



Ministry of Foreign Affairs

The Current State of Fruit & Vegetable Agro-Processing in South Africa

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The Current State of Fruit & Vegetable Agro-Processing in South Africa

Challenges and Opportunities

Authors:

Micha van Lin – ITP Advisory Services

Aart van den Bos – Verbos Business Development

Nazeem Sterras – WCFFI / Food SA

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This report has been prepared by:



Summary

This scoping study provides an overview of the current state of the agro-processing industry in South Africa, describes the current challenges and identifies the extent to which the agro-processing industry can add value, with the aim of limiting imports. The study provides recommendations and identifies Dutch technologies and solutions which are applicable to the South African context.

Food production is South Africa's largest manufacturing sector and is dominated by a few very large, diversified, national and multinational food manufacturers. Although there are over 1800 food production companies, the top ten are responsible for 70% of the industry's turnover. Nonetheless, most of South African premium quality fresh fruits are exported at high prices and the remainder are sold on the local market. Fruit that is used in processing only accounts for an estimated 29% of total fruit production. Therefore, fruit processing is regarded as a 'residual' industry that processes 'fall out or downgraded' fruits from the fresh fruit market. The vegetable market is also focused on fresh produce, but is predominantly nationally oriented. There are limited vegetable processing activities taking place, although consumer trends show an increase in demand for sauces and condiments, and there is therefore potential for growth in this area.

Growth in the agro-processing industry tends to be limited because it requires high capital investment, and scale is needed to compete with the world market. Finding qualified personnel with the right skillset and experience is a common challenge in South Africa, and although agro-processing provides potential for employment creation, companies are faced with the high cost of finding, training and retaining suitable staff. The export of processed and fresh goods are limited by high transportation costs and a lack of market access due to insufficient export protocols with some markets.

Throughout the study, Access to Markets; Access to Processing Technology; Access to Finance; Access to Skills & Information; and Access to Inputs were consistently identified as the most important factors influencing growth in the South African agro-processing industry. Key challenges of the industry include the lack of year-round availability of input produce; water-scarcity; lack of appropriate agro-processing technologies; transparency/traceability; and a general lack of access to information and skills.

The Netherlands has much to offer in terms of fruit and vegetable processing, for instance in waste reduction and food loss; preservation and extending shelf life; and increasing transparency and traceability. Technologies from The Netherlands are already widely used in the South African agro-processing industry. However, new linkages between Dutch solutions and South African challenges can

be made, although solutions need to be adapted to the South African context. Typically, The Netherlands is strong in high quality, high volume solutions, and although the South African market has a need for high quality standards, the agro-processing industry caters for lower volumes.

Specific Dutch technologies could be applied in the smart usage of crop varieties; reduction of postharvest losses; cold chain logistics; more efficient production and distribution processes; optimal water usage in production and processing (re-use of waste water and less consumption); optimal usage of residual flows; and in the reduction of and innovations in packaging.

Foreword

Dutch farming, horticulture and fisheries are continually innovating, making The Netherlands a global leader in these sectors. Dutch agriculture remains successful by continually investing in sustainable development and the renewal of agricultural production chains, where farmers are full partners in the agricultural production chains. The Netherlands promotes and supports technologies and innovations that support circular principles (for example use of robotics, sensor technology, precision agriculture, waste reduction & bringing waste to value).

The Netherlands is a reliable, innovative and solution-driven partner in the AGRI sector. To truly understand the unique South African context and achieve real results in the area of agriculture we actively engage with South African stakeholders. Through these Dutch - South African cooperations in the agricultural sector we co-create ideas and innovations for a sustainable future in South Africa and the Netherlands. The Kingdom of the Netherlands in South Africa is committed to bringing together the South Africans and the Dutch.

In 2011 the Dutch Embassy conducted a study on the context of agro-processing in South Africa. Among other things, this study discovered that the South African agro-processing industry is extensive. By and large, the quality of processing for most of the primary agricultural products is determined by consumer affordability and not consumer social preferences such as health effects, animal welfare and other ethical imperatives. However, there is now a growing emerging middle class that is leaning towards including their social preferences when buying food.

Additionally, according to the South African Department of Agriculture, Forestry and Fisheries (DAFF) in 2014, the total imports relative to the manufacturing sector totalled 15.2%, while for the whole economy this was 10.1% respectively. This indicates a relative high dependence on import in the manufacturing sector. Furthermore, it was also argued that some of the agricultural processed products imported from other countries are from primary products produced in South Africa, driving up the dependence on import within the manufacturing sector.

These were interesting facts and asked for a new, updated study that would seek to identify opportunities where the South African local agro-processing industry could be scaled up and expanded to adjust to the changing consumer preferences, to take advantage of the extensiveness of the agro-processing industry and to drive down dependence on import within the manufacturing sector. Thus in 2018, the Dutch Embassy commissioned a study on agro-processing whose findings are presented in this report.

The report is giving a clear overview of the current state of Fruit & Vegetable agro-processing in South Africa. This is mainly based upon existing sources. The value is here that significant amount of information is compiled together. The study also outlines insights in value chains and challenges in the processing of Fruit and Vegetables. Then a number of examples are given of Dutch companies that do offer knowledge and technology in several relevant developments and often supporting circular principles.

From the study it becomes clear where Dutch contributions can be made based on the interests and developments of Dutch companies. It is a good starting point for South African stakeholders to seek engagements with Dutch companies and for Dutch companies to seek where their competencies meet South African needs and developments.

We wish you a productive reading and specifically we hope that this input will give you some ideas and tools to determine the way forward for various initiatives you are involved in.

Dr Jack Vera

Agricultural Counsellor

Embassy of the Kingdom of the Netherlands

1. Introduction

1.1. Objectives and Scope

The Netherlands Enterprise Agency (RVO) and the Embassy of the Kingdom of the Netherlands in Pretoria, South Africa (EKN) have commissioned a scoping study into the current state of affairs of the agro-processing industry in South Africa and its challenges. The study provides an overview of the extent to which the agro-processing industry can add more value, with the aim of limiting imports. Furthermore, the study has been conducted with the aim of informing the Embassy of opportunities whereby Dutch experts and businesses can be mobilized to transfer agro-processing knowledge, skills and technologies to their South African counterparts.

Study objectives:

Identification of the challenges of the agro-processing industry in South Africa and the opportunities for a scale up, expansion and value addition in this industry.

Outline strategies on how Dutch experts and business can be mobilised to transfer agro-processing knowledge, skills and technologies to their South African counterparts.

More specifically the following objectives have been formulated in the Terms of Reference:

Objectives (TOR):

- 1) *To identify main technological developments on sustainable, value added agro-processing in the Netherlands and South Africa, related to the main agricultural primary commodities in South Africa;*
- 2) *To identify the countries, in Europe and other continents where the South African agricultural primary products are processed;*
- 3) *To identify the commodities which are extensively processed in South Africa and their quality;*
- 4) *To investigate the extent to which agro-processing in South Africa is done by primary producers themselves;*
- 5) *To identify the origins of the agro-processing companies operating in South Africa;*
- 6) *To investigate the reasons why some South African primary agricultural products are processed outside of South Africa and not in South Africa;*
- 7) *To identify the target markets (in and outside South Africa) for the South Africa agricultural goods processed in South Africa;*
- 8) *To identify the target markets (in and outside South Africa) for the South African agricultural goods processed outside South Africa;*

- 9) *To investigate the quality of value addition and mitigation of post-harvest losses technologies, the quality of processed goods, consumer targets, availability of resources and expertise and availability of agricultural raw materials;*
- 10) *To formulate a clear strategy that will be proposed to the Dutch Embassy in Pretoria, which outlines how Dutch experts and business can be mobilized to transfer agro-processing knowledge, skills and technologies to their South African counterparts;*
- 11) *To showcase the findings at the upcoming PMA conference in South Africa (Fresh Connections: Southern Africa August 15-16, 2018)*

The agro-processing industry refers to the subset of manufacturing that process the raw materials and intermediate products derived from the agricultural sector (FAO). The agro-processing industry thus involves the transformation of products that originate from the agriculture, forestry and fisheries sectors. The Department of Agriculture, Forestry and Fisheries (DAFF) in South Africa distinguishes eleven main agro-processing subsectors¹. In consultation with the Dutch Embassy the focus of this scoping study has been limited to *food* processing. Within agro-processing industry, food products represent the largest contribution to the South Africa GDP, with arguably the highest potential for growth. As the second largest food exporter in the world, The Netherlands has extensive knowledge and expertise in this sector.

Food products and beverages consist of 9 categories.² This report focuses on agro-processing relating to fruit and vegetables, since this is an area with huge potential for growth in South Africa and an area where Dutch have phenomenal expertise. The report includes sections on juices, sauces (dressings and condiments), dried fruits and nuts, as well as indigenous and niche products³.

Although the study covers the whole of South Africa, physical site visits were limited to Gauteng; the Eastern Cape and the Western Cape. The Western Cape Fine Food Initiative was a good starting point for the Western Cape and Cape Town area and it was found that extensive processing takes place in this region. In the Eastern Cape, the wider Nelson Mandela Bay Metro area, and in particular the Coega Industrial Development Zone, are important agro-processing hubs. The existence of these established processing regions provide a good platform for opportunity for future developments. Since Gauteng is

¹ The eleven subsectors are: 1) Food Products; 2) Paper and paper products; 3) Wood and wood products; 4) Tobacco; 5) Leather and leather products; 6) Textiles; 7) Furniture; 8) Footwear; 9) Beverages; 10) Rubber products; 11) Wearing apparel (DAFF, 2016)

² The nine categories are: 1) Production, processing and preserving of meat and meat products (Poultry / Red Meat); 2) Processing and preserving of fish and fish products; 3) Processing and preserving of fruit and vegetables; 4) Manufacture of vegetable and animal oils and fats; 5) Manufacture of dairy products; 6) Manufacture of grain mill products; 7) Manufacture of prepared animal feeds; 8) Manufacture of bakery products, sugar, cocoa, chocolate and sugar confectionery; 9) Manufacture of other food products

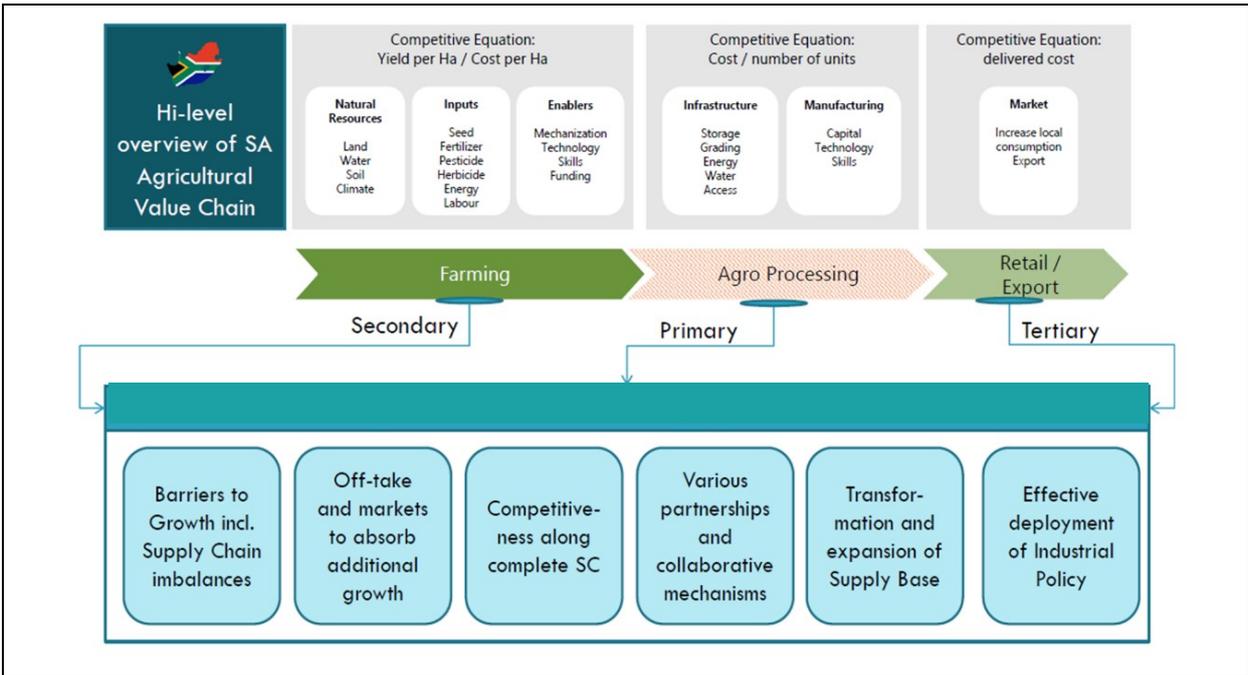
³ 'Niches' is a specific cluster of (diverse) products that are characterised by innovate product(ion)s; smaller market size and specialized products.

the most populous province of the country, much of the close-to-the-customer agro-processing takes place here. Other regions were covered through telephonic interviews.

1.2. Approach and Methodology

Central to the approach of this study is the agro-processing value chain; the whole range of goods and services necessary for an agricultural product to move from the farm to the final customer or consumer. Value chains consist of various interlinked stages and aspects relevant to that particular product. Depending on the final customer, various channels can be identified. For instance, products destined for export must adhere to specific regulatory requirements. It should be noted that informal channels / sectors have been excluded from this study. However, (emerging) semi-formal SMME’s that have the potential to upgrade to formal SMME status are included. Depending on the type of product and channel, the value chain is to a larger or lesser extent integrated and / or concentrated.

Figure 1: High level overview of the South African Agricultural Value Chain



Source: Agro-processing - Manufacturing Circle Transformation and growth APSS solution - 2017

The figure above, borrowed from the Manufacturing Circle (2017), provides a high-level overview of the South African agricultural value chain. The primary focus of the study is on the middle section of the value chain where the actual processing (or transformation) takes place. The framework would however not be complete without taking into consideration the input requirements and conditions of a particular product, as well as the varying customers and market demands.

Methodology

Agro-processing is a well-established field of research in South Africa. Therefore, limited primary data collection was required. The first stage of this study involved an extensive literature review. The review made use of vast quantities of quality checked sources, including; academic papers, business reports, government department reports, trade data, NGO reports, and various other sources. This information was synthesised and cited in order to provide insights into the selected value chains. Based on this process, preliminary findings were formulated, missing information was identified and the research questions in relation to the Terms of Reference were validated.

In the second stage of data collection, experts and stakeholders who work in the relevant fields in both South Africa and the Netherlands were identified. The analysis framework was then populated with relevant stakeholders (including companies) for the gap analysis. Structured interviews, based on a common set of questions for all interviews were used as a guideline for face-to-face and telephonic interviews. Site visits were also conducted to various companies. A focus group approach with SMMEs was used to identify specific topics and to validate both the preliminary finding and the gap analysis. Through consultations and interviews, a peer review process with Dutch agro-processing experts was conducted.

Throughout the study, three visits to South Africa were made:

Date	Location(s)	Activity	Research Outcome
March 2018	Western Cape Northern Cape	Interviews	<ul style="list-style-type: none">• Validation of research framework;• Selection of preliminary value chains;• Methodology value chain analysis;• Development and validation of channels and growth directions of the agro-processing industry.
May 2018	Western Cape Eastern Cape Gauteng	Focus Groups Company Visits Interviews	<ul style="list-style-type: none">• Data collection
August 2018	Gauteng	Conference Interviews Site visits	<ul style="list-style-type: none">• Preliminary findings and recommendations of the study were presented at the Produce Marketing Association (PMA) Conference.

The final report will be presented in the Netherlands.

1.3. Guidelines for the Reader

The two central guiding objectives of this study are to provide an overview of the current state of the agro-processing industry in South Africa and its challenges, as well as to identify the extent to which the agro-processing industry can add value, with the aim of limiting imports. With these central objectives as a starting point, further objectives have been clustered and are as such addressed throughout the report.

Chapter 2 provides a high-level overview of the agro-processing industry in South Africa. This includes its policy context and the characteristics of the fruit and vegetables value-chain. This overview provides insight into whether (TOR 2), and, if so, where products are processed (TOR 3). Subsequent questions on the why and in (or for which) target markets (TOR 6, 7, 8) processing might take place are addressed in this light. Identifying the main players in the sector helps to identify the extent to which agro-processing is done by primary producers (TOR 4) and the origin of these companies (TOR 5). Chapter 3 provides more detailed insights into a selected number of value chains, i.e. Juices, Sauces, dried fruits and nuts and niche products (TOR 9). The fruit & vegetable value chains face a number of challenges as described in chapter 4, leading to a gap analysis. Chapter 5 showcases consumer trends and relating Dutch technological developments (TOR 1). The final chapter draws conclusions and formulates strategies to transfer Dutch knowledge, skills and technology to South Africa (TOR 10).

2. General overview of agro-processing in South Africa

2.1. Government Policies & Priorities Relating to the Agro-Processing Industry

The New Growth Path (NGP), together with the National Development Plan (NDP), the Industrial Policy Action Plan (IPAP) and the South Africa Trade Policy and Strategic Framework acknowledge agro-processing as one of the vital sectors in accelerating the pace of industrialisation in South Africa. The processing of agricultural products has been recognised as a crucial sector that can help South Africa realise value added growth and support labour-intensive sectors of the economy (ITAC, 2016).

The South African government has introduced several new policies which aim to benefit the agro-processing industry. These include:

The New Growth Path (NGP)

The New Growth Path (NGP) was adopted in 2010 as the driver of the country's job creation strategy. The NGP suggests that to achieve growth and transformation of economic imbalances, firm choices and shared determination are required from every structure within society. The goal is to grow employment by five million jobs by 2020; to ensure that half of the working-age population in South Africa will be employed, and that unemployment would be reduced from 25% to 15%. The agricultural value chain has been prioritised to play an important role in the provision of job opportunities and improve the standard of living of farm workers. The NGP targets opportunities for 300,000 households in agricultural smallholder schemes, plus 145,000 jobs in agro-processing by 2020.

National Development Plan (NDP) – 2030

The National Development Plan views agriculture as critical to employment and food security. It is estimated that Agriculture would potentially create a million jobs by 2030. Specifically, AgriParks will serve as important mechanisms to execute the NDP's proposed rural development strategy due to their potential for supporting small-scale agricultural production and stimulating agro-processing in rural areas. One core element of this approach is conducting commodity and value-chain analyses and mapping exercises to determine the best areas to establish Agri-Parks based on the growth potential of value-adding commodities.

In this regard, the NDP identifies certain agricultural sub-sectors that have the most potential for development, which are categorised into large labour-intensive industries, smaller labour-intensive industries, and large existing industries with significant value-chain linkages. Small-scale, labour-intensive agriculture, including macadamia, pecan nut, rooibos tea, olive, fig, cherry, and berry industries, are found to have the greatest expansion potential due to the significant market demand

for these products. The NDP projects that approximately 80 000 jobs can be created by further developing these particular areas of small-scale agriculture.

The NDP has a number of implications for the agro-processing industry. Greater investment will be made to provide innovative market linkages for small-scale farmers, preferential procurement mechanisms are put in place to ensure that new agricultural entrants can access markets, technological development is prioritised and policy measures are implemented which increase the intake of fruits and vegetables, and to reduce the intake of saturated fats, sugar and salt, to accompany strategies to increase vegetable and fruit production.

Industrial Policy Action Plan (IPAP)

The Industrial Policy Action Plan (IPAP) is of the Department of Trade and Industry (DTI) and sets out an industrial policy framework with overriding interventions that aims to prevent industrial decline and support growth, as well as diversifications of South Africa's manufacturing sectors. IPAP identifies the agro-processing industry as a sector with potential to spur growth and create jobs, because of its strong linkage with the primary agricultural sector. The key-programmes identified for agro-processing within the IPAP are the following:

1. Development of a Food-processing Strategy and Action Plan with the objective of accelerated growth in the food-processing sector.
2. Development of a small-scale milling industry to enable small-scale maize milling 25 enterprises to produce for local markets at competitive prices.
3. Enhancement of competition in the fruit and vegetable canning industry - The creation of a sustainable platform for the long-term growth and competitiveness of the industry.
4. Development of a Soybean Action Plan promoting market linkages between primary agricultural producers and processors.
5. Development of the organic food sector – The development of a competitive organic sub-sector producing high-quality food products for both local and export markets.
6. Supporting the Public-Private Partnership (PPP) for Food Security – Entails smallholder farmer access to formal retail chains, Government procurement, and small-scale processing opportunities.

