Draft Final Report

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Profiling of the Regional Agro-Processing Value Chains in the SADC Region

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Language: British English has been used for this document.

Metric System: The metric system has been used in this document i.e. one ton is 1 000 kilogram and 1 hectare is 10 000 square metre (m²). A 'tonne' will imply it is a 'metric tonne' which is 1 000 kg.

Monetary units: '$1' will be one US dollar or USD1

General remarks: When reference is made to the 2017/2018-season it will be referred to the year 2018, implying that the season ended in 2018.

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ABBREVIATIONS

3ADI	African Agribusiness and Agro-industry's Development Initiative
ACE	Agricultural Commodity Exchange for Africa
ACTESA	Alliance for Commodity Trade in Eastern and Southern Africa
AEEA	AGOA Extension and Enhancement Act
AFASA	African Farmers Association of South Africa
AFD	French Development Agency
AfDB	African Development Bank
AFIM	African Facility for Inclusive Value Chains
AGBIZ	Agricultural Business Chamber
AGOA	American Growth and Opportunity Act
AGRA	Alliance for a Green Revolution in Africa
ASDP	African Agribusiness Supplier Development Programme
ASEAN	Association of Southeast Asian Nations
AU	Africa Union
AUC	African Union Commission
bn	billion
BRICS	Brazil, Russia, India, China and South Africa
Bth	Bacillus thuringiensis
CAADP	Comprehensive Africa Agriculture Development Programme
CFTA	African Continental Free Trade Area
CGIAR	Consultative Group for International Agricultural Research
CLUSA	Cooperative League of the USA (NCBA CLUSA)
CNSL	Cashew Nut Shell Liquid Oil
COMESA	Common Market for Eastern and Southern Africa
DBSA	Development Bank of Southern Africa
DFID	Department for International Development
EAC	East African Community
EPA	Economic Partnership Agreement
ESA	Eastern and Southern Africa
EU	European Union
FANR	Forestry Agriculture and Natural Resources (SADC Directorate)
FAO	Food and Agriculture Organization of the United Nations
FDIs	Foreign Direct Investments
FMO	Netherlands Development Finance Company
FTF	Feed the Future
GDP	Gross Domestic Product
GIZ	German development agency
GMB	Grain Marketing Board of Zimbabwe
GMO	Genetically modified organism
ha	hectare (10 000 m^2)
HLCD-3A	High-Level Conference on the Development of Agribusiness & Agro-Industries in Africa
ICTSD	International Centre for Trade and Sustainable Development
IDTD	Industrial Development and Trade Directorate of SADC

IFAD	International Fund for Agricultural Development
ITC	International Trade Centre
IVCA	In-Depth Value Chain Analysis
JSE	Johannesburg Stock Exchange
LIC	Low-Income Country
LMIC	Lower Middle-Income Country
m	million or metre – depending on the context
MIERA	More Income and Employment in Rural Areas of Malawi
MS	Member States
MSF	Most Significant Factor
NASFAM	National Smallholder Farmers' Association of Malawi
NBF	NEPAD Business Foundation
NCBA	National Cooperative Business Association (NCBA CLUSA)
NEPAD	New Partnership for Africa's Development
NGO	Non-governmental organizations
NTFP	Non-Timber Forest Products
ODI	Overseas Development Institute
OECD	Organisation for Economic Co-operation and Development
R&D	Research and Development
RECs	Regional Economic Communities
RMCs	Regional Member Countries
RoW	Rest of the World
RVCA	Rapid Value Chain Assessment
RVCs	regional value chains
SACU	Southern African Customs Union
SADC	Southern African Development Community
SAIIA	South African Institute of International Affairs
SISR	SADC Industrialisation Strategy and Roadmap
SME	Small and Medium-sized Enterprise
TIDCA	Trade, Investment, and Development Cooperative Agreement
TOR	Terms of Reference
UHT	Ultra-high temperature
UMIC	Upper Middle-Income Country
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
UNIDO	United Nations Industrial Development Organization
UNU-WIDER	United Nations University World Institute for Development Economics Research
US	United States
USAID	United States Agency for International Development
VCs	Value Chains
WFP	World Food Programme
WTO	World Trade Organisation

EXECUTIVE SUMMARY

A need has been identified amongst SADC member states for the development of agro-industries in the region to enhance intra-regional and export trade, industrialise local economies, grow rural enterprises, create new job opportunities, and address rural poverty. SADC policies are in place to facilitate this; particularly, the Regional Agricultural Policy, the SADC Industrialisation Strategy and Roadmap (SISR) (2015-2063), the SISR Action Plan, and so forth.

The goal of this study is to identify the potential for establishing additional sustainable regional agro-processing value chains as an integral part of the SADC industrialisation and market integration process. Specific objectives are: (i) Characterise the nature, form, ownership, size, depth and spread of the agro-processing industry in the region; (ii) Identify regional value chains in the agro-processing industry; (iii) Select potential regional value chains of significance that could be promoted. The project team identified specific regional value chains and agro-processing technologies that offer significant opportunities. It is foreseen that some of these value chains will enhance cross-border and intra-regional trade, whilst others will have the potential to unlock international export markets.

High-Level Value Chain Assessment

The focus of the high-level value chain assessment was to conduct an analysis and assessment of 12 broadly-defined categories of value chains, identified during the inception phase of the assignment. The Interim Report demonstrated how the methodology was followed and applied to fulfil the assignment and Deep-dive Value Chain Analysis

After the high-level value chain assessment, the team presented to, and consulted with, national and regional stakeholders at the SADC Industrial Week (SIW) during 30 July to 1 August in Windhoek, Namibia. The 12 broadly-defined value chains were agreed upon and the consulting team selected a total of 13 product-specific value chains to be further investigated in an in-depth analysis. The following product value-chains have been selected:

1. Grains – maize
2. Grains – bread wheat and durum wheat (pasta)
3. Grains – rice
4. Oilseeds, Legumes and Vegetable oils – soybeans
5. Oilseeds, Legumes and Vegetable oils – dried beans
6. Oilseeds, Legumes and Vegetable oils – groundnuts
7. Oilseeds, Legumes and Vegetable oils – sunflower
8. Oilseeds, Legumes and Vegetable oils – sesame and avocado oil
9. Cotton and Cotton Seed
10. Biomass (charcoal, animal feed, methanol, etc.)
11. Poultry products – duck and goose
12. Red-meat – beef
13. Red-meat – goats

As part of the analysis comprehensive data was collected from secondary and primary sources, analysed and described about each of the selected 13 value chains in the following areas: overview, ownership, production statistics, agro-processing activities, trade analysis (export and import), food balance analysis, standards and SPS, value-chain mapping, challenges, opportunities and conclusions and recommendations.

Cross-Cutting Themes

Crosscutting themes were identified including: (i) The status of regional value chains; (ii) Technical Barriers to Trade (TBT), Standards, SPS and Compliance; and (iii) Non-Tariff Barriers in the SADC Region.

Findings and Most Significant Factor Analysis

Field visits took place to six SADC member states (Madagascar, Malawi, Mozambique, South Africa, Zimbabwe and Zambia) and week-long missions and several interviews were conducted with a wide-spectrum of stakeholders These included government ministries and agencies, farmer associations, commodity associations, agro-processing firms, agribusinesses, development finance institutions, and bilateral and multilateral donor organisations. During the interviews background information (including projects being implemented, policies, strategies, statistics, etc.) were collected from each, and challenges and opportunities of the agro-processing sub-sector identified (also labelled Most Significant Factors or MSFs). The MSF analysis comprised a total of 380 data entries (309 responses from interviews and 71 from secondary data). The responses were classified according to 18 categories, of which 11 were common to all countries and another seven were specific to three or less countries. The MSFs that have been identified comprise (including number and percentage of responses):

MSF Classification: Categories common and less common to all countries

No. (ranked)	MSF Category	Number of responses	Percentage
Primary categories			
1	Smallholder capacity	49	12,9%
2	Processing capacity	49	12,9%
3	Regulatory environment	40	10,5%
4	Standards and SPS	40	10,5%
5	Market access and information	39	10,3%
6	Inputs	35	9,2%
7	Access to finance	31	8,1%
8	Environment	21	5,5%
9	Infrastructure	20	5,3%
10	Government capacity	20	5,3%
11	Energy access	12	3,1%
Total common categories		356	
Less common categories		24	6,3%
Total responses		**380**	**100%**

There were also MSFs identified for the SADC region as well as MSFs that were country-specific and others that were stakeholder-specific. Two MSFs were identified at the SADC regional level i.e.: Proliferation of standards and the SADC region as a growing and maturing market with potential for intra-regional trade.

There was a focus on the MSFs that most commonly occurred across value chains and across countries. The MSFs were analysed according to the challenges, opportunities and reference was made to the roles that government and private sector could play to address these MSFs. It should be noted that the challenges and opportunities identified emanated from the research that was conducted but the proposed roles government and private sector were suggested responses to the challenges and opportunities identified. The proposed responses identified under ‘roles of government’ already hinted to policies to be considered by governments.

Policy Recommendations

A policy framework is proposed and comprises the following sets of policy measures:

- Developed infrastructure and conducive business environment;
- Regional integration and openness to trade;
- Capacity to be responsive to value chains;
- Partnerships government and private sector;

- Established policy framework – social and environment.

The 11 MSFs categories common to all countries were then grouped according to the above framework of policy measures and are displayed in the table below.

Sets of policy measures, matching MSFs and percentage contributions of each:

No.	Sets of policy measures	MSFs	No. responses	Percentage MSF	Total percentage
1	Developed infrastructure and conducive business environment	9. Infrastructure	20	5,7%	
		11. Energy access	12	3,3%	
	Sub-total		32		9,0%
2	Regional integration and openness to trade	2. Regulatory environment	40	11,2%	
		4. Standards and SPS	40	11,2%	
		5. Market access and information	39	11,0%	
		6. Inputs	35	9,8%	
	Sub-total				43,2%
3	Capacity to be responsive to value chains;	3. Smallholder capacity	49	13,8%	
		4. Processing capacity	49	13,8%	
		7. Access to finance	31	8,7%	
	Sub-total				36,3%
4	Partnerships government and private sector	10. Government capacity	20	5,6%	
	Sub-total				5,6%
5	Established policy framework – social and environment.	8. Environment	21	5,9%	
	Sub-total		21		5,9%
	Total		356	100%	100%

The following policy recommendations have been proposed according to the five sets of policy measures:

1. Developed infrastructure and conducive business environment

- Transport infrastructure was rated by some interlocutors as 'obsolete, degraded and non-existing' as a key barrier across countries and all value chains. Due to poor road conditions the transport costs were high that made the landed prices of goods high and sometimes uncompetitive.
- Productive on-farm infrastructure and mechanisation poor or non-existing.
- Rural storage [and processing] facilities were scarce or absent and irrigation infrastructure poor.
- Limited access to energy due to poor coverage and insufficient energy supply where there are coverage – it limits processing activities across all value chains.

High cost of alternative energy sources, diesel, renewable energy – results in low-levels of competitiveness.

- There is a lack physical infrastructure to ensure application and oversight of SPS and veterinary regulations and controls.

2. Regional integration and openness to trade

SADC level:

- *Standards:* SADC needs to: (i) Identify barriers to trade and address emerging inconsistencies (e.g. country-specific GMO labelling regulations); (ii) Measure the impact of particular standards on competitiveness of specific countries' value chains (e.g. traceability of meat); (iii) Capacitate MSs to improve national VCs and share examples of successes (e.g. cotton and citrus industries in South

Africa); (iv) Harmonisation of standards within SADC for key commodities – inputs (harmonise fertiliser packaging and labelling standards) and outputs (as mentioned above GMO labelling, etc.).

- *Trade agreements:* SADC needs to: (i) Facilitate and implement regional agreements; (ii) Share market and investment opportunities; (ii) Encourage the creation of a regional market information system; (iii) Support investment promotion activities, entice investors and work with lead firms; (iv) Help to create a favourable business environment (e.g. a predictable policy regime); (v) Enhance trade facilitation (e.g. NTBs should be removed and cross-border trade should be facilitated).

National level:

- *Regulatory environment:* Governments should ensure that: (i) Implementation of business-friendly policies and regulations; (ii) There is regulatory governance – applied in an efficient manner.
- *Standards and SPS issues:* Governments should: (i) Invest into standards-related infrastructure (testing laboratories); (ii) Capacitate regulatory staff; (iii) Regulate standard-related services; (iv) Develop policies to facilitate and regulate the involvement of private sector; (v) Capacitate farmers to prevent high aflatoxin and residue levels; (vi) Capacitate under-staffed bio-security and veterinary services – appoint more staff, provide comprehensive training and address governance issues.
- *Market access and information:* Governments should: (i) Create agricultural market information systems; (ii) Enforcement of contracts – put policy measures in place to address side-selling and other illegal practices; (iii) Lead and collaborate SADC to create and implement regional market information systems to enhance regional and market integration.
- *Inputs:* (i) Remove import duties and valued added tax from agricultural inputs that are imported; (ii) Simplify regulations - cut the red-tape of regulatory processes; (iii) Address and eliminate corruptive practices by customs and other government officials; (iv) Remove non-tariff barriers and create a business-friendly environment where private sector could thrive; (v) Partner with private sector facilitate private sector investment in inclusive commercial projects.

3. Capacity to be responsive to value chains

- *Smallholder capacity:* Governments should: (i) Invest 10% of GDP in agriculture (Maputo Declaration of 2003); The SADC Regional Agricultural Policy support research, development and capacity enhancement of farmers through extension services; (ii) Enforce the rule of law – policies to protect contracting firms and prevent side-selling activities; (iii) Provide market information and empower farmers by providing bargaining power – disenfranchised and usually price takers; (iv) Promote agro-processing technology and facilitate the establishment of commercial projects.
- *Processing facilities:* Governments should: (i) Capacitate agro-processors to produce improved quality products for exports; (ii) Attract and facilitate private sector investments in new agro-processing activities; ensure that investors function optimally – provide an one-stop-shop; (iii) Provide tax, cost-recovery incentives (plants & equipment) and other investment incentives; (iv) Provide duty-free imports of agro-processing equipment.
- *Access to finance*: Governments should: (i) Create finance policies to facilitate the finance of small-holder farmers through contracting arrangements by agro-processors and traders; (ii) Enforce legal contracts and encourage value chain finance – act against side-selling and other illegal practices; (iii) Act against corrupt practices and act against rent-seeking officials; (iv) Ensure governance structures are in place within regulatory frameworks; (v) Provide facilitation fees to assist prospective investors in the agro-processing sector; (vi) Waive or decrease import duties on agricultural production inputs and capital equipment for farmers and ease the way for input suppliers to import and distribute much-needed production inputs (fertiliser, seed, mechanisation equipment, etc.).

4. Partnerships government and private sector

- *Government capacity*: Governments should (i) Capacitate farmers but due to limited government capacity it cannot materialise – directly linked to first MSF discussed above – the 'limited capacity of smallholder farmers' which in turn affects agricultural productivity; (ii) Capacitate institutions and officials – government service entities, extension staff needs need well-developed practical training, 'how to run a small business', undergo technical and financial literacy training, quality standards and SPS measures and compliance to standards across all value chains, etc.; (iii) Ensure there is a good education system to provide well-educated young people to supply specialised services in agro-processing sector; (iv) Provide skills training to citizens on the short to medium-term to work on future agro-processing investments – investors value skilled staff more than tax incentives.
- *Partnership with private sector:* Governments should: (i) Reach out private sector through farmer organisations, trade associations and chambers of commerce could share their expectations from each other; (ii) Assist to create private sector-led platforms to engage with government and create public-private-producer partnerships (PPPP) – a concept that is advocated by IFAD; (iii) Develop relationships with lead firms to develop regional and global value chains; (iv) Provide incentives to attract lead firms through cost-recovery incentives (investment allowances – processing plants and equipment); (v) Support regional and global VCs develop linkages to local suppliers (localisation); (vi) Support deeper VC development.
- *Standards and SPS capacity:* Governments should: (i) invest into capacitating staff and testing facilities or contract these services to provide sector but regulate pricing structures to be affordable to agro-processing and exporting businesses.

5. Established policy framework – social and environment

- Environment: Governments should: (i) Conduct contingency planning for climatic extremes that are more common; (ii) Support the farming communities and agro-processors in cases of external shocks – droughts, flooding, bushfires and power failures; (iii) Promote good agricultural practices: Governments could support soil fertility programmes and promote good agricultural practices amongst farmers.

6. Value-chain-specific recommendations

No	Value chain	SADC Imports (RoW) 2015-2017	SADC Trade Balance (RoW) 2015-2017	Comments	Poten-tial RVC
Grains					
1	Maize	396 044 000	-250 000 000	Varies between years – depends on climate conditions – mainly rainfall	High
2	Wheat	947 496 000	-945 221 000	2nd largest food crop imported of into region	High
3	Rice	1 038 550 000	-1 031 716 000	Largest food crop imported into region	High
Oil seeds and legumes					
4	Soybeans, oils & oil cake	585 339 000	-573 467 000	Highest imports are soybean oils, then cake and but also some soybeans	High
5	Sunflower seed & oil	164 515 000	-140 277 000	Sunflower oil biggest import item but also seed	High
6	Sesame	908 000	73 732 000	Export crop, important Tanzania, Mozambique – 99,4% exports to RoW	Medium
7	Cotton seed, oil & oil cake	7 546 000	46 652 000	76% of the oil cake are being exported to RoW	Medium
8	Groundnuts	30 601 000	-4 536 000	Net importer of groundnuts	High
9	Dried beans	79 203 000	-14 365 000	Net importer of dried beans	High
Other crops & livestock					

10	Cotton	521 878 000	-391 477 000	Raw cotton is exported but large quantities 'woven fabrics of cotton' imported	High
11	Biomass	No available statistics	No available statistics	New potential VC, limited data; Net exporter of charcoal; net importer methanol	Medium
12	Poultry	Limited statistics	Limited statistics	New potential VC, limited data	Medium
Red meat					
13	Cattle	217 848 000	15 630 000	Positive trade balance, but large potential to improve quality	High
14	Goats	1 253 000	103 000	Cross-border trade & imports from RoW limited – potential to grow in future	Medium

The crops with the highest potential to develop in the SADC region are rice and wheat that are mostly imported from outside the region. Some years maize is also being imported depending on climatic conditions in the region. Both wheat and rice have the potential to be cultivated in the region and supply to fellow SADC MS. South Africa is the biggest producer of wheat in the region but do not have the potential to grow its own production base – it has to import the product. South Africa is also the biggest rice consumer and cannot produce any rice and is therefore dependent on rice imports from international markets. Upland rice cultivars can be produced in the region and supplied to fellow MS.

Two oil seeds that play a leading role are soybean and sunflower – both for human consumption and for the production of animal feeds (mainly for poultry production). Soybean production has increased in recent years in the region – particularly Zambia and South Africa. The crop has great potential to be produced in most countries.

In terms of fibre, cotton is a major crop that has gone backwards in recent years. Most cotton products that are being imported are 'woven fabrics' and other processed cotton products. The regional markets are being flooded by subsidised manufactured products from Asia and local textile and clothing manufacturers find it difficult to compete against these imported products. Biomass and poultry (geese and ducks) are new opportunities that need to be developed and has the potential to grow into export opportunities.

Sesame is an important export crop in some countries, and it has the potential to grow in future. Production and trade volumes of groundnuts can increase and has the potential to grow more as an edible product that is more valuable than groundnut oil. Cotton seed oil has lower volumes, but it is suspected that there are unutilised cotton seed that are not being processed. Dried beans play an important role in the diet of the inhabitants of the region and can be processed and canned – a popular product in the region.

Red-meat production has great potential not only to develop in stronger RVCs but also as global VCs and supply international market destinations. The region has a positive trade balance with the RoW but there is more potential for growth. There are currently three MS that are net exporters of beef – Botswana, Namibia and South Africa. There are large export opportunities for beef – in the Middle and Far East – particularly China. Goat meat is not much traded across borders in the region but has the potential to grow. There is good breeding material available and with consumer education it is possible to grow the demand for goat meat. More detailed information on value chain specific conclusions and recommendations can be found in Appendix N.

Appendices

Due to the volume of the main report, the appendices had to be separated and comprise the following:

- Appendix A: Work schedule
- Appendix B: SADC Trade analysis: Exports, Imports, Trade Balance, 2015-2017 Average

- Appendix C: Donor and intervention mapping
- Appendix D: Policies and strategies
- Appendix E: Literature review
- Appendix F: Production statistics
- Appendix G: Trade analysis by country: Exports, Imports
- Appendix H: Food balance sheets
- Appendix I: TBT and SPS requirements in SADC
- Appendix J: Stakeholder list
- Appendix K: Most significant factors
- Appendix L: Live animal stocks
- Appendix M: Leading firms and key stakeholders
- Appendix N: Value chain specific challenges and recommendations
- Works Cited

1 INTRODUCTION

1.1 Background

Various policy documents have identified a need in the Southern Africa Development Community (SADC) for developing industries in the region and at the same time for integrating markets in such a way that regional trade is enhanced, industrialisation is accelerated, cooperation between Member States is further facilitated, and poverty alleviation is achieved. Most commodities produced on the continent are exported in its raw form and processed elsewhere with very little value added in producers' economies. The SADC Industrialisation Strategy and Roadmap (SISR) for the 2015-2063 period has three pillars: (i) industrialisation as a champion of economic and technological transformation; (ii) competitiveness as an active process to move from comparative advantages to competitive advantages; and (iii) regional integration and geography as the context for industrial development and prosperity.

The primary sectors, mining and agriculture, contribute about 50% of most SADC countries' GDP and most exports are raw materials and commodities of low value – therefore SADC's net trade is significantly negative. The level of agro-processing and natural resources including mineral beneficiation in the region is comparatively low. Industrial development in most SADC countries is underdeveloped and poorly diversified. The Action Plan to operationalise the SISR, as approved by the SADC summit in March 2017, envisages substantial quantitative shifts in the industrial structure, export performance and employment, through these growth paths which promote the adoption of appropriate technology and production of more diversified, higher value goods and services.

There is therefore a need to support the development of agricultural value chains and a component of this would be to enhance the development of sustainable (i.e. profitable) agro-processing activities as part of wider industrial development initiative. The role of regional value chains (RVCs) has been highlighted widely as a critical factor for trade and regional integration in developing regions. In this study, the service provider will identify agricultural value chains which can be further developed and that can have a regional impact and specific agro-processing opportunities will be identified. It is foreseen that

some of these value chains will enhance cross-border trade in the region[1] and others will have the potential to unlock international export markets.

1.2 Goals and Objectives

1.2.1 Goal of the Study

This is a study to identify the potential for increased participation in, and the establishment of, sustainable regional agro-processing value chains as an integral part of the SADC industrialisation and market integration process. This study will form part of the implementation of the SISR and Action Plan.

1.2.2 Objectives of the Study

1.2.2.1 Overall objectives

The overall objective within the scope of this study, is to profile agro-processing value chains in the SADC Region with the best opportunities to be enhanced.

