghana currently has an estimated 2,240 t/day of installed processing capacity for fruit juice and concentrates and used about 62% of this capacity in 2019 (Table 6). An installed processing capacity of 868 t/day is underutilized as most of the processing companies currently operational are not producing at full capacity. It was also observed that only 172 out of 216 processing companies are functional. Fruit processing companies can be categorized into companies producing for both export and local markets and those producing solely for the local market.

#### 3.3.1 Processing for export

Six major processing companies are involved in fresh pre-cuts, dried and fruit juice products that are exported mainly to the EU market. These include Blue Skies, HPW Fresh & Dry Limited, Bomarts Farms Limited, Pinora, Peelco and Frutiland Processing Company who all have state-of the art equipment. These companies are mainly operating in the free zones enclave<sup>1</sup>, as part of operations in the free zone enclave. Two companies that previously exported are currently not operational.

<sup>1</sup> Free zones are designated areas for the promotion of economic development; a company licensed to operate under the free zone enclave is mandated by law to export at least 70% of what it produces.

Types of products produced for the export market include the following:

- Fresh pre-cut fruits such as mango, pineapple, papaya, passion fruit, etc.
- Dried fruits (mango, pineapple, coconut, papaya and banana), mango fruit bars and rolls as snack packs.
- Orange concentrate (both conventional and organic).
- Essential oils.
- Pineapple juice (single strength, conventional only for exports).
- Mango juice and mango with other fruits blend juices are mainly sold on the local market.

#### Pre-cuts

Fresh pre-cut products for exports are currently dominated by two companies. The first company in Table 6, located at Dobro, near Nsawam in the eastern region, commenced operations in 1998. The company processes fresh pre-cut fruits primarily for exports to supermarket chains in UK, Spain, Italy, Holland, Belgium, France, Denmark and Switzerland. Total volume of exports is about 13,000 t of which about 60% is mango. The company has two factories with a total processing capacity of 30 t per day. The company has a very good traceability system through a batch processing system used in the factories, which allows products to be traced all the way back to individual farmers. Next to the fresh pre-cut products, mango and other fruit blend juices are sold on the local market.

**Figure 11.** Fresh pre-cuts ready for export (photo credit Irene Koomen)

A second company, located near Bawjiase in the Central region, commenced operations around 2009 and is exporting to supermarkets in Germany. Currently the company processes between 2 and 3 t/day and exports 100 t of fresh cuts of pineapples (50%), coconut (35%), papayas and mangoes (15%). On a weekly basis they need about 3 t of fresh mangoes. Plans are in place to operate throughout the year.

#### Dried fruit products

There are two large mango drying processing companies currently operating in Ghana. The two

**Figure 12.** Drying and packaging of dried mangoes

companies are located in Adeiso and Dobro, near Nsawam in the eastern region. The main products of the largest company, which is foreign owned, are dried mango, as well as dried pineapple and coconut. The dried fruit products are shipped directly to supermarkets in Switzerland and other European markets. Kosher certified dried mango is sold to Israel. Mango fruit bars and rolls, new products produced by the company, are exported to Italy and in small quantities to Germany and Switzerland. Mango constitutes 60–70% of the company's production. Dried product exports are 1,200 t per year, half of which is mango and 25% each for dried pineapples and coconut. In addition to the dried fruits the company has annual exports between 4,000 and 5,000 t of MD-2 fresh pineapples which constitutes 4 to 5 containers per week and increases to 10 containers per week in the high season, from December through April.

Incoming fruit supply volumes into the factory are 6,000 t mango, 3,000 t pineapples and 1,300 t coconut. Final product conversion ratios are 10:1 for mango, 16:1 for pineapple and 5:1 for coconut. The company has a processing capacity of 65 t of fresh produce per day of which mango constitutes 60%, or 39 t, which gives 8 t dried produce of 4.8 t dried mango, per day.

The second processing company in dried fruits started with exporting fresh mangoes to Europe in 1998 and to Lebanon in 2008. First efforts to produce dry products were made in 2011 and realized in 2013.



The company's main products are dried and fresh mangoes, pineapples and papaya. It ships dried mango product to Switzerland, Germany, UK and Scandinavia. Fresh exports are mainly to Switzerland, UK, Germany and Italy. Both dried and fresh mango products are exported to the Middle East (Lebanon), export to Nigeria concerns dry products only. Incoming raw material on a yearly basis is 3,000–4,000 t of mangoes, 400 t pineapples, 50 t papaya, 10 t coconut and 80 t banana (Cavendish). Processing capacity for dried mangoes is 600 t per year and 250 t for the other fruits combined. Dried mango export is about 500 t and for the other fruits 100 t per year.

**Citrus Concentrates and Pineapple not-from-concentrates (NFC) juice**

There are two companies engaged in the processing of citrus concentrates. One of the companies is located in Asamankese in the Eastern region and the other in Assin Fosu in the Central region. The former processes

mainly citrus and pineapple concentrates for exports to the Netherlands. The orange products are both conventional and organic, while the pineapple products are conventional NFCs only. Currently, 95% of the company's production is exported, the other 5% is sold in Ghanaian markets to local alcoholic beverages companies. The company has contracts with buyers in European markets to supply a fixed volume based on quality specifications and at current market prices. Incoming fruit supply volumes into the factory are 40,500 t per year of which citrus constitutes 32,500 t and pineapple 8,000 t per annum. It has a processing capacity of 400 t per day.

The latter, located in central region, was also engaged in orange concentrates and essential oils which were exported mainly to the Netherlands and Spain. The company, currently plans to process pasteurized orange juice in P.E.T bottles for the domestic market. Total volume of fresh citrus processed is about 18,000 t per year.

Figure 13. Impression of juice processor



**Processing for the domestic market**

For the domestic market, fruit processing is undertaken by a number of SMEs located primarily in Accra, but also other big cities near fruit producing areas. The majority of these SMEs are engaged in the production of fruit juices. The Fruit Processors and Marketers Association of Ghana (FPMAG) indicated that in 2019 about twenty of the sixty member companies are operational. Apart from the FPMAG members, there are about forty additional SMEs processing fruit juice across the country. Some of the SMEs are Vintage Farms, Crescent Juice, Kalyppo, St Michael, Healthy Life, Papso, Akramang Fruit Processing Company to mention a few. However, these companies face competition from imported fruit juices, such as Ceres, Don Simon, Pure Heaven, Frutelli, Sammi, and Stute.

About sixty small companies are involved in fruit processing in the domestic market. Fifty-eight of these companies are involved in production of pasteurized fruit juices, while two processors produce freshly squeezed juices (Table 8). As indicated earlier, one of the two processors operates in the free zone enclave and mainly produces for the export market. They do, however, sell freshly squeezed juice on the local market.

The total installed capacity of the local processing companies is about 330 t per day, but they are currently producing at 142 t below capacity (Table 7). Total volumes of the fresh fruits processed is estimated at about 18,016 t per year. About 83% of the total fresh fruits processed constitutes pasteurized juice, while 17% is freshly squeezed juice.

Table 7. Fruit processing companies producing for domestic market

Type of product	Type of juice	No of companies	Processing capacity (t/day)	Buyers	Total raw material processed (t/year)
Freshly-squeezed 100% natural juice (PET bottles)	<ul style="list-style-type: none"> <li>Pineapple</li> <li>Mango</li> <li>Mango/Pine</li> <li>Pineapple-ginger</li> <li>Mango-ginger</li> <li>Pineapple-passion fruit</li> <li>Mango-passion fruit</li> <li>Tropical fruit blends</li> </ul>	2	11	Distributors Retailers Supermarkets Hotels Restaurants Domestic airlines Street vendors Schools Churches Hospitals	36,563
Pasteurized fruit juices (glass bottles)	<ul style="list-style-type: none"> <li>Pineapple</li> <li>Pineapple-ginger</li> <li>Pineapple-passion fruit</li> <li>Pineapple-passionfruit-ginger</li> <li>Citrus</li> <li>Banana</li> <li>Passion fruit</li> <li>Watermelon</li> </ul>	58	319	Distributors Supermarkets Domestic airlines Hotels Restaurants Retail shops Schools Street vendors	18,016

### 3.4 Markets

Exports of fresh tropical fruits commenced in Ghana in the 1980s with smooth cayenne pineapples, relying on smallholders who contributed about 50% of export volumes. This was followed by commercial production of banana, mango and passion fruit for the fresh export market. Exports of pineapple, banana, mango, citrus and papaya was about USD 59.9 m and constituted about 73.4% of the total horticultural exports (GEPA Export Data, 2016).