With infrastructure investment as one of its main components, the Agri-Park Programme is key in advancing the objectives of IPAP.

Agricultural Policy Action Plan (APAP)

The Agricultural Policy Action Plan (APAP) (2015-2019) seeks to translate the high-level responses offered in the Integrated Growth and Development Plan (IGDP) into tangible, concrete steps. The APAP affects the agro-processing industry through the identification of the specific sub-sectors for key action programmes, including fruits and vegetables.

Department of Agriculture, Forestry and Fisheries' (DAFF) Agro-Processing Strategy

The Department of Agriculture, Forestry and Fisheries' (DAFF) Agro-Processing Strategy was developed to create a strategic direction on agro-processing for both national and provincial government. The strategy seeks to provide a response to the agro-processing job creation and related government priority targets set out in existing policy frameworks such as the NGP and IPAP. The strategic objective is to articulate how government should intervene to support and develop Small and Medium Enterprises (SMEs), agro-processing in the local and global agricultural sector, as well as forestry and fisheries value chains.

The National Policy Framework on the Development of Small and Medium Agro-Processing Enterprise in the Republic of South Africa was initiated by the DAFF. The objectives of this document are rural industrialisation through the establishment of agro-processing industries that are closer to production areas; Local economic growth through increased trade in rural areas; and Job creation through the establishment of SME agro-processors to improve livelihoods of both smallholder agro-processors and producers.

The specific challenge that this policy aims to address is the limited active participation of rural-based SMEs agro-processors in the agro-processing mainstream value chain. The strategic objective is to create a profitable, competitive and thriving small and medium agro-processing industry.

To achieve this, the policy seeks to: Provide entrepreneurial support to small and medium agro-processors; Support enterprise development through facilitating access to markets, finance, incubation, and mentorship; Facilitate agro-processing industry research and technology transfers; and Facilitate infrastructure investment specifically within rural areas.

Agriculture, Forestry and Fisheries: Integrated Growth and Development Plan (IGDP)

The Integrated Growth and Development Plan (IGDP) aims to provide a long-term strategy for the growth and development of the agricultural, forestry and fisheries sector in South Africa. The IGDP identifies that in terms of agro-processing, there is a need to support South African exporters to position their products better in fast-growing, developing country destinations and Africa. This may

require focused export intelligence and marketing support, as well as intergovernmental assistance to ensure that South African products are not unfairly subject to nontariff barriers. Greater emphasis and investment is required in the understanding and managing of international trade standards and regulations, especially in the areas of food safety and sanitary and phytosanitary measures.

The Department of Trade and Industries Agro-Processing Support Scheme (APSS)

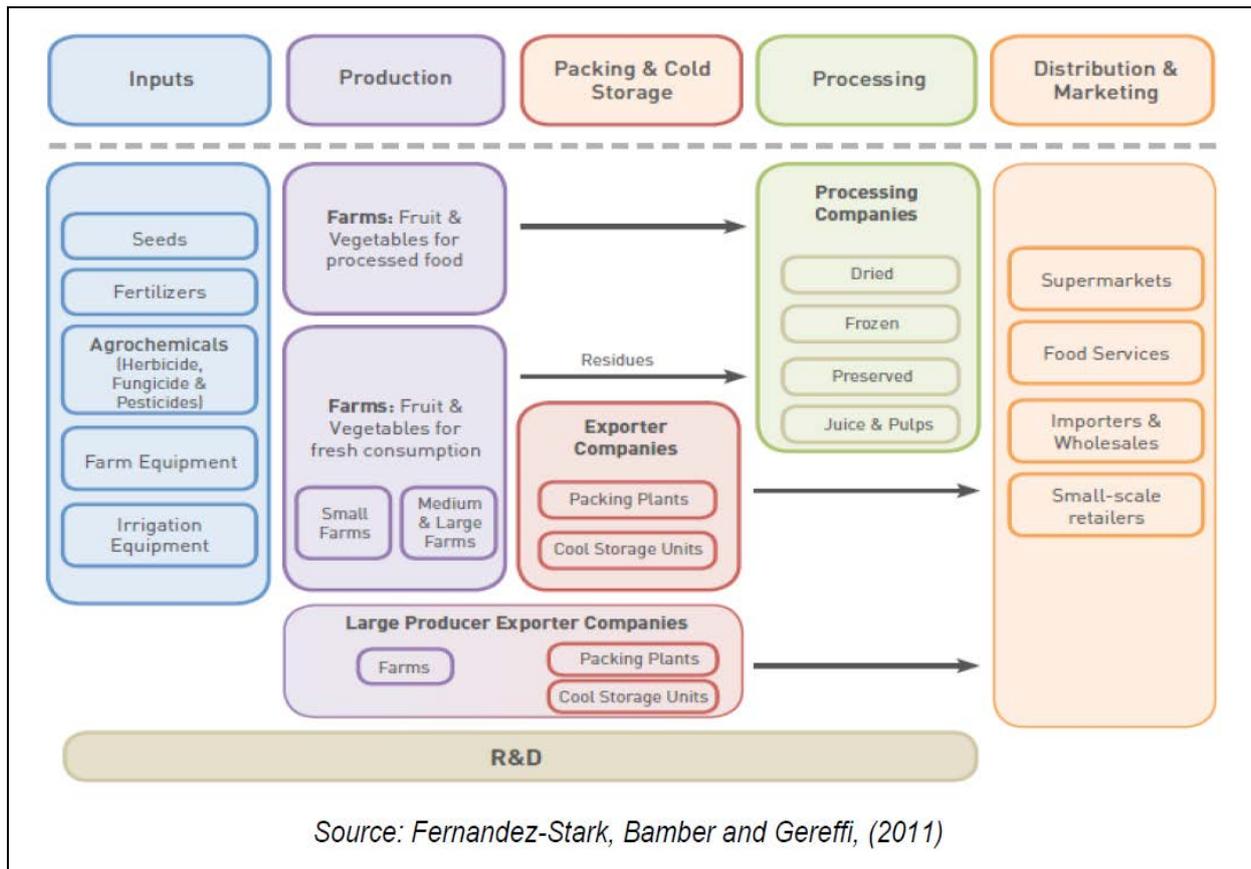
In 2017, as a response to the 9-Point Plan, the DTI launched a R1 billion Agro-Processing Support Scheme (APSS), aimed at further ramping up investment and value addition across the sector. The APSS seeks to stimulate investment in the agro-processing sector. The objectives of the APSS are to increase capacity; create employment; modernise machinery and equipment; improve competitiveness and productivity; and broaden participation. The incentive is available to new and existing agro-processing projects and can involve a wide range of post-harvest processing activities (Incentive SA, 2018).

2.2. Overview of the South African Fruit and Vegetable Value Chain

South Africa has a geography and climate that allows for multiple different agricultural regions. Therefore, almost all agricultural processing techniques are used, from niche honey bush tea producers to industrial juice manufacturers. Whilst South Africa's market is small by global standards, the various income segments are large enough that almost all levels of quality of agriculture are produced. This provides opportunity in terms of the quality of produce needed to process fruits and vegetables into value-added products.

Key activities in the fruit and vegetable value chain include (1) Production, (2) Packing and Storage, (3) Processing, and (4) Distribution and Marketing. These activities involve particular processes and technologies that add value to the product at different stages in the value chain. Food processing starts from packing and cold storage, and then moves to drying, freezing, preserving through bottling, and canning, as well as juicing and pulps. Further processing takes place when products are packaged and labelled.

Figure 2: The Fruit and Vegetable Value Chain



Production

At the production level, fruit in South Africa is primarily grown for the fresh market rather than for processing. Sales of fresh fruit constitute the most profitable segment in the value chain. 72% of total fruit production is sold in export, and only around 28% is sold locally. Because of this high export percentage, it is critical that farmers comply with global farming standards such as GlobalGAP with regards to the use of pesticides and quality of water (IDTT, 2018). The ability of farmers to comply with global farming practices is critical for gaining access into high value markets in developed countries (Chisoro-Dube et al. 2018).

Packing and Cold Storage

After harvesting, fruit is sent for packing and storage in cold units. Sophisticated packaging and cold storage units maintain freshness and quality of fruit and preserves the shelf life of fruit. The packing segment of the value chain entails investments in a wide variety of equipment to attain high standards of hygiene within the pack houses operations, including onsite laboratories for product tests. Packing also requires economies of scale due to the high costs of cold storage and other capital investments and is largely carried out by large producer-exporters (Fernandez-Stark, Bamber and Gereffi, 2011).

Investments in logistics (storage and cold chain facilities, transportation networks, and information and communication technology) to effectively move and store products throughout the supply chain while maintaining the quality of the fruit is critical because of the highly perishable quality of fruit. The bulky nature of fruits also makes handling and transportation difficult and any inefficiencies in the system lead to large post-harvest losses (Roy 2015; Fonseca and Vergara, 2015).

There are opportunities to apply more sophisticated technologies through investment in cold chain facilities and computerised logistics. The fruit industry has potential to create jobs from the farm level to ancillary activities such as packaging logistics and cold chain facilities.

Processing

Although the majority of fruit production in South Africa is sold fresh, the 'reject' fruit and vegetables are sent to processing facilities to manufacture juice concentrates, purees, pulps and preserves. Fruit that is used in processing only accounts for an estimated 29% of total fruit production. Therefore, fruit processing is regarded as a 'residual' industry that processes 'fall out or downgraded' fruits from the fresh fruit market. Processing adds value to the raw product by increasing the shelf life of the fruit and supporting development of manufacturing capabilities. However, fruit processing generates lower returns than fresh fruit despite the high capital investments and sophisticated infrastructure and skills required to perform manufacturing activities. (IDTT, 2018).

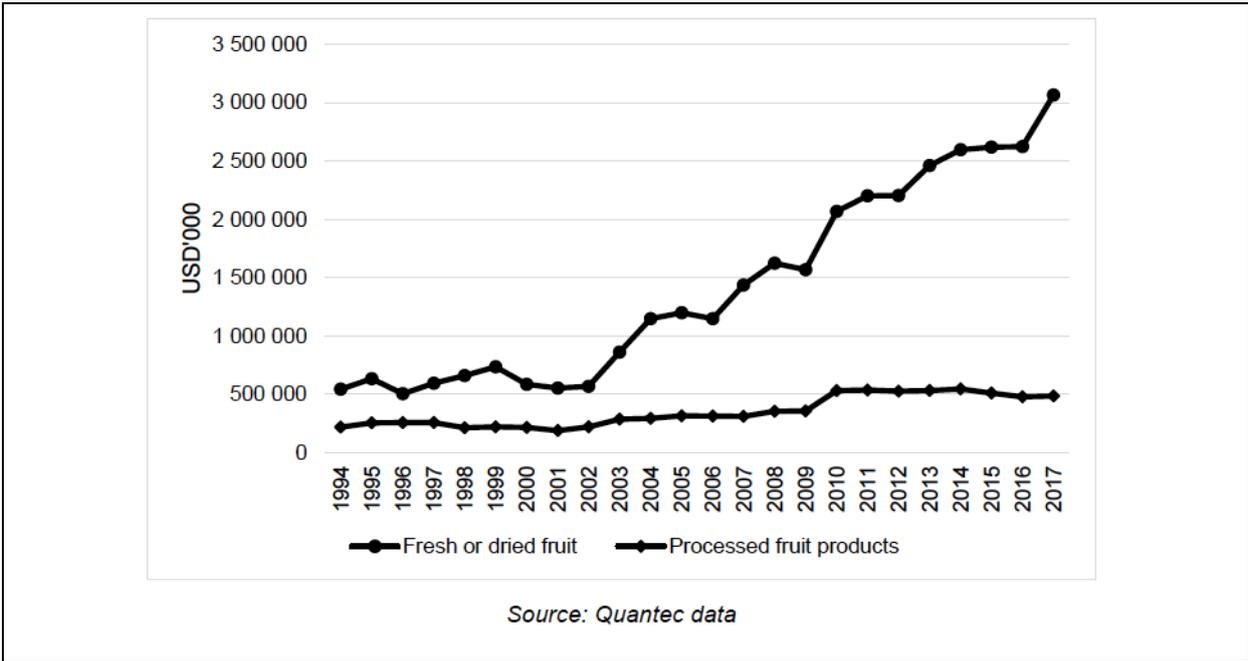
2.3. The (International) Market for SA Fruit and Vegetables

Fruit Export Market

South Africa is self-sufficient in the production of a wide range of fruit, with production growing at a steady annual rate of 3% between 1994 and 2016. Grapes, citrus, and apples are the main fruits grown, and together accounted for 77% of total fruit production in 2016. Other fruits, including berries, bananas, avocados and plums are becoming more popular with productions average compound annual growth rate of 5% between 1994 and 2016.

Looking at export trends, the value of fruit exports grew by 16% between the period 2002 – 2009, and by 6% between the period 2010 – 2017. Citrus, apples and grapes accounted for 86% of total fruit export earnings in 2017. Some of the fastest-growing fruits in export markets include niche fruits such as berries particularly cranberries and bilberries which grew at a CAGR of 32% between 2010 and 2017. The slow growth in exports of fruit between 2010 and 2017, which is largely due to depressed demand during the economic recession, stresses the importance of finding new markets beyond traditional markets in the European Union (which account for over 63% of local fruit exports) (IDTT, 2018).

Figure 3: Exports of Fresh Fruit and Processed Fruit



During the 7 year period of 2002-2009, South African fruit exports nearly doubled (Figure 3). This was largely driven by a growth in incomes during the commodity boom period. However, the strengthening of the exchange rate facilitated imports of processed foods, and this resulted in a worsening in the trade balance. Exports were largely stagnant post 2010, worsened between 2014-2016, and have now started to improve again. Main processed food exports are sugar, confectionary sugar processed vegetables, fruits and nuts; and edible preparations (such as yeasts, ice creams, and soups) (IDT, 2018). Rising incomes and urbanisation have meant that much of South Africa’s processed foods are exported to neighbouring African countries. Furthermore, the expansion of South African owned retail enterprises, such as Pick ‘n Pay, into the regional markets have resulted in a centralisation of procurement strategies which enable a route into regional markets. It is also easier to export processed foods to this region due to lower quality requirements, and fewer non-tariff barriers. This means that less efficient local producers can still access these regional export markets (Cramer and Sender, 2015).

Other than the regional market, South Africa has not used seized opportunities in terms of shifting towards the export of processed fruits to more developed countries.

Vegetables Export Market

Although South African fruit and processed fruit products have a strong export market, there exists a historically poor export market in terms of fresh and processed vegetables, with most produce consumed locally. In terms of the distribution of vegetables, 46% of production is sold through the local fresh produce markets, 42% is sold through direct sales and own consumption, 10% are processed, and only 2% are exported (IDTT, 2018). South African vegetable prices often become depressed due to oversupply, and therefore in order for the local industry to grow, the export market needs to expand (Farmer's Weekly, 2018). Obvious expansion would be into African countries, but currently Southern African Development Community (SADC) countries are the largest importers of South African vegetable products, primarily because they have retail outlets. The expansion of South African retail chains into Africa plays an important role in the cross-border trade of vegetables and fresh produce. However, one of the biggest challenges of expanding into African countries is that they lack cold storage facilities, making it difficult to trade more perishable fresh produce. The consumer market in most African countries are unlikely to be able to afford processed vegetables, so fresh vegetable export would need to be the priority export product. Investment opportunities in organised retail north of the SADC are opening up, and consumer demands in Africa is likely to shift from staples to discretionary products over the next 10 to 20 years as the middle class grows.

According to Ezra Steenkamp, deputy director of International Trade Research at the Department of Agriculture, Forestry and Fisheries in Asia, there is strong growth in the middle class, and South African vegetable exporters are gradually responding to this demand, with vegetables currently exported to destinations such as Hong Kong, Singapore, Malaysia and Indonesia, which have fewer phytosanitary requirements than other export destinations (Farmers Weekly, 2018). China is the most lucrative market in Asia, but has not yet been unlocked to exporters, since South Africa does not yet have the sanitary and phytosanitary protocols in place for exporting the in-demand products of the region, such as onions, butternuts and sweet potatoes. On a positive note, the Jakarta port in Indonesia recently opened to South African fruit and vegetable exports and furthermore, the Asian market's transport costs are relatively cheap compared to more expensive transport costs involved in exporting to African destinations.

2.4. Processing Fruit And Vegetables – A Concentrated Sector

Food production is South Africa's largest manufacturing sector and is dominated by a few very large, diversified, national and multinational food manufacturers. Although there are over 1800 food

production companies, the top ten are responsible for 70% of the industry's turnover (Flanders, 2015). South Africa's key players include national and multinational companies such as Tiger Brands, AVI, Premier Foods, Pioneer Foods, FoodCorp, Oceana Group, First SA Foods, Nestle, Clover SA, Parmalat SA, Rainbow, Astral Foods, RCL Foods, Tongaat Hulett, Rhodes Food Group Holdings, Kellogg's SA, and South African Breweries. These food processors tend to be involved in several food groups, have established market shares, and control both production capacity and sales in most food categories.

Despite their limited market share, new entrants and SMMEs play an important role to ensure a dynamic food processing environment in South Africa. Small companies depend on formal retail chains to sell their manufactured products. Big multinational companies, such as Nestle (Switzerland), Unilever-Unifoods (UK / NL), and Borden (US), operate their own manufacturing plants in South Africa. Some multinationals companies do not have processing facilities but have arrangements with local manufacturers. For example, branded packaged foods of Knorr (a Unilever brand) are manufactured under license by Robertson's, a major South African spice packer and food processor (Flanders, 2015).

There is still a need for investment in the downstream food processing level of the value chain. Currently, investments in the South African food processing sector are largely driven by the large food producers companies listed at the Johannesburg Stock Exchange (JSE), mentioned above. These large food producers account for 74% of total fixed investments in the sector in 2015 (IDTT, 2018). From 2010 to 2015, investments in food processing appear to have barely grown. Even for listed companies, growth in the total asset base has largely been through acquisitions of existing businesses rather than investments in expansion or productive capacity. Food processing firms have been more inclined to grow and diversify their businesses by acquisition in South Africa rather than organic expansion of existing operations and capacity in order to grow market share (IDTT, 2018). On the other hand, South African food processing firms are expanding operations into other sub-Saharan African countries through green field projects (IDTT, 2018).

Large and small-scale farmers produce fruit and vegetables countrywide. The fresh produce is either sold wholesale to produce markets (there are 17 national fresh produce markets in South Africa), or sold wholesale to processors (such as Nestle or Tiger Brands) who create sauces, pastes, and other food preparations with the fresh produce. In terms of fruit production specifically, there are a few very large factories in the Western Cape owned by Tiger Brands, and Rhodes. These JSE companies hold 95% of the market. Similarly, Tiger Brands and Rhodes hold 75% of the vegetable market, with factories spread across the country.

South Africa is an example where industry associations have played an important role in driving growth in the local fruit industry by sourcing markets for local producers and providing them with key market information. The success of this sector hinges on a strong industry association, Fruit South Africa. The Fruit Association is a private sector initiative, made up of South African five fruit producing organisations. They enable the sector by addressing market and trade issues that may affect the industry by liaising with government on policy and matters relating to regulation. They also ensure that market access is granted on conditions that are favourable to the South African fruit industry. On the producer side, the association provides producers with information relating to standards and the requirements of different markets (IDTT, 2018).

2.5. Conclusions

Clearly agro-processing is a key policy priority for South Africa. Agro-processing has a high propensity to create rural jobs and encourage rural economies through targeted investment and development. Employment creation is a key driver for government policies in this field. Nonetheless, individual companies are driven by market forces to adhere to coherent business plans using resources in an optimal manner.

The policies highlighted in section 2.1 are a brief overview - at the provincial, metro and local level these policies are echoed and aligned. From the perspective of individual companies, public agro-processing initiatives seem to be fragmented and disjointed because of a lack of real strategic cohesion between the national, provincial and local levels. The implementation of policy seems to be sub-optimal for various reasons. Policies and incentives are often unclear and non-accessible to SMMEs. Therefore, a change in attention “from red tape to red carpet” (i.e. from bureaucratic procedure, to pro-active support and guidance) would be beneficial in making policies work on a practical level.