1.2.2.2 Specific objectives

To achieve the overall objective, the following are specific objectives that the study will focus on:

Characterise the nature, form, ownership, size, depth and spread of the agro-processing industry in the SADC Region by analysing, among others:

- the agricultural production characteristics of the region;
- the agricultural import and export characteristics of the region;
- the consumption patterns of raw materials, agro-based intermediary and finished products;
- the existing national agro-processing value chains in the region.

Identify regional value chains in the agro-processing industry, highlighting among others:

- linkage drivers;
- inhibitors and success factors in this industry;
- key lead firms, their location and sources of competitive advantage.

Select potential regional value chains of significance that should be promoted, showing, among others:

- what advantages such proposed value chains will bring to the region in terms of investment, income, increases in export, employment and linkages with other industries?
- how such industries will promote rural development as a strategy to reduce poverty?
- critical success factors identified?
- prospects for long term sustainability, based on the strengths and weaknesses along the chain.

1.3 Scope of Work

The scope of the work entails providing information on the approach that was taken and what methodologies were employed to execute the proposed study. The content of the scope of work is based on the Terms of Reference (TOR) as provided by SADC, and further direct consultation with SADC.

[1] By default, the term 'region' in this document will refer to the SADC region.

The scope of the study was limited to agro-processing in selected product groups, namely: (i) **crop and livestock products** including grains, pulses, roots and tubers, cotton and livestock products; (ii) **forestry** and other **biomass products**, including beekeeping; (iii) **fisheries products** including aquaculture and fish catches in water bodies; and (iv) **plantation crops** including sugarcane, coffee, tea, as well as other significant product areas that may be found relevant during the course of this study. Geographically, the region comprises the 16 SADC Member States.

1.3.1 Implementation of the Study

The study was conducted over three primary phases, as highlighted in the table below.

Phase	Description of Activities
Inception Phase	• Kick-off meeting with SADC Secretariat; • Preparation of an Inception Report; • Development of value chain selection criteria; • Identification of priority value chains; • Preparation of an Interim Report
High-Level Value Chain Assessment	• In-depth literature review and trade analysis on priority value chains • High-Level Value Chain Assessment of priority value chains; • Identification of high-potential value chains and products for deep-dive value chain analysis;
In-Depth Value Chain Analysis	• Fieldwork in selected member states - Collection of primary data; - Assessment of Most Significant Factors from key stakeholders; • In-depth analysis of high-potential value chains; • Identification of regional and national opportunities to facilitate or unlock potential RVCs.

1.3.2 Fieldwork

Whilst it was not feasible to visit all Member States during this assignment, a selection of six Member States were identified for fieldwork. These states were identified by considering a range of factors, from economic diversification to geographic location to level of industrialisation.

Country	Political, Socio-economic factors relevant to study	Geographic, Physical Factors relevant to study
Madagascar	Largest of the SADC island states and an LIC. low access to inputs and processing facilities. Madagascar is also the largest island state party to the EU-ESA interim EPA. The country will also play an important role in the Regional Programme for Food Security and Nutrition (PRESAN)(2016-2020) that has recently been prepared for the Indian Ocean Commission (FAO 2018). Some evidence of political risk from agro-processors warranting consideration in identifying barriers and opportunities	Madagascar presents challenges that would not be found in mainland SADC member states – most prominently challenging trade routes with other SADC member states: Island economy Likely to require distinct solutions Volatility in production due to climatic hazards.
Malawi	As a Low-Income Country (LIC), Malawi still has a low degree of complexity in its agricultural sector and related downstream industries and is making significant efforts to increase participation in regional value chains. It also features in a range of the clusters identified above.	Landlocked with high population density, giving distinct challenges. High dependency on neighbours for export routes. Constrained on power and other wider economic factors.

Country	Political, Socio-economic factors relevant to study	Geographic, Physical Factors relevant to study
Mozambique	LIC Lusophone country undertaking extensive efforts to diversify their economic reliance on mineral and metal deposits. Mozambique is a signatory to the EU-SADC EPA.	Often ignored in regional studies, even though it has made significant efforts to develop national VCs and integrate into regional ones (for example with Macadamia nuts).
South Africa	Upper Middle-Income Country (UMIC) and prominently features throughout all the agro-processing clusters identified in the Action Plan for SADC Industrialisation Strategy and Roadmap. The maturity of its economy has resulted in a considerable proportion of agricultural and non-agricultural inputs (such as packaging materials, etc.) being supplied to SADC member states from South Africa. South Africa is also party to TIDCA, the EU-SADC EPA, and a member of the BRICS bloc.	Many of the multinational processing firms, retailers, and regional offices of targeted stakeholders are located in South Africa, with growing supply chain linkages throughout SADC. Likely to occupy positions in agro-processing, with higher capacity, in VCs originating in other SADC countries. South Africa is also a prominent member of the Southern Africa Customs Union, allowing for contextual information relating to other SACU member states to be collected centrally if necessary. Evidence of complex value chains and clustering.
Zambia	Lower Middle-Income Country (LMIC) and features quite extensively in all of the agro-processing clusters highlighted in Table 2. Rapid economic growth over past 20 years providing internal demand growth as well as export capability. Zambia's mining sector has had a significant impact on national income which has affected agro-processing factors. Zambia is party to the EU-ESA interim EPA.	Neighbouring a number of SADC member states, namely DR Congo, Malawi, Angola, Botswana, Namibia, and Tanzania, thus providing a central location in the northern region of SADC. Can provide nearby agro-processing capacity to neighbours, particularly DRC and (in Eastern Province) Malawi. Historical paths (similarities and differences) with Malawi and Zimbabwe offer opportunities for benchmarking / comparison.
Zimbabwe	Features significantly throughout the identified agro-processing clusters. It's historic role as an agricultural producer is considerable, but poor economic performance in recent years have placed considerable strain upon the national economy and its agricultural sector.	As a land-locked LIC with food security concerns it will present unique challenges to integrating into RVCs in SADC. Physical infrastructure and proximity to South Africa relevant to opportunities.

1.3.3 Implementation Challenges

Data availability and reliability remain a significant challenge. Third-party data from sources such as the FAO, COMTRADE, and other data aggregators present varied issues, such as:

- Being significantly outdated in many instances;
- Partial reporting by Member States, and in many instances wholly omitted data for many years;
- Limited availability of data from the statistical departments of Member State governments;

Furthermore, in collecting data from stakeholders during member state fieldwork there was a reluctance by private sector stakeholders to share competitive information such as costs, profit margins, or insights into the structures of their product value chains. This presented a significant challenge in profiling existing chains, particularly given the original brief to highlight the economic performance and value addition at various stages of the value chains.

Lastly, it was evident that national stakeholders generally showed a misunderstanding of the concept of regional value chains. In many of the interviews stakeholders reverted to discussing national issues and national value chains; this was prevalent throughout all the Member States, highlighting the need to raise awareness on the concept of regional value chains with state, private sector, and civil society actors.

The challenges resulting from stakeholder engagement and the poor availability of data made it significantly difficult to clearly identify and collect data on regional value chains. Thus, much of the profiling of regional value chains in this report uses fieldwork findings, publicly available trade data and secondary data from other relevant reports as proxies in an attempt, where possible, to describe some existing (and some new) regional value chains that could be promoted and supported by SADC as a regional actor.

2 CONTEXTUALISING REGIONAL VALUE CHAINS IN SADC

2.1 Regional Value Chains in SADC

2.1.1 Background

The global and regional value chains across SADC have long been defined by historical precedent through trade in commodities, including traditional products such as tea, sugar, cotton, tobacco, fruits. Capturing more of the value-accumulating activities of these chains has often been a focus, though achieving scale in operations has often posed a problem as much as upgrading through value chain functions. In the past many of these have been vertically integrated (such as sugar production) with estate functions. Today, agro-processors grapple with the challenges of achieving scale while respecting land, labour and environmental rights in a different context. Security of sourcing, and insulation against price and political risk, remain as pertinent as ever.

The 'prize' of industrialisation, from a development perspective, is manifold – agro-processing jobs often naturally favour youth employment, and while some roles are gendered as physically intensive, many functions offer formal employment for women. The potential for high margins per unit of agricultural output is achieved through labour, and increasingly skilled labour.

Some value functions (for example aggregation, milling) will require proximity to production, and this offers opportunities to achieve scale benefits and invest in overcoming challenges of poor capacity, such as post-harvest losses or poor phytosanitary conditions. Often processes in the chain are necessarily located closer to the market (producing chocolate from cocoa, for example, or bulk packaging of tea): however, the rapid growth of markets within SADC, and the growing economic power of regional consumers, are offering new opportunities for agro-processing. From a regional perspective, the opportunity to share the gains according to comparative or absolute advantage are evident, with IT and engineering often being serviced centrally within a multinational, though this could result in unbalanced growth depending on location and distribution of centralised services. Similarly, within a country, a satellite model of rural agricultural production and centralised agro-processing can start to frustrate potential,. Rural industrialisation must be rational, but and increasingly governments are caught in the political balancing act of rapid urbanisation and cost advantages of encouraging growth across their countries.

2.1.2 Changing markets – concentration of market power

Moving from the traditional global commodities, there are new avenues of demand from Asia, for example: Malawi oil seed products such as pigeon pea to India; and growth in demand for feed and hides in the Middle East. These offer SADC a new chapter of opportunity, but also a new set of challenges as these new markets are developed such as quotas or differing standards frameworks that are not as well-developed as more mature markets.

Servicing both emerging and established commodity markets are large buyers, often with global sourcing requirements but with buying offices in each country. This is, in effect, a parallel international trading structure that can translate global demand into the SADC region. Cotton, soy bean, pigeon pea are all subject to this system, the full effects of which can be overlooked at a country level.

Regionally, even the old value chains are being transformed as South Africa continues to drive demand for products, and in doing so deepens its degree of integration with other SADC countries. Supermarket networks (particularly South African ones) are two-way streets, creating highways for high quality goods (in spite of trade obstacles) while creating a market structure that is evolving into a regional platform with large buying power.

In practice, most consumer demand is growing at a more local level – nationally, agro-processors that have grown iteratively can enjoy a very concentrated market with strong market power. Poultry and meat producers face tight challenges of sourcing but have enjoyed a winner-takes-all advantage if they successfully reach scale in-country. Agro-processors of grains have more options and require less vertically integrated commitment to producers – they can rely on the trader / spot market system and source regionally in the event of shortfalls. While this is a mitigating strategy for the development of a strong agro-processing sector, it can arguably limit the degree of investment in primary agricultural production from within the value chain. Where deeper investment in extension services and contracts are attempted results have been mixed, given the other variables in play such as the control of aflatoxins and household level, road transport weaknesses, lack of organisational capacity and farm support. In countries like Malawi and Madagascar, these limitations are acute and define the whole structure of the sector.

2.1.3 Food security and Environmental Challenges

Agro-processing is inherently connected to food security, land and environmental factors, which variously pose political or production risks. At the same time, they are crucial to realising the objectives of food and climate security by providing the sustainable economic rationale for continued investment in irrigation, fertilisers and seed varieties, that often overwhelm those at farmer level. Organisational and human capacity are often manifested at the aggregation and processing levels – this study identifies clear examples where SADC's competitiveness and industrialisation objectives across the region are strongly consistent with investment social and environmental objectives – de-risking one can de-risk and improve the other.

2.1.4 Widen Economic Challenges

To a large extent, the potential for agro-processing can be dependent on the deeper 'productive capital' of a country, or its regional vicinity. The DRC's weak political and social capital means that regional trade with Zambia (and East African neighbours) is imperative and defines its agro-processing capacity. Similarly, a lack of human capital (business support, extension services) in rural areas means that an agro-processor may be limited by wider factors beyond their control or achieve sufficient scale in order to address all those factors at once (this is in many respects the approach of big operators like Illovo). Finally, physical infrastructure can remain a high determinant – energy supply, road access to rural areas, and constrained warehousing and transport stock can pose challenges. But for those who can overcome these, there can be a 'moat' of competitive advantage against competition, accessing new markets, and that can be as or more attractive than the global power relationships within established global value chains.

2.1.5 The Status of RVCs in SADC

Regional integration is part of the development agenda for SADC and part of the regional industrialisation process would be through the development of regional value chains. On the other hand, it is also true that for regional value chains to function well there is a need for enhanced regional integration.

2.1.5.1 SADC's Prioritised Agro-Processing Sectors and VCs

In the *Action Plan for SADC Industrialisation Strategy and Roadmap* (SADC, 2017), several sectors and countries are noted for potential VC enhancement. SADC considered the following value chains: (i) VCs already in existence with the potential to upscale; and (ii) new VCs with potential to develop or those VCs with links to regional and global VCs. The report also identified the following VCs: soya, sugar (and related products), cassava, food and beverages, fisheries (fresh water and marine), forestry, dairy, leather and leather products, meat and meat products, fruit and vegetables. Priority agro-processing VCs, as identified in the Action Plan for SADC Industrialisation Strategy and Road Map, and countries where those VCs play an important function, are highlighted in Table 1.

Table 1: Priority Agro-Processing VCs

Sector and value chain	Countries
Soya	South Africa, Zimbabwe, Zambia, DRC, Malawi, Madagascar
Sugar	Malawi, Mozambique, South Africa, Swaziland, DRC, Tanzania, Zambia, Zimbabwe, Mauritius, Botswana
Meat products (poultry and beef)	Botswana, South Africa, Zambia, Zimbabwe, Namibia, Swaziland, Madagascar, Tanzania, DRC
Cassava	Angola, DRC, Mozambique, Tanzania, South Africa, Malawi, Madagascar, Zambia, Zimbabwe
Dairy products	Madagascar, South Africa, Namibia, Tanzania, DRC, Malawi, Botswana, Zambia, Zimbabwe, Swaziland
Other food and drinks	Angola, DRC, Lesotho (maize), Mauritius (sea food), Zambia (oil seeds and livestock products), Malawi (oil seeds), South Africa, Zimbabwe, Swaziland, Madagascar (Rice, maize, black eyed beans, pea), Namibia, Tanzania (maize, rice, oil seeds)
Fish and fish products	Angola, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Zambia, Madagascar, Malawi, Tanzania, DRC, Zimbabwe
Horticulture (Fruits, Vegetables and Flowers)	Swaziland, Lesotho, Zambia, South Africa, Malawi, Madagascar, Zimbabwe, DRC, Namibia, Tanzania
Wildlife (game meat and hide processing)	Botswana, Namibia, South Africa, Zambia, Zimbabwe, DRC
Forestry – Timber and non-timber forest products (medi-cinal, cosmetics, essential oils and other herbal products)	DRC, South Africa, Angola, Madagascar, Swaziland, Mozambique, Zimbabwe, Zambia, Namibia, Tanzania, Malawi, Mauritius

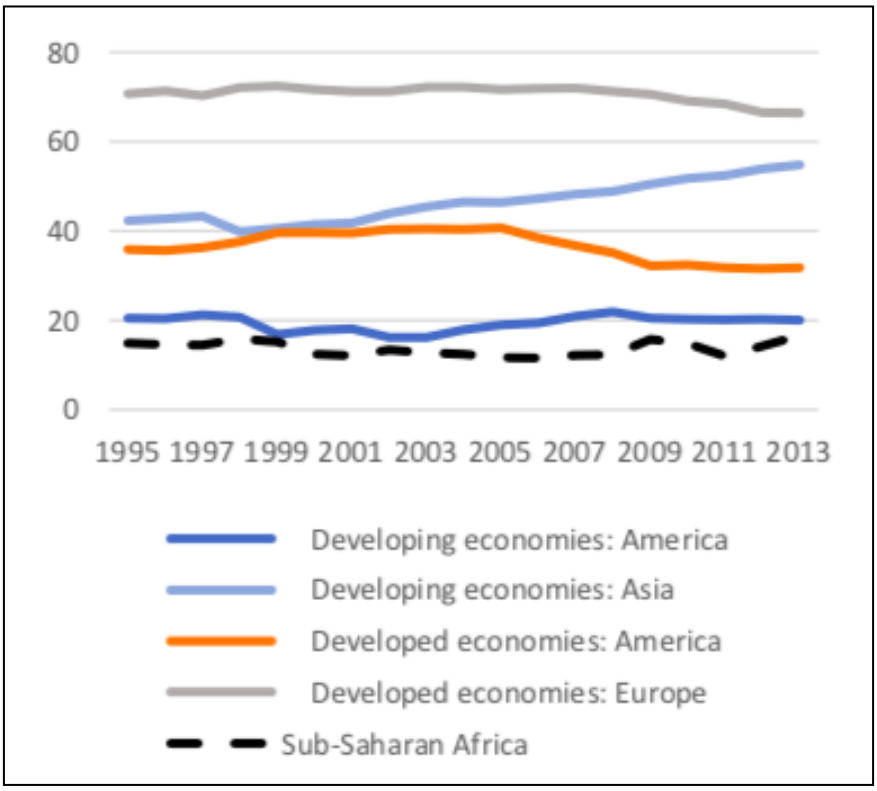
Source: Action Plan for SADC Industrialisation Strategy and Roadmap (SADC, 2017)

2.1.5.2 Intra-Regional SADC Trade

Based on the work that has been conducted by the AfDB there is evidence on GVC participation in the South African region, (AfDB, OECD, UNDP, 2014), suggests that South Africa is a key-driver of RVCs – a supplier of intermediary inputs as well as an off-take market for cross-border for exports. From analysis conducted it transpired that intra-regional exports as a share of total exports for sub-Saharan Africa are between 10% and 20% - much lower that what is experienced in other regions such as Asia, Europe and the Americas (Figure 1).

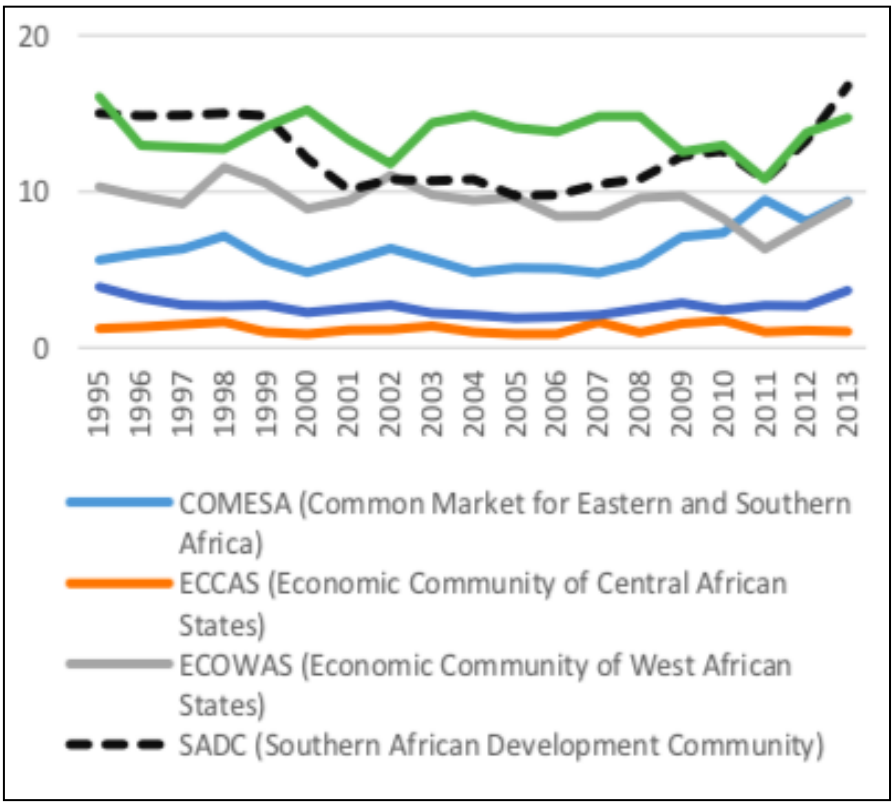
There is also evidence that intra-regional trade in SADC is higher than that in other regions on the continent especially since the financial crises during the 2008/2009 period (Figure 2). However, there is limited information on the benefits of cross-border trade in SADC and international exports from the SADC region (Keane 2016).

Figure 1: Intra-regional export as a percentage of total exports



Source: Keane 2016

Figure 2: Intra-regional export by RECs as a percentage of total exports



Source: Keane 2016

Table 2: Intra-SADC trade in priority VCs or Products

HS	Agricultural product groups	Exports			Imports			Trade balance	
		SADC total exports	Intra SADC		SADC total imports	Intra SADC		SADC total	Intra SADC
			Value	%		Value	%		
Grains and starch									
1005	Maize or corn	591 251	260 822	44%	479 905	263 815	55%	111 346	-2 993
1001	Wheat and meslin	38 577	35 540	92%	953 950	56 597	6%	-915 373	-21 057
1006	Rice	84 258	68 902	82%	1 388 605	70 380	5%	-1 304 347	-1 478
1007	Grain sorghum	9 139	6 117	67%	18 622	6 169	33%	-9 483	-52
Legumes									
1201	Soya beans, whether or not broken	66 285	55 745	84%	57 543	48 855	85%	8 742	6 890
1507	Soya-bean oil and its fractions, whether or not refined (excluding chemically modified)	52 244	46 435	89%	425 984	51 713	12%	-373 740	-5 278
0713	Dried leguminous vegetables, shelled, whether or not skinned or split	190 815	33 134	17%	170 199	42 840	25%	20 616	-9 706
1202	Groundnuts, whether or not shelled or broken (excluding roasted or otherwise cooked)	47 991	18 218	38%	44 834	13 764	31%	3 157	4 454
1508	Groundnut oil and its fractions, whether or not refined, but not chemically modified	884	680	77%	1 530	1 349	88%	-646	-669
Oilseed									
12	Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medicinal plants; straw and fodder	481 510	120 785	25%	273 580	107 730	39%	207 930	13 055
1206	Sunflower seeds, whether or not broken	4 674	1 915	41%	17 416	2 056	12%	-12 742	-141
1512	Sunflower-seed, safflower or cotton-seed oil and fractions thereof, whether or not refined, but not chemically modified	127 007	94 911	75%	282 068	77 869	28%	-155 061	17 042
1207 40	Sesamum seeds, whether or not broken	103 440	1 326	1%	3 895	1 605	41%	99 545	-279
1515 50	Sesame oil and its fractions, whether or not refined, but not chemically modified	238	213	89%	1 052	300	29%	-814	-87
Fruit and nuts									
08	Edible fruit and nuts; peel of citrus fruit or melons	4 000 852	186 524	5%	316 287	190 307	60%	3 684 565	-3 783
8045	Fresh or dried guavas, mangoes and mangosteens	16 661	2 369	14%	3 353	2 218	66%	13 308	151
0805	Citrus fruit, fresh or dried	1 454 912	19 776	1%	30 598	20 937	68%	1 424 314	-1 161
0802 60	Macadamia nuts, fresh or dried, whether or not shelled or peeled	2 012	563	28%	1	1	100%	2 011	562
0803	Bananas, incl. plantains, fresh or dried	47 213	45 882	97%	56 247	42 898	76%	-9 034	2 984
Fibres									
52	Cotton	253 183	177 015	70%	814 004	188 563	23%	-560 821	-11 548
Plantation									
17	Sugars and sugar confectionery	1 289 100	616 322	48%	1 455 955	556 874	38%	-166 855	59 448
0901	Coffee, whether or not roasted or decaffeinated....	211 671	24 301	11%	121 368	23 799	20%	90 303	502
0902	Tea, whether or not flavoured	167 046	66 400	40%	89 627	66 702	74%	77 419	-302
Biomass and forestry									
44	Wood and articles of wood; wood charcoal	911 025	355 362	39%	706 367	348 638	49%	204 658	6 724
06	Live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage	134 796	14 675	11%	35 369	14 367	41%	99 427	308
2905 11	Methanol (i.e. methyl alcohol)	2 507	827	33%	9 756	839	9%	-7 249	-12
Meat and animal products									
02	Meat and edible meat offal	485 636	251 464	52%	1 532 549	196 726	13%	-1 046 913	54 738
0201	Meat of bovine animals, fresh or chilled	178 544	36 412	20%	35 719	29 268	82%	142 825	7 144
0202	Meat of bovine animals, frozen	131 594	65 834	50%	156 818	53 043	34%	-25 224	12 791
0204	Meat of sheep or goats, fresh, chilled or frozen	16 964	15 302	90%	60 044	15 531	26%	-43 080	-229
0207	Meat and edible offal of fowls of the species Gallus domesticus (chicken), ducks, geese, turkeys and guinea fowls, fresh, chilled or frozen	101 278	97 060	96%	949 809	66 137	7%	-848 531	30 923
41	Raw hides and skins (other than furskins) and leather	359 569	23 600	7%	98 929	25 240	26%	260 640	-1 640
04	Dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified or included	282 599	262 580	93%	781 934	242 835	31%	-499 335	19 745
51	Wool, fine or coarse animal hair; horsehair yarn and woven fabric	527 077	48 876	9%	170 205	48 903	29%	356 872	-27
Fish									
03	Fish and crustaceans, molluscs and other aquatic invertebrates	1 901 180	396 766	21%	1 112 715	393 534	35%	788 465	3 232
0302 71	Fresh or chilled tilapia "Oreochromis spp."	836	835	100%	995	974	98%	-159	-139
0302 72	Fresh or chilled catfish "Pangasius spp., Silurus spp., Clarias spp., Ictalurus spp."	133	127	95%	140	127	91%	-7	0
0303 23	Frozen tilapia "Oreochromis spp."	7 745	7 665	99%	30 640	7 635	25%	-22 895	30
0303 24	Frozen catfish "Pangasius spp., Silurus spp., Clarias spp., Ictalurus spp."	99	93	94%	5 439	172	3%	-5 340	-79

2.1.5.3 Challenges in developing RVCs

Southern Africa, and the SADC region in particular, provide an interesting point of reflection for the accepted logic that RVCs can grow organically, or with limited centralised coordination. Most member states in SADC find themselves at similar levels of development, resulting in most producing similar commodities or products that compete against each other. South Africa's highly industrialised nature, at least in comparison to its fellow member states in SADC, distorts the intended linear nature of RVCs. Significant limitations to agro-processing capacity in member states result in countries competing for export markets with the same primary products.