The export sub-sector has experienced declining volumes due to a number of reasons. For instance, pineapple has seen low declining volumes due to market demand shifting from Smooth Cayenne to the MD2 variety of pineapple (FAO, 2013). Similarly, papaya was hit with mealy bugs infestations resulting in low volumes of fruits for exports. Currently mango and citrus are also affected by bacteria black spot (BBS) affecting productivity on the orchards. It is crucial to address these challenges to increase fresh exports and most importantly, strengthen the supply chain for the existing processing firms established in the country.

Ghana's trading partner for exports of processed fruits remains predominantly the EU market. Exports are mainly shipped to buyers in countries such as the UK, Netherlands, Spain, Switzerland, Italy, Germany and Belgium. A detailed breakdown of quantities produced and exported is shown in Table 8 below. As shown in the table total exports volumes of the various processed products is about 20,485 t per annum. Fresh pre-cuts constitute a larger share of exports, representing 64.0%, followed by concentrates 27.3% followed by dried fruits 8.8%. In terms of fruit quantities processed for exports, mango constitutes about 60% of the companies' production of both fresh pre-cuts and dried fruits products, followed by pineapple 25% for dried fruits and the rest for coconut, papaya and banana. Additionally, orange concentrate is about 21% and single-strength pineapple juice is about 6% of total processed fruits for exports. Together these companies have a theoretical processing capacity of 1,608 t per day, but currently they are producing 923 t per day, which leaves a deficit of 685 t/day, so there is potential to increase production.

**Table 8.** Production and export data for processed fruit (2019). Source: Field data

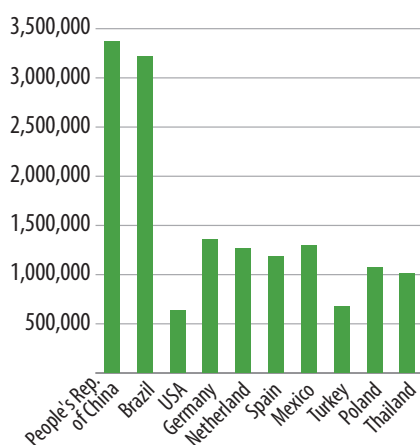
Product	Exports (t per year)	% of total processed fruit exports	Importing countries	Processing capacity (t/day)	Total raw material processed (t/year)
Pre-cuts	13,100	64.0%	UK, Spain, Italy, Holland, Belgium, France, Denmark, Switzerland	33	18,000
Dried fruit	1,800	8.8%	Switzerland, Israel, Germany, UK, Scandinavia, Lebanon, Nigeria	70	18,440
Concentrates (orange)	4,385	21.4%	Netherlands, Spain	400	44,500
Not from concentrates					
Single-strength juice (pineapple)	1,200	5.8%	Netherlands	420	8,000
<b>Total</b>	<b>20,485</b>	<b>100%</b>		<b>923</b>	<b>88,940</b>

Currently, the regional market for fruit, particularly oranges, is dominated by itinerant traders from West African countries such as Côte d'Ivoire and Burkina Faso. Copra is also traded by Nigerian buyers and the demand for copra is growing on the regional market.

The domestic market for fresh and processed fruit is dominated by local market women, supermarkets, hotels and schools. Apart from pineapple, banana and passion fruit, where greater volumes are exported, about 35% of mango, citrus and coconut are sold at farm gate level to these buyers. Prices for the fruits usually fluctuate depending on the season and availability.

By far, the largest category in the market for processed fruit is orange juice. It is worth mentioning that recently, coconut water has become a known brand in the fruit juice sector, but which is not technically fruit juice but shares a market (CBI Report, 2017). Changing lifestyles and altering eating patterns of the consumers have resulted in an increased intake of affordable, healthy and quick sources of nutrition like packaged fruit juices, thereby catalysing the growth of the market.

**Figure 14.** Major exporting countries of processed fruit, juices and nuts ( $t\ ha^{-1}$ ), 2018 data. Source: UN COMTRADE



The global fruit juice market reached a volume of 45.4 billion litres in 2018, registering a Compound Annual Growth Rate (CAGR) of around 2% during 2011–2018. The market is further projected to reach a volume of 50.6 billion litres by 2024 (source: Imarc Group). One factor that influenced the growth of the fruit juice market is a rising disposable income population in emerging countries such as China, Russia, Brazil and India among others. Leading exporting countries in 2018 include China, Brazil, USA, EU, Mexico, Turkey (Figure 14).

Ghana's traditional trade partner in the horticultural sector has been the EU and the total European juice market is estimated at 25% of the global market and valued at EUR 21 billion (AIJN, 2018). The European market of (tropical) fruit juices is estimated at EUR 350 million (CBI, 2019). Europe has become the world's largest market for citrus juices and accounts for 60% of all global imports (Agrarai.pe). This therefore creates an opportunity for a developing country like Ghana to expand juice exports (single strength and concentrates) to the EU market.

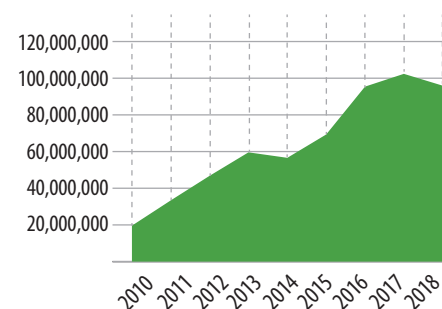
Though globally, Ghana is not among the main fruit juice producers, it has developed a state of the art fruit processing sector producing a variety of products such as dried fruits, snack bars, rolls, pre-cuts, freshly squeezed and pasteurized fruit juice and juice concentrates. Neighbouring countries such as Burkina Faso and Côte d'Ivoire are mainly involved in dried mangoes and fresh mango exports to South Africa and the EU market respectively. Mango pulp is also produced in Burkina Faso for exports by a leading fruit processing company DAFANI SA. Agrofruits in Senegal started production of fruit juice for local consumption and fruit juice concentrates, but has stopped operating. Nigeria also has large-scale fruit juice processing companies producing primarily for the domestic market.



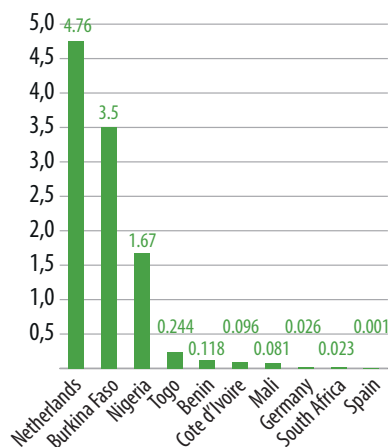
Ghana imported GHC 98.5 million (USD 17.8 million) worth of fruit juice for domestic consumption in 2018 (Figure 15). Only 28 percent of total domestic demand, worth USD 5.0 million, is produced in the country. Potential therefore exists to increase fruit juice production for the domestic market.

**Figure 15.** Value (GHS) imports of fruit juice 2010–2018.

Source: Ghana Revenue Authority, Customs Division



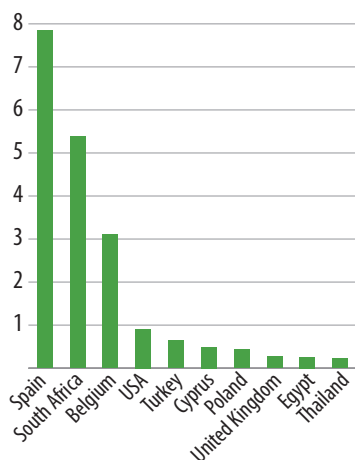
**Figure 16.** Ghana's trading partners for exports of fruit juices in 2018 (m USD). Source: UN COMTRADE



The major export destinations of fruit juices from Ghana in 2018 are the EU market and regional trade mainly in West Africa (Figure 16). About 45% of exports valued at USD 4.8 million were shipped to the Netherlands in 2018. In terms of regional trade, Burkina Faso and Nigeria were the major destinations of Ghanaian fruit juices.