The research conducted reflects that in the fruit market the predominant focus is on fresh products for the export market (72%), with world class exporting companies dominating the market. These large companies use the latest sorting and packing equipment from Europe (e.g. Italy). However,

opportunities in improving packaging, cold chain facilities and computerised logistics do exist and there is potential to create employment at the farm level. In terms of processing South African fruit produce outside of the country, the research was unable to find any clear evidence of this occurring. This is likely since fruit processing generates lower returns than fresh fruit and high capital investments, sophisticated infrastructure and skills is required.

The vegetable market is also focused on fresh produce, but is predominantly nationally oriented (92%). Exports are limited by high transportation costs (in relationship to the value of the crop) and a lack of market access due to insufficient export protocols with some markets (e.g. China). Similar to the fruit market, we have not come across major crops that are being exported for processing abroad.

The agro-processing industry in South Africa is highly concentrated, with ten companies dominating an estimated 70% of the market. Large local food-processing companies have a number of brands and are backward integrated into the value chain enabling them to control processing, branding and distribution. They exert market power to smaller suppliers and farmers. Large foreign companies have their own processing facilities in South Africa or outsource processing to local companies. This means that SMME agro-processors and small-scale farmers that want to move into processing face market access challenges. These are discussed further in the chapters to follow, along with the organisation of value chains and how this, together with key determining factors often differ across value chains.

3. Insights into selected value chains

3.1. Juices

The South African fruit juice industry is well integrated with international markets through substantial export and import trade. Industry currently processes more than one million tons of fresh fruit annually and total juice turnover is in excess of R10 billion. Of this, 75% is sold on the domestic market and the remainder is exported. The largest importers of South African fruit juice in the year 2017 were Botswana, Netherlands, Namibia, Mozambique, Zimbabwe and Zambia (Trade Map, 2018).

The balance covers a range of products including concentrates, blends, pulps, purees and final products exported worldwide. Substantial exports to sub-Saharan Africa are of particular importance. In South Africa, short- and long-life juices are sold in various categories. There are specific regulations, definitions and standards for each class of fruit juice. It is important to note that there is a large variation, from fresh fruit juices to fruit drinks. In South Africa, the term “Fruit Juice” refers to juice made from 100% fruit, and this is not subject to sugar tax. Products labelled “Fruit Nectars” need to contain 50% pure fruit juice, “Fruit Drinks” need to contain 6% fruit juice and “Fruit Flavoured Drinks” contain no fruit as they are flavoured with chemicals. This report refers to fruit juices, nectars, and drinks, but not fruit flavoured drinks.

The processing level of juices is divided into three parts: Primary processors: convert the downgraded fruit into fruit pulp, concentrate and puree that is supplied to blenders or other ‘secondary’ processors who make jams, jellies or preserves; Blenders: mix various juice combinations and supply the mixed juice to bottlers; Bottlers: pack the final product into branded cartons and distribute to final consumers (IDTT, 2018).

At the upstream fruit production level, an estimated 6,000 to 8,000 commercial, largely white, farmers were involved in the cultivation of fruit and vegetables across the country in 2016. However, the number of farmers has declined by 26% over the last decade (Chisoro-Dube et al., 2018). Decline in farmers is also due to farming units becoming larger and fewer. Therefore, production for the fresh export market tends to be dominated by large producers and marketing companies because production of fresh fruit for international markets generally requires advanced technologies and large-scale operations to meet the requirements of international markets. This has important implications with regard to participation of small and medium sized farmers who are excluded from these value chains because they lack the industrial capabilities, technologies and infrastructure to meet global requirements of the sector (IDTT, 2018).

At the downstream fruit processing level, the major primary processors and juice manufacturers are shown in Table 1. Although the industry appears to have many players, approximately 55 000 processors, fruit processing is relatively concentrated with the largest five firms accounting for slightly under 50% of total revenue in the industry (Euromonitor, 2017). There has been no entry of new processors but rather a trend towards consolidation with large processors taking over small processors (IDTT, 2018).

Table 1: Main Players in the South African Fruit Value Chain

Primary Processors	Juice Manufacturers/Packaging Companies
Associated Fruit Processors	Nestle
Ceres Fruit Processors	Coca-Cola (Appletiser)
Tiger Brands	Passina
Langeberg & Ashton Foods	Tiger Brands
Rhodes Food Group	Clover
Pioneer Foods	Rhodes Food Group
Uni-Fruit	Parmalat
Pure Juice	Pioneer (Ceres)
Venco Fruit Processors	Sir Juice
Elgin Fruit Processors	Take 5
Granor Passi	
Cape Fruit Processors	

Source: IDTT, 2018

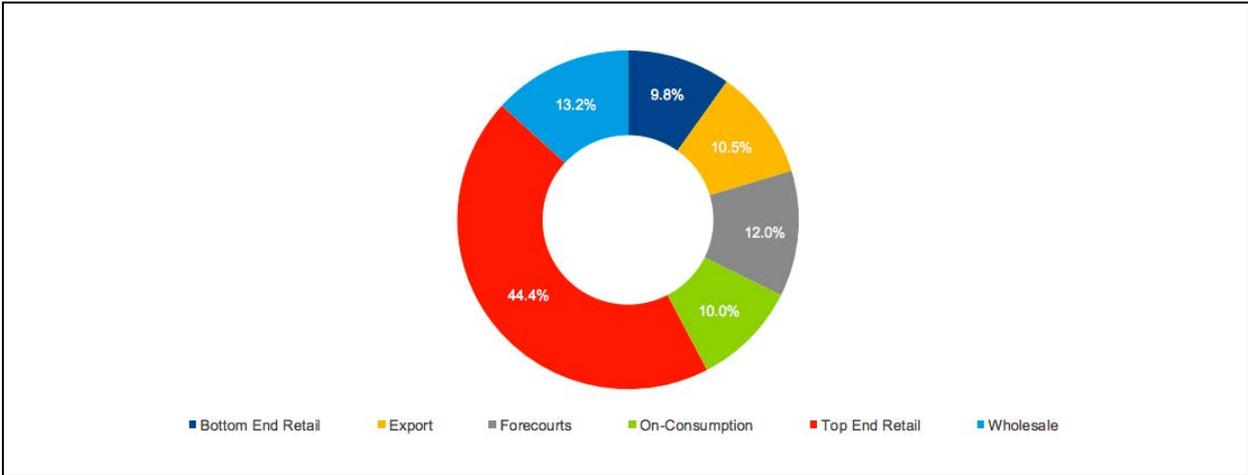
The above table shows two major business models in processing and manufacturing of fruit juices. On the one hand, corporations of primary (large scale) farmers join forces to establish joined fruit processing plants (forward integration). These are generally focussed on concentrates and purees. Much of the concentrate and puree is sold to international clients for further processing. Juice bottling typically takes place close to consumer centres since transportation of bulky end products including large percentages of water are expensive. Some of the processing companies have their own (small scale) local bottling companies and brands serving final customers.

On the other end of the spectrum, large food processing companies such as Tiger Brands, Rhodes Food Group and Pioneer Foods control the complete value chains (backward integration). They have access to consumer markets and well-positioned juice brands. Due to volume and market size, they can guarantee low prices and are able to invest in marketing to brand the products.

Smaller farmers could work together to establish joint processing plants. However, the investments are very expensive and the margins low. For individual farmers it seems to make more economical

sense to sell their residual products to existing processors. For SMMEs processors there is limited room to manoeuvre. They typically have small scale operations and produce for local markets. It is difficult and costly to establish their own brand and get access to markets, since top-end retail remains the core channel for the ready to drink fruit juice category despite losing share to wholesale and exports (BMI Research, 2017).

Figure 4: Fruit Juice Distribution Channel for the Year 2016



Source: BMI Research, 2017

VENCO Innovation Fruit Processors

VENCO produces lemon and citrus concentrated juice (preserved and frozen). It is a combined ownership made up of Sundays River Citrus Company (SRCC) (35%), San Miguel Fruits South Africa (35%), Coerney Packers (10%), Citrusrand Boerdery (10%) and Raptotron Investments (10%). VENCO has an integrated business model where shareholders also supply raw materials, to ensure a guaranteed supply of raw material for processing.

“Roughly 98 percent of the fruit we process is supplied by shareholders of VENCO” according to General Manager, Andre Swart. “We also differentiate ourselves by our close proximity to the citrus growers and the two export ports (Port Elizabeth and Coega) which becomes a significant benefit within our supply chain management.”

In the Eastern Cape there is enough land but not enough water. VENCO has irrigation water in the Sundays River Valley and that is key for producing quality fruit. Swarts expects fruit volumes to double within the next 10 years. Therefore, VENCO has expansion plans to build a second concentrate factory to move in tandem with their shareholders growth. The production plant has been set-up to allow for maximum return on raw materials, zero product waste, and the flexibility to upgrade and enhance processes according to capacity growth. They use high-end processing equipment from European suppliers. VENCO makes use of both JBT and BROWN equipment technology for juice and oil extraction and Alfa Laval technology for Juice Clarification and

Oil Separation. Up to 60% of the concentrate is exported to Europe, the US, the Middle East, the Far East and Australia. This is down from a 75% export figure. Due to shortages in the South African market, a premium price can be had in the local market.

Linking large to small

The company used to be in the retail market, but found it a very difficult market. They now have a selling agreement with their shareholder San Miguel Fruits SA that also does the marketing and provides technical advice. VENCO has the capability to supply concentrates in smaller quantities to local SMMEs juice producers. This would allow local juice producers to make their own blends and sell them into local markets or directly to customers. However, VENCO does not have the capacity, nor is it in their business model to identify and support potential emerging local SMME juice producers.

Consumer Trends – Natural and Healthy

According to the South African Fruit Juice Association (SAFJA, 2016), growth in the global fruit juice market is expected to stem from the rising demand for organic, superfruit, and 100% natural fruit juices. Fruit juice has shown strong per capita consumption growth over the past few years, whilst carbonated beverages have only achieved modest growth. The global marketplace is currently witnessing an influx of fruit juice brands which are fortified with vitamins and minerals, and lower in calories.

As the South African fruit juice industry operates significantly in its own domestic market, it is largely driven by developments in this market. Real GDP growth is currently relatively low. Conversely, the current consumption of fruit juice products indicates potential for long-term growth as consumption in the USA and Germany is approximately 44 litres per capita, whilst in South Africa it is approximately 12 litres per capita. Growth will require increased income per capita, which can be achieved over time and should increase the demand for higher-value processed foods. As in other parts of the world, the fruit juice industry in South Africa faces challenges in growing its markets. It is imperative to develop the regulatory environment to protect the juice market from unfair competition and malpractices (SAFJA, 2016).

The value of the fruit juice market in South Africa increased strongly between 2012 and 2017, achieving a compound annual growth rate (CAGR) of 12.1% over the period, and is expected to grow at a CAGR of more than 10% over the next five years. This growth, both current and forecast, is largely due to the adoption of healthier and alternative lifestyles amongst South African consumers. Higher nutritional and health awareness, together with an increasingly stressful and time-constrained society, has resulted in consumers looking for convenient and cost-effective ways of fulfilling their daily nutritional

needs. Linked to the healthy living trend, alternative dietary lifestyles are becoming increasingly popular amongst South African consumers. However, these alternative diets and their accompanying dietary restrictions often leave the adherent's body depleted of nutrients that would be gained through eating the restricted food. As a result, vegans, and adherents to other restricted diets are increasingly turning to fruit juice to obtain their essential vitamins and nutrients, which is driving further growth in the market (Supermarket & Retailer, 2018). At the same time, alternative health-oriented beverages such as coconut water are emerging. From this, it is clear that consumer lifestyle choices, as well as competition will be highly influential in terms of fruit juice consumption in the South African market (Supermarket & Retailer, 2018).

The introduction of the Sugary Beverages Levy ('sugar tax') from 1st April 2018 may impact the fruit juice industry soon. At present, fruit juice and drink concentrates are no longer taxed at 50%, but in full on a RTD basis; powders have been included; and the deemed level of sugar content increased in absence of labelling. 100% fruit juice currently remains exempted. There is also a 4gm/100ml threshold in respect to all "sugary beverages" which are tax free. Media statements have claimed that research will be conducted on the health impacts of fruit juice, and the sugary beverage levy may be adjusted depending on the findings of these studies.

3.2. Sauces, Dressings and Condiments

A study of food consumption trends in South Africa between 1994-2012 showed that sauces, dressings and condiment consumption increased from 1.9kg capita/year (1994) to 3kg capita/year (2012) (Ronquest-Ross et al. 2014). This was the third largest food category increase observed in the study. Between the period 1999 – 2012, table sauce consumption in South Africa has increased by 73.3%, which shows that consumers are becoming more interested in the product. Tomato sauce consumption in particular has more than doubled since 1999, and mayonnaise grew by 50%. There is therefore a growing market for sauces, dressings and condiments in the region, as the middle class grows. In the past 5 years the major destinations of South Africa sauce exports were Botswana (16.2%), Namibia (14.5%), Zimbabwe (13.2%) and Mozambique (9.9%) (DAFF & Food SA, 2018).

The growing market provides opportunities for SMMEs to enter. In addition to the formal retail market, local sale channels exist through restaurants, hotels and local markets. Moreover, processing vegetables that do not meet size or colour requirements reduce losses. Food SA supports several SMMEs companies that have developed particular brands of sauces, chutneys and jams using own recipes and local brands. Some of these companies have started very small, from household kitchens with limited investments. As they grow, more formal health and processing requirements are put in place to meet market demands.

Intaba Mountain Fruit Processing

Intaba Mountain Fruit Processing has achieved the distinction of being a supplier to Woolworths Food. From pickling to the labelling process, Intaba jams have created new livelihood opportunities for dozens of people living in the Piketberg area in the Western Cape. Intaba Mountain Fruit Processing was started by the Nozala Trust and the Cape Women's Forum, by creating the Izandla Women's Initiative. The initiative is an entrepreneurship and job creation programme specifically aimed at helping women living in rural areas of the Western Cape.



Izandla identified an opportunity by helping unemployed or semi-employed farm workers to produce jam from the fallen fruit of fruit trees in the area. The Nozala Trust paid for the rental of a disused church and bought processing equipment for the women to begin processing this fruit into jams. The Agricultural Research Council provided factory workers with technical training. Intaba came to the attention of the Western Cape Provincial Government. Intaba was incorporated into a governmental program for job creation and funds were allocated to upgrade the facilities to the required SABS standards. Through Nozala, the CSIR was commissioned to give technical support and manage the project. New and advanced equipment was purchased, and the facilities upgraded, providing the means to deliver a unique high-quality product (Tshwarisano, 2012).

Case Study: Tomato Based Products

The tomato is the second most important and popular vegetable crop after potatoes in South Africa. While tomatoes are produced in all provinces, Limpopo has the largest production area at 3,590ha, accounting for more than 75% of the total area planted with tomatoes. It is not only cultivated commercially, but also commonly grown by subsistence, resource poor farmers and home gardeners. It contributed approximately 18.3% (excluding potatoes) to the gross value of vegetable production in 2015. Most tomatoes produced are destined for the domestic market and a small fraction of raw tomatoes and processed tomatoes are exported to other countries. In terms of processed tomatoes, less than one percentage is exported to other countries (DAFF, 2017).

South Africa is a net exporter of tomatoes but fails to meet local demand for tomato-based processed products, especially tomato paste — a gap that points to a lack of industrial capacity in the agro-processing sector. Tomatoes can be canned or processed into tomato puree, tomato sauce, tomato paste and other by-products that need tomato base sauces. The increased demand for tomato paste makes South Africa a net importer of the product, although processors are making strides to address the shortage. The Agricultural Research Council -Institute for Agricultural Engineering reported that in SA, only 10% of the local tomato crop is processed. Of this amount, 85% is destined for the tomato sauce market and 10% for frozen tomato products. In contrast, the US processes 50% of its tomato

crop while Europe processes 30% of its crop. However, it should be noted that the US wants to reduce the percentage of processed tomatoes.

ZZ2 is the largest tomato producer in the southern hemisphere and supply consumers with tomatoes throughout the year, operating mainly in the Limpopo Province, as well as in the Western Cape, Eastern Cape, Gauteng and Namibia. ZZ2 tomatoes are produced in different areas of the Limpopo Province, including Mooketsi, Polokwane, Waterpoort, Pontdrift, as well as near Tshipise along the Limpopo River. It produces tomatoes mainly for the South African (fresh) market (40% of South Africa's total tomato production), but the tomatoes are also exported by independent agents to other African countries.

The Dutch and South African government are collaborating to support the Nwanedi New Generation Cooperative (NNGC) comprising 16 (mainly female) smallholders and ZZ2, South Africa's largest tomato producing company. The project supports new emerging farmers to develop both commercial and technical skills, as well as, an efficient production process of vegetables (mainly tomatoes). The cooperative uses a new organisational model to stimulate entrepreneurship. Different varieties of tomatoes are grown and technical support is provided by Dutch experts and ZZ2. Besides diseases, water is one of the main challenges in growing the crops efficiently. ZZ2 offers good off-take agreements to the farmers, reducing the risk of their investments. NNGC has managed to generate a good return on investment, despite struggling with crop disease. The 16 emerging farmers created employment for 73 fixed and 198 temporary workers.

Small-scale farmers could benefit from the shortage of tomato paste by increasing their production capacity, as there is a guaranteed market. However, most factories require farmers to sign forward contracts for the supply of tomatoes to the processing plants. A processing plant producing hundreds of tons of fresh tomatoes every day requires a precise and constant supply of fresh product (raw material). This requires highly organised tomato harvesting and delivery such that the exact amount arrives at the factory at the right time (not too early or too late). By installing collection pools in the processing plant, short term stockpiles can be made, providing the processing line with a constant supply of product. It is vitally important that the tomato processing line constantly operates at maximum capacity. It is not possible to work at a very reduced capacity, intermittently, or even every other day. Every time the tomato processing line is shut down, all the machinery must be cleaned, with the subsequent loss of working hours, wastage of both a great amount of water and a great deal of product contained in the evaporator.

South African's government has supported various tomato processing industrialisation projects by providing loans and grants. For instance, to the Dursots & All Joy tomato processing plant in Limpopo. The objective is to build manufacturing capacity aimed at creating employment, and supporting small, medium-and micro-sized enterprises. Another example is Famous Brands' investment in Coega.

Famous Brands – Tomato Paste Processing Plant Coega

In 2010, Cape Concentrate built a R200 million state of the art tomato paste processing plant with an output of 350 000 tons per year of fresh tomatoes, which translates to 48 000 tons of tomato paste production a year. However, the factory went into liquidation and was bought by Famous Brands in 2016 for a fraction of the original price (reported at R35 million). Cape Contrate both had difficulties to secure quality inputs at the right price and quantity, as well as, to sell the final product to South African customers.

The business case seemed simple: South Africa imports between 30 000 and 35 000 tons of tomato paste. Moreover, the DTI increased the rate of import duty on tomato pastes, purees and concentrates from 15% to 37% in 2012. Famous Brands was itself importing between 1 500 tons and 2 000 tons of tomato paste per year, which it used for sauce products for its restaurant network. The acquisition of the processing plant was part of Famous Brands' backward integration strategy to secure supply chains.

As there are numerous varieties of tomatoes, it is essential to convince famers to grow the right type of high fibre and low water varieties suitable for processing tomato concentrate. However, it should be noted that tomato concentrate yields R1500/ton, whereas fresh tomatoes can yield up to R5000/ton. Moreover, tomato production in the region is mainly open field and the yield per hectare is only 80 tons. Farmers struggle with water shortage and crop diseases.

Typically tomato paste factories are backward integrated with their own tomato growers. However, Famous Brands only works with independent farmers. Famous Brand advocate for a new approach, comprising of a strategic alliance partnership between local farmers, who will grow tomatoes on contract, and Famous Brands are responsible for providing the customer base, as well as managing the production and route-to-market functions.

Despite all efforts and investments, it seems to very difficult to run profitable large-scale tomato concentrate factories in South Africa. The margin on the product is limited and requires a highly organised supply chain. Growing cannot be done haphazardly and long transportation routes deteriorate the product and are too costly. The incentives for farmers to grow sufficient quantities of the right variety of tomatoes close to the plants seem to be insufficient.