Priorities of national versus regional: A landlocked country like Zambia is dependent on the road network in Mozambique to transport fertiliser through the port in Beira and export copper through the Durban port in South Africa. In most cases national development programmes focusses more on national priorities than those '*with strong regional externalities as the benefits cannot fully appropriated nationally*' (Keane, 2016).

Policy differences: In SADC there are policies that varies across the region that prevents trade of certain products. SA produces GMO maize and Zimbabwe has banned the importation of such maize products therefore prevents the development of RVCs (Ncube, 2018).

Business environment and predictability of policies: There are many South African agribusinesses that have invested into SADC countries and some even invested in West and Central African countries. One of the largest agribusinesses in SA invested in Zambia, Mozambique, Tanzania and Uganda but also in Ghana and the Republic of the Congo. Some challenges have been identified and has been highlighted in the study. Some of the challenges that limit the development of regional value chain are the repatriation of profits from foreign operations (due to foreign exchange control), predictability of policy, weak infrastructure, small markets with few commercial farmers and price formation of crop prices (mostly maize) alongside government intervention in market price systems. This has been evidenced by the redrafting of the Malawi Control of Goods Act, which in its original form allowed ad-hoc import and export bans resulting in a highly unpredictable trading environment in the country.

2.1.5.4 Success Stories

The AfDB (2014) describes South Africa a driver of RVCs in SADC by supplying intermediary inputs (seed, fertiliser, etc.) as well an important off-taker of exports from the region.

There is scepticism amongst some researchers in that it is difficult to identify a sector in the SADC region where RVCs have in fact been successfully created. In recent years it is argued that SADC trade between the MSs has not increased dramatically. In the literature, reference is mostly being made to national value chains and the potential export of the products being produced – many a time referring to international export markets and not cross-border trade into the SADC region. Thus, most of the projects and research on national value chains refer little to the impact it could have on RVCs. About the only example of truly well-developed RVC is that of South-African-based supermarkets like Shoprite, Woolworths, Pick n Pay, Spar, etc. (Bertelsmann-Scott & Markowitz, 2017). Although these retailers import most of their products from SA there is a renewed effort to source in-country-produced products like maize meal from CIM (a large maize-milling operation south of Maputo) and yogurt and fruit-juice products in Madagascar. The procurement of fresh produce from local and in-country suppliers have been more challenging mostly due to food safety and private standards applied by these supermarkets.

There are however opportunities for future growth like in the macadamia nut industry that could be enhanced through technology and plant material available in South Africa. The leather industry has thrived in Lesotho and supplied products to South Africa that was utilised in the manufacturing of seats for the motor industry in South Africa (Bertelsmann-Scott and Markowitz 2017).

During the past five years the cotton production in SA has expanded to such an extent that local cotton processing sector – specifically the spinning of cotton lint – had to be outsourced to spinning operations in Mauritius and Zimbabwe.

Other promising regional value chains that are underdeveloped, but highlighted as significant for consideration, include the Animal Feed to Poultry Value Chain across Botswana, South Africa, and Zimbabwe (Ncube, et al., 2016), and the Oilseeds and Edible Oils Value Chain between Tanzania and South Africa (Chisoro-Dube & Paremoer, n.d.)

According to Ncube (2018) poultry value chains differ between countries and there are two types of VCs – formal and hybrid VCs with both similarities and differences between these types of value chains. If changes in policies will be made at regional level it will have different impacts on the different types of value chains within the various SADC MSs. If borders will be opened it will have most have a positive impact on the more formal VCs and will have a negative impact on the informal or hybrid VCs.

2.1.5.5 Opportunities to make RVCs better

Another approach to enhance regional integration and promote the RVCs would be to remove regional non-tariff measures (NTMs). In a proactive approach to enhance trade there should be an effort to enhance regional standards and rules of origin. There should be a concerted effort by national governments and intra-regional agencies to ensure that NTMs do not become non-tariff barriers (NTBs) (Keane 2016).

In terms of a broader regional integration agenda there are usually three areas that should be focussed on: market integration, infrastructure and industrial development – also known as *developmental integration*. This approach could lead the way to make SADC member states more competitive in future (Keane 2016).

There is also a need to understand how value chains are being operated but it is also important that countries understand how private sector companies behave in the management of these value chains. This insight of governments into this behaviour of firms can provide guidance to design policies in such a way as to attract investment into selected sectors of the economy (Ncube 2018).

It should be noted that there are a few RVCs in the SADC region but there needs to be an effort to stimulate the growth of cross-border value chain development. In the poultry sector regional investments have been made in the SADC region but it was felt that more could be done at regional policy level to promote the development of comprehensive regional value chains (Ncube, 2018). The development of RVCs goes hand-in-hand with enhanced regional integration – including improvement of transport and trade infrastructure, improved trade facilitation and as a means to accelerate the removal or mitigation of prominent NTBs. This could only be achieved through collaboration in the SADC region between all key actors – civil society, private sector, national governments, inter-governmental agencies, and the broader donor community – and the continued implementation of the SADC Free Trade Agreement.

2.1.5.6 Key Impediments and Opportunities for Agro-Processing Development

It should however be noted that certain important impediments exist which hamper the establishment or expansion of agro-industries, preventing the large-scale participation by more players. Those factors would be addressed through the deployment of small and intensive skilled implementation structures along the pattern of successful development corporations. Without addressing these issues as summarised in Table 3, many promising opportunities will again land on the shelves. It is foreseen that through the right guidance and organising in a skilful manner it will be ensured that the bottlenecks to development are removed. The implementation of novel technologies can assist to achieve those plans.

Table 3: Barriers to the development of value chains

Areas for attention	Aspects to be addressed	Important bottlenecks	Potential for enabling processes
Physical processes			
	Canning: tins	The high cost of tins for canning	New approaches to low cost containers
	Packaging: small containers, boxes	The high cost of packaging	New possibilities of low-cost packaging
	Packaging: alternative lines of packaging	Limited usage of glass and plastic bottles	New approaches to usage of bottles glass and plastics
	Processing technologies	Lack of expertise on processing technologies in many areas	Availability of novel technologies for processing
Enabling requirements			
	Traceability	General lack of traceability in most areas and high requirements by end users	Advanced new methods to improve traceability at all levels
	Quality standards	Frequent low standards of products on offer	Potential to comply to the high standards required
	Harmonisation between countries	General lack of coherent policies between countries	Potential to upgrade co-operation in the SADC region
	Organic certification	Lack of understanding of organic certification	Large-scale potential for capitalising on organic certification
	Branding	Little local experience	Large potential for improved marketing
Production materials supply			
	Supply difficulties for phosphates for fertilizer	Endemic phosphate deficiency in soils and erratic phosphate supply to production areas	Strong potential to alleviate the shortages and stimulate entrepreneurship
	Supply difficulties for calcitic and dolomitic lime	Endemic Calcium and Magnesium deficiency in soils and erratic lime supply to production areas	Strong potential to alleviate the shortages and stimulate entrepreneurship
Breeding materials for high-value crops			
	Rootstocks and new varieties of different exportable crops	Lack of availability of the best cultivars required to attain optimal production and quality	Potential to feed new genetic materials into the production systems

The data aggregated are mirror and direct data; Source: TradeMap, International Trade Centre (2018)

3 HIGH-LEVEL VALUE CHAIN ASSESSMENT

Agriculture contributes about 15% of total SADC GDP (between 4% and 27% of GDP in the different SADC Member States), industry accounts for 31% and services for 55% (SAIIA, 2016). The share of manufacturing (11% SADC wide, 2014), with the exception of South Africa and Mauritius, remains low and undiversified in the region (Tralac, 2017). In South Africa agro-processing, and in particular food processing, was the largest manufacturing subsector in 2015 and the sector grew more rapidly than total manufacturing in the period 2004-2014.

3.1 Methodology for High-Level Value Chain Assessment

In the Action Plan for the SADC Industrialisation Strategy and Roadmap, a range of priority VCs have been identified to demonstrate the potential that these VCs have to deepen regional integration through boosting intra-regional trade and cross-border investments. In the Action Plan the agro-industry subsector was identified as one of six value-chain clusters (SADC, 2017). The VCs listed under the Agro-Processing Cluster of the Action Plan are highlighted in **Error! Reference source not found.**, and was used as the point of departure for the High-Level VCA.

In-depth analysis of all prioritised VCs was beyond the scope of this assignment. In order to still provide reasonable insights into the opportunities presented by the priority VCs, a desk-based high-level value chain assessment (VCA) was undertaken. The intention of this was to both to ensure equal consideration of all VCs, and to identify products or product-lines for in-depth analysis in the In-Depth Value Chain Analysis phase of the assignment.

3.2 Long-List for High-Level Value Chain Assessment

At the regional level it was suggested to include those VCs that are less complex, have high volumes, high financial transactions, engage more people (including women, disabled people and youth) and are already in existence. Focus was also be placed on those value chains that are non-existent, but which can be activated at low cost, little effort and high returns. An initial set of criteria was developed for this phase of the study (see Table 4: Long-list of VCs for high-level value chain analysis).

In the Action Plan for SADC Industrialisation Strategy and Roadmap (SADC, 2017), several sectors and countries are noted for potential VC enhancement. SADC considered the following value chains: (i) VCs already in existence with the potential to upscale; and (ii) new VCs with potential to develop or those VCs with links to regional and global VCs. The report also identified the following VCs: soya, sugar (and related products), cassava, food and beverages, fisheries (fresh water and marine), forestry, dairy, leather and leather products, meat and meat products, fruit and vegetables.

The Action Plan stressed the fact that VCs should compete successfully at national level but also at a regional level to be able to perform competitively against other RVCs and GVCs. A need was identified for ‘hands-on studies’ to be conducted on specific VCs, and the capacities and capabilities of VC actors needed to be assessed. It was also foreseen in the VC assessment and development that it will have to take cognisance of the policy and regulatory environment – both at the national and regional level. The impact and facilitation of policies and regulations on VC development had to be assessed.

The long list of 35 product or commodity VCs across 10 VC clusters was prepared for initial review, as listed in Table 4.

In Section 3.4: Converting Barriers to Opportunities important barriers were identified that could be converted into opportunities. These opportunities were then incorporated into section 3.4 and various agro-processing technologies were evaluated. A total of 13 criteria were identified and the identified value chains were rated according to these 13 criteria. An allocated priority factor was also included. Although the approach has rather been qualitative by nature, it was still comprehensive enough to draw meaningful conclusions. Where possible and available, updated trade figures for both intra-SADC trade and SADC

trade with the rest of the world were also included for the identified VCs – see the next section for a summarised analysis.

Table 4: Long-list of VCs for high-level value chain analysis

Product group	Value chain / technology	Primary reasons for selection	Other considerations
Grains and starch:			
	Maize	Most popular grain type in many forms along the value-chains in SADC region	Largest volumes of all grain types consumed and important for food security
	Wheat	Growing in popularity and demand; growing income -> people's preferences migrate from maize to bread	Increasing shortfall in production; High imports into SADC; hard wheat types for pasta are important
	Rice	Growing in popularity and demand; can be produced in SADC region at relatively low cost, utilising new technologies	Almost no production in SADC region; Novel processing technologies available for primary production and processing level.
	Grain sorghum	Popular grain type in many forms along the value-chains in SADC region	Portion of crops produced in all countries; processed into beer
Legumes:			
	Soybeans	Large and growing imports into region and important basis for animal feedlots	Prime candidate for processing into a range of food items; Valuable source of vegetable oil and protein
	Dry beans	Large and growing imports and important for food security	Important basis for the canning industry; canned with tomato puree
	Groundnuts	Large and growing imports and important for processing and food security	Not only oil, but important basis for various down-stream industries such as peanut snacks
Oilseed:			
	Sunflowers	Endemic shortage of cooking oil in SADC area	Strong need for value-adding processes
	Avocado oil	Endemic shortage of cooking oil in SADC area; High value processed oil products	Strong need for value-adding processes
	Sesame	Ideal crop for smallholders; exports from Mozambique and Tanzania; imports into South Africa	Yields are low; prices high; small volumes
Fruit and nuts:			
	Guavas	Easily cultivated, amid acute shortage of canned guavas & dried fruit in SADC; International export markets	Large potential market off-take; shortage of correct rootstocks to be addressed; High costs of export value chains and scale needed
	Mangoes	Easily cultivated and poorly exploited; large tree numbers exist; dried mango's export demand; fruit juice pulping	Due to seasonality of fruiting, down-stream value-adding is required
	Citrus	Estate and out-grower production provide large profit potential; international export markets; also processing - juice	Natural resources suitable for production of quality fruits; capital intensive; good management and irrigation system needed
	Marula	Indigenous with large tree numbers across SADC area; processing potential; off-take agreements	Due to extreme seasonality of fruiting, down-stream value-adding is required
	Yellow cling peaches	Easily cultivated, amid acute shortage of canned peaches and dried fruit rolls; trade in SADC and International markets	Large potential market off-take; capital intensive; good management and irrigation system needed

Product group	Value chain / technology	Primary reasons for selection	Other considerations
	Macadamia nuts	Easily cultivated; high value and low mass of nuts	Large potential market off-take; down-stream value-adding necessary
	Bananas	High demand in SADC; local village markets may have potential	Industrial crop; high efficiencies needed – highly competitive
Fibres:			
	Cotton, cotton ginning	Popular cash crop. Large-scale production existing; Low-cost ginneries available abroad;	Value adding non-existing. Strong potential for downstream processing; Large numbers of rural people in many SADC countries can participate in value adding
	Sisal to ropes	Grown extensively in many areas	Processing relatively easy and potential for participation by local communities
Plantation:			
	Sugar	Other applications: sugar syrup for canning of fruit; Bagasse for heating	Decrease in EU sugar quotas; oversupply in region and SADC net sugar exporter
	Coffee	Has been produced in the past in many countries; Can be revived if value can be added	With branding, packaging and trading large amount of value adding is possible
	Tea	Has been produced in the past in many countries; Can be revived if value can be added	With branding, packaging and trading large amount of value adding is possible
Biomass:			
Indigenous invasive bush types – extensive areas 120 million ha	Sickle bush, black thorn, yellow thorn, other species	Electricity generation through vortex burners; large markets	Novel technologies to be introduced
		Livestock feed pellets; international export markets – Middle East	Novel technologies to be introduced
		Methanol vehicle fuel; large markets – regional and international exports	Novel technologies to be introduced
		High quality export charcoal	Novel technologies to be introduced
		Laminated timber panels	Novel technologies to be introduced
Forestry:			
Foreign invaders & Forestry activities	Wattle, Eucalyptus	Laminated timber panels; large international exports markets	Novel technologies to be introduced
		High quality charcoal for export; large international exports markets	Novel technologies to be introduced
Meat and animal products:			
	Beef	Large numbers of cattle form the most important agricultural activity	Down-stream processing and growing export potential needs attention
	Goats	Large numbers of goats form the most important agricultural activity	Down-stream processing and growing export potential needs attention
	Sheep	Large numbers of sheep are kept	Down-stream processing and growing export potential needs attention
	Chickens – broilers, free range	Biggest agricultural activity globally; local village markets opportunity; free range – opportunity for sophisticated niche and developed urban markets	Challenge: Dumping by US, Brazil and EU; Small producers not competitive; minimum commercial scale – 6 houses; high capital costs; value add is poor; challenges - feed
	Chickens – layers (eggs)	Potential in certain urban markets; good source of protein	High capital costs; value add is poor; challenges - feed
	Ducks and geese	Easy to produce at low risk. Birds consume grasses and weeds	Strong markets exist for export of high value products
	Dairy – milk, cheese	High demand in some countries;	Very competitive; high risk; high imports UHT processed milk; high capital costs; scale important – min. 400 cows in lactation

Product group	Value chain / technology	Primary reasons for selection	Other considerations
	Wool & mohair	International demand and value chains; successful South Africa and Lesotho	Limited areas in SADC; good management needed; strong commercial industry needed to support
Fish:			
Freshwater vegetarian (Tilapia)		Large production potential in warmer climates; international export markets	Large potential export market, attractive prices, novel technologies
Freshwater carnivorous (Catfish)		Large production potential in warmer climates; international export markets	Local and regional markets
Ocean fisheries & Mariculture ('Ocean aquaculture')		Potential for mariculture in certain countries; potential to improve management systems of marine fisheries	'Blue Economy' - important for island states; capital intensive; foreign countries' depleting marine resources

The methodology developed and applied for this high-level VCA was as follows:

- A scoring matrix was produced comprising of contextual criteria for identifying value chain potential in SADC. Scoring criteria was based on matrixes used in various other VCAs, but included suggestions gained from consultation with the SADC Secretariat and findings from the literature review;
- Secondary qualitative and quantitative data was compiled per the scoring matrixes for the identified VCs;
- Selected remote interviews were undertaken with key individuals and institutions where secondary data was not sufficient;
- The consulting team gained an improved understanding of institutional frameworks, high-level constraints, opportunities and existing support for value chain development;
- A long list was drafted by the team and was discussed with the relevant SADC staff during the kick-off meeting – suggestions were made for specific agro-processing opportunities, value chains and products also to be considered;
- A high-level analysis has been of the products and value chains that are important for food and fibre products being produced and traded in the SADC region;
- Some products and value chains that were included are novel ideas that will have the potential to be developed as national and even regional value chains;
- All the products and value chains listed can be processed, and/or value can be added;
- About 27 value chains were assessed and restricted coverage provided to those elements necessary for the value chain assessment process;
- A final list of 12 value chain groups were selected based on the scoring matrix for high-level VCA;
- Each of these groups was profiled and discussed in greater detail in the sections that follow.

3.2.1 Assessment Criteria

In an effort to evaluate these value chains (i.e. products or technologies), 13 criteria were developed to measure the impact that it could have in the region. The criteria used in the evaluation are described below and is also reflected in Table 5.

- *Times value adding:* An indication of the amount of value to be added to the basic commodity, expressed as percentage increase on average.
- *Additional participation by individuals and small groups:* An indication of the opportunities available for the involvement of people on the ground, especially females without financial resources, both as producers and as shareholders.
- *Number of beneficiary countries:* The suitability of the processes to be applied in most or all of the respective SADC countries.

- *Economic impact on the region:* The potential effects on all the layers of the economy, including interactions between countries and regional trade.
- *Import replacement:* Expression of the priority to replace imports into individual countries, but especially into the entire sub-continent, such as rice, bread wheat, pasta wheat and vegetable oils imports.
- *Exports - regional:* Based on new opportunities and off-take agreements which present themselves, the potential to make significant contributions towards intra-Africa trade are being evaluated.
- *Exports - international:* Based on new opportunities and off-take agreements which present themselves, the potential to make significant contributions towards international trade are being evaluated.
- *Immediate impact on certain theatres:* It is important to provide an indication of the time scale for the expected improvements in the creation of wealth, instead of waiting for several years before the effects can be observed.
- *New types of opportunities to be created:* It is important to take note of novel opportunities which have not been highjacked by various role players. That provides an indication of the openness of the playing fields for the downstream value adding.
- *Utilisation of previously unused assets:* An indication is provided of the extent of unused or underutilised assets such as neglected primary production, liabilities such as excessive biomass, mangoes, freshwater fish, seed cotton and others which can be converted into high income products and the creation of wealth for large portions of the population and various layers of economic participation.
- *Sensitivity to climatic extremes:* A measure of the resilience of the process amid extremes in rainfall, temperatures and other phenomena.
- *Potential cost of investment:* A quick estimation of the cost of various fixed capital elements, technologies and operating cost to provide a measure of the accessibility of rural communities.
- *Return on investment:* A quick estimation of the expected returns based on the capital invested.

These factors have been listed in columns A to M in Table 5. A weight has been allocated to each factor for the identified technologies. An average was calculated in column O to get a value that reflects the importance of the value of the agro-processing technology. In column P a ‘priority factor’ has also been calculated based on the known importance of a certain technology in the region based on production and consumption patterns of member states. In the case of maize, the calculated average for the nine factors identified is only a 2,5 but due to the importance of the crop for food security in the region a factor of 5 has been awarded in column P. Therefore, the average factor is a 4.