Ghana imported about 37% of its fruit juice for local consumption from Spain, followed by South Africa at 25%, Belgium (14.8%) and the US at 4.3% (Figure 17). To meet the domestic demand for fruit juices and juice concentrates for blending for some local companies, Ghana's imports increased from GHC 60 million in 2014 to GHC 102 million in 2017 (Figure 15). Awareness creation on healthy eating, establishment of shopping malls in Accra and big cities across Ghana, growing middle class and booming street vendors producing fruit smoothies for consumption contributed to the high demand. Additionally, there has been a steady increase in new hotels with increased demand for fresh fruits and fresh fruit juices and as a result high demand for fruits such as oranges, pineapple, mangoes, bananas, coconut and watermelon in the domestic market.

**Figure 17.** Ghana's trading partners for imports of fruit juices in 2018 (m USD). Source: UN COMTRADE



## 4. Opportunities and challenges for processed fruit

To be able to understand the opportunities and challenges for processing of fruit in Ghana interviews and data collection in the field of both successful and defunct companies was carried out. The information gathered is described and presented as a SOT analysis at the end of this chapter.

### 4.1 Defunct companies

Discussions were held with three companies that ceased operations in the last 10 years. These companies were engaged in production of the following products:

- pasteurized pineapple juice, and pineapple and tropical fruit blends in tetra packs;
- orange and pineapple juice concentrates (conventional and organic) for exports;
- lime and distilled oil, concentrates, as well as lime and orange peels.

Reasons mentioned for the collapse of the companies included the following:

- Delays in payments by importers and retailers resulted in cashflow issues. Payments were not on time, so companies were unable to pay loans and overdrafts received from banks.
- Their products were not well known on the market. High advertising costs (i.e. one jingle on a radio station costs GHC 5,000/week) resulted in low promotion of their locally produced fruit juice. Imported fruit juices brands, on the other hand, are vigorously advertised, hence high patronage compared to the local brands.
- Seasonality of fruit supply limited business operations.
- Limited availability and high cost of packaging materials e.g. glass bottles, crown corks, tetra packs, stand up pouch, cartons, etc. as most of the packaging material has to be imported.
- Managerial issues that affected the operations of the companies.

- Pilfering and theft of the finished products by staff.
- High cost of capital loans for long term investment.

Two of the defunct companies, however are currently in the process of revamping their operations and have submitted business plans to the Ghana Exim Bank to source loans for expansion and refurbishing of existing factories. Most of the loan applications are at the final stages of approval. These companies may commence with the construction of new processing units this year. Types of products to be produced include the following:

- canned pineapples (chunks and slices), pasteurized pineapple juice, citrus, pineapple and tropical fruit blends in tetra packs;
- orange and lime concentrates, distilled oil, lime and orange peels.

### 4.2 Start-up companies

Four businesses are currently seeking funding from the Ghana Exim Bank to set up new processing factories. Types of products to be produced include pasteurized fruit juices (mango, citrus and pineapple) for the domestic market. To date, one of the companies, the Ekumfi Fruit Juice Processing Company, has finalized construction of new factory buildings, installation of equipment and has undertaken an initial test run of the processing line and sold the finished product on the market.

### 4.3 Operational companies

Key field findings on the processing companies revealed the following:

#### 4.3.1 Supply of raw material

For a fruit processing company to succeed, it is crucial that a strong supply base is continuously guaranteed. As a result, most well performing processing companies have strong linkages with fruit producers,

traders and agents. It is worth mentioning that these processing companies also have linkages with the major fruit exporters for purchase of second grade fruit for processing.

Interviews with farmer groups and key respondents revealed that between 30–40% of their citrus and mango is sold to processing companies, while the remainder is sold to the local and regional markets.

### 4.3.2 Price negotiations and payment terms

Fruits like mango, citrus and pineapple are purchased from producers at a pre-determined price negotiated between the processors and the producers before the start of each harvesting season. Contractual agreements between the companies and producers or suppliers are the exception rather than the rule. The pre-determined prices include transport costs, and in most cases, the processors organise the harvesting and transportation of fruit from the farm gate to the processing factories.

Processors normally pay their suppliers 2 weeks to 1 month after receiving the fruit. This is usually paid to the farmer associations by cheque or cash, who then pay their individual members by cheque, cash or mobile money transfers.

### 4.3.3 Storage of fruits for processing

Apart from the large-scale fruit processing companies that have storage facilities (i.e. temperature regulated chambers to store large volumes of fruits especially during the major season), storage facilities are non-existent in most factory premises visited. Fruits are usually processed within 48 to 72 hours upon delivery to the factory gates to prevent any wastage and fruit losses. However, most processors are confronted with storage problems during the major season when fruit is in abundance and becomes more difficult to manage fruit supply and the capacity of the processing factories.

### 4.3.4 Quality assurance

To meet international standards, the processors have inspection teams that undertake on-farm inspections and check on fruit quality (i.e. brix level, sizes,

mechanical damage, etc.). The focus is to undertake quality checks and then scheduling a harvesting plan on the various farms with the producers and their associations. Key criteria used during inspections and harvesting of fruits on-farm and delivery at the factory gate include the following:

- brix level (sugar-acid ratio)
- maturity (colour, uniformity in shape and sizes, etc.)
- water/juice content
- insects and disease infestations (fruit flies, BBS, stone weevil, anthracnose, mealybugs, internal browning, *Pseudocercospora* leaf and fruit spot of citrus, etc.)
- bruising
- mechanical damage
- internal browning.

Upon delivery of fruits and before weighing at the factory gate, a member of the quality assurance team will pick a sample from the fruits randomly and check the quality as per their standards. At the processing plant, most factories are equipped with laboratories that analyse the products before and after processing. Generally, most of these companies are certified by both international and local bodies on food safety standards. Local food certification approvals are done by the Food & Drugs Authority, Ghana Standards Authority and Environmental Protection Agency. The international certifications include SGF, Kosher & Halal, US FDA, Fairtrade, ECO, Organic, GlobalGAP as required by the off takers.

### 4.3.5 Packaging

It was observed that companies producing concentrates for exports package finished products in aseptic bags placed in drums or wooden bins for transportation. For dried fruit, bulk packaging using polythene bags and paper cartons are used. In addition, stand up pouches were used for both the export and domestic markets.

The majority of packaging material is imported as very little is produced in Ghana itself. Availability, high cost and appropriateness of packaging material for product shelf life are the main challenges confronting local processors in marketing their product (Table 9).

Imported fruit juices are usually packaged in tetra packs and have a shelf life of one year. The local products packaged in glass and PET bottles have shelf lives of six months and two weeks respectively. Also, the local products have high volume content but low value packaging, hence consumers prefer to buy the one litre tetra pack fruit juices than the local ones.

Figure 18. Examples of juice bottled in PET and glass



Table 9. Challenges faced using packaging materials

Type of packaging material	Characteristics
Glass bottle	<ul style="list-style-type: none"> <li>• Not easily available</li> <li>• High costs</li> <li>• Risky in handling</li> <li>• Logistics in distribution very expensive – cold chain supply of products unavailable and expensive</li> </ul>
PET bottle	<ul style="list-style-type: none"> <li>• Cheap, easy to handle and can be recycled</li> <li>• Not environmentally friendly</li> </ul>
Tetra Pack	<ul style="list-style-type: none"> <li>• Not easily available and expensive</li> <li>• Not environmentally friendly</li> <li>• Can be recycled</li> </ul>
Stand up pouch	<ul style="list-style-type: none"> <li>• Not easily available and expensive</li> <li>• Not environmentally friendly</li> <li>• Can be recycled</li> </ul>

### 4.3.6 Marketing

Exports of processed fruits are mainly to the EU market. Orange and pineapple concentrates are shipped to international buyers who are mainly (wholesalers/distributors) that buy concentrate for distribution to juice producers. A few exports have been undertaken on the regional market (including Togo, Benin and Nigeria) mainly through trade shows. Less than 1% of concentrates produced are sold locally to alcoholic beverages processing companies. Most of the exporting processing companies have a contract with the buyers and payments are made to the company upon arrival of the consignment in the final destination.

Buying criteria to meet:

- quality of product
- price
- consistency
- timely delivery of supply volumes.

On the domestic market, processors sell their finished products through distributors, supermarkets, retailers, hotels, domestic airlines and schools. Generally, most companies interviewed indicated the biggest challenge in marketing and sales of products are consistency of supply and good prices.