3.3. Dried Fruits

Dried fruit and edible nuts are two different groups of products which are usually traded by the same companies in international trade. The reason for this is their long shelf life compared to fresh fruit and

vegetables and similar storing and handling conditions. Also, edible nuts and dried fruit are used in a similar way: as snacks or as culinary ingredients in bakery or confectionary products.

- Dried fruit is fruit from which the majority of the original water content has been removed. This is done either naturally, through sun drying, or through the use of specialized dryers or dehydrators.
- A nut is a fruit composed of a hard shell and a seed, which is mostly edible. However, in a general context, a wide variety of dried seeds are also called nuts and include some seeds without hard shell (e.g. pine nuts).

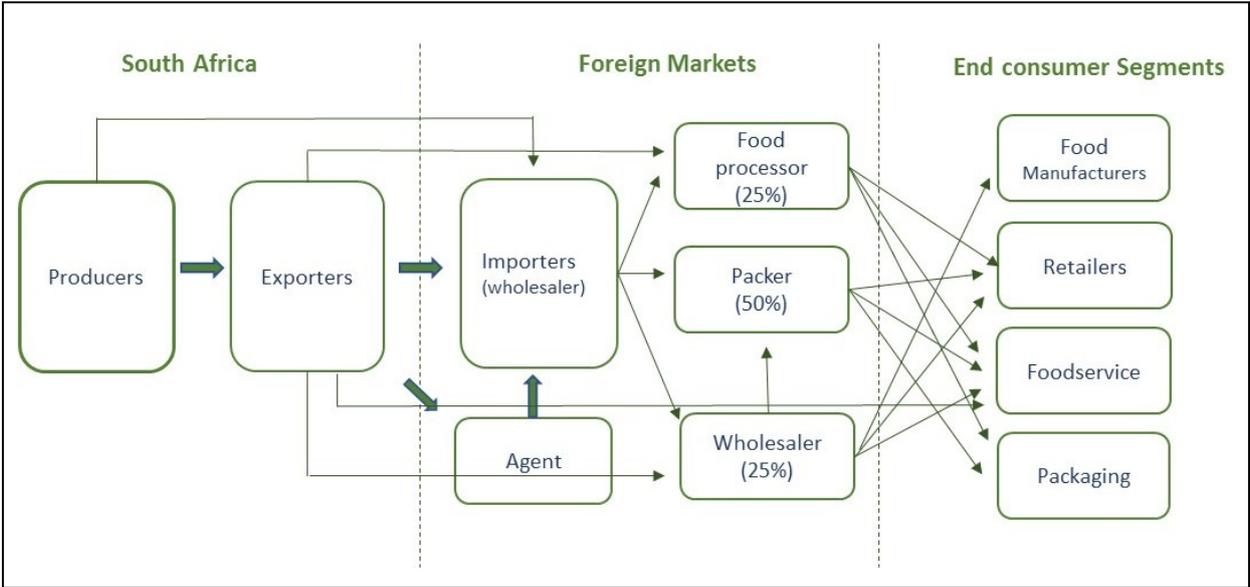
Dried Fruit Production

Agricultural produce that cannot be sold in the fresh market due to lower quality or non-marketable shapes often finds their way to the dried fruit or juice market. Outdoor solar drying does not require a lot of energy, however once more industrial processes are involved, such as free drying or drum drying, the process becomes energy heavy. Only 1% (47 000 tons) of South African fruit production is dried. (Fruit South Africa, 2017).

Production of dried vine fruit increased by 20,1%, from 54 629 tons in 2016 to 65 589 tons in 2017, whilst that of dried tree fruit decreased by 8,8%, from 6 779 tons in 2016 to 6 181 tons in 2017 (DAFF, 2017). Dried fruit is produced mainly in the western and southern parts of the Western Cape Province and the Lower and Upper Orange River areas in the Northern Cape Province. Tree fruit, as opposed to vine fruit, is dried mainly in the Western Cape. The market for dried tropical fruits was particularly challenging during 2017 due to major raw material shortages for many of the categories. There has been a subsequent supply squeeze on many of the tropical dried fruits, but there is hope that will be alleviated soon. However, given the current climatic situation in the country this might not be easily achieved (Foodnews, 2017).

The most important dried fruit products in terms of volume are Thompson seedless raisins, golden sultanas, unbleached sultanas, currants, peaches, pears, apricots and prunes. The quantities of dried fruit produced vary per fruit type, depending on the factors that influence production and the opportunities. Apricots are grown mainly in the Little Karoo and prunes are produced almost exclusively in the Tulbagh District in the Western Cape. Most raisins are produced in the area along the Lower Orange River and currants are mainly from the Vredendal District in the Western Cape. There are a few large players in the dried fruit industry in South Africa, including Montagu Dried Fruit & Nuts, as well as JAB Dried Fruit.

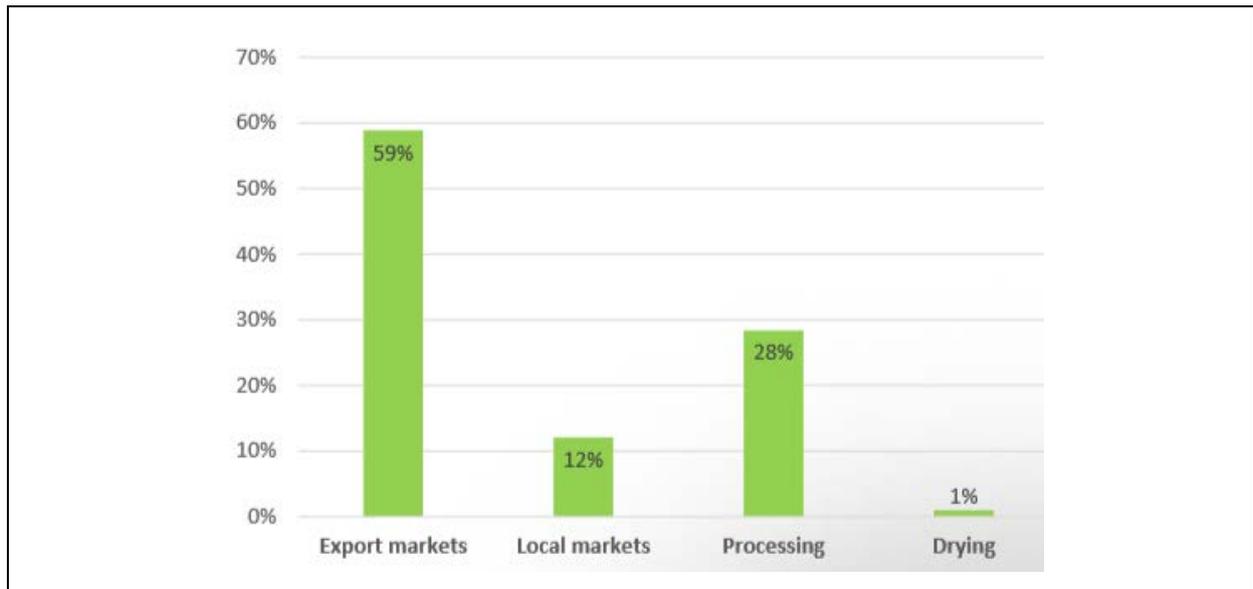
Figure 5: Dried Fruit Supply Chain



Source: CBI, 2017

The dried fruit supply chain as depicted in Figure 5 is segmented in national (South African) producers and exporters, further processing steps (Foreign Markets) and end consumers. The type of high value add in food processing, packaging or wholesale is based on particular end consumer markets requirements and branding. Although in theory it would be beneficial for South Africa to try to progress upward in the value chain, connection with end consumer markets and requirements is key. In terms of the processes used to produce dried fruits, processing factories tend not to invest due to raw material supply shortages. For example, Papaya is often short in supply, whilst mango has limited availability (Foodnews, 2017). There may be potential opportunity to invest in freeze drying technologies as there is a trend in the confectionary industry to use freeze dried fruit in different forms such as: powders, whole pieces, segments and slices. However, at the moment much of the drying is done with small scale equipment.

Figure 6: Fruit processing South Africa, 2016

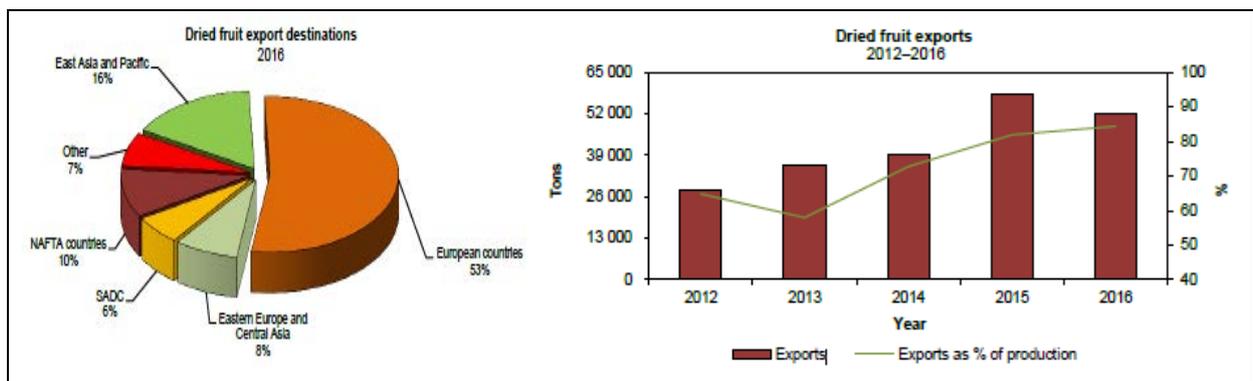


Source: Fruit South Africa, 2017

More than 50% of South African dried fruit is exported. The Perishable Products Export Control Board (PPECB) is responsible for the inspection of exported dried fruit and ensures that there is adherence to quality standards. Exporters are required to obtain a PPECB export certificate. The charts below show dried fruit export destinations during 2016 and exports from 2012 to 2016, respectively.

There is also an increasing demand for dried superfruit such as: dried berries (e.g. cranberry, aronia, mulberry, dried physalis (Cape Goosberry) and powdered dried superfruit (Moringa)(CBI,2018).

Figure 7: Dried Fruit Exports, 2016



Source: PPECB, 2017

Trends in Vegetables and Fruit-Based Snacks

Fruit snacks with simple ingredients, including real fruit and vegetables as the first ingredient, and minimal faux flavours, are being incorporated into snack foods. Traditional fruit snacks labelled as “no sugar added” are often sweetened with high fructose fruit juice or puree, which decreases their nutritional value. Another trend in this realm is fruit and vegetable "jerky," which is dried (and often flavoured) versions of fruit.



Levubu Dried Fruit



Levubu Dried Fruit is an example of a small business that grew from a home industry in 1983, to a busy fruit factory now employing a team of 35 workers. Levubu Dried Fruit is situated in a subtropical valley at the foot of the Soutpansberg in Limpopo Province. Levubu Dried Fruits was first started by Emmie Cloete when she created a dried guava roll. The product was so popular that the business has grown substantially. Now producing dried guava, banana, pineapple, mango and other tropical fruit products, Levubu Dried Fruit has buyers throughout South Africa. Guava's are grown on the farm, whilst other fruits are sourced from the surrounding area. Levubu Dried Fruit dry their fruit using a combination of air drying in tunnels and sun drying. The factory employs workers from the rural areas surrounding Levubu and train each individual in their specific task. Local skill development is pertinent to the success of this South African SME (Levubu Dried Fruit, 2018).

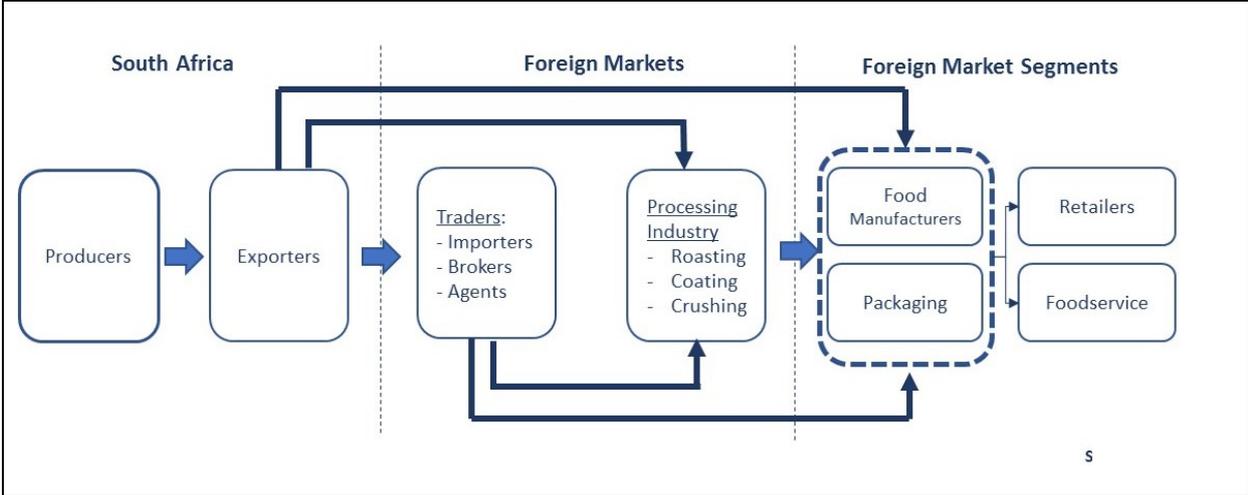
3.4. Nuts

Nuts Supply Chain

The nut industry worldwide is growing on the back of improved lifestyles and a desire to eat more healthily. According to The Agri Handbook (Macaskill, 2017), South Africa has the climate and the ecology to become a recognised producer and value-added processor of most nuts. The harvest time in the southern hemisphere is ideally suited too, just before the main global market demand at Christmas. The predominant tree nut crops grown in South Africa are macadamias and pecans, of which macadamia is by far the largest volume. South Africa competes with Australia as the world's largest exporter of macadamia nuts. However, most nuts are exported without any further added value in SA.

Efficiency up and down the value chain, together with benefits achieved through scale of economy and aggregation models, allows most South African value chains to be globally competitive. This is best illustrated by South Africa being a net exporter of both primary and secondary (processed) dried fruits and nuts.

Figure 8: Nut Supply Chain



Source: CBI, 2016

Generally speaking South Africa is not a large player in the international tree nut market, but locally demand is outgrowing production. In 2012, more than 7000 tons of nuts were imported. According to Montagu Dried Fruit and Nuts, one of South Africa’s largest nut importers and suppliers – the local market’s hunger is far from satisfied (Farmer’s Weekly). However, the challenge with expanding the nut industry is twofold: there is a lack of processing capacity, and not enough nuts being produced to supply the critical volume that would make investment in processing facilities viable.

Lack of Processing

Although there are processing companies in South Africa, statistics show that many raw nuts are exported without any added value. For example, in Pecan Nuts: the majority is sold NIS (nut in shell) to China, where the value is added (USDA, 2017). In the sector of edible nuts and dried fruit the specialised importer is the preferred channel for market entry. Many importers are also packers and also conduct trading and wholesale activities. Generally, more dried fruit is being repacked for the retail industry and more nuts end up in the food manufacturing industry. However, the volumns in channels are different for specific products (CBI, 2017).

Current technologies used in the nut processing industry is quite basic, although a few projects are currently implementing more advanced machinery and equipment. Technology wise, it is mainly the

larger farmers who process nuts, have their own processing equipment, and source produce from smaller farmers.

Food Safety

The regulatory landscape regarding nuts has changed tremendously over the last 10 years, particularly since the mandated pasteurization of Almonds was introduced in the US in 2007 following food borne illness outbreaks. The tree nut industry is prepared for major changes in food safety with the implementation of the Food Safety Modernization Act (FSMA) in the United States which impacts not only domestically (US) produced nuts but also concerns producing countries around the world. In the EU and worldwide similar food safety requirements are being implemented affecting the processing value chain. Pasteurization of nuts is becoming the norm in the nut industry as processors adapt to increasing regulatory constraints and industry demands. Many processors are choosing to bring a pasteurization process in house rather than send their products to third party for treatment. Some companies from the Netherlands, such as Royal Duyvis Wiener, have a particular expertise in assuring food safety requirements in nuts processing.

Local Market

South Africa's internal market is also asking for more healthy and affordable food. Retailers in particular are making an effort to source locally. Nevertheless, most emerging farmers in South Africa don't comply with any standards of production, despite the SIZA (Sustainability Initiative of South Africa). On the other hand, most packers do comply.

There is opportunity and potential in the nut processing industry in South Africa, but farmers are cautious about investing in nuts when the processing infrastructure is not in place. There is currently some capacity to process pecans, macadamias and almonds and with this potential, it is not surprising that the National Development Plan has singled out the nut sector as one of the smaller, labour-intensive industries with huge expansion and labour creation potential.

Export Markets

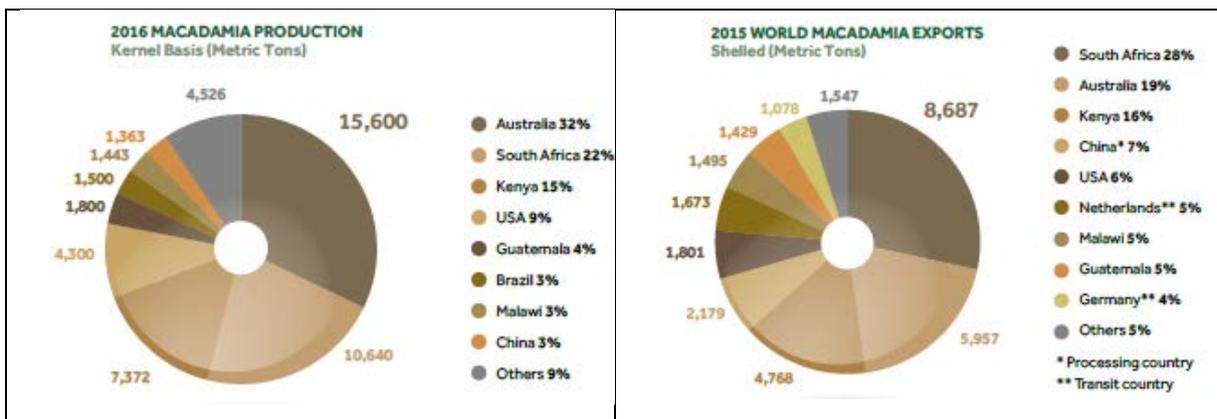
The Netherlands, Germany, United Kingdom and France offer opportunities for exports of edible nuts and dried fruit from South Africa. The United Kingdom is the largest European importer of edible nuts while Germany is the largest European importer of dried fruit (CBI, 2017). Besides these large markets, opportunities can be found in the growing markets of Central Europe. The demand for almonds, brazil nuts, hazelnuts, macadamia nuts and dried prunes is rising. The future outlook of the export of edible nuts and dried fruit to Europe is positive in the long term and it is expected that exports will continue to increase in the coming years.

Case Study - Macadamia Nuts

With the largest harvest in 30 years, South Africa has become the greatest producer of macadamia nuts in the world (BizCommunity, 2018). The South African market is largely driven by exports. Over 80% (8687/10640 Mts) of the product is exported as shelled without extra processing steps (INC, 2017). In 2017 more than 50% was exported as nut in shell to China, with only limited processing taking place in South Africa (drying and bagging as bulk commodity).

Macadamias South Africa NPC (SAMAC) forecasts the 2018 harvest at 52 412t (September, 2018) a significant improvement on the previous two season's crops of 38 000t and 44 610t for 2016 and 2017 respectively, which were severely reduced due to a drought period. The kernel market is also gaining more prominence, as up to 65% of the South African crop is expected to be processed to kernel. This 15% higher than 2017, when 50% of the crop was exported as in-shell.