Table 5: Evaluation of agro-processing opportunities

Value chains (i.e. products or technologies) considered: Crops, Livestock, Biomass, Forestry and Fishery	Thirteen Criteria													Results		
	Times value adding	Additional participation by individuals & small groups	Number of beneficiary countries	Economic impact on the region	Import replacement	Exports - Regional	Exports - International	Immediate impact on certain theatres	New types of opportunities to be created	Utilisation of previously unused assets	Resilience to climatic extremes	Potential cost of investment	Return on Investment	Calculated average	Allocated priority	Average
Rating: 1 = very low & 10 = very high																(O+P)/2
Columns	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**O**	**P**	**Q**
Factor		**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**
Grains and starch: Maize, Wheat, Rice and Grainsorghum																
Meal (flour) and meal products	3	3,5	5,0	2,5	2,0	2,5	1,0	3,5	3,0	1,0	3,0	3,5	4,0	**2,9**	**5,0**	**3,9**
Breakfast cereals, bread, rusks, pasta, snacks	20	1,0	5,0	3,5	4,0	3,0	1,0	4,0	4,0	1,5	3,0	2,5	3,5	**4,3**	**5,0**	**4,7**
Rice, production, parboiling and further processing	3	3,5	4,0	3,5	4,5	3,5	1,5	4,0	4,0	4,0	4,0	2,0	4,0	**3,5**	**5,0**	**4,3**
Legumes: soybeans, drybeans and groundnuts																
Small packaging	3	2,0	5,0	4,0	3,5	3,5	2,0	3,5	2,0	1,5	3,5	4,0	4,0	**3,2**	**4,0**	**3,6**
Pre-packed oil, protein, peanut butter	4	1,5	5,0	4,0	3,5	3,5	1,5	3,5	2,0	1,5	3,5	3,0	4,0	**3,1**	**4,0**	**3,6**
Canned beans, groundnut snacks & products	6	1,0	4,0	4,0	4,0	4,0	1,0	3,0	2,0	1,5	3,5	2,0	4,0	**3,1**	**3,0**	**3,0**
Oilseeds: sunflowers, avocado oil and sesame																
Pre-packed oil	4	3,5	5,0	3,0	2,5	1,5	1,5	3,0	3,0	2,5	4,0	3,0	4,0	**3,1**	**4,0**	**3,6**
Fruit and nuts: guavas, mangoes, citrus, marula, yellow cling peaches, macedamia nuts and bananas																
Shelf life increase	3	2,0	3,0	2,5	1,5	4,0	4,0	1,5	2,5	3,0	3,5	3,5	4,5	**3,0**	**4,0**	**3,5**
Drying, juicing	3	1,5	2,5	3,0	2,5	2,5	2,5	1,0	3,0	3,5	3,5	3,0	4,0	**2,7**	**3,0**	**2,9**
Canning	15	3,0	5,0	4,0	4,0	4,5	2,5	3,5	4,0	4,0	4,0	2,0	3,5	**4,5**	**5,0**	**4,8**
Shelled nuts	3	2,0	2,0	2,0	2,5	2,5	3,5	3,0	3,5	3,5	4,0	3,5	4,0	**3,0**	**3,5**	**3,3**
Fibres: cotton, cotton ginning and sisal to ropes																
Cotton ginning, seed delinting, oil pressing, oil cake livestock feed	2	4,5	3,0	3,0	4,0	3,5	3,5	4,0	4,0	3,5	4,0	3,5	4,0	**3,6**	**5,0**	**4,3**
Sisal to ropes	4	4,0	2,0	3,0	2,0	3,5	3,5	4,0	2,0	1,5	4,0	4,0	2,5	**3,1**	**2,0**	**2,5**
Plantation: sugar, coffee and tea																
Sugar	3	4,5	3,0	3,0	4,0	3,5	1,5	4,0	4,0	3,5	3,5	2,0	2,5	**3,2**	**5,0**	**4,1**
Coffee	10	4,5	3,0	3,0	4,0	3,5	4,0	4,0	4,0	3,5	3,0	4,0	4,0	**4,2**	**5,0**	**4,6**
Tea	10	4,5	3,0	3,0	4,0	3,5	3,0	4,0	4,0	3,5	2,5	2,0	3,0	**3,8**	**3,5**	**3,7**

Value chains (i.e. products or technologies) considered: Crops, Livestock, Biomass, Forestry and Fishery	Thirteen Criteria													Results		
	Times value adding	Additional participation by individuals & small groups	Number of beneficiary countries	Economic impact on the region	Import replacement	Exports - Regional	Exports - International	Immediate impact on certain theatres	New types of opportunities to be created	Utilisation of previously unused assets	Resilience to climatic extremes	Potential cost of investment	Return on Investment	Calculated average	Allocated priority	Average
Rating: 1 = very low & 10 = very high																(O+P)/2
Columns	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**O**	**P**	**Q**
Factor		**5,0**	**5,0**	**5,0**	**5,0**	**5,0**	**5,0**	**5,0**	**5,0**	**5,0**	**5,0**	**5,0**	**5,0**	**5,0**	**5,0**	**5,0**
Biomass: Indigenous bush tyes - sickle bush, black thorn, yellow thorn and other species																
Electricity generation	10	4,0	4,5	4,0	1,5	1,0	3,5	4,0	4,0	4,5	4,0	2,5	4,5	**4,0**	**5,0**	**4,5**
Livestock feed	10	4,5	4,5	4,5	2,0	1,0	3,5	4,0	4,0	4,5	4,0	4,0	4,5	**4,2**	**5,0**	**4,6**
Methanol fuel	10	3,5	3,5	4,0	4,0	4,0	4,0	3,0	4,0	4,5	4,0	3,0	4,5	**4,3**	**5,0**	**4,7**
Timber panels	15	3,5	4,5	3,5	2,5	4,0	4,5	4,0	4,0	4,5	3,5	2,5	4,5	**4,7**	**5,0**	**4,8**
Quality charcoal	6	4,0	4,5	3,0	1,0	3,5	4,0	4,0	4,0	4,5	3,5	2,5	4,5	**3,8**	**5,0**	**4,4**
Forestry: Foreign invaders - wattle and eucalyptus																
Eucalyptus planks, electricity, methanol, timber panels, quality charcoal	4	1,0	3,5	2,0	1,0	1,5	2,0	2,0	2,5	3,5	2,0	2,0	2,0	**2,2**	**2,0**	**2,1**
Pine planks, electricity, methanol	3	1,0	2,5	1,5	1,0	1,5	2,5	2,0	2,5	3,5	2,5	2,0	2,0	**2,1**	**1,0**	**1,6**
Meat and animal products: beef, goats, sheep, chickens (broilers free range), chickens (eggs), ducks & geese, dairy (cheese & milk), wool & mohair																
Ducks and geese - down, skins for fashionware, meat deboning	4	4,5	4,0	4,0	2,5	4,0	4,5	4,0	4,0	4,0	4,0	4,0	4,5	**4,0**	**4,5**	**4,3**
Red meat: Grass feedlots, abattoirs	2	4,0	5,0	4,0	1,5	4,0	4,0	3,5	4,0	4,0	3,0	2,0	3,0	**3,4**	**3,0**	**3,2**
Red meat: Processing, packaging	4	1,5	4,0	2,5	3,5	5,0	4,0	3,5	4,0	4,0	4,0	2,0	3,5	**3,5**	**4,0**	**3,8**
Chickens: Broilers - batteries	2	1,5	5,0	1,5	1,5	1,0	1,0	1,5	1,5	1,5	1,0	1,5	0,5	**1,6**	**1,0**	**1,3**
Chickens: Broilers - Free range	3	3,0	5,0	2,5	3,0	1,5	1,5	2,5	2,0	1,5	2,0	2,5	2,0	**2,5**	**3,0**	**2,7**
Chickens: Eggs	2	1,5	5,0	1,5	1,5	1,0	1,0	2,5	3,0	3,0	2,0	3,5	2,5	**2,3**	**3,0**	**2,7**
Fish:																
Freshwater vegetarian (Tilapia)	5	3,0	4,0	3,0	3,5	2,0	4,5	4,0	4,0	4,5	3,0	3,5	4,5	**3,7**	**4,0**	**3,9**
Freshwater carnivorous (Catfish)	4	2,5	3,0	2,5	1,0	1,0	1,5	1,5	1,5	1,5	3,0	3,5	3,5	**2,3**	**2,0**	**2,2**
Ocean fisheries (Deepsea fishing)	3	2,0	1,5	3,0	4,0	4,0	4,5	2,5	4,0	4,0	3,0	2,0	3,5	**3,2**	**2,5**	**2,8**

3.2.2 Resulting VCs for High-Level VCA

The results of the scoring exercise produced 12 definitive product or commodity VCs for the high-level VCA. These are listed in the table below.

Table 6: VCs selected for high-level VCA

Value Chain Cluster	Value Chain Products
Grain	• Maize and wheat meal (including flour) and meal products • Maize and small grains (wheat and durum wheat) breakfast cereals, bread, rusks, pasta snacks • Rice, new technologies for parboiling, further processing
Legumes	• Soybeans, drybeans (or dried beans), groundnuts - crops and products • Small packaging • Pre-packed oil, protein, peanut butter
Oil Seeds and Vegetable Oils	• Sunflower, avocado oil, sesame: pre-packed oil, oilcake for livestock feed
Fruit, Vegetables and Nuts	• Guavas, mangos, passion fruit, pineapples, cling peaches, avocados (for oil), tomatoes • Onions (with tomatoes) - goulash • Shelf-life increase • Canning • Macadamia nuts
Cotton	• Ginning and further processing
Sugar	
Coffee	
Tea	
Biomass	• Electricity generation • Livestock feed • Methanol fuel • Timber panels • High-quality charcoal
Poultry	• Production and processing of duck and goose products
Red Meat	• Processing and packaging
Freshwater Vegetarian Fish	• Tilapia - production, packaging and export

3.3 Findings from the High-Level VCA

For each of the selected value chains, a profile was prepared comprising information such as:

- Key products throughout various steps of the VC;
- Ownership characteristics of primary actors;
- Production and consumption characteristics (volumes, reserves, production techniques, domestic and regional demand);
- Geographic spread of the VCs across SADC;
- Trade analysis (export/import volumes), including opportunities and barriers to trade (intra- and inter-regionally, such as quality and safety compliance for instance);
- Challenges and bottlenecks in accessing key inputs, processing facilities, supporting infrastructure (access to finance, business development services, compliance facilities, etc.).

3.3.1 Grain – Meal

This section will deal with meal and meal products that also includes flour products.

3.3.1.1 Crops and Products

The backbone of agriculture is starch rich products such as root crops like cassava, sweet potatoes yam, cocoyam (Colacacia species or Elephant's ears) and potatoes, as well as grains such as maize, wheat, grain sorghum, millet and others. The starchy energy rich products are consumed by people or fed to livestock to produce meat and energy rich fat. Therefore, no economy can be operated without the production and consumption of huge amounts of starch rich crops or sugar.

The composition and quality of the starch derived from root crops is higher than that contained in grains, with the ratio between amylose (loose starch with fewer sugar polymer side chains and cross-binding) to amylopectin (sticky starch) being higher in root crop products than n grains. It is for that reason that starch extraction from root crops is more popular with food processors, although grain starches are also extensively used. However, as the roots or tubers contain high amounts of water, they are susceptible to rotting and have a short shelf-life. If roots or tubers cannot be consumed or processed into starch products immediately, the material has to be sliced and dried for storage. Drying of cassava roots requires thin slicing and tedious rapid drying, with subsequent trading in cassava chips.

The volumes of potatoes consumed are small and the production of the crop is confined to cool areas. The presence and multiplication of plant viruses poses a constant threat to sustainable yields and the breeding of virus free tubers is expensive. The yields to be attained from virus infected potato tubers is often only 20% of that derived from virus free tubers. The high production cost of potatoes is therefore strongly determined by the purchase of expensive plant seed tubers and therefore that crop is excluded from the present list. The persistent strong demand for potatoes for cooking, the production of French fries, chips fried in vegetable oil and other food preparations with high value nevertheless begs for more attention in future to increase production in most SADC countries.

It is a well-documented fact that where grains are milled and packed into small packages, the value is immediately considerably elevated. Where milling facilities are not available in rural areas, people at primary level normally use wooden grinding blocks to break up the grains into meal for the production of porridge.

At present few opportunities exist for people on the ground to participate in the lucrative down-stream value chain for grains, even at an elementary level. For any meaningful diversification of the value adding processes, a paradigm shift in the approach to the processing of grains is required as addressed in this exercise.

3.3.1.2 Opportunities

Attractive small to medium sized roller and hammer milling equipment is available to decrease the opportunity cost of grain products at primary producers' level. Through such actions multitudes of rural people can benefit, not only as end users, but also as entrepreneurs involved in local trading. It is suggested that a development corporation be created to fund the small-scale equipment and that the users of the equipment repay the small loans utilised for the purchase of the mills. Small hand-cranked roller mills cost about $100 each and petrol driven mills an estimated $500 each. Through such a minimal investment the rural economy can be altered for the better to benefit large numbers of people. It is therefore suggested that in each SADC country about 10 000 hand-cranked mills be financed as well as a 1 000-petrol-driven mills.

3.3.1.3 Trade

- In the period 2015-2017 the SADC region was a net importer of cereal (HS10), importing a value of $2,2 billion (bn). It could be assumed that most of the imports were in fact maize and wheat. An

estimated 76% (USD value) of the cereal exports were traded intra-regionally but the average imports were $3 bn.

- In terms of wheat (including meslin flour) (HS1101) a total of $353 m was imported into the SADC region to supply about 80% of the total needs of the region – while only 20% of the wheat was supplied from within the SADC region.
- About 91% of the other cereal flours (HS1102) – excluding wheat and expected to be mostly maize – was traded within the region, while 9% of these other flours (worth $66.5 m) were imported from outside the region.
- A total of 97% of the cereal grouts, meal and pellets (HS 1103) produced in SADC was traded intra-regionally and a total of $22 m worth of product was imported. A total of 74% of the products have been imported from within the region and only 26% have been supplied from outside SADC – i.e. the RoW.
- It could be concluded that for the period 2015 – 2017 most of the cereal produced and exported was supplied from within the region – and it was mostly maize. However, in terms of exports about 80% of SADC's demand is still being supplied from outside the region. This could be partly due to the drought conditions in the region over the past three years.

3.3.1.4 Critical Success Factors

The following factors are critical for the value adding offensive to be implemented with grains:

- Creating better general awareness of the amount of value-adding that can be achieved by means of milling and packaging;
- Making people on the ground aware of the availability of low-cost equipment which can make a large difference in the value of the grain products;
- Concentrating on the funding of the small-scale equipment through the compiling of business plans by this present advisory group and the operation of a small effective agricultural development corporation.

Table 7: Maize production and processing

Primary production	First stage processing	Investment	Second stage processing	Investment	Profitability
Primary production: Improve farming methods Assistance with Inputs	Increased mechanisation of the milling and packaging processes	Relatively low Investment			High
			Organised storage and trading	Fairly high Investment	Very high

3.3.2 Grain – Processed

This section will deal with breakfast cereals, snacks, bread, rusks, pasta snacks.

3.3.2.1 Crops and Products

Although substantial volumes of maize are being produced in many SADC countries, in most countries no or very little bread or pasta wheat is being produced. Many new wheat varieties have in recent years been developed which can produce fairly good yields, despite the absence of sufficiently low temperatures during the winter nights for proper stalk development and kernel formation. The extremely low production of wheat in the SADC countries, apart from South Africa, represents a serious shortfall against the constantly rising consumption and imports of bread and pasta wheat. The extremely poor soils, low annual rainfall and harsh climatic conditions of South Africa limits expansion of production.

Even in South Africa the consumption of wheat by far exceeds the production and the shortfall is increasing constantly. This is the result of the market migration from the consumption of mealie porridge to bread and from bread to pasta, partly because pasta wheat does not contain gluten and does not cause the negative gluten sensitivity effects.

The value adding further downstream from basic milling of maize and wheat entails a considerable paradigm shift. With proper strategies it is within reach of people low down on the ladder of affluence to participate in the lucrative processes of food processing.

3.3.2.2 Opportunities

With novel equipment it is now also possible to process maize and wheat grains into high value breakfast cereals and snacks. Through such an action the large-scale imports of breakfast cereals can be reduced. However, it requires the creation of a development corporation to fund a co-operatively operated small food factory and for the skilled management to handle the technical aspects as well as sensitive hygiene and health issues, packaging, branding and marketing. It is recommended that equipment to produce breakfast cereals and snacks be financed at a purchase price of about $500 000 each, while considerable amounts of working capital should also be provided for packaging and branding. Where about five of those manufacturing systems can be financed, it can result in large-scale import replacement and economic progress for entire landscapes.

With the processing of maize into breakfast cereals and snacks, the amount of value added is staggering – up to 15 to 30 times. Novel technology and medium to small-scale equipment are presently available to process maize grain into breakfast cereals and snacks. Distribution of the products can be done through rural shop outlets.

It is also recommended that small co-operatives be created to undertake dough production and distribution as well as baking activities. Through such activities a multitude of new entrepreneurs can be established in a sustainable manner. Highly successful examples of such enterprises can be observed through arrangements by these present report compilers. For the creation of dough mixing equipment, accompanied by wood fired ovens, the entire capital investment per production site is about $20 000. Where additional dough freezing systems are to be installed, it could cost an estimated $2 000 for a paraffin powered freezer. Should a 1 000-dough production and baking systems be financed, it can positively alter the economic outlook of an entire geographical area.

It should be noted that with bread preparation from bread wheat (*Triticum aestivum*), a fair amount of water is sold as part of the product. When bread dough is prepared, frozen and sold, the amount of value added is also considerable. A market also exists for the preparation of pre-packed rusks for the lucrative supermarket distribution system in the region. When pasta wheat or durum wheat (*Triticum durum*) is processed into pasta products such as spaghetti, macaroni, noodles, soup noodles and pizzas, the downstream value is enhanced. Equipment is available at a reasonable cost for processing, to be used by small entrepreneurs.

3.3.2.3 Trade

- The SADC Region over the period 2015 – 2017 was a net importer of processed grain products (HS 1905) (e.g. bread, pastry, cakes etc.), importing $156 m from the RoW.
- SADC's exports were $90 m of which 86% of these products that were exported to SADC member states. The total SADC exports and imports from the RoW were respectively $12 m and $168 m and therefore the net SADC deficit of $156 m.
- In terms of rusks, toasted bread similar toasted products (HS1905 40) there is a small deficit of $6 m.

- For pasta and associated products[2] (HS 1902) SADC exported $45 m, where 95% were exported to the region. SADC imported $134 m from the RoW. SADC is importing a total of 75% of its needs for this product range from the RoW.

3.3.2.4 Critical Success Factors

- Creation of general awareness of the value to be added close to primary production;
- Creation of funding structures to materialise the proposed plans;
- Organising entrepreneurs into businesses.

Table 8: Grain processing

Primary production	First stage processing	Investment	Second stage processing	Investment	Profita-bility
Handling and storage of grains in rural and urban areas	Processing into various downstream products Production of breakfast cereals, dough, bread, pasta and snacks	Fairly large investments to small people			Very high
			Packaging, branding and trading	Fairly high investment	Very high

3.3.3 Grains – Rice

This section will deal with rice production, new technologies for parboiling as well as further processing.

3.3.3.1 Crops and Products

Large volumes of rice are consumed in the SADC region. Only very small quantities of rice are produced in the region, as many former producers find it unattractive to face the harsh muddy conditions under which the crop has traditionally been grown. However, one attractive feature of rice production is that, immaterial of drought conditions and unseasonal low rainfall, rice may still yield fair sized yields where it is grown with its feet in the water or mud.

Most of the rice consumed in the SADC countries is imported into those countries, either due to a lack of level lying areas blessed with abundant supplies of water in certain countries, or the difficulties of conventional rice production under flood irrigation or in paddies. An over-riding factor in limiting rice production is the fact that rice, contrary to most other crops, needs to be parboiled at great cost and de-husked before it can be consumed. Despite the above-mentioned hurdles which restrict rice production, modern advanced technologies have become available through which rice production can be mechanised, with dramatic reduction in production cost and increases in yields.

As many areas in the SADC countries are suitable for rice production and the market demand persists and grows in the face of increasing affluence, rice production has been given priority by this consultancy group. Short grain varieties which yield sticky kernels when boiled into a porridge consistency, are more popular in many areas, but the price is lower than that of long grain varieties with loose cooking characteristics. The long grain varieties are in stronger demand among supermarkets and the top market layer of consumers, with higher prices.

[2] Pasta, whether or not cooked or stuffed with meat or other substances or otherwise prepared, such as spaghetti, macaroni, noodles, lasagne, gnocchi, ravioli, cannelloni; couscous, whether or not prepared.

With the prospect of much reduced capital cost of drying and parboiling through novel technologies, as well as the potential for elevated yields, more intensive attention is being given in this report to rice production and processing.

With conventional harvesting methods, the rice has to be harvested when the kernels are still moist in order to prevent sun-drying from causing cracking of the kernels. The rough rice or paddy rice is then slowly dried in cyclone driers and stored. The rough rice is soaked in water and subjected to high temperatures and pressure in large expensive pressure cookers or parboilers, which allow much of the nutrients in the brown aleurone layer around the kernels to diffuse into the starchy white endosperm of the kernels. The parboiled rough rice is again subsequently dried off in cyclone driers, threshed or de-husked and twice submitted to polishing or grinding actions in polishing machines, to produce white parboiled rice. Through parboiling much of the nutrients remain available in the kernels and the low nutritional value of non-parboiled white rice is overcome. The first polishing layer which is removed through polishing of threshed rice is fed to animals due to the content of some particles of rough husks. The second layer of polishing waste with a pleasant sweet nutty flavour is often added to breakfast cereals. The global upmarket requirement for rice is mostly for long grain white parboiled rice with a maximum content of five percent broken kernels.

3.3.3.2 Opportunities

Whereas conventional production methods entail the pulverisation of the soil to eradicate weeds, planting by hand of rice plants of a few weeks old and flood irrigation on level fields, the utilisation of modern methods involves the use of wheat planters on dry fields, flood or sprinkler irrigation and harvesting of the rice by means of wheat combine harvesters.

Small wheat planters are cheap at about $4 000, with a medium sized tractor costing $60 000, while medium sized wheat planters are more expensive at $6 000 to $15 000 and large 30 row versions cost an estimated $200 000. With the latter planter, drawn by a 400-kilowatt tractor, costing $300 000, more than 1 000 ha can be planted in a single day. A large wheat combine-harvester costs about $350 000, but it can harvest more than 500 ha per day.

When novel technologies are employed, the rough rice is processed through convection ovens under pressure and the kernels are parboiled and dried within about four minutes. The rough rice is immediately de-husked, polished and packaged for delivery to supermarkets. A modern convection parboiling plant costs an estimated $400 000 and can process 20 ton of rough rice per hour into parboiled rice. The conventional de-husking equipment is used and costs about $50 000 for a large operation.

For the lower level markets across much of the SADC region, people consume a fair amount of short and medium kernel rice with a sticky consistency when cooked. The short grain rice also tends to have a more pleasant nutty flavour. However, the average prices for short grain types are lower than for long grain varieties.