### 4.3.7 General challenges in the fruit processing sector

The fruit industry covers key export commodities and offers great potential for contributing to Ghana's effort at enhancing the non-traditional export economy and for accelerating the domestic fruit processing sub-sector. However, some production difficulties are hindering its export and processing activities as indicated below:

- *Seasonality of fruit supply* makes it more difficult for the processing companies to produce all year round, hence the low volumes of processed fruits. Apart from pineapple, papaya and bananas that are available throughout the year, the rest of the fruits are seasonal, with fruit availability ranging between three to five months in a year.
- *Pest and diseases* such as anthracnose, powdery mildew, *Alternaria*, stem-end rot, *Pseudocercospora*

- leaf and fruit spot of citrus, Cape St Paul wilt for coconuts, fruit fly, mealybug, termites, mango bugs and bacterial black spot of mango are a major concern. Despite some success in controlling pest and diseases, these have a direct economic impact on the various actors.
- There is a *lack of irrigation* facilities to address drought and prolong the seasonality of fruits (including citrus, mango, papaya, and passion fruit).
- Most processing companies are *producing below the capacity* of the processing equipment. The result is low volumes of finished products at high production cost (high fruit, labour, packaging and utility costs), thereby making the local juice products more expensive than the imported ones.
- *Choice of technology* is often poor, since obsolete and brand new processing equipment are often used together in the same processing plant.
- There is an *absence of skilled technicians* needed for maintenance and repair of spare parts. This is particularly the case among local SMEs.
- There is an *absence of skilled staff*, or at time not adequately trained for the job, in the local processing companies (quality control officers, engineers for maintenance/repairs, accountants and limited factory workers), resulting in low production efficiency.
- There are *high production losses*, due to a lack of storage facilities (i.e. pre-cooling chambers) before processing and also for fruit storage during bumper seasons.
- *Poor post-harvest practices* in the area of fruit handling (i.e. transportation) lower the quality of fruits produced and contribute to post harvest losses.
- At the processors end, there are *challenges in meeting consistency and quality of product* and frequent equipment breakdowns, which affects production volumes, risk of contamination, increased production cost, and other constraints.
- Value chain actors in the fruit industry are *only partially aware of the production potential*.
- Available varieties, post-harvest practices, market access requirements, demand trends and international competition.
- Producers and exporters have difficulty *maintaining international quality standards* (i.e. GlobalGAP, fairtrade, organic) for certification due to the associated costs, resulting in insufficient raw material supplied to fruit processing companies and low volumes of fresh exports. Additionally, some processing companies are confronted with traceability issues and meeting local and international Good Manufacturing Practices (GMP) certifications, such as HACCP, ISO, BRC, US FDA, SGF (customer certificate).
- With regards to national regulations, *failure (to renew) food safety standards certifications* such as EPA, FSC, FDA, and GSA to enable the companies to operate effectively.
- Imported fruit juices are invariably cheaper than local products, reducing *competitiveness of local products*.

## 4.4 Policies and regulations affecting fruit processors

### 4.4.1 Policies and regulations with a positive effect on the fruit processing sector

#### Planting for Export and Rural Development (PERD)

As one the flagship programmes of the government of Ghana (GoG), this program is a decentralized tree crop program to promote economic growth and household incomes in rural areas. The program is being jointly implemented by the Ministry of Local Government and Rural Development (MLGRD) and the Ministry of Food and Agriculture (MoFA). Tree crops to be covered under the program include mango, citrus, cashew, oil palm, rubber, shea, coffee and cotton.

The focus is primarily to support key actors in the selected value chains to create a sustainable raw material base to promote the decentralized industrial drive through the One District One Factory Program (1D1F, see below). One million farmers will be provided with planting materials of the selected tree crops to increase production base for processing and exports.

#### One District One Factory Program (1D1F)

Another flagship program of the GoG seeks to promote the setting up factories in the districts across the country, thereby setting the stage for a greater industrial drive. Furthermore the GoG is using agri-businesses to provide jobs and improve incomes for household incomes of rural areas. Relevant stakeholders in the agri-business sector can submit business plans and proposals to the 1D1F for financial assistance to set up or expand existing factories to create jobs and improve incomes of households in the respective districts. The business plans are aimed at acquiring funds such as short term working capital and long term loans for procuring production and processing equipment. The program is jointly implemented in collaboration with the Exim Guarantee Bank.

#### Ghana Exim Bank

Ghana Exim Bank was set up to support SMEs, who generally have challenges providing collateral, to receive bank financing through the provision of the necessary guarantees required by banks, thereby mitigating credit risk exposure to banks. The bank's vision is to become a strong financial institution that will be an engine in the development of Ghana's export trade, facilitate cross border trade and make Ghana a pillar in regional and continental trade. Currently, the bank has secured a loan facility of USD 100 million from the International Investment Bank (Credit Swiss).

Discussions in the field revealed that about five processing companies (three start-ups and 2 defunct companies) have submitted business plans to the bank to source loans to establish new fruit juice processing factories. Most of the loan applications are at the final stages of approval and they may commence construction of new processing units this year. To date, one

new company that has benefitted from the loans, the Ekumfi Fruit Juice Processing Company, which has finalized construction of new factory buildings and installation of equipment and has undertaken an initial test run of the processing line and finished products.

#### Out-Grower Value Chain Fund (OVCF)

This fund is a Value Chain and Out-grower Credit Facility aimed at providing improved access to medium to long-term financing for agriculture and agribusiness investments, finance the development and promotion of out-grower schemes. To enable it achieve its set objectives, the OVCF works with three key parties:

- group of smallholders (out-growers)
- technical operator (such as processors, exporters, traders and buyers)
- financial institutions.

#### Rural Enterprise Development Fund

Rural Enterprise Development Fund (REDF) is credit support facility provided by MoFA with support from the German Credit Facility to Rural Micro and Small Enterprises. The program focus is to facilitate access of rural SMEs to finance and also to improve their livelihoods and incomes. The credit facility is available for the following:

- acquiring working capital as short term loans;
- sourcing long term loans for procuring production and processing equipment.

It is worth mentioning that the credit facility covers up to 30% of the cost for equipment, while a client pays 10% of the cost and the remaining 60% is covered by a loan provided by the bank.

#### Venture Capital Trust Fund

Another fund that fruit processing companies can seek for assistance is the Venture Capital Trust Fund (VCTF). It was established by the Government of Ghana through the Venture Capital Trust Act 2004 (Act 680), to provide low cost financing to SMEs and to promote the growth of venture capital in the country. The objective of the VCTF is to provide financial resources for the development and promotion of venture capital financing for SMEs in priority sectors of the economy. VCTF invests in

all eligible sectors of the economy except direct imports for selling. Investments in SMEs by venture capital finance companies are by equity or quasi- equity and companies may be granted working capital loans on case by case basis. Total assets of SMEs that qualify to apply for funding support should not exceed the cedi equivalent of USD 1 million in value.

### Development of Smooth Cayenne Pineapple Suckers

Under its five-year development strategy, the Ghana Export Promotion Authority (GEPA) is currently working with two key pineapple farms, Bomarts Farms and Billy Farms, to develop smooth cayenne pineapple suckers to be distributed to pineapple farmers in Ghana. So far, about three million smooth cayenne pineapple suckers have been distributed to nine pineapple groups in the Nsawam enclave through a collaboration between a processor, ASTEK, and the farmer groups.

In addition to these government interventions, donor support from development programmes such as HortiFresh and the German Development Agency (GIZ) have been important for the development of some commercial fruit processing investments. For instance, GIZ has provided support for a fruit processing equipment for one of the lead processors producing for exports. HortiFresh has provided technical assistance in training fruit farmers and assisted processing companies to prepare business plans to seek for financial assistance from financial institutions. The programme also support innovations such as tissue culture multiplication by supporting the ribov company.

#### 4.4.2 Policies and regulations with a negative effect on the fruit processing sector

##### Introduction of the 50% reduction in benchmark port value

The recent introduction of the 50% reduction in benchmark port value on selected imports items (including fruit juice) is set to worsen the plight of

local fruit juice processing companies, due to imported products benefiting from lower tariffs. This makes imported products more competitive than those produced locally. This has been a major concern for the local processors, since this will increase the influx of cheaper imported goods onto the domestic market.