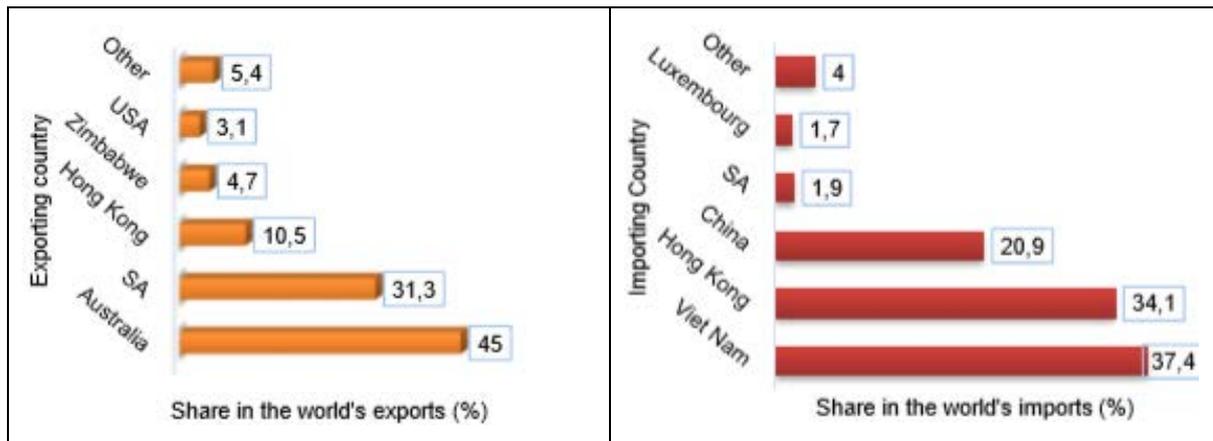
Figure 9: Macadamia Production and Exports, 2016



(Source: INC, 2017)

Overall 90% of the world's export is going to Asia, mainly for further processing. A few of the large players in South Africa are: JAB Fruit (www.jabfruit.co.za), Bex Group (www.bester.co.za), GreenFarms Nuts Company (www.gfnc.co.za).

Figure 10: World Exporters And Importers Of Macadamia Nuts In Shell, 2016



Source: Trademap, 2016

Green Farms Nuts Company

Green Farms Nuts Company (GFNC) is the oldest active macadamia processing and exporting company in South Africa and is part of the largest global macadamia marketing company, Green & Gold Nuts. According to Alex Whyte, general manager of Green Farms Nut Company (GFNC), the South African industry does not have sufficient ability to process its entire crop (BizCommunity, 2018). By building the largest under roof macadamia processing facility in the world in White River, Mpumalanga, GFNC gets more control over how the product is marketed. It is seen as a key step for a sustainable future for both GFNC and the South African macadamia industry and is warranted by local macadamia production. The macadamia production forecast for 2018 is 54,000 tons and is projected to double in the next five to seven years.

The new 10,000 m² facility has a long-term capacity of handling up to 25,000 tons of macadamia and increases GFNC's processing capacity by 40%. It includes state-of-the-art technology and sterilisation techniques. These technologies drive higher efficiency and help to reduce water and electricity usage. For instance, state-of-the-art optical sorters will drive efficiency through increased processing speed. Part of the new developments will be to use the old factory to establish value-adding capabilities, such as roasting and manufacturing oil.



3.5. Indigenous and Niche products

In South Africa commercial agriculture land use activities has mostly focused on growing traditional crops. However, the new generation of rural farmers are struggling to compete with commercial traditional agriculture and therefore need to investigate new, alternative and niche crops to become competitive. New crop development is needed to create opportunities for sustaining livelihoods, and to develop strong linkages between agriculture and the rest of the economy (Reinten and Coetzee, 2002). The Department of Social Development, The Department of Agriculture, Forestry and Fisheries and The Department of Science and Technology all mention indigenous crops in their policies relating to job creation, sustainable agriculture and food security issues, respectively.

Indigenous food crops refer to crops that have their origin in South Africa (DAFF, 2013). These crops are produced and found growing in the country under various weather conditions with many found in the wild. They are divided into three categories; namely grains, vegetables and fruit. Most of the indigenous crops are less researched, grown on a small scale, or collected from the wild and mostly not marketed. One of the greatest benefits of growing indigenous crops is that they are relatively adapted to the climate and land of the regions in which they grow naturally. For example, crops like millet and sorghum are more drought tolerant than maize. These crops are also able to give a good yield under low input conditions (DAFF, 2002). Furthermore, it has been documented that some of the indigenous food crops are as nutritious as the exotic food crops in some cases even more. There are therefore opportunities worth researching to expand upon the potential of processing indigenous crops in South Africa.

Agro-Processing and Indigenous Crops

South Africa's indigenous product market is very small by global standards, with very little processing and value-addition taking place. Although there are examples of some primary processing, such as drying of honey bush and packaging and refrigeration of certain berries, the processing of raw indigenous crops in South Africa is very minimal. Most indigenous crops are grown and sold on the informal market, with consumers being from the poorest households. The products are mostly sold raw, with extremely limited packaging and usually little to no further processing. Value addition might be possible for these products, but this would require research into product development and subsequent marketing and branding of these products as to make the product more desirable to a wider variety of consumers and markets.

Government Policy and Indigenous Crops

In the Department of Social Development and Department of Agriculture, Forestry and Fisheries' National Policy on Food and Nutrition Security, indigenous foods such as amaranth and amadumbe are

identified as integral in ensuring that households consume more diverse diets and are consuming all necessary micro-nutrients. It is also believed that increased consumption of indigenous foods will induce their production and assist in the creation of markets for these commodities, which will in turn enhance rural economies in South Africa (NDA, 2013). Indigenous food crops also feature in the Department of Science and Technology's Bio-economy Strategy and the Department of Agriculture, Forestry and Fisheries' National Policy document on Sustainable Agriculture (DAFF, 2018). The promotion of indigenous crops is identified as key variable in South Africa's sustainable agriculture policy, as well as the adoption of indigenous conservation and rehabilitation practices and farming systems (DAFF, 2018).

Case Study Indigenous Crops: Honey Bush



Honey bush tea is a young, but growing industry that is unique to South Africa. Honey bush tea, like rooibos tea, is regarded as the healthy alternative because they are both caffeine-free and high in antioxidants. Honey bush, which is a naturally sweet tea, has additional appeal because of the growing global awareness of the dangers of excess sugar consumption. There is also evidence that it may be effective in the treatment of diabetes (WWF, 2016). Honey bush is used to make a beverage and a medicinal tea. Honey bush extracts can potentially be used in the food and beverage industry as flavourings in ready-to-drink beverages such as iced tea, fruit juice blends and sweets. Honey bush tea is potentially used by the cosmetic and pharmaceutical industries and can also be used to fight cancer, headaches, depression, cardiovascular problems, high cholesterol a host of other ailments (DAFF, 2016). The seeds can be used to make tea oil.

Due to its growing popularity around the world, there are opportunities for more farmers to start growing this indigenous crop (SAHTA, 2018). The honey bush industry has the potential to emulate the success of the rooibos industry. South Africa's honey bush industry is still very young and produces an average 394 tons per annum (dry tea). A key problem is that 82% of honey bush tea is wild-harvested and only 18% cultivated. The plant grows naturally on wetter and cooler southern slopes of mountains (SAHTA, 2018). There are three Honey bush processors who export directly in bulk and value-adding processors who export directly in bulk. Future customers of Honey bush tea are UK, Japan, Germany and Switzerland. The South African Honey bush Tea Association (SAHTA) is the representative body that coordinate activities in the industry and aims to help more farmers to grow and market honey bush successfully, and to ensure that farming and wild-harvesting is done sustainably (SAHTA, 2018).

The current demand is primarily for export. Annual honey bush production has increased from 200 tons in 2011 to more than 300 tons in 2016, at a price of approximately R58 – R76 per export kilogram, and demand considerably exceeds supply (WWF, 2016). Most of this crop is exported to countries such as the Netherlands, Germany, the UK and the USA. The herbal tea market is escalating worldwide, and South Africa's indigenous rooibos and honey bush teas are increasingly prized in not only the traditional European market, but also in new markets in the United States, Canada and China (WWF, 2016).



Challenges and opportunities

Given that most indigenous crops in South Africa have never been cultivated at a large scale before, agricultural experts recommend that it is best to start with a small crop and scale up production over time. In the first year of business, there will need to be a lot of market research conducted, to determine the actual size of the market and the demand for the niche indigenous products. Experts also recommend that disease resistant or tissue material would be worth exploring. Little is known about pest and diseases affecting indigenous crops, but indigenous knowledge systems can be interrogated, and a breeding programme could be established such that disease resistant/high yielding varieties are selected. Strong market research and marketing efforts would be required, especially when it comes to value-addition through processing (AfricaBio, 2017).

There is high demand for certain indigenous products locally in South Africa, with particular crops, such as African Ginger, fetching premium prices. The commercialization of indigenous crops may have associated socio-economic benefits, especially since many of the products are only available in South Africa and can therefore be exported. There are definite opportunities for value addition and export of indigenous crops, and with very little competition in that there are very few market players – there is huge potential here. However, there are considerable challenges in growing, processing and marketing indigenous food crops (AfricaBio, 2017):

- **Shortage of seed and other propagating material.** There is no formal seed supply system for many indigenous crops
- **Increased decline in consumption and production.** There is a shift among younger South African generations towards less nutritious foodstuffs due to lifestyle changes and assumptions about desirable eating habits.

- **Lack of value-adding technologies.** Indigenous crops are largely consumed unprocessed. The popular value addition is drying or processing into flour through pounding. Lack of processing technologies makes it difficult for the sector to cater for changing needs of consumers.
- **Marketing problems.** Both local and export markets are flooded by exotic crops making it difficult for the introduction of indigenous crops. As a result, indigenous crops remain largely crops of the small producers, consumed largely in areas where they are produced. Lack of general public awareness of indigenous and niche crops and their uses.
- **Threatened species.** A lot of the vegetables and fruit occur under natural vegetation, risking over-exploitation, which is aggravated since little effort is done to cultivate these species.
- **Unrecognised nutritional value.** Poor consumer awareness of the nutritional and taste value.
- **Reputational problems.** Certain indigenous foods are seen as food for “poorer” people.
- **Lack of knowledge.** Little is known on the extent of damage from pests and diseases, and many indigenous crops have not been successfully commercialized at a large scale before. There are not even be many indigenous crop specialists.
- **Regulation.** There are often permits required to cultivate and trade certain indigenous crops.

Trends in The Netherlands

Consumers are demanding safer, more hygienic and healthier foods. While the share of conventional fruit juices in western markets is declining, a growing number of vegetable and superfruit based juices can be found in the beverage section of supermarkets. Similar developments can be noted for non-traditional fruits and vegetable that have been accredited with particular health benefits. Moreover, food products that have a history or story behind it, have an additional appeal to certain consumer groups. Specialist importers and SMMEs cater for these consumer groups. Linking these types of companies to South African SMMEs active in a similar field could be beneficial to both sides.

Seaweed Production and Processing In One Hand

Wild harvest of seaweed is not sustainable because the global demand grows every year, while seaweed is not an unlimited resource. It forms our underwater rainforest, so we cannot afford to keep removing incremental volumes counting many million kilos, every year. Therefore, it might be an interesting crop to cultivate, process and sell. In 2013, Zeewaar founded the first seaweed farm in the Netherlands and it has been actively farmed ever since. Zeewaar believes in sustainable seaweed cultivation because it is good for people and planet.

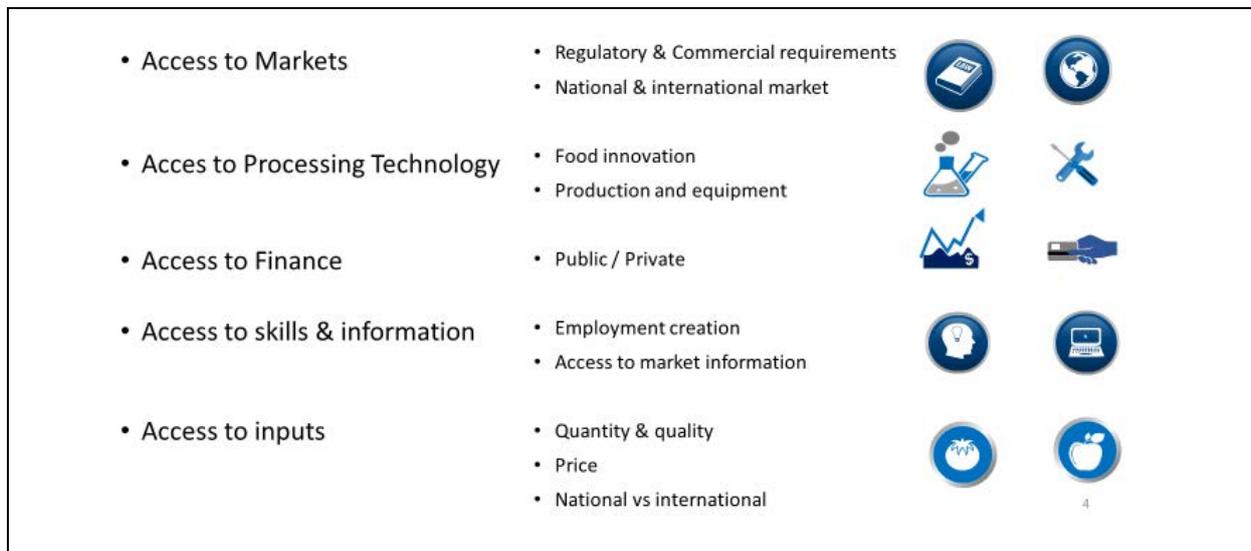


4. Challenges in Processing Fruit and Vegetables

4.1. Factors Influencing (SMME) Growth in Fruit and Vegetables Agro-Processing

Given the diversity of the sub-sectors that make up the agro-processing industry, the challenges facing the industry are relatively sector-specific. Moreover, South Africa has a dual agricultural economy, with both well-developed commercial farming, and more subsistence-based production in the deep rural areas. However, during the interviews and focus groups the following factors were consistently validated as being the most important factors influencing growth in the South African agro-processing.

Figure 11: Factors Influencing (SMME) Growth in Fruit and Vegetables Agro-Processing



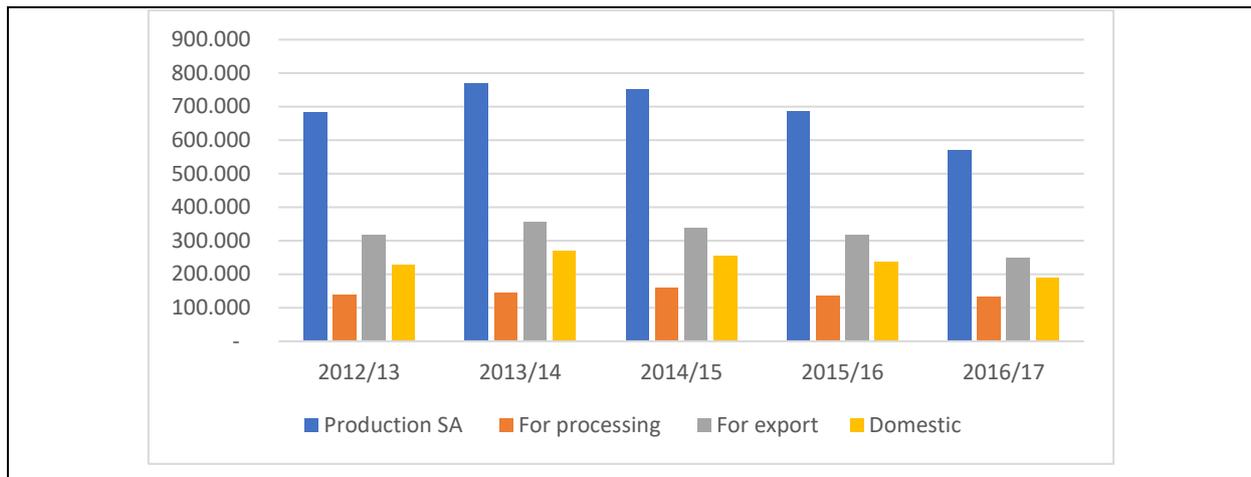
Source: Authors own.

4.2. Common Challenges in the Fruit and Vegetable Sector

Decreasing Number of Farm Owners and Availability of Fruit

Over the years the number of farm owners have decreased, as the market is dominated by a few companies who own most of the producing farms. This has a consequence on the available product for processing and export. The decreasing fruit supply in combination with high post-harvest losses creates pressure on the market of raw materials.

Figure 12: Tropical Fruit (Tons)



Source: DAFF, 2017

Since product is not always available throughout the year, processors are forced to either import products with different seasonal patterns or be flexible and use multi-functional equipment which can be used for other products. The sourcing is mainly via a few large farmers in combination with many small farmers.

There is a lack of security of fruit supply into fruit processing, as it competes for raw material with the fresh local and export markets. Most of South African premium quality fresh fruits are exported at high prices and the remainder are sold on the local market, where they are purchased by most South African consumers who cannot afford processed / convenience food products. This leaves little fresh fruit for input into agro-processing industries since it makes more economical sense for producers to export fresh fruit compared to producing fresh fruit for agro-processing products. As such, fruit processing companies are often vertically integrated into farming to ensure security of fruit supply (IDTT, 2017). It is therefore required that the primary, basic and advanced processing sectors of agro-processing move in tandem, to maximise the whole business model. If the fresh fruit supply grows, more inputs will be available for (large scale) fruit processing. This will bring down production costs and open opportunities to supply both local, but also foreign markets.

One of the success factors that determine the viability of the agro-processing industry is the availability of raw material supply throughout the year. The lack of raw material supply that meets production capacity and the frequent changes in the volume of supply are some of the most overarching obstacles hindering the growth of food processors. In addition to the supply of raw materials, the volatility and high cost of inputs also challenge the viability of the industry. In terms of SME processors, the lack of storage capacity puts them in a disadvantageous position relative to big processors who can mitigate the effect of erratic supply by storing during the harvest season.

In addition, agro-processing industries may find it increasingly difficult to source agricultural inputs for their production processes locally, while imported alternatives may be substantially more expensive in light of the weaker Rand. The ability to pass higher input costs on to consumers is limited, for household budgets are already under strain (DAFF, 2012).

Growth of the fruit sector is highly capital intensive and depending on the fruit type, an average estimated cost for establishment of an orchard is R250 000 per hectare with an annual maintenance cost of R40 000. Considering most fruit trees take 5 to 7 years to bear fruit, cash-flow becomes an important success factor. This is especially challenging for small holder farmers (APAP, 2014). Access to raw materials can also be challenging for newcomers, and scale is needed to compete with the world market. It is therefore difficult for new producers and agro-processors to break into the domestic or global market.

Natural Resources and Water-Scarcity

South Africa is a water-scarce country and is characterised by variable rainfall and increased frequencies of drought conditions affecting agricultural production. Given the scarcity of water and fertile land for growing crops, it is crucial that production focuses more on crops that generate the highest value to the economy. The lack of investment in irrigation in South Africa threatens the production of fruit, and since irrigation accounts for 63% of surface water use in South Africa, investment in irrigation would only put further strain on water availability (Cramer and Sender, 2015; IDTT, 2018).

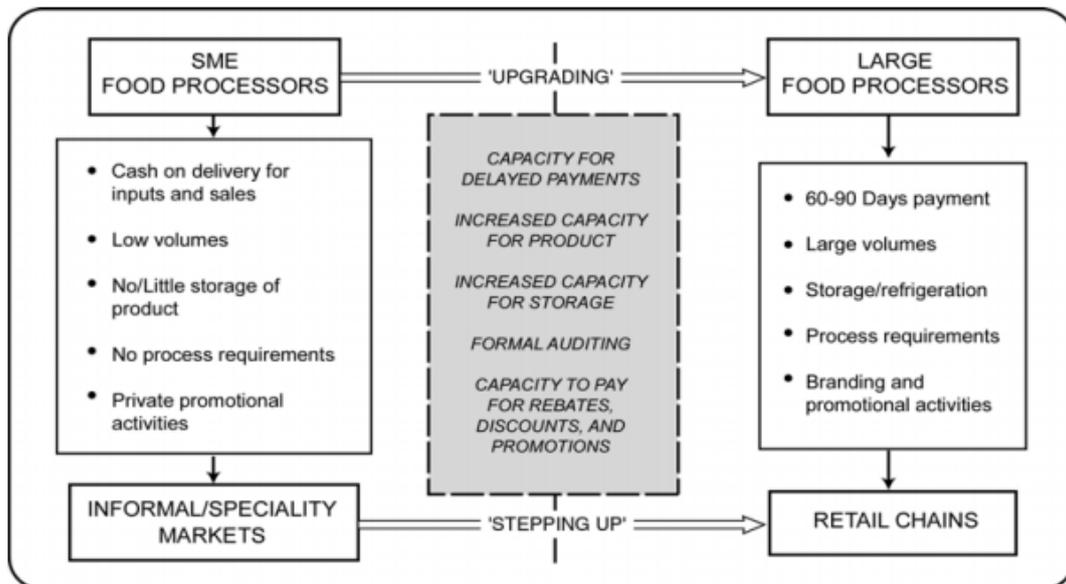
Agriculture often puts strain on natural resources, as it can lead to a loss of biodiversity, increased invasive species, freshwater depletion, soil degradation, destruction of habitat, and increased chemical pollutants from pesticides and herbicides. Agriculture and agro-processing could reverse this trend if more sustainable practices were employed.