In Zambia alone approximately 300 000 ha of irrigated upland rice can be cultivated west of the Upper Zambezi Floodplain and a further 100 000 ha in the same area eastwards across the Zambesi Floodplain. Elsewhere in Zambia a further 300 000 ha of upland rice can be cultivated with success along river floodplains where few other crops can be produced sustainably. Traditional paddy rice can also be grown by peasant farmers in Zambia on patches of lowland rice areas on about 50 000 ha .

In Mozambique, along the Lower Buzi River Basin as well as the Zambesi Delta a total of approximately 200 000 ha of irrigated upland rice can be produced, with a further approximately 50 000 ha elsewhere in the country, downstream of Chokwe along the Lower Limpopo Floodplain. It can also be accomplished along the Lower Komati Floodplain on a further 20 000 ha of periodically flooded land. Along the floodplain of the Lower Pongola River (Rio do Maputo) much of the land has been allowed to salinize excessively and it has been lost to further sustainable cultivation.

In Tanzania some 60 000 ha of low-lying land can be put under commercial cultivation and a further 30 000 ha under traditional peasant paddy farming. On Madagascar an estimated 200 000 ha of irrigated

upland rice can be cultivated in parallel with approximately 100 000 ha of traditional peasant paddy production. Due to the small size of Malawi only about 20 000 ha of commercial upland rice and conventional peasant paddy rice can be grown.

In South Africa water is too scarce to waste on water consuming rice production, while it can be utilised for the production of more water efficient export citrus, mangoes, pineapples, granadillas, macadamia nuts and other tropical and sub-tropical fruits and nuts. It is better to import the highly subsidised USA rice and rice from Thailand and elsewhere where water occurs in abundance, into the country for further distribution into the entire sub-region. It is important to note that despite the fact that the subsidised rice from the USA and even from certain other countries can be exported from those countries at very low prices, the consumers in the importing countries do not benefit materially from those low prices; on the contrary. They in fact pay more than the global consumer average.

It should be noted that in countries such as Nigeria, small farmers often cook the paddy rice in large steel drums in order to be able to sell 'parboiled rice' and to reduce the percentage of cracked kernels. The end result is quite acceptable to the lower ends of the market, once the cooked rice has been de-husked and could also be polished.

It is a shame that while many consumers at all layers of the market prefer to eat some brown rice, it is seldom made available and when it is, it is sold at unreasonably high prices. It should be remembered that brown rice does not need to be parboiled to retain some of its health properties. The marketing of brown rice nevertheless presents a clear opportunity to producers to benefit.

3.3.3.3 Trade

- On average over the 2015 – 2017 period, the SADC region was a net importer of rice (HS 1006), importing $1 billion (bn). About 76% (USD value) of total cereal exports (including rice) were traded intra-regionally at a value of $3 bn over the same period.
- Of the $1 bn of rice imported into the SADC region, 7% or $8 m was sourced from within the region.
- Rice in the husk (paddy or rough) (HS 1006 10) was traded in smaller volumes and only $6 m worth of product was imported into SADC from the RoW. The same applies to husked (brown rice) where SADC only imported $2 m from RoW. The demand is low and most of the rice is not being traded in this form i.e. 'rice in husk' and brown rice.
- In terms of 'semi-milled or wholly milled rice, whether or not polished or glazed' (HS 1006 30): The total net SADC imports from RoW has been estimated to be $895 m per annum (p.a.) for the past three years while broken rice has been estimated at $128 m.
- It could be concluded that for the period 2015 – 2017 most of the rice being consumed in the SADC region has been imported from the RoW – a total of $898 m p.a. and a total of 95% of rice imported by SADC member states.
- With an increase in urbanisation of the SADC population there is an increase in the utilisation of rice and bread (wheat) away from other staple crops like maize, cassava, grain sorghum, etc.

3.3.3.4 Critical Success Factors

Leading the respective role players to mustering as many of the novel technologies as possible;

- Facilitate large-scale commercial rice farming with very high yields;
- Facilitate small-scale farmers to utilise as many of the new technologies as possible;
- Promote more direct marketing of rice to the public through branding and small packaging.

Table 9: Rice processing

Primary production	Investment	First stage processing	Invest-ment	Second stage pro-cessing	Investment	Profita bility
Revising production methods. Mechanisation to receive priority	High investment and very high output	New technologies for instant parboiling	Fairly large investm ents			High
				Packaging, branding and trading	Fairly high investment in buildings, packaging and branding	High
Handling and storage of grains in rural and urban areas	High invest-ment	De-husking and polishing to pro-duce white rice	Fairly large invest-ments			Fair
				Packaging, branding and trading	Fairly high investment in buildings, packaging and branding	High

3.3.4 Legumes

3.3.4.1 Crops and Products

The imports and trading of drybeans, field peas and fresh frozen peas into SADC countries require more attention. Dry beans – also known as dried beans (mostly *Phaseolus vulgaris*, speckled sugar beans, small white haricot, large white kidney beans and lentils) are fairly easy to grow and new Rhizobium root nodule strains have been developed to enable the crop plants to fix atmospheric nitrogen into proteins. Through that technique large savings can be accomplished for expensive nitrogenous fertiliser usage. With modern management technologies the crop yields can be increased in a to 3-tonnes-threshed beans per ha.

The drybeans are non-perishable and suitable for long-term storage under insect free conditions. At primary level the beans are cooked into soup and other dishes. But the demand for the drybeans is more focussed on the processing into canned baked beans in tomato sauce. The markets for canned baked beans are steadily growing. Therefore, the imports of drybeans into the SADC countries are considerable and the primary products are transformed into high value products.

3.3.4.2 Opportunities

A canning factory requires large volumes of tomato paste and therefore the production of factory tomatoes needs to be associated with a baked-beans canning operation. A small canning factory requires the capital outlay of about $5 m, while a tin manufacturing operation can require an estimated $2 m capital outlay. Although the magnitude of such an operation falls outside the scope of even small groups of primary producers, it is recommended to be executed by a co-operative or joint venture under skilled management. The value of the drybeans can then be elevated from $600 per ton to $2 400 in canned form.

Soybeans cannot be consumed by humans in raw or unprocessed form. The beans are pressed for vegetable oil, which constitutes less than 20% of the mass of the beans and the residues are processed into protein rich foodstuffs and soybean milk. The market for these upmarket products is gradually expanding. The largest segment of the expanding market for soybeans is for livestock feed, both for chickens and other livestock.

Unfortunately, the raw soybeans contain tripsin inhibitor and when fed raw to animals their health is affected. Therefore, the soybeans are roasted to destroy the tripsin inhibitor before being fed to livestock. Before roasting is performed, the oil can first be extracted for edible cooking oil or the soybeans can be roasted in full and be called 'full-fat soybeans'. Cattle feedlots consume large amounts of full fat soybeans in conjunction with maize. Most SADC countries are well-suited to the production of soybeans and bean yields are strongly increasing under commercial production conditions, to be threefold that of drybeans. Large imports from Brazil, the USA, Argentina and other countries into the region are experienced for the ever-increasing demand for livestock production.

3.3.4.3 Trade

Regarding dried beans (or dry beans), pigeon peas and lentils (HS 07), average trade in the SADC region over the period 2015 – 2017 was as follows:

- Dried beans (HS 0713 31), *Vigna spp. Phaseolus spp*. – net export of $5 m p.a. to RoW.
- Dried beans shelled beans of species (HS 0708 20), *Vigna mungo, Vigna mungo, Hepper* or *Vigna radiata* – net export of $19 m p.a. to RoW.
- Pigeon peas, fresh or chilled peas *Pisum sativum*, shelled or unshelled (HS 7808 10), net export of $15 m p.a. to RoW.
- Dried, shelled kidney beans *Phaseolus vulgaris*, whether or not skinned or split (HS 0713 33): $32 m net import into SADC. Broad beans and horse beans, *Vicia fabia*, net imports of $1.9 m into SADC from RoW.
- Lentils (HS 0713 40), net imports of $10 m into SADC from RoW.
- It could be concluded that for the period 2015 – 2017 there was a net import from the RoW of the dried beans, peas and lentils of $10 m – where exports were $39 m and imports were $49 m in trading with the RoW.

Regarding soya beans, soya-bean oil, groundnuts, groundnut oil (HS12 and HS15) and protein concentrates (HS2106), average trade in the SADC region over the period 2015 – 2017 was as follows:

- Soya beans (HS 1201) net import of $58 m from RoW; 12% of product was exported to RoW, i.e. $4 m.
- Soya-bean oil (HS 1507) net import of $295 m from RoW, 4.5% of product was exported to RoW, i.e. $3.2 m.
- Groundnuts (HS 1202) net import of $5 m from RoW, 63% of product was exported to RoW i.e. $26 m. It could be that exporters found better international prices for good quality groundnuts and/or different cultivars were imported for processing. The commodity is highly tradable.
- Groundnut oil (HS 1508) net export of $230 000 to RoW, 38% of product was exported to RoW i.e. R670 000. It could be concluded that the oil is less traded than the groundnuts itself and that processors will rather import the nuts and process in local market.
- Protein concentrates and substances (HS2106 10) there was a net import of $18 m from RoW, 7% of product was exported to RoW i.e. $1 m.
- It could be concluded that for the period 2015 – 2017 there was a net import of the soya beans, soya-bean oils and groundnuts of $357 m while groundnut oil export was only a $230 000 with RoW. Soya-bean oil was by far the largest net import into the region with $295 m.

3.3.4.4 Critical Success Factors

- Stimulation of primary production;
- Provide access to funding for farmers and entrepreneurs;
- Create enterprises in conjunction with potential entrepreneurs – focusing on women and the youth.

Table 10: Legume crops and processing

Primary production	First stage processing	Investment	Second stage processing	Investment	Profitability
Handling and storage of beans in rural and urban areas	Processing into various downstream products	Fairly large investments for small businesses			High
			Packaging, branding and trading of baked beans and other bean products		
			Soybeans are processed into protein rich foods	Fairly high investment	Very high
			Groundnuts are processed into snacks and peanut butter	Fairly high investment	Very high

3.3.5 Oil Seeds and Vegetable Oils

Globally the demand for vegetable oils is steadily increasing. The vegetable oils are used as cooking oil, in printing ink, toilet soap, paints, margarine, coffee creamer (e.g. the South African Cremora brand), certain chemical polymers and many other uses. As a result, large forested areas are being demolished for the preparation of oil palm plantations in tropical countries such as Nigeria, Indonesia, Malaysia, Papua New Guinea, Brazil and other countries. No other crop produces higher yields of vegetable oil than oil palm, where experimental blocks in Malaysia can yield as much as 11 tonnes of total oil (palm oil and palm kernel oil) per ha. However, oil palm only produces well where the night temperatures and relative humidity remain high throughout the year. Apart from some areas in the Democratic Republic of Congo, Northern Mozambique and Northern Angola, few areas in the SADC region are suitable to attain high oil palm yields.

Close to sea level coconuts also produce high yields of vegetable oil, albeit not as high as oil palm. However, new semi-dwarf coconut hybrids also produce steadily increasing yields of vegetable oil. Coconut palms can withstand higher salt concentrations in the soil than most other crops globally.

Avocado fruits contain up to 20% vegetable oil and certain varieties, especially West Indian types, but also some Mexican types with lower quality edible fruit, do produce high fruit yields and are therefore receiving increasing attention for vegetable oil production. The fruit are ripened, peeled and de-seeded before the oil is extracted. As the avocado oil commands much higher prices than that of most other vegetable oils, it is often marketed into alternative channels. It is unfortunate that uninformed commentators often wrongly criticise the usage of avocados for the production of vegetable oil and for non-food uses, on their opinion that local populations should not be deprived of food in favour of commercialised uses.

Most tree nut crops also produce considerable yields of vegetable oil, but the nuts are too valuable to be demolished for the extraction of vegetable oil with a much lower value.

For the extraction of cooking oil more soybeans and sunflowers need to be produced and more cotton seed needs to be utilised for oil production.

3.3.5.1 Opportunities

- Small and large-scale producers can benefit from the production of higher volumes of soybeans as the yields are attractively high and the occurrence of foliar diseases which plague most other legume crops is low;
- The soybeans can be roasted to add value and the equipment is not expensive;
- As small hand cranked oil presses cost as little as $400 each, it is recommended that 1 000 small oil presses be made available to small producers in each SADC country where vegetable oil crops are being produced.

- Oil extraction from soybeans, sunflowers and cotton seed is easy through the use of small-scale equipment and it is not necessary to extract all the oil through hexane extraction to be viable. The oil cakes are valuable livestock feed;
- Although the preparation of avocado fruits for oil extraction is a tedious process, the high prices of the oil and other products are attractive;
- It is recommended that vegetable oil production and beneficiation be promoted at all levels.

3.3.5.2 Trade

Regarding sunflower seeds, other oil seeds[3] and oil cake average trade in the SADC region over the period 2015 – 2017 was as follows: Sunflower seeds (HS1206), net import $19 m from RoW; 40% of SADC production is exported to RoW.

- Other oil seeds (HS1207), net export of $127 m to RoW; 94% of SADC production is exported to RoW.
- Cotton seeds (HS1207 20), net export of $23 000 to RoW; 93% of SADC production is exported to RoW.
- Cotton seeds for sowing (HS1207 21), net import $157 000 from RoW.
- Cotton seeds not for sowing (HS1207 29), net import $110 000 from RoW.
- Oil cakes - flours and meals of oil seeds or oleaginous fruits (excluding mustard) (HS1208) – net import $625 000 from RoW.

The average sunflower seed oil, cotton-seed oil and sesame oil trade for the 2015 – 2017 period from the SADC region the following has reference:

- Crude sunflower-seed or safflower oil (HS1512 11), net imports of $105 m into SADC from RoW.
- Crude cotton-seed oil (HS1512 21), net imports of $84 000 into SADC from RoW.
- Sesame oil and its fractions, whether or not refined, but not chemically modified (HS1515 50), net export of $74 m p.a. to RoW.

It could be concluded that for the period 2015 – 2017 there was a net export of the oilseeds of $77 m – exports were $206 m and imports were $129 m in trading with the RoW. The biggest exports were 'other oil seeds' of $128 m and sesame oil of $74 m while the biggest imports crude sunflower-seed oil – a commodity that could easily be produced in the SADC region.

3.3.5.3 Critical Success Factors

- Stimulation of primary production;
- Provide access to funding for farmers and entrepreneurs;
- Create enterprises in conjunction with potential entrepreneurs – focusing on women and the youth.

Table 11: Vegetable oil crops and processing

Primary production	First stage processing	Investment	Second stage processing	Investment	Profita-bility
Handling and storage of all oilseeds in rural and urban	Processing into various downstream products	Fairly small investments for small businesses			High
			Packaging, branding and trading of cooking oil	Relatively small investment	Very high

[3] Other oil seeds and oleaginous fruits, whether or not broken (excluding edible nuts, olives, soya beans, groundnuts, copra, linseed, rape or colza seeds and sunflower seeds)

Primary production	First stage processing	Investment	Second stage processing	Investment	Profita-bility
areas			Production of high value oil-based products such as oil-based paints and toilet soap	Fairly high investment	Very high

3.3.6 Fruit – Canning

This section will deal with fruit processing such as canning but will also refer to non-fruit canning opportunities.

3.3.6.1 Crops and Products

Close investigation of the canning industries indicates that the cost of the cans and other containers is many times that of the contents of fruit, vegetables, spaghetti and other products. The end values of canned products are extremely high compared to the basic commodities. For canning industries to be established, it is important to create systems whereby cans, bottles and other containers can be made available at reasonable cost. The fixed capital cost of small canning factories is modest, but the cost of funding of stock and debtors is high.

When establishing a canning operation, it is important for the project planners to ensure that the canning factory is kept operating for as many months per year as possible. The manufacturing of tins and other containers inside the host country is advisable as the transport of pre-prepared cans can be very high per ton.

Through canning the value of the fruit is elevated by as much as eight-fold. With a canning factory close to the fruit orchards, the cumbersome and delicate pathway of the marketing of fresh fruit is avoided and large-scale markets are available through the supermarket chains or rural shop outlets.

Growing shortages of canned guavas, mangoes, yellow cling peaches and other fruits are experienced in the SADC countries due to aggressive root diseases on the South African guava crops and large-scale pilferage of yellow cling peaches. At the same time the market demand has been growing steadily.

3.3.6.2 Opportunities

- Around a small canning factory, fruit orchards can be established for the fruit to be canned. The same canning factory can be used to produce canned baked beans, canned meat balls, canned spaghetti and canned tomato pieces mixed with onions.
- Demand for products based on tomato paste is strong and growing. However, chronic shortages of tomato paste are encountered as it is used in the canning of onions, spaghetti and other pasta products, baked beans, meat balls and tomato sauce. When the integrated production and processing systems are considered it becomes clear that a comprehensive primary and secondary diversified production system should be viewed as essential, with enormous potential for wealth creation.
- Besides the considerable number of employment opportunities to be created, the amount of wealth creation through value adding is considerable. It can directly and positively affect the lives of many more people;
- Participation in primary production and downstream value-adding can be considerable;
- Large-scale import replacement can be achieved.

3.3.6.3 Trade

Regarding edible fruit, pineapples, guavas, mangoes, citrus, macadamia nuts and bananas average trade in the SADC region over the period 2015 – 2017 was as follows:

- Edible fruit (HS08), net export of $3,3 bn p.a. to RoW; 95% of edible fruit exported, i.e. $3,4 bn was exported to RoW.

- Pineapples, fresh or dried (HS0804 30), net export of $5,8 m p.a. from RoW; 88% of pineapples exported. i.e. $6,5 m was exported to RoW.
- Pineapples, canned[4] (HS2008 20), net import of $1,9 m p.a. from RoW; 88% of pineapples exported. i.e. $6,5 m was exported to RoW.
- Guavas and mangoes, fresh or dried[5] (HS0804 50), net export of $14,5 m p.a. from RoW; 90% of guavas and mangoes are exported. i.e. $15 m were exported to RoW.
- Citrus fruit, chilled or dried (HS0805), net export of $1,2 bn p.a. from RoW; 98% of citrus was exported. i.e. $1,2 bn was exported to RoW.
- Macadamia nuts, fresh or dried, shelled or not (HS0802 50), net export of $1,2 m p.a. from RoW; 75% of nuts was exported. i.e. $1,2 m was exported to RoW.
- Bananas, fresh or dried (HS0803), net import of $19 m p.a. from RoW; 14% of bananas was exported, i.e. $6 m was exported to RoW.

It could be concluded that for the period 2015 – 2017 there was a net export of edible fruit of $3,2 bn – exports were $3.38 bn and imports were $131 m in trading with the RoW. The biggest exports were citrus of $1,2 bn.

3.3.6.4 Critical Success Factors

- Making strong rootstocks with high resistance to root rot available to growers
- Organise large-scale production of primary commodities
- Organise the establishment of co-operative actions for canning
- Organise the branding and marketing of high-value products

Table 12: Canning of fruit and other products

Primary production	First stage processing	Investment	Second stage Processing	Investment	Profita-bility
Promotion of increased commercial and small-scale production of fruits, beans, tomatoes, onions and certain other vegetables	Organising logistics systems for harvesting and delivery to a central location	Fairly small investments in transport and barns for handling of perish-ables			Fairly high
			Processing of products into high-value end products	Relatively high investment	Very high
	Processing into various downstream products		Packaging, branding and trading of canned products	Medium sized investment	Very high

3.3.7 Cotton – Ginning and Further Processing

3.3.7.1 Crops and Products

Thousands of smallholder farmers are involved in the primary cotton production system across SADC countries. However, they receive considerably lower prices than the world average because they do not have any control over the downstream handling of the cotton. Cotton ginneries commonly take the cotton seed for themselves, while the cotton producers could have benefitted more by downstream processing

[4] Canned - Pineapples, prepared or preserved, whether or not containing added sugar or other sweetening
[5] Mangosteens excluded from tariff description because not been cultivated in SADC area.

on the cotton seed into edible oil, oilcake and cotton seed fibre used for conversion into explosives and as additive to bread to make it whiter.

3.3.7.2 Opportunities

Many cotton processers abroad have terminated their seed cotton processing, where many cotton gins have been decommissioned, which are still in a good working condition. The lifespan of cotton gins is generally many decades as the working parts are fairly simple and durable. Some of these overseas cotton gin owners are willing to relocate the gins into the SADC countries, with the understanding that they would receive a modest shareholding in the gins and they would also be assisting the funding of the working capital of the gins. Through such an action the local communities stand to benefit by shareholding and sharing in the higher prices of the ginned cotton. In addition, they would benefit by the processing of the cotton seed and seed lint, which at present are taken without compensation by the present gin owners and international traders.

3.3.7.3 Trade

Regarding cotton and cotton thread average trade in the SADC region over the period 2015 – 2017 was as follows:

- Cotton (HS52), net import $394 m p.a. from RoW; 42% of cotton exported, i.e. $129 m was exported to RoW.
- Cotton sewing thread (HS5204), net export of $2 m p.a. from RoW; 2% of cotton thread exported, i.e. $70 000 are exported to RoW – 98% exported with SADC region.
- Some cotton products have been listed under oil seeds.

3.3.7.4 Opportunities

For the ginning and trading of cotton the following factors are critical:

- Obtaining the second-hand cotton ginneries at low cost, together with the investors;
- Providing much needed production inputs to primary producers to increase production of seed cotton;
- There is skilled technical expertise available in the region. Project funding is needed to facilitate and support these experts to provide advisory services at project level;
- Providing basic transport infrastructure for the cotton production to be collected and processed.

Table 13: Cotton production and ginning

Primary production	First stage processing	Investment	Second stage processing	Investment	Profitability
Primary production Improved farming methods Assistance with inputs provision	Seed cotton harvesting	Low investment			Low
			Ginning of seed cotton	Relatively high Investment	Fairly high
			Acid or mecha-nical de-linting seed, utilising duff	Relatively low Investment	Fairly high
			Oil pressing, packaging	Fairly high Investment	Fairly high
			Oilseed cake for livestock	Low investment	Fairly high

3.3.8 Sugar

3.3.8.1 Crops and Products

Sugarcane is being produced in most of the SADC countries on a large scale and several large sugar mills as well as sugar refineries are in operation. It is proposed that sugarcane production in the rural areas be stimulated to provide a rich source of energy to the people as well as a saleable product. However, it is not proposed to establish more sugar mills. The most important reason for this present initiative is to make sugar syrup available for canning processes and as a filler for pre-packed sterilised fruit juices. It is fairly easy to grow the sugarcane and harvest it when the demand is best. The most common growing period for sugarcane in the SADC areas under irrigation or conditions of good moisture supply is a 12-month cutting cycle.

For processes where sugar syrup is required such as with canning of guavas, pineapples, a number of fruit juice types, field peas and others, it is feasible to extract the raw juice from the sugarcane at low cost and utilise the juice instead of using expensive refined sugar. At harvest the sugarcane stalks are stripped of leaves and topped, and the stems are sent through metal rollers which press the juice out. Despite the fact that a lower sugar extraction rate is achieved than in a sugar mill, the lower extraction cost per ton of sucrose compensates for the relative inefficiency of the process. Once the raw juice has been pressed out, it is filtered and boiled in order to reduce the water content and also to eliminate as much of the microbial content as possible.