##### Lack of government support for importation of packaging materials

It was observed during the interviews that fruit processing sector lacks support in sourcing appropriate packaging materials from manufacturers across the world. For instance, government could assist processors to undertake group sourcing of packaging materials at cheaper costs and also ensure timely delivery. The fruit processing sector continues to rely on imports of packaging materials such as Tetra pack, aseptic bins, wooden bins, drums, glass bottles, stand-up pouch, cans, etc. to package their products. Currently, processors import these packaging materials individually and costs are very high. Delays in supplying the imports on time, the correct specifications for the packaging materials, and high shipment cost invariably affect the cost of the finished products.

##### High utility bills

Another hindering factor is the high utility bills (electricity, water, gas and fuel) paid for processing activities in their processing units. The resultant effect is a high production cost which invariably makes the local product more expensive than the imported fruit juice.

## 4.5 SWOT analysis

On the basis of the interviews, field finds and literature review a strength, weaknesses, opportunities and threats analysis was done. This analysis was validated in the stakeholder workshop.

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>Ghana's proximity to the EU market offers cheaper freight charges on exports of processed fruits when compared to other regions of the world</li> <li>Processing plants are located near production areas, making it easier to source fruits for processing</li> <li>There is sufficient raw material available for processing</li> <li>Managerial competences are present in the sector</li> <li>Packaging materials, e.g. PET bottles and paper cartons are manufactured locally</li> <li>The domestic market for processed fruit (i.e. juices, dried fruits and smoothies) is expanding</li> <li>Important investments have been made in the development of fruit sector (i.e. pack houses with pre-cooling facilities, reefer containers for the transport of fresh and processed fruits for exports)</li> <li>Current government programmes and policies are supportive to the processing sector</li> </ul>	<ul style="list-style-type: none"> <li>High pest and disease pressure results in low productivity</li> <li>The processing capacity is not fully utilized within the sector</li> <li>Processors face challenges with seasonality of supply of fresh pineapple and mango which are imported from neighbouring Côte d'Ivoire, Burkina Faso and Senegal during lean season (April to June) as well as from Brazil in August and September</li> <li>Inadequate fruit storage capacity results in losses during peak season</li> <li>Production losses from contamination occur when machinery breaks down</li> <li>Skilled labour is often inadequate in the processing lines, since employees are mostly trained on-the-job and labour turnover is high</li> <li>A mix of new and overaged technical equipment result in low juice extraction</li> <li>Additional processing of and market for by-products is limited</li> <li>Maintenance of processing equipment is absent or limited Packaging materials such as glass bottles, tetra packs, stand up pouches, and crown corks are expensive and not available locally</li> <li>Access to finance is a challenge, which makes it difficult for processors to purchase inputs and invest in their facilities</li> <li>High cost of capital loans for long term investment</li> <li>Utility costs are high, particularly for electricity and running of generators</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>Availability of improved seeds and new varieties</li> <li>Research on good agricultural practices and pest and disease</li> <li>The ECOWAS Trade Liberalization Scheme once put into place allows for duty free access to the regional market</li> <li>There is an increasing demand in local and sub-regional markets</li> <li>Growing incomes and middle class in Ghana brings more opportunities to serve the local market</li> <li>Growing demand in Europe for fresh and processed fruit</li> </ul>	<ul style="list-style-type: none"> <li>Imported fruit juices with favourable tariffs are cheaper than locally processed goods</li> <li>Competition from countries such as Brazil, Spain, the Netherlands, South Africa, UK and Morocco</li> <li>Influx of fruit juices from Côte d'Ivoire, Burkina Faso and Nigeria</li> <li>Unfavourable climatic conditions (i.e. rainfall patterns and drought)</li> <li>Requirement from importers lead to high costs</li> </ul>



## 5. Economic analysis of processed fruit

A financial analysis was done to determine profitability of the business and finished products. As previously indicated, a major challenge encountered in this assignment was unwillingness of some of the companies to give out full financial details on their business operations to conduct a financial analysis. Limited financial data were provided while some vital ones remain undisclosed. Hence the analysis could only be performed on two products, one for the export market and the other for the domestic market.

### Product A

- Toll processing of orange juice concentrate (Fairtrade certified) between Onyame Akwan Citrus Farmers Association, an orange farmer group association in the Ashanti region and PINORA, a processing company located in Adeiso in the eastern region.

### Product B

- A local processing company producing pasteurized and freshly squeezed fruit juice. The company is seeking to expand its processing unit and expand operations.

### A. Toll processing of orange Concentrate (Fairtrade certified) for export

The arrangement of the toll processing is that the Onyame Akwan Citrus Farmers Association signed a contract with the PINROA, a citrus processing company which exports Fairtrade certified orange juice concentrate to the Netherlands. The farmers supply Fairtrade certified fresh citrus to the company which does the processing, packaging and exporting. This contract started in March 2019 and a total of 43.62 t of Fairtrade certified orange juice concentrate was exported in the first quarter of 2019.

Based on the data provided, we looked at the gross margin and the break-even point in sales to find out whether the business was making profit or losses and to determine at what sales point the company would break even.

At a gross margin of 32%, it clearly shows that Fairtrade toll processing is profitable and getting closer to the industry benchmark of 35% set for processing activities (Table 10).

**Table 10.** Gross margin analysis of toll processing of Fairtrade certified orange concentrate

Revenue	
Quantity Orange concentrate (t)	43.62
Unit price (GHC)	11,500
<b>Total revenue (GHC)</b>	<b>501,630</b>
Variable cost	
Fresh Oranges	65,430
Utility (water, electricity & steam)	20,000
Packaging cost	118,575
<b>Total inputs</b>	<b>204,005</b>
Fixed cost	
Salaries (factory workers)	25,000
Consultant's fees	2,500
Transport cost	95,964
Rent	10,000
Administrative expenses	5,500
<b>Total fixed cost</b>	<b>138,964</b>
<b>Total costs (fixed cost + variable cost)</b>	<b>342,969</b>
<b>Gross margin</b>	<b>158,661</b>
% Gross margin	32%

Discussions are currently on-going between the citrus association and the processing company to increase the toll processing activities during the major season in 2020. However, it must be noted that it is currently not clear what the gross margin for the farmers is.

### Calculation of break-even points to determine profitability of the products

Fixed costs	GHC 138,964
Unit price/MT of Fairtrade certified orange concentrate	GHC 11,500
Unit variable cost (total VC divided by total volume produced)	GHC 4,676.87
Calculation	
Fixed costs ÷ (Price – Variable costs) = Break-even point in units	
GHC 138,964 ÷ (GHC 11,500 – GHC 4,676.87) = 20.4 t of orange juice concentrate sold	

From the calculations, the processing company has to produce and sell 20.4 t of the Fairtrade certified orange concentrates in order to cover all expenses (fixed and variable). For the citrus association the break-even point might be different, a separate calculation for this would then be required.

### B. Company producing juice for the domestic market

A financial analysis based on the forecast provided by the company, a processing company producing pasteurized and freshly squeezed fruit juice for the domestic market was undertaken to determine the potential profitability of the company.

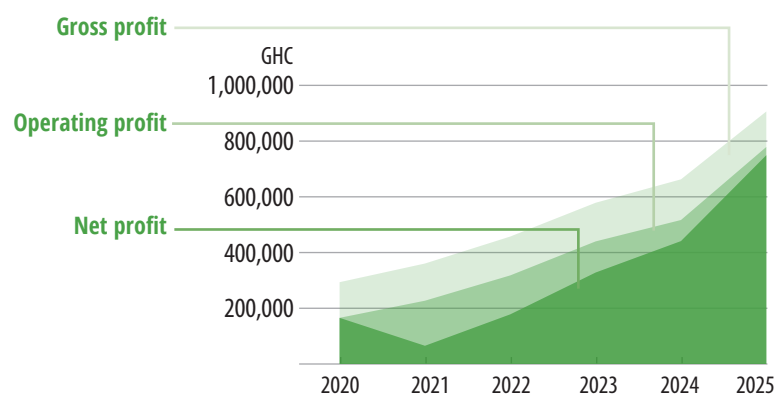
The company is looking to raise approximately GHC 681,443 from interested funding sources. This amount will sufficiently fund additional capital expense estimated at GHC 447,429 and working capital estimated at GHC 234,014 (Table 11). The operation is projected to generate revenues of GHC 964,653 in the first year (2020) and would grow through market share gain to GHC 2.59 million by year 5.