4.3. Access to Markets – South African Retailers

The South African supermarket industry is concentrated with only a handful of large chains holding majority of the national market share collectively in formal markets. This limits the options that agro-processing firms have in supplying their products and makes them vulnerable to the abuse of buying power of large supermarket chains. The compulsion to comply with stringent regulations and standards, in addition to the apparent need for a consistent and large volume of supply of outputs by the processor industry, puts South African processors, particularly SME processors, in unfavourable positions to access the retail market. Standard requirements imposed by the retail sector are onerous, meaning that a huge 'step-up' investment is needed to qualify to be a listed company for the retailers.

Upgrading from local to retailer suppliers doesn't follow an incremental growth path by SMMEs. Another obstacle for smaller processors is the 'buying practices' unique to each retailer, such as delayed payments, discounts and rebates. These can be very challenging for most SMME producers (DAFF, 2012).

Figure 13: SME Food Processors Market And The Upgrading Needed To Access Retail Chains



Retailers have an important role in driving growth and development of agriculture and agro-processing value chains in South Africa, because they are a key channel to get fresh and processed food products to consumers. South African supermarket chains have grown and spread in urban areas as well as into low-income and rural areas. All the main chains operating in South Africa – Shoprite, Pick n Pay, SPAR, Woolworths, Game and Fruit and Veg City, in addition to chains from other countries in the region such as Choppies – have also spread into the southern African region. This presents important opportunities to access wider consumer bases in markets beyond just South Africa for agro-processors, allowing them to build scale and develop capabilities. Supermarkets are therefore potentially strong catalysts in stimulating food processing industries in southern Africa.

A key opportunity may lie in easing access routes to markets for all scales of farmers and food processors. Since South African retailers are expanding into the southern African region, and this could provide a wide network of markets for smaller-scale producers. Government appears to be on board with programmes such as the Department of Trade and Industry's Supplier Development Programme. This programme aims to integrate smallholder farmers into supply chains by increasing procurement of smallholder farmers' produce by large retailers and processors. The development of focused supplier development programmes, as well as guides on codes of conduct to build relationships

between suppliers and supermarkets, are important to develop supplier capabilities and to ensure the sustainability of suppliers.

In order to support SMME's and their access into the mainstream retail market, some of the larger South African retailers, such as Pick 'n Pay, Woolworths and Shoprite Checkers have 'Buy Local' initiatives and SMME development programmes. Major supermarket house brands as well as shelf space for SMMEs are ways in which small-scale processors can access the larger retailers (IDTT, 2018).

Pick 'n Pay – *Pick Local* Initiative

"Small business development in the retail sector, particularly of black and women-owned businesses, is essential to grow our economy, drive employment and empower individuals. A diverse supplier base is important in ensuring we have a broad variety of products to meet customer needs and a strong pipeline of innovation (PnP, 2018).

Sage Kitchen

An example of Pick 'n Pay's "Pick Local" initiative is Sage Kitchen. The business started out in a husband and wife's family kitchen, where they enjoyed cooking and making vegetable, fruit and herb based pestos, relishes and jams as a part-time activity. Now the business is supplying to Pick 'n Pay as part of the retailer's "Pick Local" product range. Pick 'n Pay state that one of their core underlying principles is "Doing Good is Good Business" (PnP, 2018).



Sage Kitchen grew its business by supplying to local and regional coffee shops, restaurants, hotels and specialty outlets such as butchers. This is where their base and growth model comes from. Stepping up to supplying Pick 'n Pay or Spar is the next step in their journey. This has been possible due to a rigorous quality standards and HACCP accreditation by the South African Bureau of Standards.

Woolworths - Enterprise and Supplier Development programme

“The Woolworths Supplier and Enterprise Development (SED) programme has been designed primarily to support emerging small and medium sized business in the Woolworths supply chain. This is used as a tool to remove barriers of entry into our supply chain for small, medium, black and black women-owned enterprises” (Woolworths, 2018).

Inspired Leaf

Inspired Leaf, owned by Jimmy Botha supplies Woolworths with baby spinach, rocket, wild rocket and basil. Ten years ago, a former telecommunications worker followed his dream to become a farmer. He joined the Woolworths Enterprise and Supplier Development programme in 2013, and with financial assistance from Woolworths along with mentorship and investment from neighbouring farmers has been able to expand his operations and become a Woolworths Farming For the Future supplier (Woolworths, 2018).



Shoprite Checkers – Local Suppliers

The Shoprite Group gives entrepreneurs and SMMEs access to economic opportunities by providing suppliers with access to the market. A large percentage of Shoprite’s fresh produce suppliers are small-to medium-sized businesses, with more than half of them delivering on contracts worth less than R500 000 a year (Shoprite Group, 2018).

Elias Pangane Vegetables



Elias Pangane, a vegetable grower from the Hazyview community in Mpumalanga, has seen his business expand since doing business with Shoprite. Pangane started out selling vegetables to tourists and locals along the side of the road, but since joining Shoprite’s local buyer initiative, supplies butternut, green beans, chilies and tomatoes to stores across the Group’s Gauteng division (Shoprite Group, 2018).

Despite these various positive examples of individual success stories, the SMME focus group has also shown that experiences in working with large retailers differ widely. For instance, Pick ‘n Pay has two central logistics centres and takes care of the distribution to individual stores. On the contrary, Spar

as a decentral model, where vendor listing only leads to being registered, but Spar store owners still need to be contacted and supplied individually. Moreover, some retailers allow companies to keep their own brand and marketing, giving opportunity to grow their business further in other markets. Others only allow to supply under the retailer's brand, limiting brand recognition. The scalability of the local supplier approach is not clear. It seems that for instance Pick 'n Pay supported two cohorts of local suppliers of which only a very limited number of companies managed to get their product in stores (of which Sage Kitchen is one). It is unclear whether new cohorts are started again.

4.4. Access to International Markets

Export-focused producers in the processed food sub-sector face challenges that are related to developed-country trade policy, including subsidies and tariffs. Africa is driving most of South Africa's agro-processing export growth. However, the country is facing competition from China, the EU, India and the USA in Africa for agro-processing products, and this poses a threat on the rate of trade reforms. South Africa needs to raise its competitiveness to increase and sustain its market share in international markets (ITAC, 2016).

At the same time, producers primarily focused on supplying the domestic market, such as soybean processing, fruit juice, and processed food sub-sectors, face heightened competition from imports. Increased import penetration has coincided with rising domestic cost pressures resulting from a range of production inputs, including electricity and water, road transport, fertiliser and seed costs. The resulting margin squeeze has led to some employment losses, increased labour strikes, and under-investment in productivity-enhancing measures and plant level maintenance (ITAC, 2016).

Analytical Services Laboratories

For companies to get fully certified and accredited to supply any country in Europe, protocols and host country standards can be prohibitive and even block entry. There is a need for strengthening access to global markets for local agricultural products. In aid of this goal, the infrastructure and equipment for the analytical services laboratories are being upgraded. Laboratory accreditation should be attained to ensure analytical test results are internationally recognised. This is expected to strengthen global market access by providing assurance to global trading partners that the country's products meet technical standards for human safety and food quality. Furthermore, inspection services are strengthened to increase capacity at ports of entry to improve plant and animal quarantine services (Treasury, 2018).

The export-oriented fruit industry, is accompanied by stringent import regulations in international markets in the form of import tariffs, import permits, and sanitary as well as phytosanitary standards constituting key barriers to trade in fresh fruit. Governments often lack the capacity and skills to

provide support and regulatory services required throughout the value chain up to the point where fruit is ready for export markets. For example, DAFF which is mandated with conducting independent inspections lacks capacity to enforce standards and ensure compliance, and often uses assignees such as the Perishable Products Export Control Board to perform these functions (Chisoro-Dube et al. 2018).

Clearly the current (public) testing and laboratory facilities in South Africa are not up to par and underperforming. Initiatives for privately owned laboratory services exist, but they have to compete with publicly funding institutions. At the same time, many of the top producers or processors have either their own facilities, or send samples for testing to e.g. the Netherlands. Wageningen University in The Netherlands is working on developing mobile labs that could be used in this context.

Lack of Infrastructure and Regulation

The industry's growth, and the participation of smaller farmers specifically, has been limited by lack of adequate infrastructure; including transport, storage facilities, and pack-houses. This leads to delays and disruptions in the cold chain, while also limiting entry and expansion into export markets. This in turn influences meeting global quality and sanitary standards, as well as phytosanitary regulations (IDTT, 2018).

4.5. Challenges for Agro-Processing Companies

Lack of appropriate Agro-processing Technologies

Large scale (export-oriented) agro-processing companies use top of the bill (European) processing equipment to meet stringent (export) demands. In contrast, for SMMEs there is a lack of appropriate technologies suited to start-up agro-processing plants. Often this has to do with the lack of year-round availability of product in addition to the fact that not many companies have the market knowledge, ideas and financial means to invest in the next steps required in the supply chain. Another observation identified by one of our interviewees is that processors often make use of older equipment and machinery and there can be a tendency for them to stick with only known suppliers, which leaves little room for flexibility and innovation (Sterras, 2018).

Transparency / Traceability

Possibly one of the most important food trends in 2018 is transparency and traceability, especially in the case of product labelling. Retailers (such as Woolworths, Pick 'n Pay) as well as consumers are interested in the real story behind their food, and how that item made its way from the source to the store. GMO transparency is normally a primary concern, but shoppers also seek out other details, such as Fairtrade certification, responsible production and animal welfare standards (USDA, 2018).

Access to Information and Skills

Overall knowledge and information transfer about market opportunities is slow, scarce and outdated. Inadequate Customer relationship management (CRM) systems exist within these organisations and there appear to be limited networks with South African foreign offices. There is definite lack of knowledge transfer and network with information service providers and this is problematic since there is a real need for improved specialised skill development.

European agencies such as the Netherlands based Centre for the Promotion of Imports from developing countries (CBI)⁴ and the Swiss Import Promotion Programme (SIPPO)⁵ offer very relevant market intelligence reports. Unfortunately, many (aspiring) SMMEs agro-processing have little to no knowledge of these available information sources.

Finding qualified personnel with the right skillset and experience is a common challenge in South Africa. Although agro-processing provides great potential for employment creation, SMME's are faced with the high cost of finding, training and retaining suitable staff.

Developing the capabilities that are required to participate in global markets entails identifying the technological and human capabilities required for processing. Greater support in terms of training, skills and technical knowledge is essential for fruit farmers and processors to take advantage of the growth in global demand for fresh fruit and confectionery products, and industry associations need assistance from government in doing so (IDTT, 2018).

Access to Finance

In South Africa, SMME's often have very limited access to finance, and this is a major bottleneck for business operation and expansion. The main reason that precludes them from accessing finance is the high collateral required by financial institutions owing to the high-risk profile attached to them and the inability to provide a track record of financial statements. Due to lack of access to finance, SMME's cannot invest in agro-processing facilities and only larger players are able to set up suitable facilities. Discounts or price reductions could be used in the supply chain as a source of funding, although this is not easy to execute. Entrants and existing players in the agro-processing business are facing significant challenges in accessing development finance, an important factor to enter and grow in these value chains. There is therefore need for the provision of patient capital from institutions and funders to assist SMME's with start-up costs (IDD, 2018).

⁴ www.cbi.eu/market-information/

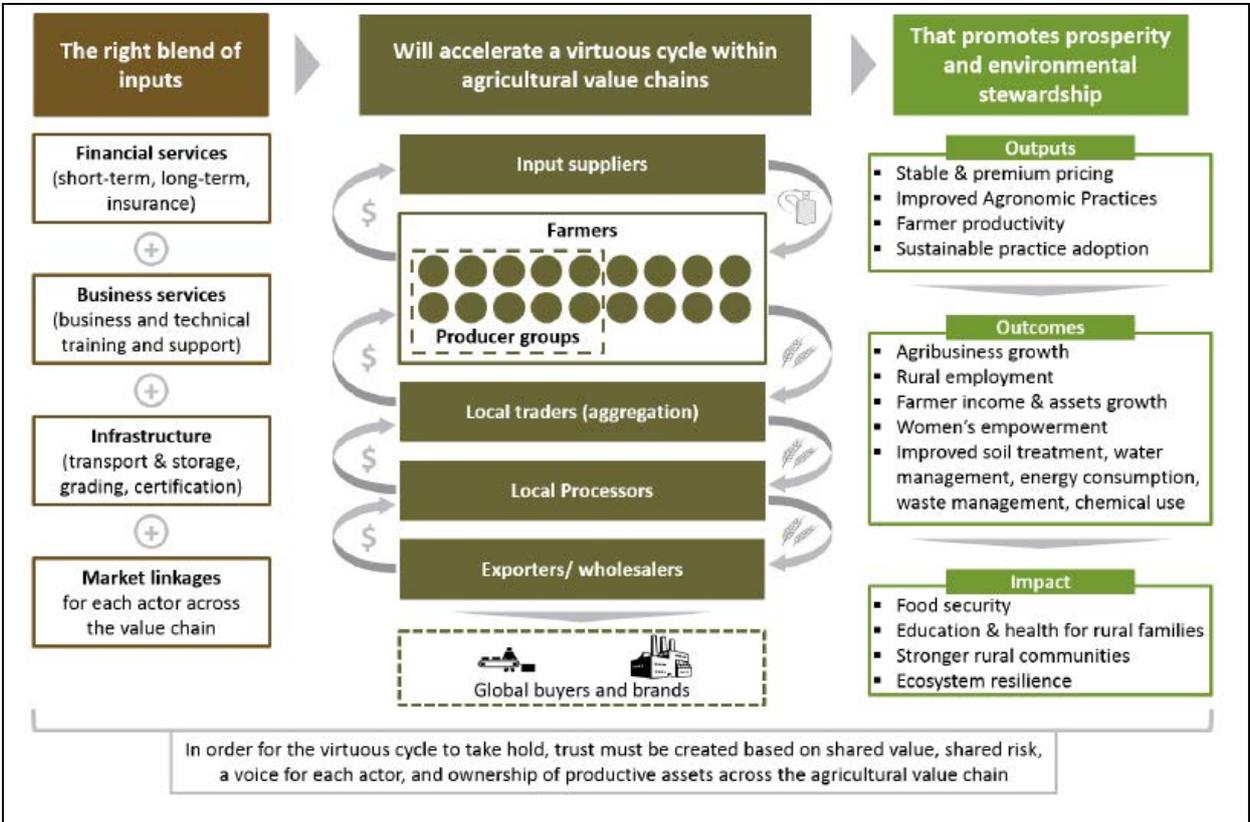
⁵ www.sippo.ch

Loyalty and the Black Hole Effect

Although there are many food processing companies that try to care for their farmer network, a black hole exists in the food sourcing process. After a food sourcing company contracts a farmer, it has none or minimal overview of what exactly happens on farmers' fields during the production process until the time of delivery. If farmers do not perform well and do not deliver the desired quantity and quality, the food sourcing company is pulled into this black hole, which could affect the time of delivery, quality of outputs, and customer satisfaction. The sourcing company usually pays the higher price for a late order of produce at desired quality level if they can afford it (Farming Portal, 2015).

Recruiting and training a farmer is a significant investment whose return depends on the loyalty of the farmer, measured either by farmer’s respect of their engagement (e.g. no side-selling, on-time repayment of loans), or by their continued involvement with the organization working with them (i.e. limited churn rates). Farmers loyalty behaviour is obviously not driven by their character or morality, but rather by circumstances. Convenience and transparency can also drive loyalty and reduce side-selling (Hystra, 2017). A way to change the approach and aim for a long-lasting relationship is creating a mutual beneficial long-term relationship. Experts designed a theory of change to tackle this challenge. See the model below:

Figure 14: Universal Theory of Change



Source: *The initiative for Smallholder Finance*

4.6. Summary Gap analysis

GAP	GAP Description	Why important?	Key Stakeholders	Area of Activity/ intervention
Access to Markets	Lack of market information	Increases VC competitiveness of SMEs	Retailers/Suppliers/Exporters	Supply chain management & restructure
	Lack of trading opportunities	Increases sales, export volumes, innovation	Certifiers/	Marketing/branding/promotion
	Inadequate resource allocation	Increases employment, poverty alleviation	Trade & promotion agencies	Preferential NTB's, BTA's, Protocols
Dominance of Retailers	Certification standards are prohibitive to SMEs	Increases sales, export volumes, innovation	Government	Regulations & compliance - preferential procurement
	Barriers to entry very high	Increases employment, poverty alleviation and rural economy access to agro-processing	Retailers/Suppliers/Exporters	Supplier diversity programmes
	Oligopoly leads to value chain dominance	Up-stream access increases participation in value adding activities	SMEs, DFIs, MFIs, Dev agencies	SME Development programmes and funding
Sector Concentration	5 food companies control >40%	Broad-based economic activity within agro-processing increases production & jobs	Retailers/Suppliers/Exporters	Create upstream and downstream opportunities
	SMEs mainly operate in informal markets	Access to formal markets with high income generating potential, including VC rebates	Government	Legislation/regulatory/environmental promoting SME inclusiveness
	Employment growth in stifled or retarded	Increases tax base for SA - informal sector less and formal sector players increases	Sector Bodies/NGOs/Associations	Incentives to large corporates - tax holidays, etc.
	Less risk of investment/fund flight to overseas destinations	Acquisition & mergers can add risk to sector and economy - reduced!		
Skills & capacity building	Technology transfer skills required	Risk mitigation - funds, credit, decrease dependency on government	Educational institutions	Supplier diversity programmes
	Onsite capacity building	Innovation - production, supply chain, product development, food trends, etc	Sector bodies, NGOs, Dev Orgs	Advisory services, formal training workshops
		Increase competitiveness in value chain	Government - SETAs, TVETs, etc	Market development trip/Coaching/Mentorships/e.g. PUM
			Large Corporate - suppliers, customers	
Institutional support	Weak policy	To reduce post-harvest losses along VC - from production to consumer supply	Government, TPAs, DFI,, MFIs	Policy, funding, grants, loans, credits, risk management
	Weak implementation	To increase production, VC efficiencies and competitiveness	Sector bodies, NGOs, Dev Orgs	Skills development, sector development, grants, B2B linkages, etc
	lack of institutional capacity	To increase food security, quality, food safety and retained earnings	Educational institutions	Relevant curriculum, training and skills development
	mismatched with needs of industry	Increases skill development, innovation, technology transfer and job creation		

Access to Finance	High transaction & input costs	For business operation and expansion	Commercial banks	Innovative finance models to be explored
	Lack of collateral	To decrease transaction costs	DFIs, MFIs, Government	
		To enable start-ups and initiation of businesses	Large Corporate - suppliers, customers	
Innovation and Technology Application	Companies have the need to invest in upgraded or superior equipment and technology	Technology is an enabler for key factors of VC competitiveness	Banks, grant funders, NGOs	Support to purchase key equipment via development funds
	Lack of investment capital to purchase new equipment	Key processes – organization of more efficient production and management processes	Sector organisations	Training and consulting about the obtaining of the investment capital
			Educational institutions	DAFF - grant funding
			Government grant schemes	DTI - grant funding requirements to be revisited
Incubation	Reduce risks	Skilled and capable workforce to support an inclusive economic growth	DTI, SEDA, ARC, CSIR	Agro-processing enterprises requiring incubation identified
	Increases survival %		Sector/industry organisations, universities, private companies	MoUs and SLAs signed with incubators
			Government	MoUs and SLAs signed with funders
			Development Agencies	

Source: Authors overview based on desk research, focus group and interviews.