The capital outlay of the juice extraction equipment is very low, and the entire process can be handled even in villages. Like in the case of Colombia and India, the sugar juice can be further evaporated until a solid form of sugar toffee is obtained. This toffee is highly saleable and can become an important source of energy for the rural people.

3.3.8.2 Opportunities

- Small blocks of sugarcane can be established around households for use throughout the year;
- Larger blocks can be established as part of commercial processes where the sugar juice can be extracted over specific periods;
- Several thousand small-scale juice extractors can be made available to rural households;
- Through the activity of an agricultural development corporation, larger juice extractors can be funded in order to supply concentrated sugarcane juice to canning and fruit juice factories and sweets manufacturers.

3.3.8.3 Trade

Regarding sugar and sugar confectionary average trade in the SADC region over the period 2015 – 2017 was as follows:

- Sugar and sugar confectionary (HS17), net import of $59 m from RoW; 48% of product exported, i.e. $594 m was exported to RoW.
- Cane or beet sugar and chemically pure sucrose, in solid form (HS1701), net export was $65 m to RoW; 54% of product exported, i.e. $563 m was exported to RoW.
- Raw cane sugar, in solid form[6] (HS1701 13), net import was $5 m to RoW; 9% of product exported, i.e. $15 m was exported to RoW.

[6] Raw cane sugar, in solid form, not containing added flavouring or colouring matter, obtained without centrifugation, with sucrose content 69° to 93°, containing only natural anhedral microcrystals

- Raw cane sugar, in solid form, not containing added flavouring or colouring matter (excluding cane sugar of 1701 13) (HS1701 14), net export was $217m to RoW; 60% of product exported, i.e. $314 m was exported to RoW.
- Molasses (HS1703), net export was $5 m to RoW; 57% of product exported, i.e. $11 m was exported to RoW.

3.3.8.4 Critical Success Factors

- Making planting material of virus free and virus resistant sugarcane varieties available to rural producers;
- Making juice extractors and evaporators available to producers who wish to participate in the supply chain;
- Organising the co-ordination of the juice supplying and canning activities;
- Organising the labelling and marketing of the end products.

Table 14: Sugarcane and sugar juice production

Primary production	First stage processing	Invest-ment	Second stage processing	Investment	Profitability
Primary production Improved farming methods Assistance with inputs provision	Harvesting of sugarcane and extracting the juice	Low Invest-ment			Modest
			Processing the juice concentrate into panela and toffee	Low Investment	Fairly high
	Filtering the juice		Sterilising the juice concentrate and store it	Relatively low Investment	Fairly high
	Evaporating the water in the juice to sterilise and concentrate it		Utilising the juice in fruit juice blends and canning operations	Fairly high Investment	High

3.3.9 Coffee

3.3.9.1 Crops and Products

Both *Coffea arabica* (Arabica coffee) and *Coffea canephora* (Robusta coffee) have been cultivated on an extensive scale in almost all of the warm non-arid SADC countries in the past. Some coffee estates are still operational. A fair number of primary coffee processing pieces still exist and can be used, as the lifespan of coffee equipment is long. With the use of the good coffee production climate and land and the deployment of coffee berry peeling machines, sugar mucous fermenting processes, washing equipment, sun-drying tables and Cathadore de-husking machines, high quality washed sundried Arabica coffee can be produced as green coffee beans.

It has been found in the past in South Africa, Zimbabwe, Zambia and Malawi that due to a range of different micro-climatic conditions encountered at different estates, that the coffee is characterised by unique flavour developments. Therefore, some World Bank nominated experts concluded that the marketing of ‘Estate of Origin’ coffee presented a major opportunity for the marketing of the coffee at a high premium from Southern African countries.

A major deficiency in the coffee value chain is the fact that primary producers seldom share in the often extremely high amount of value addition to green coffee up to the end users. Whereas primary coffee producers are bound to receive an estimated $1 500 per ton of high-quality green coffee beans, the end users can pay as much $100 000 per ton through the retail outlets such as “House of Coffees” and others.

It is proposed that structures be created whereby the green coffee from specific estates can be roasted, ground and packed under labels which indicate the origin of the green coffee. With such branding and marketing a fairer proportion of the end value can accrue to the primary producers.

3.3.9.2 Opportunities

- Produce the coffee with proper control of Coffee Berry Disease, Antestia Stink Bug and other important pests, by the use of natural pesticides such as Azedaracthin, natural Pyrethrins and other compounds;
- Harvest the red berries frequently and process them to attain the best qualities of washed sundried green coffee;
- Enter the green coffee into the downstream value chain, branded as unique estate coffee, similar to the situation with wine marketing;
- Register the proprietary characteristics and rights to the marketing of the coffee with unique characteristics;
- Perform roasting, grounding, packaging and direct marketing to receive the best prices possible.

3.3.9.3 Trade

Regarding roasted and not roasted coffee average trade in the SADC region over the period 2015 – 2017 was as follows:

- Coffee, whether or not roasted or decaffeinated (HS0901), net export of $93 m to RoW; 89% of product exported, i.e. $183 m was exported to RoW.
- Coffee, excluding roasted and decaffeinated (HS0901 11), net import of $123 m from RoW; 95% of product exported, i.e. $175 m was exported to RoW.
- Coffee, roasted excluding decaffeinated, including grounded coffee is part of this grouping (HS0901 21), net import of $30 m from RoW; 48% of product exported, i.e. $3 m was exported to RoW.
- Extracts, essences and concentrates of coffee (HS2101 11), net import of $59 m from RoW; 28% of product exported, i.e. $1 m was exported to RoW.
- Preparations with a basis of extracts, essences or concentrates of coffee or with a basis of coffee grouping (HS2101 12), net import of $12 m from RoW; 14% of product exported, i.e. $360 000 was exported to RoW.

3.3.9.4 Critical Success Factors

- Establishing healthy nurseries and planting of the correct coffee varieties, derived from SL 28, SL 34, Blue Mountain, Catuai and other varieties;
- Diligent handling of the unique coffee products;
- Creation of co-operative structures for the further handling of the unique coffee brands.

Table 15: Coffee production and value adding

Primary production	First stage processing	Investment	Second stage processing	Investment	Profitability
Primary production Improved farming methods	Harvesting of red coffee berries	High investment in orchard expansions			Fairly low
Assistance with inputs provision	Processing into high quality green beans	Low investment in primary processing			Fairly low
			De-husking and further processing into	Fairly low investment	Very high

Primary production	First stage processing	Investment	Second stage processing	Investment	Profitability
			pre-packed ground coffee		
			Effective marketing of unique brands	Relatively low Investment	Very high

3.3.10 Tea

3.3.10.1 Crops and Products

Tea (*Camellia sinensis*) for the production of black tea (English tea) has been cultivated on an extensive scale in almost all of the warm non-arid SADC countries in the past. Some tea estates are still operational although the tea bushes on many former productive tea estates have during the past two decades grown into trees. Those trees can in many cases be cut back and re-shaped into productive tea rows.

On many former tea estates, the tea factories still exist and can be refurbished under good specialised management. The withering troughs and 'cut-tear-and-curl' machines can be revamped; the rolling lines and drying drums can be refurbished, and the tea packaging equipment can be re-commissioned.

It has been found in the past in South Africa, Zimbabwe, Mozambique and Malawi that the type of tea produced in Southern Africa represents a typical 'African-type' quality and, when blended with tea from India or Sri Lanka produces an end result which is highly acceptable to the upper market echelons.

A major deficiency in the tea value chain is the fact that primary producers seldom share in the often-high amount of value addition to the black tea up to the end users.

It is proposed that structures be created whereby the made tea from specific estates can be packaged into tea bags and marketed under labels which indicate the origin of the black tea. With such branding and marketing a fairer proportion of the end value can accrue to the primary producers.

3.3.10.2 Opportunities

- Produce the clonal tea bushes with proper management to ensure that only the young sprouts are picked;
- Harvest the tea frequently to ensure high quality;
- Enter the black tea to be packaged in bags into the downstream value chain, branded as unique estate tea, similar the situation with wine marketing;
- Register the proprietary characteristics and rights to the marketing of the tea with unique characteristics;
- Perform blending, packaging into tea bags and direct marketing so as to receive the best prices possible.

3.3.10.3 Trade

Regarding tea average trade in the SADC region over the period 2015 – 2017 was as follows:

- Tea, whether or not flavoured (HS0902), net export of $68 m to RoW; 56% of product exported, i.e. $91 m is exported to RoW.

3.3.10.4 Critical Success Factors

- Establishing healthy nurseries of clonal tea and planting of the correct tea selections;
- Diligent handling of the unique tea products;
- Creation of co-operative structures for the further handling of the unique tea brands.

Table 16: Tea production and value adding

Primary production	First stage processing	Investment	Second stage processing	Investment	Profitability
Primary production Improved farming methods Assistance with inputs provision	Harvesting of tea buds by hand or machines on level slopes	High investment in plantation expansions			Medium
Mechanisation of harvesting		Relatively high investment			Fairly low
	Processing into high quality black tea	High investment in primary processing			Fairly low
			Grading, blending and packaging into tea bags in pre-packed boxes	Fairly low investment	Very high
			Effective marketing of unique brands	Relatively low Investment	Very high

3.3.11 Biomass

This section will describe the utilisation of excessive biomass from encroaching plant species for high-value addition and processing.

3.3.11.1 Crops and Products

In the wake of the removal of mono-gastric animals such as elephant, rhinoceroses and many game species, from the savanna grazing areas of the SADC countries over the past 150 years bush species such as sickle bush, black thorn, yellow thorn and other species started overgrowing the grazing areas. With overgrazing, grass fires and human induced droughts, the bush encroachment has assumed such proportions in Southern Africa that man and animals find it hard to move through the thickets and vastly reduced grazing capacity. The grass cover on the soil surface has also been decimated, with concomitant soil surface erosion and the carrying capacity seriously reduced.

It has been found that where the excessive bush encroachment is selectively removed, and the different portions of the biomass utilised for the production of various valuable products, the grass cover is quickly restored, and the grazing capacity of the veld increased.

Livestock feed: In extensive experiments conducted over the past several decades in Namibia and South Africa it was determined that when bush material which contains a fair amount of bark, is milled and blended with certain other ingredients and subsequently pelletised, it makes good and cheap overwintering rations. When livestock and game animals consume those pellets their mass would not necessarily increase significantly, but their condition would not deteriorate. Through such production of feed pellets the livestock industry can be stabilised and stock mortalities can be prevented. It can also enable large and increasing numbers of rural dwellers to participate in livestock rearing and trading.

Methanol: Through the implementation of recently developed multi-metal catalysts in South Africa, the conversion of biomass into methanol (methyl alcohol or methylated spirits) at low cost has become sustainable. The methanol is in strong demand on global markets as low cost vehicle fuel, instead of ethanol (ethyl alcohol), which is not a viable option.

Timber panels: In recent years the popularity and price of laminated hardwood timber panels has been increasing steadily. Those panels are popular as attractive cladding in buildings and for the manufacturing

of furniture. It is a relatively simple process to utilise the small hardwood planks for the production of the laminated panels.

Charcoal: By far the majority of charcoal being produced is of a very low quality, with a high ash content. Strong demand exists for charcoal with a low ash content and a high carbon content, especially on the export markets to Europe and the Middle East. With the use of movable modified Gayllard retorts which were developed in South Africa, the quality of the charcoal can be assured. Novel methods of milling the charcoal and briquetting it into large square plates has been developed in South Africa and is available for implementation to reduce the transport cost of the charcoal by half.

Electricity generation: After several dozens of electricity generation processes have been evaluated, it was concluded that the high vortex burner technology which has been developed by scientists in the USA is the most sustainable. Through that technology a burner is carried on a farm trailer while the generator and switchgear are transported on another trailer. With the feeding in of every ton of combustible material per hour one megawatt-hour (i.e. 1 MWh) electricity is produced. Through the deployment of those low-cost electricity generators entire towns can be supplied with low cost electricity and many value-adding processes can also be established.

3.3.11.2 Opportunities

Where overgrown farmland is selectively cleared of encroaching bush species, considerable value can be added to the resultant available biomass. As a scarcity of biomass occurs in Europe and other developed areas, strong appeal is lodged repeatedly for the utilisation of the excessive biomass occurring over vast tracts of land in the SADC countries.

Individuals with some funding, or small groups of entrepreneurs or larger enterprises can derive large-scale benefits from the conversion of the large volumes of excessive biomass, which presently mostly act as a strong liability, into a highly valuable asset.

While it is more sensible to divide the respective parts of the trees and bush into thin branches, thick stems and root crowns, all the components can be used for the generation of electricity, methanol and high-quality charcoal. While the present project compilers designed various of the above-mentioned industries recently, it was clear that the marketing studies would indicate the optimal allocation of the various plant parts for the production of the respective high value products.

Composite timber panels: The equipment required for the sawing, sizing, smoothing and gluing of the timber panels entails capital expenditure of about $3 m for a medium sized operation, which can handle an estimated 6 to 10 ton of glued panels per hour. At a wholesale market price of $1 500 to $2 000 per cubic meter ($m^3$), it represents a considerable value addition. With a yield of 70-tonnes bush and tree material per hectare and a recovery rate of approximately 30%, the turnover can be as high as $31 500 per ha or more.

Livestock feed pellets: When livestock feed pellets are manufactured out of the branches and bark of the bush material, about 60% percent of the bush and tree material can be utilised. That represents an estimated 42 ton of hammer-milled material, which, after being blended with small masses of other materials and pelletised can be sold at $50 per ton, with a turnover of $2 200 per hectare. The capital cost of the equipment is fairly low, namely a tractor, trailer, chipper, hammer mill, blender and pelletiser. That list of items amounts to about $75 000.

Methanol: For an integrated methanol production plant, the total capital investment can amount to about $6 m for the production of an estimated 4 ton per hour of methanol. At a wholesale price of $600 per ton and a conversion rate of biomass to methanol of about 60%, the turnover can be an estimated $25 200 per ha. The scenario presents itself whereby the excessive encroaching bush can be removed to restore the natural veld and sufficient volumes of methanol fuel can be produced, which, if not exported, can make the further imports of petroleum unnecessary into posterity.

Electricity: When the biomass is converted into electricity using a high vortex machine mounted on a farm trailer and the switchgear mounted on another farm trailer, a highly usable mobile electricity generation system is operated. The biomass is converted at a rate of 1 tonnes of biomass to more than 1 megawatt hour electricity. That implies that at an industry rate of $0,05 (5 US cents) per kilowatt hour, the turnover can be $3 500 per ha. A single mobile generator system involves the capital cost of an estimated $240 000. Through such an operation electricity can be supplied to agro-industries, townships and other users and complete rural landscapes can be transformed.

High quality charcoal: Where movable modified Gayllard retorts are deployed, the bush material can be converted at a rate of 35 percent of bush material to a ton of high-quality charcoal for the export market. A retort is about 3 m high and 2,5 m wide, with the ability to be closed off totally from an inflow of air into the retort. That implies that the 3-tonnes wooden blocks fed into the retort before closure of the retort is pyrolyzed in the absence of oxygen and that none of the carbon is turned into carbon dioxide. In conventional holes in the ground, the predominant method which is used throughout Africa, a recovery percentage of approximately 6% of carbon from timber is achieved. With spent fuel tanks and other charring devices up to 16% recovery of carbon can be attained, as compared to the 35% recovery rate and low wastage rate through the use of a Gayllard retort.

Through the use of modified Gayllard retorts, high quality charcoal is produced which conform to the international quality specification, namely the generally-accepted DIN specification (*'Deutsche International Norme'*). The respective elements of the specification for the charcoal are:

- Carbon content – minimum of 83%;
- Ash content – maximum of 3%;
- Water content – maximum of 5%;
- Volatile gasses and other compounds such as methane – about 9%.

At a conservative biomass recovery rate of 70 tonnes per hectare, it implies that an estimated 24,5 ton of high-quality charcoal carbon is produced per hectare. With an export price of about $420 per ton, the income per hectare can be $10 280. That sum surpasses the potential income from cattle farming on the same land by approximately 500 times. In addition, the general condition of the land in respect of grazing capacity, soil erosion prevention, general fertility, water holding capacity and common value, is vastly increased. Through this action a major liability is transformed into a major asset at very low expenditure.

It should be noted that special security measures and advanced technology apply after the quenching of the charcoal with water and the cooling down, in order to prevent possible injuries. This is the result of the presence of volatile organic gasses, especially methane in the cavities of the charcoal, which can undergo spontaneous combustion when the charcoal is moved. Therefore, the steel drums and other containers with the high-quality charcoal have to be monitored and fire extinguishers should be kept ready. Charcoal may not be loaded in containers and shipped within two weeks of charring as fires can occur in shipping holds.

3.3.11.3 Trade

Regarding methanol, fuel wood[7] and wood charcoal[8] average trade in the SADC region over the period 2015 – 2017 was as follows:

- Methanol (HS2905 11), net import of $178 m from RoW; 85% of product exported, i.e. $179 m was exported to RoW.

[7] Fuel wood, in logs, billets, twigs, faggots or similar forms; wood in chips or particles; sawdust and wood waste and scrap, whether or not agglomerated in logs, briquettes, pellets or similar forms

[8] Wood charcoal, incl. shell or nut charcoal, whether or not agglomerated (excluding wood charcoal used as a medicament, charcoal mixed with incense, activated charcoal and charcoal in the form of crayons)

- Fuel wood in logs (HS4401), net export of $123 m to RoW; 95% of product exported, i.e. $175 m was exported to RoW.
- Wood charcoal (HS44021), net export of $28 m to RoW; 75% of product exported, i.e. $30 m was exported to RoW.

3.3.11.4 Critical Success Factors

- Selectively removing the excessive encroaching bush over 100 m ha of grazing land in all of the countries involved, including Namibia and Botswana;
- Establishing the respective processing systems for high-value products.
- Arranging funding through an agricultural development corporation whereby rural communities can benefit substantially.
- Arranging effective marketing systems for the respective products.

Table 17: Biomass with high-value addition

Primary production	First stage processing	Investment	Second stage processing	Investment	Profitability
Selective clearing of excessive bush growth Dividing plant material for different uses	Thin branches for livestock feed production	Low investment	Chipping, milling, blending, pelletising	Low investment	Fairly high
	Thick branches for timber panels	Relatively low investment	Sawing, drying, gluing	Relatively low investment	Very high
	Harvesting waste material for electricity	Low investment	Sawing, burning, electricity generation, distribution	Modest investment	Very high
	Harvesting waste material for export charcoal	Low investment	Retort carbonising, milling, plate briquetting, packaging	Relatively low investment	High
	Harvesting waste material for methanol fuel, combustible oils	Low investment	Gasification with multi metal catalysts	Relatively high investment	High

3.3.12 Poultry

This section will analyse the production and describe the processing of products from ducks and geese. Please note that reference will also be made to the broiler industry.

3.3.12.1 Birds and Products

Poultry provides the lowest cost protein food in the shortest production time to humans. As poultry species are small, their production can easily fit into small spaces around households without interrupting most other activities. Chickens are the most popular for production, as they can be kept in the minutest spaces possible if ventilation is provided. However, chickens consume expensive feed concentrates and cannot readily digest fibrous plant materials. Ducks, geese and Muscovy ducks, on the other hand can digest grasses, sedges and other weed types and demand less feed concentrates. They can be produced on open grassland and under trees with almost no grains or beans required in their diet. For that reason, the production cost of ducks and geese is a fraction of that of chickens. Ducks and geese are also much more resistant to the diseases which frequently plague chickens. Therefore, they do not need the expensive inoculation against New Castle Disease and other contagious diseases which often ravage chicken populations. Although the ducks and geese tend to grow slower than chickens, the production cost of ducks and geese is much lower than that of chickens, bearing in mind that the former poultry types can consume grasses and sedges free of charge and do not need to consume large amounts of

expensive grains and protein rich feeds. The birds can be slaughtered at different ages and can therefore provide in a constant supply of meat or income when sold.

Furthermore, the soft goose down on the front of the underside of the geese can be plucked once or twice a year, washed and dried and marketed in the Far East at handsome prices. The down is in demand for the stuffing of pillows and duvets. It has been found in South Africa that where cottage industries are organised, old age women or disabled people can be involved in the production of pillows and duvets. The latter sell at high prices and can provide a significant income to rural people. It has also been found that individual birds in breeding flocks of geese can be kept and plucked for as long as 28 years while they keep on breeding. The birds are also popular as guardsmen around homesteads as they sound the alarm at suspicious movements of people.

Geese are slaughtered at different ages to determine the feather follicle sizes on the skins and therefore on the leather to be tanned. The objective is to satisfy the demand by fashion houses for different textured leather products. After slaughtering, the skins are carefully removed in a prescribed manner and the leather tanned through a process developed by centuries' old leather tanning families in Eastern Europe.

Although leather of all kinds does not command high prices globally, the leather products represent several degrees higher prices. When the goose leather is processed into fashion items for the European market, such as ladies' handbags, fashion gloves and other items, the value of the end products can be remarkably high, and the products are highly exportable. As the production of ducks and geese involves low risk and the production cost is low, multitudes of primary producers at all levels can participate.

After slaughtering of the geese and ducks the meat is marketed into restaurants and other outlets. Any surplus meat is diverted into meat deboning machines and the resultant meat pulp is utilised for the production of Frankfurters, Vienna sausages and other high value meat products after salt, garlic and other ingredients have been added and blended in.

3.3.12.2 Opportunities

The breeding flocks of geese and ducks can be kept around homesteads and plucked when it is convenient for the owners. The soft goose down on the front of the underside of the geese can be plucked once or twice a year. It is washed, dried and marketed in the Far East at handsome prices. After slaughtering, the down on the birds is similarly sorted, washed and marketed.

The birds are also popular as guardsmen around homesteads as they sound the alarm at suspicious movements of people. With some stimulation of the rural and other populations, it could be possible to attain breeding flocks totalling several million birds in total. That action would entail little capital outlay to prospective owners of the birds. It should nevertheless be noted that in order to ensure a low mortality rate of goslings and ducklings, the mothers should have proper breeding nests or indoor protection or artificial heating available. The birds frequently maintain two breeding seasons per year and 10 young on average can be reared to adulthood. Predators should be kept at bay, namely dogs, wild cats, otters, mongooses, meerkats and others.

As the slaughtering and processing equipment is relatively cheap, it is within reach of many people in the countryside to participate in the downstream value-adding processes. The marketing of the down and other products can be done on a co-operative basis. If a household maintains a small flock of 50 birds, the birds can be plucked annually to produce income. The grass and other weeds as well as the insects around the household are consumed and kept under control. About 500 birds can be slaughtered annually by the inhabitants of a small household as a result of the multiplication rate. The vital statistics on the income potential is available from this consultancy group, as complete project plans have been compiled by them.

With the expansion of the goose and duck farming enterprises in the rural areas, an immediate elevation in the income patterns at household and regional level can be accomplished. As this agro-industry lends itself to the involvement of women, old age people and people with disabilities, the socio-economic effects on the communities can be remarkable.