### Assumptions for the forecast/financial projections:

General Assumptions	Base year	2020	2021	2022	2023	2024	2025
Annual inflation (local)	9.3%	9.2%	8.8%	8.4%	8.1%	8.0%	8.0%
Interest rates (local loan)	25%	25%	25%	25%	25%	25%	25%
Prices of fruits (orange and pineapple)	5%	5%	5%	5%	5%	5%	5%
Wages and salaries	10%	10%	10%	10%	10%	10%	10%
Other input costs	10%	10%	10%	10%	10%	10%	10%
Selling prices to increase by	10%	10%	10%	10%	10%	10%	10%
Selling and marketing costs	10%	10%	10%	10%	10%	10%	10%
Electricity & water – utilities' prices	10%	10%	10%	10%	10%	10%	10%
Other admin expenses	10%	10%	10%	10%	10%	10%	10%
Fuel prices to increase by	15%	15%	15%	15%	15%	15%	15%
Exchange rates	5%	5%	5%	5%	5%	5%	5%
Depreciation rate of the GHC/USD	5.78	6.06	6.37	6.69	7.02	7.37	7.74

**Table 11.** Proforma profit & loss analysis (in GHC)

	2020	2021	2022	2023	2024	2025
<b>Volume (projection in litres)</b>	<b>64,653</b>	<b>1,237,971</b>	<b>1,564,247</b>	<b>1,828,214</b>	<b>2,021,244</b>	<b>2,588,194</b>
<b>Cost</b>						
Production	293,867	362,093	458,892	517,844	552,420	709,535
Packaging	169,304	217,273	274,537	320,865	354,744	473,831
Logistics/Marketing	49,962	55,978	62,637	69,090	75,397	85,004
Labour	157,872	241,997	310,647	341,711	375,882	413,471
<b>Total costs</b>	<b>671,005</b>	<b>877,341</b>	<b>1,106,713</b>	<b>1,249,510</b>	<b>1,358,444</b>	<b>1,681,840</b>
<b>Gross profit</b>	<b>293,648</b>	<b>360,630</b>	<b>457,534</b>	<b>578,704</b>	<b>662,800</b>	<b>906,353</b>
Gross margin (%)	30%	29%	29%	32%	33%	35%
Admin/Overhead	54,692	60,161	66,177	72,795	80,075	88,082
Depreciation & Amortization expense	73,293	73,293	73,293	65,878	65,878	39,258
<b>Operating profit/(loss)</b>	<b>165,664</b>	<b>227,176</b>	<b>318,064</b>	<b>440,032</b>	<b>516,848</b>	<b>779,014</b>
Operating margin (%)	17%	18%	20%	24%	26%	30%
<b>Financial expense</b>						
Equipment loans (Int)		106,235	91,818	73,353	49,705	19,418
W/Capital (Int)	-	55,563	48,023	38,365	25,997	10,156
Interest expenses	-					
<b>Total financial expenses</b>	<b>-</b>	<b>161,798</b>	<b>139,841</b>	<b>111,718</b>	<b>75,701</b>	<b>29,573</b>
<b>Profit before tax</b>	<b>165,664</b>	<b>65,378</b>	<b>178,224</b>	<b>328,313</b>	<b>441,147</b>	<b>749,440</b>
Profit before tax margin	17%	5%	11%	18%	22%	29%
<b>Tax rate</b>						
Tax	0	0	0	0	0	0
<b>Net profit/(loss)</b>	<b>165,664</b>	<b>65,378</b>	<b>178,224</b>	<b>328,313</b>	<b>441,147</b>	<b>749,440</b>
Net margin	17%	5%	11%	18%	22%	29%



## Processing Plant Information

## Conversion ratios:

Fresh pineapple (t)	1.0
Processed pasteurized pineapple juice (50%)	(50%)
Freshly squeezed pineapple juice (50%)	(50%)
Pineapple ready-to-drink juice (litres)	504.0
Fresh passion fruit (t)	1.0
Processed pineapple (juice – %)	40%
Passion fruit juice (litres)	400
Fresh Ginger (t)	1.0
Processed ginger (juice)	10%
Ginger juice (litres)	100
Pineapple juice extraction rate	60%
Passion fruit juice extraction rate	20%
Ginger extraction rate	20%
Installed capacity per hour (throughput)/hour (kg)	125
Average maximum shift/day	2
No of working hours per shift (hours)	8
Installed capacity per shift (t)	1
Installed capacity per day (t)	2
Average No of working days/month (days)	20
No of working months/year (months)	12
Installed capacity/year (t)	480
Installed capacity/shift/year (t)	240

*Critical risk the company may face*

- Supply of raw material

Revenues to be generated could be reduced if fruit supply is not consistent and adequate for processing activities in the year. Issues of disease and pests and prolonged drought leading to shortage of fruits can affect the liquidity of the company to source

adequate fruits for business operations. This is a challenge but it can be mitigated by establishing an outgrower scheme with a proper contractual agreement to supply the required fruit supply for processing. The company would have to ensure that proper agronomic practices are adhered to in order to reduce pests and disease infestation on outgrower farms.

- Strict adherence to food safety protocols

The company will be competing with other processors on the local market and as a result the company will have to produce quality finished products that are comparable with importers from other countries. The company should employ good quality standards such as HACCP, Good Manufacturing Practices and Good Agricultural Practices (GAP) for its outgrowers to achieve good results in order to stay in business. The company should tap into various technical assistances available to the industry and offered by NGOs, MOFA and other relevant institutions.

- Labour turnover

Labour turnover, particularly skilled labour, tends to be a challenge for most processing companies in the horticultural industry. The company should therefore optimize the use of human and other resources such as acquisition of equipment to achieve desired results. Adequate compensation and incentives must be instituted to attract skilled and reliable workers to ensure high productivity. Management must monitor and supervise workers to ensure that quality and safety processing techniques are properly followed and pilfering by workers is reduced.

## 6. Conclusions and recommendations

### 6.1 Conclusions

Generally, an analysis of the fruit processing sector in Ghana shows low capacity utilization of the processing companies. Out of an estimated 2,240 MT of installed processing capacity for fruit juice and concentrates, about 62% of this capacity was used in 2019. Installed processing capacity of 868 MT, currently under-utilized with only 176 out of 216 processing companies functional in 2019. Fruit processing companies can be categorized into companies producing for both export and local markets and those producing solely for the local market.

It was observed that certain positive strides have been made in the following areas:

- Most processing companies have strong linkages with tropical fruit producers and exporters to ensure that a strong supply base is continuously guaranteed.
- The processors have inspection teams that undertake on-farm inspections to check on fruit quality (brix level, sizes, mechanical damage, etc.) to determine fruit quantities and prices with producers. This enables them to develop scheduling harvesting plan on the various farms with the producers/associations.
- In terms of traceability, processing companies producing for exports have a robust traceability system that helps them to identify all raw materials to the source. In addition, they are able to trace their produce from field to fork.
- Price negotiations are done between the processors and producers before the start of each harvesting season. Fruits like mango, citrus and pineapple are purchased from producers at a pre-determined price negotiated. There are only a few signed contractual agreements between suppliers and processors.

- In terms of payment for fruits purchased, processors normally pay between 2 weeks to 1 month after collecting the fruits. Payments are usually by cheque or cash, paid to the farmer associations.
- To meet strict adherence to quality standards, most processing factories are equipped with laboratories that analyse the products before and after processing. Upon delivery of fruits and before weighing at the factory gate, the quality assurance team picks a sample from the fruits randomly and checks the quality as per their standards (including brix, colour and water/juice).
- Exports of processed fruits are mainly directed at the EU market. Orange and pineapple concentrates are shipped to international buyers (usually wholesalers/distributors) that buy concentrate to redistribute to juice producers. A few exports have been undertaken on the regional market (Togo, Benin and Nigeria) mainly through trade shows. Less than 1% of concentrates produced are sold locally to companies producing alcoholic beverages. Most of the exporting processing companies have a contract with the buyers and payments are made to the company upon arrival of the consignment at the final destination.
- The economic analysis of two different processing companies, one operational already, the other a projected forecast show that it is possible to make a profitable business out of fruit processing. However without a reduction of the potential risks and challenges in the sector it remains an uncertain business prospect.