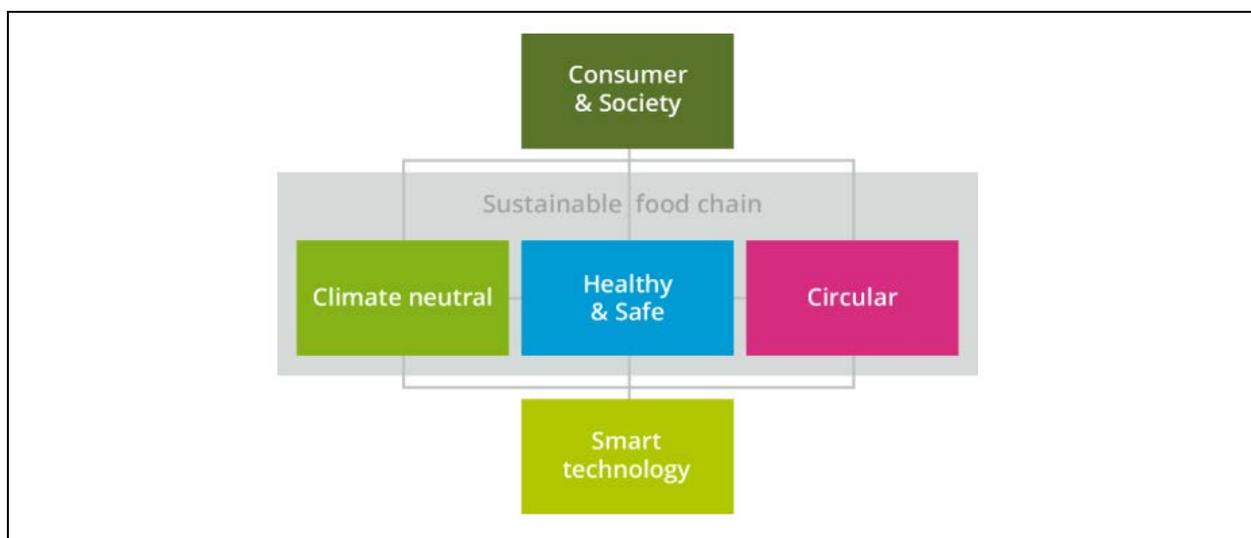
Based on desk research, focus groups and interviews a Gap analysis has been conducted to summarise the various challenges faced in the agro-processing industry in South Africa. The final column “Area of Activity / intervention” refers to potential intervention that are recommended to pursue.

5. Trends and Technological Developments

5.1. Trends in Europe and The Netherlands

Technological developments in the agro-processing sector in Europe and The Netherlands are driven by a number of overarching trends. The gap analysis in chapter 4 showed that the challenges faced by the agroprocessing industry in South Africa are wide, complex and interlinked. Access to technology or expertise is but one of many avenues that can support the growth of the sector. At the same time, it is important for South African companies to understand these trends to align their products with consumer demands in potential export markets. In The Netherlands the agro-food development agenda⁶ is driven by a number of central themes, as depicted in figure 15.

Figure 15: Central Themes Topsector Agrifood



Source: Topsector Agrifood

Central to these themes are a number of trends which link to developing a sustainable food chain:

- Tasty, healthy and safe food for a growing world population;
- Climate neutral and robust food systems;
- Circularity and resource efficiency of chains and food systems;
- Strengthening of innovation and business earning capacity;
- Valorisation in successful chains.

Some of the trends and developments in The Netherlands have a direct bearing on the challenges in South Africa. For instance, natural resources and water-scarcity have a direct link to building a climate

⁶ <https://topsectoragrifood.nl/en/kennis-en-innovatie-tki/>

neutral and robust food system and the circularity and resource efficiency of chains and food systems. Although different drivers push developments and terminology might differ, the underlying developments in The Netherlands and South Africa are similar. Moreover, South African companies can be inspired by technological developments from The Netherlands.

CBI has identified several trends that offer opportunities in the European market for processed fruit and vegetables and edible nuts.⁷ Overall the trend is toward more healthy food, sustainable production techniques and increased food safety. This creates possibilities for South African agro-processing companies if they are able to demonstrate sustainably sourced products, e.g. through certification. The trend of vertical integration of supply chains offers an opportunity to establish long-term partnerships with European buyers (CBI, 2017). Further trends include:

- Campaigns to decrease sugar consumption;
- Natural, healthy and clean labelling;
- Vertical integration;
- Sustainable initiatives are becoming more important and more complicated;
- Growth of the organic market;
- Continued demand for superfruit;
- Increasing food safety regulations;
- Exotic fruit preparations, sweet potato and frozen fruit are in demand;
- Vegetarian and vegan alternatives for animal products are in high demand;
- Busy lifestyles and convenience in eating.

The Netherlands is a world class agro-food country. Technologies from The Netherlands are already widely used in the South African agro-processing industry. However, new linkages between Dutch solutions and South African challenges can be made, although solutions need to be adapted to the South African context. Typically, The Netherlands is strong in high quality, high volume solutions. The South African market has a need for high for quality standards, but generally in lower volumes to cater for mid-sized companies. Not all solutions need be high tech, but mid-tech solutions adapted to the South African context are required.

Underpinning the use of advanced technology and the drive to greater efficiency, is the talent factor and requisite skills. Jobs in the sector are changing as fewer unskilled labourers are required, but more semi- to highly skilled personnel are employed in the value chain (McKinsey, 2015). At the same time, employment creation is one of the main South African policy objectives underpinning the support to

⁷ www.cbi.eu/market-information/processed-fruit-vegetables-edible-nuts/trends/

develop the agro-processing industry. Therefore, the use of appropriate technologies in combination with (semi-)skilled labour force is key in the South African context.

The Netherlands is particularly strong in several areas. Throughout this chapter examples of Dutch agro-processing technological developments and companies are provided. The examples have been selected keeping the gap analysis in mind, however, no direct one-on-one link exist between the complex challenges South African agro-processing companies face and technological solutions provided by Dutch companies. As described in chapter 4, access to technology and expertise is but one of many issues that need to be addressed in order for the South African agro-processing industry to really take off. The example have been selected through discussions with industry experts and only represent a limited selection of what The Netherlands has to offer. Nonetheless, it provides insights into what kind of technology could be sourced from The Netherlands. Dutch technologies could be particularly relevant in the following fields:

- Smart usage of crop varieties;
- Reduction of postharvest losses;
- Cold chain logistics (more efficient production and distribution processes);
- More efficient production and distribution processes;
- Optimal water usage in production & processing (re-use of waste water and less consumption);
- Optimal usage of residual flows;
- Reduction of and innovations in packaging;
- Etc.

5.2. Trends in Fruit and Vegetable Processing

Trend: the market becomes more demanding regarding efficiency in supply chains. Processing, food handling, smart use of tools and innovative solutions for drying, packaging and product handling.

Food Handling & Processing Solutions⁸

A company called foodlife was formed by the JFPT group. JFPT.B.V. is a full service business partner for food processing companies and operates mainly in the fruit and vegetable sector, catering for customers from retailers to large fresh cut and food industry companies. foodlife develops innovative machinery and processing solutions combining knowledge and experience in engineering, robotics, vision technologies and system integration in top of the range advanced food gripping and handling

⁸ www.foodlife.nl/

systems. Both fresh or frozen, foodlife's systems cater for every type of foodstuff, plant or crop. The standard systems and food handling solutions are used for vegetables, meat, poultry, fish through to confectionery and bakery products.

Processing and Production Solutions for the Vegetable Sector⁹

Eillert B.V. is a manufacturer of processing machines and complete production solutions for the vegetable sector (potatoes, vegetables and fruit). The machines and lines are supplied in several models and capacities to renowned processing companies worldwide, who in turn supply to supermarket chains, well-known fast-food chains, catering companies, the institutional market as well as the frozen food industry, vegetable dehydration companies, potato and onion peeling companies and other vegetable processing sectors.

Fruit and Fruit Preparations¹⁰

Terlet offers a wide range of specialised equipment. Heart of any jam cooking plant is the cooking of fruit under vacuumized atmosphere. By lowering the cooking point, the evaporation of moisture goes quicker and the fruit is cooked with far less thermal force. Terlet's jam cookers' design assures an optimal heat transfer by means of intensive convection without touching the product mechanically. The Terlotherm is a heater and cooler designed for fruit preparation. When flushable seals are used, the Terlotherm can operate under aseptic conditions and with extreme low rpms. Combined with the free passing of 25 mm (1") it leaves fruit undamaged through the heating and cooling process.

The Terlet Technology Centre (Pilot Plant) is built according to modern rules of hygiene, food safety and food processing. Utilities, such as steam and glycol are available on such a scale that not only pilot plant scale tests can be done, but also skid mounted equipment can produce products at "real life scale". Both building and equipment meet the modern food production standards allowing customers to produce products for internal testing on appearance, taste and shelf life.

Optimizing Wet Processes in Fruits and Vegetables¹¹

Innotec has innovative solutions in wet processes like blanching, cooking and chilling. For example, a company active in producing and exporting IQF and canned fruits and vegetables installed a processing line with a capacity of 2500kg per hour. The machine consists of modules for washing, blanching, cooling and freezing. The benefit of using the system is that the time the product is inside the machine can be controlled to the very second. Besides using the rainfall principle, blanching through steam is also possible with this module. The machine is divided into multiple temperature zones that are all

⁹ <http://eillert.nl/en/>

¹⁰ www.terlet.com

¹¹ www.innotec-systems.net/en/

separately programmable. The temperature can be controlled up to a difference of 0,2 degrees Celsius which makes the blanching process highly controllable. The system uses a minimal amount of water in processing and extra water is only added to compensate for evaporation and spillage. Both the blancher and cooler have their own water circulation system to guarantee food hygiene.

Drum Drying Technology¹²

Andritz Gouda specializes in food processing lines, based on advanced drum drying technology. The technology is used for a large range of products, from baby food and fruit to chemicals. The continuous indirect drying method allows short heat retention times whilst evaporating all the liquid within a single rotation of the drum. It not only virtually eliminates the risk of damaging the product but also enables the product to retain its unique properties such as taste, smell, and texture.

Keeping Produce Fresh from Field to Fork¹³

Modern, fast transport networks and sophisticated cooling, freezing, and logistics technologies have transformed the fresh food market to be able to enjoy fresh foods from any part of the world, all year round. However, fruit and vegetables are delicate products, and the temperature control and gentle handling of these sensitive foodstuffs are critical to retaining their quality. GEA Food Solutions Bakel B.V.'s (GEA) chilling and freezing systems for fruits and vegetables ensures that the cooling chain remains efficient and uninterrupted from field to fork. It's portfolio of temperature, packaging and handling systems equipment and solutions for fruit and vegetables includes chillers, freezers for commercial and industrial settings, including supermarkets, distribution centres and transport vehicles. GEA supplies efficient, hygienic and reliable technologies for packaging fresh and frozen foods, including vacuum packs, formed and preformed trays.

For a leading producer of dried fruits packaged without preservatives, the bag quality, seal integrity and packaging speed are crucial. The producer receives raw materials from all over the world that processes and packages with an innovative pasteurization system for fruits and vegetables among which apricots, plums, figs, dates, grape, tomatoes and vegetables mix. For this producer the GEA SmartPacker was selected to supply vertical form, fill and seal machines. The GEA Line packages soft fruit in pillow bags at 125 to 130 packs per minute (ppm) for the 125-gram size and 110 ppm for 250-gram packs.

¹² www.andritzgouda.com/en/index.php/machine/Drum_Dryer/

¹³ www.gea.com/en/applications/food/fruit_vegetables/index.jsp

Food Processing and Packaging Systems For Sauces¹⁴

Selo produces fully automated process and production lines for cooked, pasteurised and cooled sauces, such as pizza sauce, pasta sauce, spaghetti sauce and meat/vegetable sauces (with or without pieces). The systems meet the highest requirements and standards in the field of hygiene and quality. Apart from supplying systems for processing sauces, Selo are experts at packaging liquid food products. Sauces can be packaged in modern stand-up pouches, but also in hermetically sealed jars and bottles.

5.3. Trends in Waste Reduction and Food Loss

Trend: Due to increased awareness regarding our limited natural resources on the planet businesses are focussing on reducing, re-using and recycling of waste streams, not only on production level but also in the entire supply chain. Including campaigns where the consumer buys misshaped products which are exactly the same quality as the same products who have the 'right shapes'.

One third of all food produced for human consumption is lost or wasted. In a world where almost one billion people go hungry, this is an excessive amount. At least five billion euros of perfectly good food is wasted annually in the Netherlands. These food losses represent a waste of our resources such as land, water, energy and other inputs that went into producing food. Several initiatives have emerged to address food waste and loss, creating opportunities for new businesses:

Surplus Food Factory¹⁵

The Surplus Food Factory is an example where food processing activities are being used to reduce food waste in the Netherlands. Instead of sending surplus produce to animal feed lots, the Surplus Food Factory processes surplus materials (products which have not quite met manufacturer's rules) which are sent to them by their partners, and process the raw materials into products which can be sold in supermarkets. An example of such a product is the processing of surplus vegetables into soup. The founder of the Surplus Food Factory, Bob Hutton, purchased an empty manufacturing plant in Veghel, where he installed production and cooling systems. He started the Surplus Food Factory with a sustainable impact loan from The Rabobank.

¹⁴ www.selo.com/product/sauce-systems/

¹⁵ <https://deverspillingsfabriek.nl/en/home>

Jacob's Juice¹⁶



Many fruits and vegetables are wasted because they don't fit the 'perfect quality' standards, for logistical reasons or because it is classified as 'surplus food'. Jacob's Juice processes these fruits and vegetables into healthy juices.

Root-to-Stem / Waste reduction¹⁷

Between nose-to-tail butcheries and reducing food waste, there is a growing trend for 'root-to-stem' cooking, which makes use of the entire fruit or vegetable, including the stems or leaves that are less commonly eaten. Recipes like pickled watermelon rinds, beet-green pesto or broccoli-stem slaw have introduced consumers to new flavours and textures (Ecophilis, 2017). Vegetarianism and veganism are becoming more common and the "root-to-stem" trend of eating has added something interesting to food that promotes good health and minimal waste.

High-Tech Goes Plant-Forward

Plant-based diets and dishes continue to dominate trends in the food world, and the tech industry has begun using science to advance recipes and manipulate plant-based ingredients and proteins. Such techniques are creating alternatives such as "bleeding" vegan burgers or sushi-grade "not-tuna" made from tomatoes. These new production techniques are also producing varieties of nut milks and yogurts made from pili nuts, peas, dried fruits, macadamia nuts and pecans.

5.4. Trends in Preservation and Extending Shelf Life

Trend: higher standards for product characteristics. In terms of shelf life, usage of conservation technologies, health benefits and food safety consumers become more knowledgeable and more demanding.

Longer Shelf Life and Yet Fresh¹⁸

The demand for fresh, healthy and easy to use products is still rising in The Netherlands and other European countries. With conventional conservation technologies like heat pasteurization, products lose healthy nutrients and the fresh taste is often lost. Several new preservation technologies have

¹⁶ <https://jacobs-juice.com/>

¹⁷ www.mindfood.com/article/all-about-root-to-stem-eating/

¹⁸ <https://topsectoragrifood.nl/en/showcase-langer-houdbaar-en-toch-vers/>

been developed on a small scale but have not yet been applied on an industrial scale. The goal of this project is to further develop mild conservation methods and make them available for a larger group of end users so that quality, shelf life, sustainability and safety of foodstuffs are increased.

High Pressure Conservation¹⁹

Natur. are cold-pressed juices made of 100% fruit and vegetables. A mild conservation technique keeps them fresh and gives them a long shelf life. The juices aren't conserved with heat, but are pasteurized by very high pressure. By using this new production method, the nutritional value and fresh flavour of the juice remains intact.



TOP B.V. has been part of the development of the concept from the very beginning. The whole process of initial development of the recipe, the microbiological risk analyses, scale-up, product launch and positioning were supported by TOP.

Food Safety Without Heat or Preservatives²⁰

Former Stork Food & Dairy Systems' main activities are the development, production and supply of integrated processing and filling lines for the dairy, juice, food processing and pharmaceutical industries. In 2015 the company was acquired by JBT Corporation, a solutions and equipment provider within the fruit and vegetable industry segment. The company makes use of non-thermal and low thermal processing technologies like high pressure processing (HPP) and these are used for the development of more natural recipes with maximum retention of nutrients. By processing foods at extremely high water pressure (up to 6,000 bar / 87,000 psi – more than the deepest ocean), Avure HPP machines neutralize listeria, salmonella, E. coli and other deadly bacteria. Unlike thermal, chemical and other high-heat treatments, HPP runs cold. It doesn't alter food taste, texture or quality, or require loads of chemicals to stay "fresh" and extends shelf life up to two or three times longer than traditional preservation methods.

5.5. Trends in Sustainable Packaging

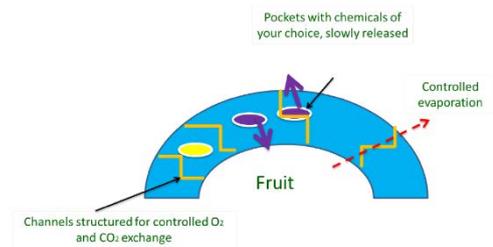
Trend: Driven by the consumer, quality and regulatory demands require innovative solutions in food packaging. Packaging needs to both increase the shelf life, reduce waste and decrease packaging costs. Examples of innovative products in the packaging sector include:

¹⁹ <https://top-bv.nl/showcase/natur-cold-pressed/>

²⁰ www.jbtc.com/foodtech/markets/fruits-nuts-vegetables

Liquidseal²¹

Liquidseal is ultrathin packaging which achieves shelf life extension of perishable products such as cut flowers and tropical fruits. The specific characteristics of Liquidseal enable the reduction in product wastage and reduces the need of pesticides. Liquidseal extends the life of perishable agricultural products in an innovative, sustainable and cost-effective manner. Their postharvest recipes for growers and wholesalers in the floriculture and horticulture sector improve the product quality and shelf life throughout the supply chain.



Innovative packaging - Natural Branding²²



Organic products must be distinguishable from non-organic products in the supermarket by EU law, which unfortunately leads to organic products being packed. Eosta has been developing sustainable packaging alternatives for years, a road which led from bioplastics and compostable stickers to sugarcane carton, cellulose netting and Natural Branding.

Natural Branding is the organic approach to marking fruits and vegetables with laser. The contact free method has been approved by organic certifiers, while no additional agents are used. The process does not influence taste or shelf life. As a bonus, the energy needed for applying a laser mark is less than 1% of the energy needed for a sticker.

Currently Natural Branding is being applied to avocado, zucchini, ginger, coconut, cucumber, mango, pumpkin and sweet potatoes. Since December 2016 Eosta has saved 6,3 million plastic packaging units, 88 metric tons of plastic, 38,000 m² of paper and 396 metric tons of CO₂-emissions.

Packaging From Agricultural Waste²³



PaperWise is an alternative for traditional paper and cardboard. It is made from agricultural waste and has the same qualities and properties as ordinary paper and cardboard.

²¹ www.liquidseal.nl

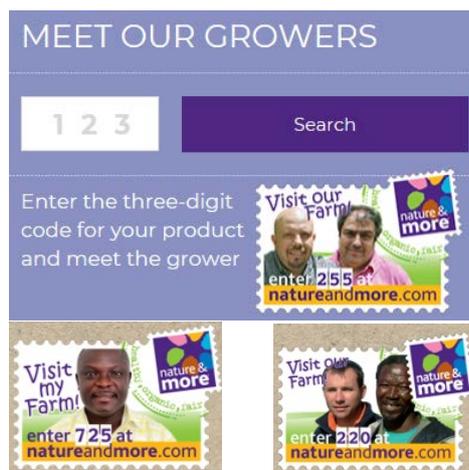
²² www.natureandmore.com/en/natural-branding

²³ www.bio4pack.com

5.6. Trends in Transparency and Traceability

Trend: An important trend is the potential of benefitting from biotechnology (informatics, robotics (processing, packaging), and digital information systems (for example for traceability). The advent of Big Data management is allowing role players in the value chain to improve efficiencies considerably and gain an edge over their competitors. The Netherlands is particularly strong in integrating sensing tools and tracing equipment into processing equipment and systems.