3.3.12.3 Trade

Regarding geese and ducks[9] and meat[10] average trade in the SADC region over the period 2015 – 2017 was as follows:

- Live poultry (HS0105), net import of $16,1 m from RoW; 4,3% of product exported, i.e. $585 000 was exported to RoW.
- Meat and edible offal (HS0207), net import of $763,2 m from RoW; 3% of product exported, i.e. $3 m was exported to RoW.

3.3.12.4 Critical Success Factors

- The communities in all the affected countries should be made aware of the considerable income potential associated with this kind of farming;
- More breeding material of the right kinds should be made available to the rural communities in the form of young birds.
- Small abattoirs, down-washing facilities and leather tanning operations need to be established and the meat processed into sausages and prime cuts;
- .
- People with specialised skills in marketing should be utilised in the proposed agricultural development corporation in order to make a success of the marketing operations.

Table 18: Duck and goose production

Primary production	First stage processing	Investment	Second stage processing	Investment	Profitability
Rearing around rural households Improved farming methods	Seasonal plucking of down	Low investment	Washing of down and stuffing duvets	Very low investment	Very high
	Slaughtering, skinning, salting of skins	Relatively low investment	Deboning of meat, sausage production	Relatively low investment	High
			Meat cutting, packaging, cooling	Fairly high investment	Fairly high
			Salting of skins, tanning, cutting, fashionwear production	Fairly high investment	Very high

[9] Live poultry, "fowls of the species *Gallus domesticus*, ducks, geese, turkeys and guinea fowls"
[10] Meat and edible offal of fowls of the species *Gallus domesticus*, ducks, geese, turkeys and guinea fowls, fresh, chilled or frozen

Box 1: Production of broiler chickens

The following notes serve to create an awareness of the facts which are often overlooked.

Battery-grown and free-range chickens: It is important to note the differences between the approach to grow these two types of chickens. Broiler chicken production is the largest agro-industrial activity on earth and chicken meat represents the cheapest source of protein to billions of people globally. The chickens can be produced under all circumstances and divergent climatic conditions. The types of chickens kept under extensive conditions around households, also referred to as free-range chickens, are different from those bred specifically to endure the extremely high population densities of intensive chicken houses. The latter types can hardly survive under natural conditions, but with intensive feeding, ventilation of the houses and temperature control, they can mature very fast, much faster than free-range chickens. The free-range chickens can digest food which contains somewhat more fibre and roam around where they seek insects, snails and plant seeds and small flowers and buds. Although the feeding cost of free-range chickens on a daily basis is much lower than that of battery chickens, the rearing cost is not necessarily lower per kilogram, in view of the longer periods from birth to slaughter and the extended period of care and feeding which is required. The capital cost of the structures to house free-range chickens is a fraction of that of battery chickens. However, acute shortages of day old or week-old chickens of free-range types exist, and this acts as an impediment to the full development of free-range chicken production and participation in the down-stream value chain.

Health considerations: The efficiency of feed conversion of battery chickens has been steadily increasing over the past century and the period of rearing from birth to slaughter has also been reduced dramatically, namely by more than 80 percent. However, recent studies by the scientists involved with the American Broiler Chicken Association, have revealed alarming facts. It has become clear that, probably due to the high population densities, the high concentrations of ammonia gas exuded by the chicken dung and the lack of proper exercising, broiler chickens develop a range of stress related biochemical compounds in their bodies. Experiments have indicated that from an early age the birds develop severe pain in their limbs as well as acute rheumatoid osteoarthritis. The latter condition apparently causes brittleness of their bones and frequently bone deformities. The bones of broilers often break without much force exercised on them by handlers. Consumers are becoming increasingly aware of the possibilities that the extremely high concentrations of stress-induced compounds in the battery chickens might affect their health if chicken meat is consumed frequently. This represents a global dilemma and increasing numbers of consumers regard the consumption of battery produced broiler chickens with suspicion. One practicable solution is to turn to the consumption of free-range farm chickens instead.

Improving market conditions for free-range chickens: As a result of the above-mentioned studies as well as other humane considerations, measures have been adopted in various countries to ensure that chickens have a choice to roam around outside of the chicken houses. If the chicken houses are equipped with doors to allow them the opportunity to roam free, they can be classified as “free-range chickens” and supermarkets can charge much higher prices for them. The reality, however, is that the temperature regime inside the chicken houses is mostly kept at such levels that the chickens hardly find it attractive to roam outside, except during rain storms or overcast days. Consumers who require real free-range farm chickens are acutely aware of the fact that the strains of chickens raised as farm chickens are different from battery chickens and the mere fact that certain limited measures which are introduced, cannot possibly convert ‘free-range’ battery chickens into real farm chickens. As a result, consumers in many parts of the world insist on being offered real farm chickens and are willing to pay a high premium for them.

Opportunities for participation in the value chains: Real opportunities exist for the production and slaughtering of free-range chickens. With the necessary traceability measures in place, small-scale

producers in rural areas can profit considerably if they wish to participate in the delivery of slaughtered whole chickens or pre-cooked chicken portions.

The dilemma of imported chicken meat dumped onto Southern Africa: The US government pays out several billion dollars annually to support people who wish to farm and remain on the countryside. That measure is deemed to be essential to keep more people on the countryside, amid the hardships encountered on the farms and the lack of available labourers. As a result, the production cost of maize (corn), soybeans and other commodities is a fraction of that encountered in Southern Africa. The US broiler chicken producers are therefore at a considerable advantage when they utilise the highly subsidised feeds.

The AGOA Extension and Enhancement Agreement (AEEA) was signed on 29 June 2015, extending the benefits for further 10 years. In return, the 48 signatory countries in sub-Sahara Africa were expected to remove barriers to US trade and investment. In the case of South Africa, the AEEA came with the condition that the country does away with the trade barriers to allow US chicken export into the country by 16 March 2016, failing which the country will be excluded for the duty-free programme. In December 2015, South Africa published the rebate position and guideline for the import of 65 000 tons of US bone-in chicken pieces into the country, exempt of anti-dumping duties. The surplus of low-cost broiler chicken products was allowed into these countries and serves as a counter performance condition to the fact that many agricultural and agro-industrial products from SADC countries are imported duty-free into the US under about 6 000 tariff lines (South African Reserve Bank, 2016). The South African broiler chicken industry is highly productive, is working on very thin margins and has vast overcapacity – many local broiler producers have already been forced out of production. Several tens of thousands of employment opportunities have also been lost in the process.

The destructive role of the commodity traders in the derailing of the SADC agro-industries: Contrary to the position taken by the SA Government that the dumping should not be frowned upon as it is ‘cheap food for our people’, the consumer prices of dumped broiler chickens are only fractionally lower than the broiler chickens produced in SADC. Therefore, the traders make what might be consideredexcessive profits, while the local agro-industrial sector is battling to survive amid the low profit margins and the high feeding costs. When price wars are initiated by the local broiler producers in order to regain their market share, the traders are in a position to undercut their prices in view of the large profit margins they enjoy.

Stalemate on the broiler chicken front: As a result of the destructive dumping actions of USA broiler materials, the broiler producers across SADC are almost permanently deprived of the opportunity to participate in profitable broiler production. No feasible solution exists to break the deadlock. However, it is suggested that the international traders be forced to sell the imported dumped chicken at international reference prices to local traders and to people and organisations who wish to add value to it. One of the best links in the value chain to latch on, is the selling of pre-cooked chicken portions in batter or in untreated form. It is nevertheless suggested that the subject of dumped broiler chickens be further considered.

3.3.13 Cattle and Goats

This section will refer specifically to the processing and packaging of beef and goat meat - red meat.

3.3.13.1 Products

The largest agricultural activity in the rural areas on the African continent and in SADC member states is animal husbandry. However, because the livestock farmers do not trade in especially male offspring as they should, they do not have access to value adding facilities. The handling structures such as veterinary services and traceability systems are deficient and little of the real value of the meat products accrue to the people on the ground.

With the planned advanced purchase and trading system, coupled with the provision of basic veterinary services and the creation of grass feedlots, the system is set to be overhauled. Adding the planned small rural abattoirs and meat, off-fall and hide and skin tanning facilities, the integrated system can serve to change the entire livestock farming and meat processing value chains for the benefit of farming and rural communities.

A serious constraint on general trading in red meat is posed by especially Foot and Mouth Disease (FMD), Bovine Brucellosis (BB), tuberculosis (TB), but also certain other serious contagious diseases. Those ailments and infections also include rabies, lint worms, anthracnosis and others. At all levels of trading consumers seek guarantees that the required inspection services are operational, to safeguard the consumers from contracting the dangerous diseases. Many multilateral agreements have been signed between governments and also between regional groupings whereby all parties would provide guarantees that the inspection services are operating at the required standards, that inspection by skilled practitioners is done at abattoirs and that certification of the meat is done in the correct manner. This includes a guarantee that the health standards at the abattoirs are maintained in a professional manner.

However, the above-mentioned is generally not in order and politicised and for producers in many countries, the importing agents which represent the receiving countries, have to provide additional assurances that the health standards are maintained.

One of the tools to facilitate the monitoring of the production and trading systems is to rigorously enforce traceability of all products. The governments of the SADC region are therefore prompted to appoint the right people and intensify the efforts of their veterinary services to ensure that health requirements are maintained. This is most often not achieved, and this deficiency serves as an important impediment to trading in meat and other animal products.

3.3.13.2 Opportunities

Improving the slaughter percentage of animals through grass feedlots: The slaughter percentage of cattle offered for slaughter in the rural areas of the SADC countries is generally around 33%. That implies that the amount of recoverable meat is very low. When animals are kept on grazing land and fed on additional grains and feed concentrates, their mass increases and the slaughter percentages increase over a period of 120 days. With some breeds of cattle, the slaughter percentage can increase to 65 percent. The concept of intensive feedlots where cattle are fed, is gradually losing in popularity in view of the high incidence of disease and the high cost of feeding. Where the animals are kept on natural grazing while being fed, the feeding cost per kilogram meat gained is usually much higher. It is therefore proposed to create a multitude of grass feedlots for the improvement of the condition of the cattle before slaughter.

Health considerations: Strong opposition is currently mounting to the use of growth promoting hormones, the usage of a number of pesticides, large doses of antibiotics and anti-inflammatory injections such as Voltaren and other substances which pose dangers to the health of the end consumers. Guarantees are sought that meat which is exported is free of those substances. This aspect will be promoted in the advancement of high value exports from various countries. As a number of European countries have in the past found it difficult to eradicate the infection with Creutzfeldt Jacob disease (Bovine dementia or mad-cow disease) which is caused by dangerous ultra-micro disease particles, meat

imports from African countries such as SADC are welcomed. This creates a strong opportunity for the marketing of meat free of that and other diseases as well as meat from animals produced on grazing alone or grass feedlots. Large-scale market opportunities are therefore created whereby producers of beef and goats' meat can benefit from high prices.

3.3.13.3 Trade

Regarding goats and goat's meat average trade in the SADC region over the period 2015 – 2017 was as follows:

- Live sheep and goats (HS0104), net import of $36 000 to RoW; 4% of product exported, i.e. $1 m was exported to RoW – 96% or $32 m was intra-regional trade in SADC.
- Live goats (HS0104 20), net export of $211 000 to RoW; 9% of product exported, i.e. $805 000 was exported to RoW – 91% or $8 m was intra-regional trade in SADC.
- Fresh, chilled or frozen meat of goats (HS0204 50), net import of $103 000 to RoW; 91% of product exported, i.e. $1,4 m was exported to RoW – 9% or $128 000 was intra-regional trade in SADC.

The following has reference to the average bovine animals' meat trade for the 2015 – 2017 period from the SADC region:

- Meat of bovine animals, fresh or chilled (HS0201), net export of $112 m to RoW; 73% of product exported, i.e. $119 m is exported to RoW – 27% or $43 m was intra-regional trade in SADC.
- Meat of bovine animals, frozen (HS0202), net import of $46 m from RoW; 51% of product exported, i.e. $166,3 m was exported to RoW.
- Frozen, boneless meat of bovine animals (HS0202 30), net import of $51 m from RoW; 441% of product exported, i.e. $45 m was exported to RoW.
- Meat of sheep or goats, fresh, chilled or frozen (HS0204), net import of $35 m from RoW; 17% of product exported, i.e. $4 m was exported to RoW.
- Meat of bovine animals, salted, in brine, dried or smoked (HS0210 20), net import of $19 m from RoW; 2,5% of product exported, i.e. $86 000 was exported to RoW – 97.5% or $3 m was intra-regional trade in SADC.
- Fresh or chilled edible offal of bovine animals (HS0206 10), net export of $7 000 from RoW; 10% of product exported, i.e. $202 000 was exported to RoW – 90% or $2 m was intra-regional trade in SADC.
- Fats of bovine animals, sheep or goats – excluding oil and oleostearin (HS1502), net import of $5 m from RoW; 1% of product exported, i.e. $24 000 was exported to RoW – 99% or $3 m was intra-regional trade in SADC.
- Sausages and similar products, of meat, offal or blood; food preparations based on these products (HS1601 00), net import of $92 m from RoW; 2,% of product exported, i.e. $381 000 was exported to RoW – 98% or $17 m was intra-regional trade in SADC.

The following refers to the average trade of hides, skins and raw skins for the 2015 – 2017 period from the SADC region:

- Hides and skins of goats or kids, in the dry state "crust", without wool on, whether or not… (HS4106 22), net export of $7 000 to RoW; 78% of product exported, i.e. $13 000 was exported to RoW.
- Hides and skins of goats or kids, in the wet state "incl. wet-blue", tanned, without wool on… (HS4106 21), net export of $581 000 to RoW; 97% of product exported, i.e. $582 000 was exported to RoW.

- Raw skins of sheep or lambs, fresh, or salted...[11] (HS4102), net export of $67 m to RoW; 98% of product exported, i.e. $67 m is exported to RoW.

3.3.13.4 Critical Success Factors

- Establishment of grass feedlots, hygienic abattoirs, meat processing systems and traceability systems suitable for international trading;
- Provision of better veterinary services and advice on livestock rearing;
- Establishment of cooperative actions through agricultural development corporations to enable the handling of the animals and meat in the desired manner;
- Establish high standard ultra-hygienic meat processing plants whereby the value of the meat can be enhanced considerably.

Table 19: Red-meat production and value adding

Primary production	First stage processing	Investment	Second stage processing	Investment	Profit-ability
Improved techniques for the production of weaner bull calves ready for grass-feedlots	Marking of animals for traceability	Fairly low investment			Fairly high
	Slaughtering in new hygienic abattoirs	High investment			High
	Salting of hides and skins and removal of fat and hairs	Low investment			Fairly high
			Deboning of meat, pre-packaging and freezing	High Investment	High
			Processing of leather and production of motor vehicle seats	High investment	High

Box 2 Dairy production

The demand for dairy products in the SADC countries is gradually rising. As a result, many appeals are periodically made for the establishment of dairy production systems in all of the SADC countries. This consultancy group has over the past number of years been intimately involved with the dairy industry in many African countries.

The most important dairy production in the SADC countries outside of South Africa consists of the milking of cows of rural beef type cattle herds which graze on natural veld. The yield per cow per day is very low and the quality of the milk is such that it can only be used in local households but can seldom be marketed commercially. Most of these households do not have access to pasteurising equipment. Very few large-scale commercial dairy farms also operate in those countries.

Commercial dairy farming is regarded as an extremely risky business due to the fact that mastitis presents a constant threat throughout every day. If a cow has contracted mastitis the milk production capacity of that udder quarter is permanently damaged, despite any rectifying treatment which may be administered. It is crucial and costly to maintain a high standard of general hygienic conditions in the milk parlour and its surroundings.

Cows easily contract Bovine Brucellosis disease which is transmitted to humans where it causes Malta Fever. Any ungular female which undergoes an abortion poses a threat to the dairy operation as crows

[11] Raw skins of sheep or lambs, fresh, or salted, dried, limed, pickled or otherwise preserved, whether or not dehaired or split (excluding those with wool on, fleeces of Astrakhan, Caracul, Persian, Broadtail or similar lambs, or of Indian, Chinese, Mongolian or Tibetan lambs and tanned, parchment-dressed or further prepared)

or scavengers can carry the abortive material around and infect large numbers of cows. Cows can also contract Bovine Tuberculosis which can be transmitted to humans. For the above reasons and to control other contagious diseases potentially transmitted by milk, it is essential that milk be pasteurised before distribution. Although a pasteurising machine is costly, it provides comfort to the end users of the fresh milk.

Due to the constant threat of the introduction of diseases through the purchase of new animals into a dairy herd, it is advisable for a dairy management corps to breed their own replacement animals. Therefore, the management of a herd needs to pay special attention to the feeding of heifers which are destined to replace cows which are retired. The present advent of Bovine leucosis, a viral disease which cause leukaemia in cattle, is currently spreading throughout South and Southern Africa, largely as a result of sub-standard veterinary services. That form of leukaemia can cause breast cancer among humans if milk from infected cows is ingested.

For every cow in lactation, one other female animal which is not in production is carried on the farm, namely dry cows waiting to calf and heifers which are prepared for calving and lactation. In South Africa the standard minimum requirement for a sustainable commercial herd is 400 cows-in-milk. That minimum number of animals is required to provide in sufficient numbers of replacement animals from inside the commercial dairy herd. That also implies that advanced milking and other equipment should be installed at great cost, including cow houses with advanced cooling designs.

Where high mean annual rainfall conditions exist, it is possible to maintain irrigated pastures, which make the feeding of the commercial farming operation cheaper, but as the cows have to walk to the grazing areas, they cannot produce very high yields per day: at most 15 to 20 litres per day. Where cows are fed in the stables and are not required to walk far to graze, their milk production can be elevated by two to threefold. However, cows with a very high milk production can only be milked for a limited few lactations, before their milk production starts dropping and they need to be replaced.

Where dairy production is centred around primary production, the operation is at best marginally profitable. As most people of African origin lose their ability to secrete lactase enzyme, which breaks down lactose, they can normally only consume small amounts of fresh milk before they start feeling bad. Therefore, most of the milk South of the Sahara has to be converted into yoghurt or amasi (sour milk) where the *Lactobacillus acidophilus* bacteria have broken down the milk sugar (lactose) which causes the uneasiness.

As a result of the complexities of commercial milk production, it has always been easier to import milk powder into the SADC countries outside of South Africa, as the lactose has been mostly broken down in the drying process of the milk. To establish commercial milking operations is costly and highly demanding on management and the primary production system invariably needs to be linked to downstream processing into higher value end products. It is a highly risky investment and not a primary subject to attempt in this present submission.

3.3.14 Fish

This section will make specific reference to freshwater fish production and processing – specifically a vegetarian fish species Tilapia.

3.3.14.1 Fish and Products

The production of cold fresh water fish species such as trout is generally not sustainable, on account of the high cost of protein rich feeds, unless the farming systems can rely heavily on tourists to pay high prices for the fish they catch and throw back into the water or the processing of the fish into various food items with a high value. Therefore, it is not regarded as a high priority.

However, where warm water is available throughout the year in parts of most SADC countries, large potential exists for freshwater fish farming. As catfish also demands protein rich feeds, which are generally expensive, it is not as lucrative as farming with vegetarian species, especially Tilapia. It should be noted that indoor farming depends heavily on the feeding of expensive feed concentrates in small areas and therefore it is not as profitable as outdoor farming in open ponds.

In discussions with the four largest companies which either catch fish, import fish and market fish products throughout South Africa and SADC, this consultant group was informed that the largest markets exist for fish with a pale (white) colour and a neutral flavour devoid of a strong fish flavour. As a result, a large part of the international market has developed away from carp fish with a muddy taste and marine fishes with a strong fish flavour. Strong focus is presently given to the production of Tilapia.

By the implementation of novel techniques significant yield and efficiency advantages can be gained. This includes the breeding of female sterile fish whereby the fishes are all males and because they cannot breed, they grow out to large sizes within eight months. By concentrating on the feeding of finely divided organic material into the water a host of bacteria and algae are stimulated to grow and for the fish to consume them. Thereby the cost of feeding is largely eliminated. The water needs to be aerated by paddle wheel or water jet aerators.

3.3.14.2 Opportunities

Attractive markets exist for export of live Tilapia to restaurants in Europe. The fish is kept in large open ponds into which the correct phytoplankton, namely mostly algae and bacteria as well as small floating water plants which are kept as feed for the fish. The water needs to be aerated in order to provide oxygen for the fish and carbon dioxide for the water plants and plankton to produce optimally. Through such a system the feeding cost is reduced by up to 90 percent, especially when finely ground plant material or animal dung is fed into the water.

With the low production cost and high potential income from Tilapia production, it can be regarded as a relatively easy production system with low capital outlay and large potential for participation by almost any parts of the population, especially women. The value adding processes to the products are also easily manageable. In view of the large export potential and the potential local uptake of surplus production, this type of farming and value adding is strongly promoted by the project team. The restaurant markets in Europe demand presentable fishes of about 480 gram each. The fish needs to be kept alive until they are cooked. That implies that the fish is kept in fine ice and flown out to the end destinations.

3.3.14.3 Trade

Regarding freshwater fish and fish meals average trade in the SADC region over the period 2015 – 2017 was as follows:

- Fresh or chilled tilapia ‘Oreochromis spp.’ (HS0302 71), net import of $332 000 from RoW; 99% of product exported, i.e. $372 000 was exported within the SADC region.
- Frozen tilapia ‘Oreochromis spp.’ (HS0303 23), net import of $25,4 m from RoW; 99% of product exported, i.e. $5 m was exported within the SADC region.

- Fresh or chilled fillets of tilapia 'Oreochromis spp.' (HS0304 31), net import of $411 000 from RoW; 24% of product exported, i.e. $30 000 was exported to RoW.
- Flours, meals and pellets, of meat or meat offal, of fish or of crustaceans, molluscs or other aquatic invertebrates, unfit for human consumption; greaves (HS2301), net export of $90 m to RoW; 89% of product exported, i.e. $118 m was exported to RoW.

3.3.14.4 Critical Success Factors

- Involving people located close to rivers where shallow ponds can be erected;
- Implementation of the integrated plankton and Tilapia production as well as nitrogen fixing floating water plants;
- Availability of electricity or other energy sources for the aeration of the water;
- Establishment of fish handling and export systems.

Table 20: Freshwater fish production

Primary production	First stage processing	Investment	Second stage processing	Investment	Profitability
Tilapia fish - Shallow ponds fertilised with antibiotics - free dung and floating water plants, aeration	Size sorting into containers	Low investment	Packing on fine ice in crates	Low investment	Very high
	Transport to airport depots	Low investment	Air transport to Europe	Low investment	Fairly high
	Removal of guts, scales, gills for local markets	Low investment	Refrigeration and distribution	Low investment	Fairly high

Box 3 The value chain for marine fisheries

One of the two largest fishing fields on earth, together with the fishing fields off the coast of Chile and Peru, is situated along the west coast of South Africa, Namibia and Angola. Fishing in that area as well as the pelagic fishing areas close to the coasts of those three countries, requires large trailers with cooling and freezing facilities to handle the trawled fish and octopus (calamari). Those factory ships belong to large companies and companies from many foreign countries also have trawlers in those areas. Deep ocean dragline netting systems such as for sole can be 38 kilometres long and those create massive disturbances of the ocean floor.