On the domestic market, processors sell their finished products through distributors, supermarkets, retailers, hotels, domestic airlines and schools. Generally, most companies interviewed indicated the biggest challenge in marketing and sales of products are consistency of supply of their products and prices.

Despite these strides, there are challenges in the fruit processing sector that are hindering the effective business operations. Seasonality of fruit supply, various disease and pest infestations on farms resulting in low yields, inadequate/lack of storage facilities, e.g. temperature regulated chambers in most factory premises visited to store large volumes of fruits especially during the major season affect the operations of the fruit processing companies. Additionally, availability, high cost and appropriateness of packaging material for product shelf life are the main challenges confronting local processors in marketing their product. It was also observed that most processing companies are producing below the theoretical capacity of the processing equipment. The result is low volumes of finished products at high production cost (with high fruit, labour, packaging and utility costs) thereby making the local juice products more expensive than the imported ones.

### 6.2 Recommendations

On the basis of the analysis presented, there is the need to take the necessary steps to address the challenges identified in order for the fruit processing sector to become operationally and financially sustainable.

On the supply and demand of raw material it is imperative that producers and processors work very closely together. This is in terms of the required volume as well as the quality of the fruit.

- Seasonality of fruit supply can never be completely overcome but a mix of different varieties with different maturity times can alleviate this to some extent. Processing companies can also consider diversifying their mix of fruit they process.
- The control of pest and diseases needs to improve through integrated pest management and advisors that are well trained in the matter. Business entities (especially agro-input supply companies) should explore opportunities to provide effective control measures to ensure disease free orchards.

- Funds for irrigation facilities should be made available together with the appropriate technical advice on best irrigation practices.

Business planning by the processing companies can be improved including taking forecast and potential risks into account.

- A gross margin analysis can assist the company to operate on the capacity that is required to make it a profitable enterprise.
- Investing in technology that is suitable for the size of the processing company and assuring that equipment is of good quality will enhance the processing.
- Enhancement in skills needs to be done either by involving the colleges, the input companies to ensure adequate training as well as on the job training.
- Investment in appropriate post-harvest storage and transport should be promoted and required technologies made available for purchase through the input companies.
- Processing companies should adhere to quality standards both for the product specifications as well as for food safety.
- The regulatory bodies should assist companies to be able to adhere to both national as well as international standards.

On the competitiveness:

- The GoG should reconsider the tariff for imported goods as this leads to unfair competition between imported and locally produced processed fruit.
- FPMAG should support their membership in group sourcing of appropriate packaging materials to ensure lower prices and timely delivery.
- Explore new products and buyers in the export and regional markets.

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## Appendix 1 – Questionnaire

### Questionnaire: Fruit processors

#### Introduction to the interview

##### HortiFresh

The Netherlands Embassy of Ghana funds the HortiFresh program in the period of 2018–2021, which is part of the Aid to Trade Agenda. The HortiFresh program aims to contribute to sustainable and internationally competitive fruit and vegetable sector that contributes to inclusive economic growth, food and nutrition security. The focus countries are Ghana and Cote d'Ivoire. The program is implemented by five partners, i.e. Wageningen University & Research, SNV, Resilience, Advance Consulting, and Sense.

##### Fruit processing assignment

Earlier in this program a scoping study of the fruit sector in Ghana was carried out. This study identified that the processing sector is in various states of operation. A couple of the larger plants have seized operations. On the other hand, the seasonal glut of fruit, i.e. mango, offers opportunities for processing. Both the domestic market as well as the export market seem to have a high demand for processed fruit.

The objective of this assignment is to understand why fruit processors for the local and international market in Ghana have struggled to survive and develop into reliable off takers of local fruit. Understanding these reasons will help developing ideas on how to improve competitiveness of the sector. In this assignment we particularly focus on citrus and mango.

In the coming month, we aim to talk to fruit processing factories which are currently operating and those which have recently seized their operations. Also, we intend to talk to farmers supplying these companies. In general, we would like to explore three main areas, i.e. supply, production in the factory and marketing. All these areas influence the competitiveness of companies.

##### Data usage

The interview will be recorded to aid data processing. Recordings will be deleted after the data is processed. Ask for consent!

The data will be handled confidential and anonymous. We will not publish any economic data with the name of the companies, it is only to evaluate the profitability and where improvements are necessary to become more competitive.



## Questionnaire

### Supply

#### *Supplier base and sourcing raw material*

1. Who are your suppliers?
2. Where do you get the raw material from? (Local market, import: in terms of percentage, definition of different types of suppliers eg. the definition of small plantation)
3. What is your supply season? (When are you buying the raw material?)
4. How do you get the raw materials requested? Do you have contracts with your suppliers?
5. How is the fruit transported? (Who organizes and pays for transport? )
6. How is the material packaged? (crates, bulk, bulk bins, cardboard)

#### *Raw material quality and price*

7. What is the time between harvest and actual processing?
8. What are your purchasing criteria?
9. How do your suppliers score on your buying criteria? Is there a difference for different suppliers?
10. What do you do if criteria are not met? (Reject or lower the price?)
11. What % of fruit is rejected? (% of total supply)
12. For what reasons fruits are rejected?
13. Do you pay for rejected fruit?
14. What happens with the fruit that is rejected? (thrown away, sold to someone else, returned to farmer)
15. What is the price that you pay?
16. How is the price determined? (e.g. market price plus premium, fixed price for season)
17. How much raw material do you process (day/week)?
18. Can you always find enough fruit of the right quality?
19. What are the payment terms to your suppliers? (mode of payment, time of payment: in 2 weeks, cash on delivery)

#### *Quality control & storage*

20. What quality control system do you have?
21. Do you have temperature regulated chambers to store raw material (also to speed up or slow down ripening process)?

#### *Support to farmers*

22. Do you offer any support to suppliers/ farmers? (access to finance, technical support, input?)

#### *Challenges related to raw material*

23. What is your biggest challenge in terms of supply?

### Factory

#### *Products, capacity and production*

24. Which finished products do you produce?
25. What is the actual capacity of the production line per hour that you manage to achieve? (in terms of raw material or finished products)
26. What is the theoretical production capacity according to the manufacturer?

27. How many hours do you spend processing per day? (in peak season and low season)
28. When does your production season start and end?
29. When does your peak season start and end?
30. How many days are you working per week?
31. How many weeks in the year?
32. How many tons of fruit do you need to produce 1 ton of final product? (Or if you process 1 ton of fruit, how much product have you got in the end?)
33. Is your production limited by market, fruit available, working capital or machinery?

#### *Machinery and equipment*

34. What kind of equipment do you have? (brand plus country of origin)
35. How old is the machinery?
36. Was the machinery new or second-hand when you purchased?
37. How did you select the equipment? (asked quotes themselves from suppliers by google, went to shows, visited other factories, employed engineer, received advice from...)
38. Do you have an engineer who helps you to design the factory?
39. What is your energy source for steam?
40. Do you have generators to power the whole factory?
41. Do you have a maintenance schedule, and what does it look like? (e.g. one week a year for overall maintenance, once a week check-up, etc.)
42. How often do you have breakdowns?
43. What is the consequence of a breakdown in terms of production? (How long does a breakdown take to get fixed?)
44. What kind of packaging do you use for final products?
45. What is the total investment cost for buildings, land, vehicles and equipment?
46. How much is the factory's average working capital?

#### *Labor force*

47. How many seasonal laborers work in the factory during the season?
48. What is their day wage?
49. How many permanent production staff do you have? (e.g. mechanic, shift leaders)
50. What is their average wage per month?
51. How was the labor force trained? Regular update of training?
52. How many permanent management and support staff do you have? (e.g. marketing, sales, financial management, secretary, CEO)
53. What is the total wage bill for permanent support staff per month?
54. What is the structure of the management team?
55. Which certifications do the factory have? (e.g. HACCP, BRC, Organic, Fair Trade, ISO 9002)

#### *Challenges related to production*

56. What is your biggest challenge in running the factory?

## Marketing

### *Client base and markets*

57. Which products are you selling and to which market?
58. How much do you sell of each product per year?
59. Who are your most important clients? (name, country, type of product, order size indication)
60. Are you selling directly to your clients or through an agent, distributor, exporter?
61. How are the products transported to the end client?
62. Who pays for transport?
63. Do you have contracts with your buyers? (conditions, payment terms)
64. What are the buying criteria of your clients?
65. How do you feel you score on those?
66. Have you had shipments of products rejected?
67. What are your biggest challenges in terms of marketing and sales?