Technology and Transparency – Nature & More²⁴



Nature & More is the "trace & tell" consumer trademark and online transparency system of Eosta. Eosta is a supplier of fresh organic fruits & vegetables from all over the world, which is GMO-free, pesticide-free and free from artificial fertilizers. Eosta use their "trace & tell" system to communicate their various grower's stories and this provides full transparency to consumers. Each product is labelled with a sticker and through the website one can enter the 3-digit code to meet the grower.

Sample Carousel: Enhances Sampling Systems²⁵

Dinnissen Process Technology designed a solution for customers who need to be 100% sure about their production quality and maintain that level over longer production runs. The Sample Carousel enables validation per batch or process over a longer time, all connected with automation and sampling procedures. With this innovation it is easy to track & trace a production process. The system can be integrated into new as well as existing production processes in filling lines, silos, transport systems, and mixing and packaging installations. As the automated sampling system was developed in line with current EHEDG criteria²⁶, it ensures compliance with the strict requirements that apply in relation to quality and food safety.

To stimulate innovation Dinnissen Process Technology has opened the Food Design Factory, a unique multi flexible development factory in a high-quality test environment specially intended for the development of new foodstuffs (and animal feed). This development factory will be made available to

²⁴ www.natureandmore.com/en

²⁵ www.dinnissen.nl

²⁶ European Hygienic Engineering & Design Group. www.ehedg.org

companies that may or may not wish to develop new products with each other. With the Food Design Factory, aims to stimulate innovation.

5.7. Trends in Consumer Snacks and Nuts

Trend: Portability and convenience are playing a larger part in purchasing decisions and consumers are wanting to snack more frequently anywhere and at any time. Consumers are increasingly drawn to buying new or novel snack foods; especially products that are reinventions of traditional foods, Western snacks, and obscure foreign foods. Consumers seek products with natural flavours and less processed ingredients, whilst also trying to reduce or avoid consumption of sodium, sugar and fat. Younger generations are increasingly aware of how diet impacts health issues like obesity and diabetes. The South African government is also encouraging healthy eating reducing the sodium content in processed foods and implementing a sugar tax (USDA, 2018).

Puffed and Popped Snacks

Alternative production techniques such as popping or baking without the use of oils are increasingly being explored because of the health trend. Crunchy snacks are perennial favourites, but modern technology is revolutionising all things puffed, popped, dried and crisped. New ways of processing and combining ingredients have paved the way for popped cassava chips, puffed pasta bow ties, seaweed fava chips and puffed rice clusters. Traditional chips have also been upgraded as part of the trend, with healthier options, such as jicama, parsnip, or brussels sprout crisps. These new processing technologies could open new market opportunities for SMME food-processors.

Snack Nuts

According to Innova Market Insights²⁷, snack nuts and seeds like trail mixes accounted for over 30% of snack launches in 2016, up from 27% five years earlier. Factors driving this growth include new research on nuts' health attributes, greater availability of various nut types, and technological advances allowing for new coatings, flavours, and packaging formats.

Due to a possible increase in cocoa prices chocolate producers are looking for ingredients such as nuts that can decrease the amount of cocoa used in final products. Chocolate-coated nuts and dried fruit are popular sweets in Europe. Confectionary industry buyers are increasingly asking for UTZ certification from suppliers of chocolate-coated products so compliance becomes more important.

²⁷ www.innovadatabase.com

The Dutch Technology Centre for cocoa, chocolate and nuts²⁸

The core business of Royal Duyvis Wiener is the engineering, manufacturing, installation and maintenance of production machinery for the cocoa -, chocolate – and compound industry. The Dutch Technology Centre for cocoa, chocolate and nuts, comprises Duyvis Wiener processing equipment, suitable for trial and product development. Here, customers can test and analyse the development of their new products. Whether chocolate, cocoa or nuts, trials can be performed, methods and recipes tested in the 2000 m² lab fitted with state-of the art cocoa and chocolate processing equipment. A team of food experts, process and design engineers work side by side to analyse taste, rheology, capacity, energy, and optimise performance in collaboration with clients.

²⁸ www.duyviswiener.nl

6. Conclusions and Recommendations

This scoping study has set out to provide an overview of the current state of the agro-processing industry in South Africa and its challenges, as well as, to identify the extent to which the agro-processing industry can add value, with the aim of limiting imports. South Africa has a robust and resilient agro-food system that, despite many political, social and environmental challenges, provides affordable food to its population (Agbiz, 2017).

Government Policy and Growth Strategies

There are several developments and challenges that impact on the agro-food industry, including the imperative to develop and implement inclusive growth models in the various value chains. Economic growth and employment creation are key policy factors. At the same time market forces drive agro-processing SMME's to ensure that optimal resource allocation leads to viable business plans. Without access to markets, no public stimulation policy will bear fruit. From the perspective of individual companies, public agro-processing initiatives seem to be fragmented and disjointed because of a lack of real strategic cohesion between the national, provincial and local levels. Moreover, practical implementation of policies seem to be hindered by bureaucratic procedures.

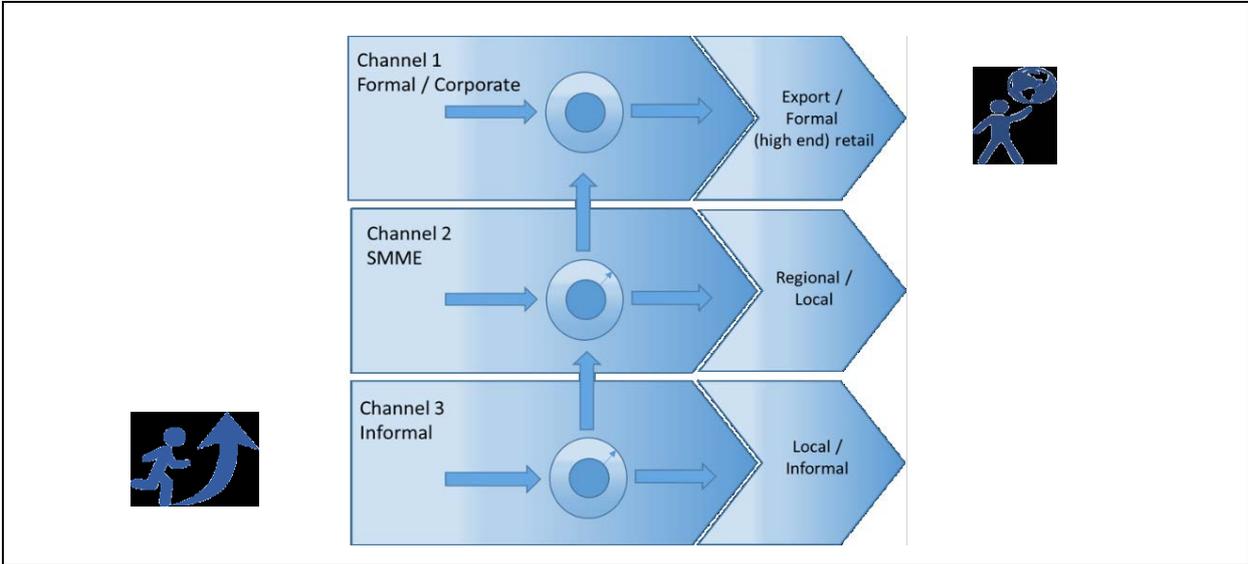
Growth directions for agro-processing in South Africa include various avenues. New entrants could be stimulated. However, access to markets and input is essential for new entrants to be successful. Existing businesses would benefit from professional, market driven support and (international) networks. For instance, by linking them to like-minded agro-processors or importers that can provide insights into production requirements, as well as, access to markets. This could be achieved by setting up a matchmaking process between specialised (social entrepreneurs, niche market players) food retailers or importers (e.g. as part of FNLI²⁹) and South Africa food companies (e.g. through Food SA). Such a process could be a one off (pilot) or supported through a (digital) platform.

Forward or backward integration are common business strategies in agro-processing. Both large companies and SMMEs might be able to span the entire value chain. However, this requires a combination of skills ranging from production all the way to commercial marketing and distribution on a national or even international level. Many South African SMMEs find it difficult to successfully combine these skills. Rather than trying to combine all these skills into one company, intermediate solutions could be found where a cooperation or platform supports the (international) marketing and distribution for a portfolio of companies. Once companies are better established and have gradually

²⁹ FNLI – Federatie Nederlandse Levensmiddelen Industrie www.fnli.nl

improved their processing and marketing skills over time, they will be able to graduate to higher, more formal – and often more profitable channels. These growth strategies are depicted below.

Figure 16: Growth Strategies and Channels



Source: Authors own based on desk research, focus group and interviews.

South African’s Fruit and Vegetable Value Chains

Fruit and vegetable value chains have been the focus of this analysis. Most of South African premium quality fresh fruits are exported at high prices and the remainder are sold on the local market. Over recent years, the number of South African farm owners have decreased and therefore the market is dominated by a few companies who own most of the producing farms. The research conducted reflects that in the fruit market the predominant focus is on fresh products for the export market, with a limited number of world class (large) exporting companies dominating the market. Farmers fetch a higher price selling and exporting fresh fruit than they do for processed fruit. Existing fruit processing companies are often vertically integrated into farming to ensure security of raw fruit supply. In terms of the processing of South African fresh fruit outside of the country, the research was unable to find any clear evidence of this occurring.

Opportunities in improving packaging, cold chain facilities and computerised logistics do exist and there is potential to create employment at the farm level. Post-harvest losses are still very high due to non-existing or poorly managed cold chains in the mid- and lower segments of the market. Opportunities exist for Dutch organisations exist not only to supply (mobile) cold chain facilities, but also to train operators at all level to ensure that the cold chain is not broken. Larger, export oriented companies already have their (mandatory) processes in order. Gaps in packaging, cold chain and

logistics are identified pertaining to small holders and mid-size producers. Therefore, (technical) solutions should be geared to this particular market segment.

The vegetable market is also focused on fresh produce, but is predominantly nationally oriented. Exports are limited by high transportation costs (in relation to the value of the crop) and a lack of market access due to insufficient export protocols with some markets (e.g. China). The South African government could assign additional resources to negotiating export protocols that support growth. Similar to the fruit market, we have not come across major crops that are being exported for processing abroad.

The agro-processing industry in South Africa is highly concentrated, with a few very large companies dominating the market. These food processing companies are world-class and use high level (European) equipment. At the same time, opportunities do exist for SMMEs to create their own market opportunities. For instance, several large producers of (intermediate) processed goods currently only focus on exports markets. These (intermediate) products, such as juice concentrates, could also be made available to (local) SMMEs producing juices with their own recipes, thereby “linking large to small”. However, it is not within the scope of most of these large producers to do so. On a local or regional level, such large producers could be identified and mechanisms set-up to link them effectively to local SMMEs.

The growing market of sauces, dressings and condiments provide opportunities for SMMEs to enter. Moreover, processing vegetables that do not meet size or colour requirements reduce food losses. Food SA supports several SMMEs companies that have developed their own brands of sauces, chutneys and jams using own recipes and local brands. As they grow, investments into more formal health and processing requirements are required to meet market demands. However, processing volumes will remain relatively low. Processing equipment should meet these requirements.

The dried fruit supply chain is divided into national (South African) producers and exporters; further processing steps (mainly in Foreign Markets); and end consumers. The type of high value add in food processing, packaging or wholesale is based on end consumer market requirements and branding. A direct link with end consumer markets and requirements is key to drive the industry forward. In terms of the processes used to produce dried fruits, processing factories tend not to invest due to raw material supply shortages. There may be potential opportunity to invest in freeze drying technologies as there is a trend in the confectionary industry to use freeze dried fruit in different forms such as: powders, whole pieces, segments and slices. South African and Dutch organisations could explore possibilities to cooperate in this field by exchanging information on (emerging) consumer trends in the European market and appropriate technologies.

Statistics show that many raw nuts are exported without any added value, despite the presence of some processing companies in South Africa. There is currently some capacity to process pecans, macadamias and almonds. Current technologies used in the nut processing industry is quite basic, although a few projects are currently implementing more advanced machinery and equipment. Technology wise, it is mainly the larger farmers who process nuts, have their own processing equipment, and source produce from smaller farmers. There is opportunity in the nut processing industry in South Africa, but farmers are cautious to invest when the processing infrastructure is not in place. The large scale investment in the macadamia processing plant should first proof itself to see whether this negative cycle between lack of investment in nuts and missing processing infrastructure can be broken. Furthermore, access to final markets and corresponding consumer trends are needed to ensure that the right type of processing and value add is achieved. Selected Dutch companies have nut processing technologies available and might be interested to share market information.

South Africa's indigenous product market is very small by global standards, with very little processing and value-addition taking place. Although there are examples of some primary processing, such as drying of honey bush and packaging and refrigeration of certain berries, the processing of raw indigenous crops in South Africa is very minimal. Most indigenous crops are grown and sold raw on the informal market. Indigenous crops are largely consumed unprocessed. The popular value addition is drying or processing into flour through pounding. Lack of processing technologies make it difficult for the sector to cater for changing needs of consumers. At the same time, (Western) consumer interest in superfruits and naturally healthy products is booming. Linking (importing) SMMEs in The Netherlands to producing companies in South Africa could create benefits for both and open new market opportunities.

Growth Factors and Technological Trends Influencing Fruit and Vegetable Agro-Processing

Access to markets; Access to Processing Technology; Access to Finance; Access to Skills & Information; and Access to Inputs have consistently been identified as the most important factors influencing growth in the South African agro-processing industry. Some standard and regulatory requirements imposed by the retail and export sectors are onerous for SMME's. Support is needed to meet these requirements. A key opportunity lies in easing access routes to markets for all scales of farmers and food processors. For instance, major supermarket house brands as well as shelf space for SMMEs are ways in which small-scale processors can access the larger retailers. Growth of the agro-processing sector is highly capital intensive and scale is needed to compete with the world market. SMME's and small-scale farmers do not have the capital for investment in agro-processing technologies or training of personnel to manage the equipment.

There is very little in terms of a knowledge network in agro-processing in South Africa. Sharing knowledge on markets and regulations and making them readily accessible to SMMEs could benefit these companies enormously. In some instance a wealth of information is available, e.g. through the CBI³⁰ and other organisations, but individual South African processing companies are not aware that this information even exists. Several avenues could be explored to close this gap. For instance, an easy accessible portal (supported by an e.g. app) could harness the information and make them more readily available. However, no portal is useful if the information does not reach the individual user. This might be the biggest obstacle to tackle. Sustained campaigning on available information and training of sector organisations, coaches or experts to use and disseminate the information is required.

Finding qualified personnel with the right skillset and experience is a common challenge in South Africa. Although agro-processing provides great potential for employment creation, SMME's are faced with the high cost of finding, training and retaining suitable staff. South Africa has a large population of unemployed and unskilled workers. The level of skill required to manage the agro-processing plant technology that is needed to compete with the global agro-processing market is not in line with the skill level available. Uplifting the basic skills level in South Africa is beyond the scope of this study. However, within a more concentrated approach, an (regional) centre of excellence that caters for different skill level within particular value chains could support the availability of more skilled workers. Training vouchers could help to increase accessibility of the facilities to all target groups. Dutch senior experts could share their knowledge and expertise to a wider audience through these centres of excellence.

Recommendations following from the Gap Analysis

The Summary Gap Analysis presented in paragraph 4.6 provides an overview of the various GAPS identified in the South African agro-processing industry. The table also provided high-level recommendations to address these gaps. The challenges that South Africa faces are complex and intertwined. Therefore, no straight-forward "A leads to B" solutions, nor corresponding recommendations exists. Unfortunately, there is no magic bullet.

For instance, in order to address the market dominance of retailers, regulations and compliance could be addresses to ensure preferential procurement for SMMEs; Supplier diversity programmes should be established and SME Development programmes and funding is needed (see page 51). Many of these action have to some extend already been included in national or local policy indicatives. However, coherent implementation that really effects SMME processing companies on the ground is lacking. We

³⁰ www.cbi.nl

therefore recommend a regional approach where, within a specific supply chain and geographic region (e.g. metro or province), all the relevant key stakeholders form a co-creation process that address the gaps identified and translate them into actionable plans.

Expertise from The Netherlands on how to effectively engage in such a process could fast-track the approach. At the same time, organisations that could bring the processing skills within the selected value chain to the next level could be brought in, combine with technical expertise. Interested (SMMEs) buyers could be twinned with local producers to share knowledge on market access conditions, customer preferences and production techniques. A (regional) centre of excellence that functions on a (semi) commercial basis, could function as a nucleus that brings together all relevant information, skills and expertise.

Matching trends and technological developments to the South African context

Technological developments in the agro-processing sector in Europe and The Netherlands are driven by the desire for a sustainable food chain: Climate neutral, healthy and safe, and circular. Understanding these trends is key for South African companies, such that they align their products with changing consumer demands in potential export markets. The Netherlands has much to offer in terms of fruit and vegetable processing, for instance in waste reduction and food loss; preservation and extending shelf life; and increasing transparency and traceability. Technologies from The Netherlands are already widely used in the South African agro-processing industry. However, new linkages between Dutch solutions and South African challenges can be made, especially in relation to mid-sized companies. The South African market has a need for high quality standards, but generally in lower volumes to cater for mid-sized companies. Not all solutions need be high-tech, but rather mid-tech solutions adapted to the South African context are called for. Dutch equipment manufacturers could adapt their portfolio to these needs. For instance, by having an equipment range that can be scaled once the company grows. Making equipment available to (regional) centres of excellences ensures that (future) entrepreneurs are familiar with their type of technology and are exposed to new and innovative solutions.

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Annex 2. People involved / interviewed

Organisation	Name
PUM Netherlands Senior Experts	Lesley J. Africa
PUM Netherlands Senior Experts	Gertjan Kooij
PUM Netherlands Senior Experts	Henri van Muijden
A Quest Colsen	Christ van Schaijk
Department of Trade & Industry - Republic of South Africa	Gordon Gleimius
Department of Trade & Industry - Republic of South Africa	Garth Strachan
Department of Trade & Industry - Republic of South Africa	Ayanda Ntola
Department of Trade & Industry - Republic of South Africa	Solly Molepo
Department of Trade & Industry - Republic of South Africa	Cliff Rasoesoe
Department of Trade & Industry - Republic of South Africa	Luke Govender
Department of Agriculture, Forestry & Fisheries - Republic of South Africa	Mahlogedi Victor Thindisa
Tshwane Economic Development Agency	Floyd Moloko
Tshwane Economic Development Agency	Cllr Randall Williams
Tshwane Economic Development Agency	Vusi Mveli
SAFVCEC (S.A Fruit & Vegetable Canners' Export Council)	Jill Atwood-Palm
SAFJA (South Africa Fruit Juice Association)	Rudi Richards
Agbiz (Agricultural Business Chamber)	John Purchase
Agbiz (Agricultural Business Chamber)	Wandile Sihlobo
IDC (Industrial Development Corporation)	Lizo Ntloko
Coega Development Corporation (Pty) Ltd	Dr. Keith du Plessis
National Agricultural Marketing Council	Khumbuzile Mosoma
FOOD South Africa	Derek Zimmerman
FOOD South Africa	Fanus Engelbrecht
KROMCO (Pty) Ltd	Ian Snetler
KROMCO (Pty) Ltd	Anton Gouws
VENCO Innovation Fruit Processors	Andre Swart
VENCO Innovation Fruit Processors	Andre Fourie
Famous Brands	Leon Wait
Famous Brands	Mark Harris
Rio Largo Olive Estate	Nick Wilkinson
Rio Largo Olive Estate	Brenda Wilkinson
Sage Kitchen	Colin Lyall
Mojome	Julia Edwards
Food Chain Laboratories	Janice Giddy

Entecom

Munch Bowls

Agri Mentor

Cape Peninsula University of Technology

Kamva Capital

Robinson & Sinclair Exporters of Premium Wines

Dynamic Commodities (Pty) Ltd

Janice Giddy

Georgina de Kock

Henri A. Minnaar

Larry Dolley

Fikile Khiva

Sarah Krone

Murray Price

This is a publication of
Netherlands Enterprise Agency
Prinses Beatrixlaan 2
PO Box 93144 | 2509 AC The Hague
T +31 (0) 88 042 42 42
E klantcontact@rvo.nl
www.rvo.nl

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