### *Market trends and research*

68. Have you done market research to explore the market? How?
69. What trends do you see in the market? How do you see the market developing?
70. What are the trends in pricing?
71. How much have you sold over the past 3 years?
72. Can you sell everything that you produce?
73. How did the market/client base grow in the past years?
74. What is the current sales price per market and per product? (pls specify incl. transport or excl. transport; CIF, FOB, Ex.works: factory floor [at the gate of the factory])

### *Strategy and competition*

75. Do you have a 5-year strategy? What is your sales and marketing strategy? What is your target market?
76. What is your competitive edge?
77. Who are the shareholders of the company?
78. Who are your biggest competitors in each market?

## Questionnaire: Suppliers/farmers

### Introduction to the interview

#### HortiFresh

The Netherlands Embassy of Ghana funds the HortiFresh program in the period of 2018–2021, which is part of the Aid to Trade Agenda. The HortiFresh program aims to contribute to sustainable and internationally competitive fruit and vegetable sector that contributes to inclusive economic growth, food and nutrition security. The focus countries are Ghana and Cote d'Ivoire. The program is implemented by five partners, i.e. Wageningen University & Research, SNV, Resilience, Advance Consulting, and Sense.

#### Fruit processing assignment

Earlier in this program a scoping study of the fruit sector in Ghana was carried out. This study identified that the processing sector is in various states of operation. A couple of the larger plants have seized operations. On the other hand, the seasonal glut of fruit i.e. mango, offers opportunities for processing. Both the domestic market as well as the export market seem to have a high demand for processed fruit.

The objective of this assignment is to understand why fruit processors for the local and international market in Ghana have struggled to survive and develop into reliable off takers of local fruit. Understanding these reasons will help developing ideas on how to improve competitiveness of the sector. In this assignment we particularly focus on citrus and mango.

In the coming month, we aim to talk to fruit processing factories which are currently operating and those which have recently seized their operations. Also, we intend to talk to farmers supplying these companies. In general, we would like to explore two main areas, i.e. production in the orchards and marketing/sales of produce.

#### Data usage

The interview will be recorded to aid data processing. Recordings will be deleted after the data is processed. Ask for consent!

The data will be handled confidential and anonymous. We will not publish any economic data with the name of the companies, it is only to evaluate the profitability and where improvements are necessary to become more competitive.

## Questionnaire

### Production in the orchards

1. What kind of fruits do you produce? (varieties)
2. What is the area of production per fruit?
3. What is the average yield per fruit (mango/orange)?
4. How did the production fluctuate over the years?
5. What was the reason for this fluctuation?
6. What are the main reasons for production losses?
7. Have you had post-harvest losses?
8. Do you have a quality control system?
9. Do you have storage? (size of storage, conditions)
10. What kind of machinery/equipment do you use?
11. Do you have irrigation system in the field?
12. How many seasonal workers do you have?
13. How many permanent staff do you have?
14. What services do you use on the farm? (services for spraying, other outsourced services)
15. How do you perceive the quality of services you make use of?
16. How do you harvest your produce? (factory assisting in harvest or not)
17. How is the fruit transported? (Who organizes and pays for transport?)
18. What is the production cost per kg of fruit (mango/orange)?
19. What are the main cost factors?
20. What are the biggest challenges related to production? (inputs, diseases)

### Buyer/marketing

21. Are you member of a producer association?
22. Do you sell your products through the association or individually?
23. Who are you selling to?
24. How much do you sell for each buyer?
25. Seasonality of supply (peak season, within year and over years)
26. How is your produce picked up and transported to the supplier? (frequency of pick up, volume)
27. What is the market for the final processed product? (export/local)
28. Can you sell all your produce to the buyers?
29. Do you have contracts with your buyers?
30. What are the payment terms?
31. What is the price per kilo for the supplied fruit?
32. What are the purchasing criteria of the buyer?
33. How do you feel you score on those?
34. Have you had your produce rejected by the factory?
35. What is the rate of rejection?
36. What is the reason for rejection?
37. When do you get notified about the rejection?
38. Do you get paid for rejected products?
39. What trends do you see in the market? How do you see the market developing?
40. What are the trends in pricing?
41. What are the main challenges related to the marketing and sales?
42. What are your plans for the future? (expansion, specialization, diversification, quality)

## Questionnaire: Defunct Fruit Company

### Supply

#### *Supplier base and sourcing raw material*

1. Who were your suppliers?
2. Where did you get the raw material from? (Local market, import: in terms of percentage? definition of different types of suppliers e.g. the definition of small plantation)
3. What was your supply season? (When are you buying the raw material?)
4. How did you get the raw materials requested? Did you have contracts with your suppliers?
5. Who picked the raw material up?
6. How do they get raw materials in? (in crates, in bulk)

#### *Raw material quality and price*

7. What was the time between harvest and actual processing?
8. What was your purchasing criteria?
9. What did you do if criteria was not met? Reject or lower the price?
10. What was the average rejects of raw material? (% of total supply)
11. What was the price that they pay? How they determine? Do they pay for rejects or they weigh after rejects?
12. How much raw material do you process (day/week)? Can you always find enough raw material or not?
13. What are the payment terms to your suppliers? (mode of payment, time of payment: in 2 weeks, cash on delivery)

#### *Quality control*

14. What was your quality control system?
15. Did you have temperature regulated chambers to store raw material (also to speed up or slow down ripening process)?

#### *Support to farmers*

16. Did you offer any support to their suppliers/ farmers (access to finance, technical support, input)?

#### *Challenges related to raw material*

17. What is your biggest challenge in terms of raw material supply?

### Factory

#### *Products, capacity and production*

18. What are the finished products you process?
19. What was the capacity of the production line per hour? (in terms of raw material or finished products)
20. How many hours did you spend processing per day? (difference in peak season and otherwise)
21. How long was the peak season? When is it?
22. How many days are you working per week?
23. How many weeks in the year?
24. Difference between actual and theoretical capacity? (what do you manage to do in practice?)
25. What is the conversion rate of raw material into finished products?

*Machinery and equipment*

26. What kind of equipment did you have?
27. How did you select the equipment?
28. Did you have an engineer?
29. What is your energy source?
30. How old is the machinery?
31. Was the machinery new or second-hand when you purchased?
32. Was the machinery regularly maintained? How regularly?
33. How often did you have breakdowns?
34. What is the consequence of a breakdown in terms of production? (How long does a breakdown take to get fixed?)
35. What kind of packaging did you use?

*Labor force*

36. How many people worked in the factory? (skilled, non-skilled laborers, management)
37. How was the labor force trained? Regular update of training?
38. What was the wage for laborers?

*Management and certification*

39. What was the management structure?
40. What kind of certification did the factory have?

*Challenges related to production*

41. What is your biggest challenge in running the factory?

**Marketing***Client base and markets*

42. Who were your bigger clients? (export, local market)
43. Who were your most important clients and markets? (business that bottles juice, local vendors)
44. What products were you selling and to which market?
45. Were you selling directly to your clients or through an agent?
46. What was your distribution system especially in the local market?
47. How was the export organized by air or by sea?
48. Did you have contracts with your buyers? (conditions, payment terms)
49. What were the buying criteria of your clients?

*Market trends and research*

50. Have you done market research to explore the market?
51. What trends do you see in the market? How do you see the market developing?
52. What are the trends in pricing?
53. How much have you sold over the past 3 years?
54. How did the market/client base grow in the past 10 years?
55. What was the current sales price per market per product? (incl. transport or excl. transport; CIF, FOB, Ex. works: factory floor (at the gate of the factory)

*Strategy and competition*

56. Do you have a 5-year strategy? What is your sales and marketing strategy? What is your target market?
57. What is your competitive edge?
58. Who are the shareholders of the company?
59. Who are your competitors? In which market?

*Challenges related to marketing and sales*

60. What are your biggest challenges in terms of marketing and sales?

*Linking to cost-price model*

61. Are they interested to do the cost-price model together? Investment costs in land, building, machinery



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