Closer to the shoreline, where national marine exclusion zones apply, the fishing rights are allocated by the governments of the host countries. That also applies to the exploitation of crayfish, prawns, oysters, abalone and other species.

Apart from the pelagic fishing and line fishing close to the shores, where attempts are constantly lodged in order to afford certain of the local communities more opportunities to share in the wealth of the primary and downstream value chain, the lion's share of the industry is in the hands of large marine companies.

Along the east coast of the SADC countries with a sea front and also the Indian Ocean Islands, the focus is on line fishing activities, although some netting also occurs. Some prawn harvesting also occurs. A source of constant worry is the fact that fish and other marine species start developing histamines within 30 minutes of exposure to the sun. The histamines can cause serious health problems to many people and the histamines are not degraded with cooking. It is therefore important for fishermen to attempt to cool down and freeze the fish out of the sun within minutes in order to ensure that the fish retain its quality.

As the fishing industry in the Indian Ocean areas does not have the same magnitude as that of the Atlantic Ocean area, the potential for more downstream participation by smaller business entities is smaller. However, funding can be made available to fishermen on a small scale to purchase larger vessels and to install better cooling facilities. They can also be assisted to better participate in the further handling and marketing of their catches. As line fish usually command higher prices in the marketplace, some leeway exists for small-scale fishermen who are better equipped, to participate in the downstream value chain. However, such an action would demand decisive intervention by an agricultural and fisheries development corporation.

3.4 Converting Barriers to Opportunities

A number of barriers to value-adding processes exist and should be converted into opportunities for development, whereupon these opportunities can also form part of many value-adding processing as such.

Table 21: Converting Barriers to Opportunities

Value chains (i.e. products or technologies) considered: Crops, Livestock, Biomass, Forestry and Fishery	Twelve Criteria												Results		
	Times value adding	Additional participation by individuals & small groups	Number of beneficiary countries	Economic impact on the region	Import replacement	Exports - Regional	Exports - International	Immediate impact on certain theatres	New types of opportunities to be created	Resilience to climatic extremes	Potential cost of investment	Return on Investment	Calculated average	Allocated priority	Average
Rating: 1 = very low & 10 = very high															(P+Q)/2
Columns	A	B	C	D	E	F	G	H	I	J	L	M	O	P	Q
Factor		5	5	5	5	5	5	5	5	5	5	5	5	5	5
Physical processes															
Canning: tins, bottles, packaging	4,5	4,0	5,0	4,0	4,5	4,5	3,0	4,0	4,0	3,5	1,5	3,0	**3,8**	**4,0**	**3,9**
New processing technologies	4,5	4,5	5,0	4,0	2,5	3,0	4,0	4,0	4,0	4,0	4,0	4,5	**4,0**	**4,5**	**4,3**
Enabling requirements															
Traceability	1,5	2,0	4,5	4,0	2,0	2,5	4,0	4,0	3,5	3,5	3,5	4,5	**3,3**	**4,5**	**3,9**
Quality standards	2,0	2,5	4,5	3,0	4,0	4,0	4,5	4,0	4,0	3,0	2,5	3,5	**3,5**	**4,0**	**3,7**
Harmonisation between countries	1,5	1,0	2,5	1,5	1,5	2,0	2,0	1,5	2,0	1,5	2,0	2,0	**1,8**	**2,5**	**2,1**
Organic certification	1,5	2,0	3,5	2,0	1,5	2,0	3,5	3,0	3,0	2,5	3,5	3,0	**2,6**	**2,5**	**2,5**
Branding	2,0	2,5	3,5	2,5	3,5	3,5	4,0	3,0	3,0	4,0	2,5	3,0	**3,1**	**3,5**	**3,3**
Production material supply															
Phosphates	3,0	4,0	4,5	5,0	4,5	4,5	4,5	4,5	3,5	4,5	1,5	4,0	**4,0**	**4,5**	**4,3**
Calcitic and dolomitic lime	2,5	4,0	5,0	4,5	2,0	1,5	1,5	4,0	3,5	4,0	4,0	4,0	**3,4**	**4,5**	**3,9**
Breeding material for high-vlaue crops															
Rootstocks and new varieties of different exportable crops	3,5	4,0	4,5	2,5	2,0	3,5	4,0	4,0	3,5	4,0	2,0	0,0	**3,1**	**4,5**	**3,8**

Certain important linkages or enabling factors which are essential to the success of the development of agro-processing activities act as barriers, unless they are decisively addressed. If not, the establishment of competitive, robust RVCs across the region are highly unlikely.

In addition to the above-mentioned over-riding structural elements, a number of other barriers which are globally encountered are addressed below. It is proposed that those barriers are removed through the development of enterprises which utilise these barriers as a basis for business and to utilise the products of those new enterprises to ensure the success of all of the value chain-based opportunities listed in this document.

3.4.1 Physical Processes

***Canning*:** Tins, bottles, packaging: As canning of various products can open up a wide field of opportunities for high value production, the manufacturing of containers and packaging represents an important barrier to downstream processing. It is proposed that local manufacturing processes be established in order to create value over a wide field.

***New processing technologies*:** Various novel technologies are available which can be employed for the production of high value products which has in the past hardly been possible. This includes the production of breakfast cereals, soybean protein products and others.

3.4.2 Enabling Requirements

***Traceability*:** Not only the international markets, but increasingly also the local markets demand that traceability be possible on many consumer products. Through such a measure, discerning buyer organisations can inspect the production processes, the use of pesticides and the general hygiene of the environment. With the implementation of traceability, vast new market opportunities are opened up.

***Quality standards*:** As producers maintain high quality standards, their products are assured of good acceptance in discerning markets. The introduction of internationally accepted standards through standardisation channels improves the potential to obtain high market prices.

***Harmonisation between countries*:** Trade between countries is enhanced where harmony of standards, product and process descriptions as well as health procedures are maintained.

***Organic certification*:** As many consumers insist on organically produced products, it can benefit producers and processors to obtain certification and be assured of higher prices than for conventionally produced products.

Branding: It is a tool to open up marketability of products.

3.4.3 Production Input Supply

***Phosphates*:** The soils of the African continent generally contain the lowest phosphorus amounts of all continents. Due to the severe phosphorus deficiency in the cropping soils, crop and animal production is severely hampered. It is proposed that many phosphate deposits be investigated for exploitation and the production of soluble phosphate fertilizers.

***Calcitic and dolomitic lime*:** The soils of the southern part of the African continent are strongly acidic by nature. With cultivation and the application of fertilizers acidification is further enhanced, with resultant aluminium toxicity and poor yields. The seasonal addition of lime to the soil is necessary to restore the fertility. It is proposed that many lime pits be opened for lime to be supplied to crop producers.

3.4.4 Breeding Material for High-Value Crops

Rootstocks and new varieties of different exportable crops are essential to enable the production of high value and high yielding crop types. It is proposed that disease and drought resistant rootstocks be multiplied in various countries for producers to become able to produce optimally.

3.5 Fast-Tracking Strategies to Attain Results

3.5.1 Selection of Routes of Least Resistance

Real progress in increasing agricultural production in semi-commercial sectors often takes considerable time to materialise. The same applies to value adding to crops and products. Therefore, it is concluded that for tangible results based on value adding to be achieved, other routes have to be pursued and the host of limiting factors which are normally encountered should be avoided, where possible, until the conventional institutional forces can be mustered to pave the way for overall sustainable development on a wider front.

While sustainable agro-industrial development is normally dependent on massive improvement in infrastructure, research, training and other inputs for meaningful increases in production and the development of the value chains to occur, that process needs time to become a reality. Those processes are normally accompanied by large capital investments, adjustments to national and regional policies as well as adjustments to production and processing patterns.

In this assignment an approach is proposed to rather concentrate on those opportunities which can be exploited to ensure increases in production and value-adding without the necessity of those large-scale and cumbersome interventions by governments and the private sector. Thereby the shortest routes to the end result, namely ensuring the highest value of end products and benefits to the populations of the host countries, without the time-consuming processes described above, are pursued.

No significant improvements to the infrastructure are required for most of the value adding pathways promoted in this exercise and governments are also not required to play a significant role in the

processes, apart from facilitating developments. Few adjustments to policies need to occur, apart from minor adjustments to ensure smooth flow of goods and services.

This report is based on decades of experience by members of this project team gained by working in many countries, development of novel technologies, working in the private sector and with governments, observing trends on the world markets and identifying promising new opportunities over a wide playing field. The project team is therefore confident that it can present a list of opportunities and propose practical measures which, if taken seriously, can materially alter the agro-industrial landscape within a short period and relatively-low cost at various levels of participation by people involved in agriculture and related fields.

3.5.2 Catalysing Value Addition without Increased Yields

In this present approach the focus is not necessarily on attaining immediate large yield increases, which would naturally follow in the wake of wealth creation, but rather to concentrate on adding value to existing products and to ensure that production is maintained at healthy levels. It will still take time to provide access to quality inputs – good-quality seed, high quality fertiliser and lime, mechanisation equipment, value chain finance and other types of finance, on-farm processing equipment technologies. However, there are positive developments in this field and farmers are finding it easier to access to inputs through smaller rural agrodealers that supply some of these inputs are reasonable prices. Therefore, increases in primary production can generally not be expected. Yet, if the measures advocated in this report are headed, production, value adding, cross border trading and improvements in the general economic development can occur.

The exception is rice production and processing as well as biomass harvesting for which novel processes are available and for which the above-mentioned systemic rehabilitation processes are not necessarily a prerequisite. The opportunity for improvement in the performance in those fields is so big that it could hardly be held down.

3.5.2.1 The Exception of Rice

The exception to the general strategy followed in this assignment, rice production, is where a paradigm shift in the approach to production through mechanisation of planting and harvesting as well as novel processing technology is attainable and advocated. This approach is taken in view of the massive and increasing imports of processed rice into the SADC region, despite the fact that the natural conditions exist for large-scale rice production. Through the interventions discussed below, large-scale import replacement can be achieved after the mechanisation bottleneck has been overcome and an entirely new method of processing is adopted.

3.5.2.2 Increased Production for Certain Perennial Crops

As in the case of rice production, the recommendations to embark on increased production of certain perennial crops under irrigation, would have the natural outflow that high yield increases would be obtained.

3.5.2.3 Adopting Freely Available Novel Technologies

Significant yield and production increases of especially annual cops such as maize and soybeans can be achieved through simple adjustments to existing production systems and therefore those measures are also briefly addressed here. Increased yields can be obtained with the adoption of genetically modified crops (GMO) into which genes have been inserted of the Bacillus thuringiensis (Bth) bacteria which endows the crop plants with the ability to fend off attacks by the larvae stages of many insect species. The adoption of those new crop varieties by most of the developed agriculture world has led to enormous increases in yields in recent years. The yield increases have been accompanied by considerable reduction of production cost and the elimination of the use of expensive and often toxic insecticides. However, certain governments in the SADC block have placed a ban on the use of GMO crops, with serious disadvantages to the competitiveness of farmers.

3.5.3 Supply-side Measures

In view of the glaring deficiencies in effective supply-side measures in certain fields, special attention is given to overcome a few bottlenecks which act as serious impediments to agriculture on a wide front. These barriers include amongst others the:

- Lack of mechanisation: This deficiency can be resolved by the implementation of well-organised mechanisation schemes;
- Endemic lack of supply of phosphate fertiliser: A concerted effort is recommended to overcome the almost disastrous lack of primary supply of phosphate materials to be utilised as fertiliser, livestock feed, washing powders and food grade acidulants – an aspect to be addressed in this project;
- Deficient exploitation and supply of lime to agriculture: Agricultural development is stifled due to the erratic supply of dolomitic and calcitic lime. The irony is that where agricultural production is stimulated the need for lime is exponentially increased. Measures are discussed for the increased supply of lime to agriculture.

3.5.4 Strategies for Marketing Approaches

The project team draws heavily on private sector information regarding new large-scale market opportunities which have been developing in recent years. For the production of those end products novel technologies are available. Market opportunities have also been opening up due to large-scale shortages of livestock feed pellets in the Arab countries and elsewhere in the Middle East.

Strong market demand has also been created for attractive hardwood panels, which can be created from excess biomass obtained from encroaching bush. Portions of the biomass obtained from encroaching bush can also be processed into low cost electricity, exported methanol, high quality charcoal, oxalic acid and other specialised products for which technologies have recently become available.

With the rapid expansion of the supermarket networks across the SADC region, strong demand exists for a number of commodities, which can be supplied from production and agro-processing in the host countries.

The project team takes care to ensure that all market segments are involved, namely low cost primary consumption to high priced specialty markets. Special emphasis is placed on the exploitation of lucrative export markets, where attractive off-take agreements are available.

The creation of a *bureau for market information* is also addressed to overcome certain structural deficiencies relating to the availability of useful updated market information.

3.5.5 Available Resources and Technologies in the Region

An approach is taken whereby a number of useful resources that are available in the region, can be exploited. Those include the implementation of several advanced new technologies which are presently under-utilised, such as catalyst technologies for the processing of encroaching bush material in livestock grazing areas into methanol for export as vehicle fuel, electricity production through the use of low cost vortex generators in rural areas, the production of high value charcoal, livestock feed pellets, oxalic acid to replace imports and the processing of hardwood timber planks into attractive walling panels. There also a range of rural and agricultural machinery and equipment available to process agricultural outputs through drying, canning, conserving, producing, manufacturing and other processes.

A considerable number of agricultural specialists with strong private sector experience are available in the region and these experts can be utilised under the pioneering conditions encountered in the host countries in order to fast-track the planned developments. Many potential farmers and rural entrepreneurs in the region could be capacitated through mentorship, volunteer programmes and skills transfer in the member states.

3.5.6 Establishing and Capacitating Development Entities

There is a need for the development of structures to help implement programmes in targeted project areas. There is a need for these implementing entities to be private-sector led but firm partnerships should be formed with governments through mechanisms such as public-private partnership (PPP). There should be a strong effort to ensure inclusiveness of local farming and rural urban communities, rural enterprises and small agro-dealers. Agro-processing hubs could be developed and links to off-takers could be facilitated.

As development finance is usually difficult to muster, certain funding mechanisms could be designed, in view of successes achieved in the past and current experiences elsewhere on the continent. Value chain finance is only but one of a range of funding options available and it will have to be addressed especially in the absence of available collateral finance in most member states.

3.6 Other VC Opportunities

3.6.1 Animal Feeds and Production

Large deficits occur in the supply of animal feeds to especially the Middle East, but also to many other areas. It would be possible for many new entrants to participate in the value chain with the end markets destined as the export markets. However, as the local markets are also under-supplied, it is possible that primary producers could position themselves to participate in primary production as well as blending of materials into loose feeds as well as feed pellets. Unfortunately, the cost of mechanisation can be prohibitively high and the margins to be attained relatively low.

3.6.2 Market Demand and Supply Conditions for Vegetable Oil VCs

Among rural and urban populations in the world the demand for vegetable oils for cooking purposes is steadily climbing. This tendency is exacerbated under conditions of increased urbanisation and affluence by the increased consumption of food types which require the use of vegetable oils for frying such as protein rich foods. Those include eggs, meat, fried potatoes, fried sweet potatoes, stir-fried vegetables, fish products and others. In the SADC area increased margarine usage is linked to the tendency to eat more bread, where margarine replaces butter. Also, with the increase in use of oil-based paints for decoration of buildings and the manufacturing of certain plastics, the consumption of and demand for vegetable oils is constantly growing globally. The highest yields of edible vegetable oils per hectare are attained by the following crops:

Table 22: Edible vegetable oils

Climatic conditions	Crop and products	Description of production	Yield under good management
Very high mean annual rainfall: >1 800 mm; tropical conditions; high minimum temperatures (not applicable to SADC countries)	Oil palm: Palm oil and palm kernel oil	Perennial plantations: non-irrigated. New varieties have high yields	5 – 7 ton palm oil 1,5-ton palm kernel oil /hectare
High mean annual rainfall: >1 200 mm; tropical coastal conditions; fairly high minimum temperatures (mainly coastal areas of SADC countries)	Coconuts: Coconut oil, copra	Perennial plantations: non-irrigated. New semi-dwarf varieties have higher yields	3,5 – 4 ton coconut oil /hectare
Medium annual rainfall: >700 – 1 200 mm (many areas in SADC countries)	Avocado's: Avocado oil	Perennial plantations: supplementary irrigation	3 – 4 ton avocado oil/hectare
Medium to lower annual rainfall: 800 - 500 mm (most areas in SADC countries)	Summer annual crops: sunflowers, soybeans,	Short growing season: 4 – 7 months	1 – 1,5 ton vegetable oil / hectare

Climatic conditions	Crop and products	Description of production	Yield under good management
	cotton, groundnuts, lin-seed, sesame Winter annual crops: canola		

Due to the high net farming income of palm oil and hybrid coconuts and the fact that the crops do not need to be re-established every year, millions of hectares of additional areas in the tropical climates of the world such as Malaysia, Indonesia, Philippines, Papua New Guinea, Brazil, West Africa and other areas with high rainfall are being established under these perennial crops. Simple hand operated screw presses are in use in many areas and although the quality of the oil is generally fairly low, it is acceptable to the end users in rural and even local city areas. The fact that the palm oil contains higher amounts of red Beta-carotene and antho-cyanine pigment, which is deemed healthy, makes it more acceptable to users less familiar with the refined products sold in global markets.

Where annual vegetable oil crops are grown, expensive hybrid seed needs to be purchased every year and costly mechanisation programmes have to be funded.

The small-scale extraction of un-refined vegetable oil from the seeds and fruits of the above-mentioned crops represents one of the cheapest and easiest opportunities for participation by primary producers in rural areas in the lucrative down-stream value chain. Low cost equipment is generally available and packaging materials such as glass bottles are also freely available. As many of the rural consumers do not necessarily demand refined vegetable oil from which odours have been removed at high cost, a ready market for local cold pressed oil exists. It should, however, be noted that with the rather inefficient crude extraction methods involved at village level, a percentage of the vegetable oil remains behind in the oil cake residues and this represents a loss to the producers. The oil cake is utilised for cattle feed after it has been blended with feed which contains more protein and fibre.

In large-scale commercial vegetable oil extraction operations, the vegetable oil is stripped of free small amounts of free water and free fatty acids, followed by de-gumming, de-colourising and de-odourising operations before it can be packaged or processed into margarine. Those operations are costly and normally the fixed capital employed is considerable.

It can therefore be concluded that one of the best opportunities for participation in the agro-processing of oilseeds by even small-scale primary producers is to conduct hand operated vegetable oil extraction at village level at low capital and operating cost.

4 DEEP-DIVE VALUE CHAIN ANALYSIS

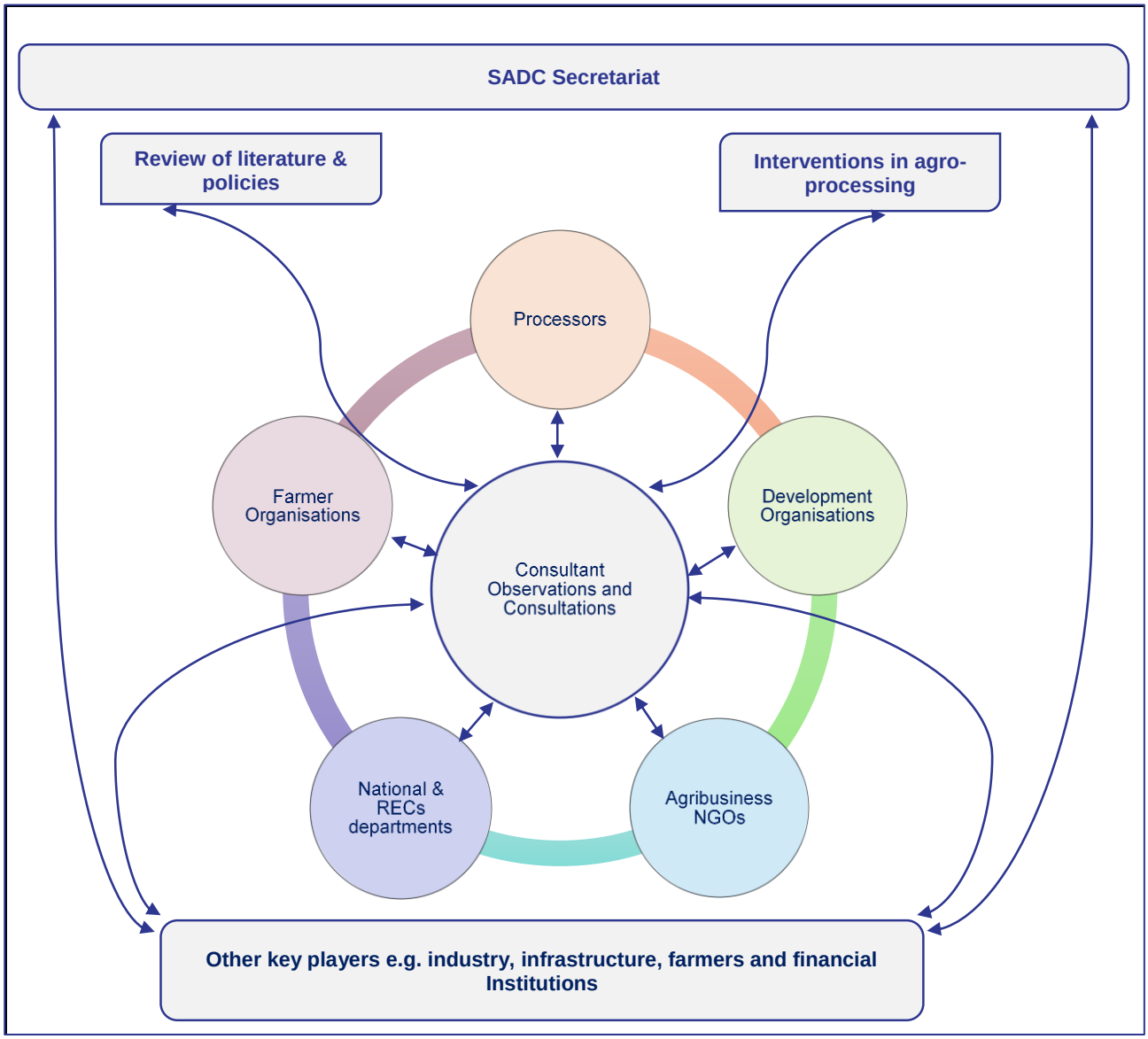
Building on the results and findings from the high-level VCA, a deep-dive value chain analysis was undertaken of six priority value chains and some of their sub-products or commodities. The intention of this deep-dive VCA was to both characterise existing regional value chains where they exist, and to highlight opportunities where SADC could facilitate the growth of these chains or support the development of new chains.

4.1 Methodology for the Deep-Dive VCA

4.1.1 Stakeholder and Intervention Mapping

Most of the direct engagement with stakeholders and specifically donors were conducted during this phase of the project and specifically during the missions to the SADC member states identified for fieldwork. More information has also been provided in **Appendix C: Donor and Intervention Mapping**. This is a summary of all the activities that have been taken place in recent years in the SADC region and in specific countries.

Figure 3: Stakeholder engagement process



In-depth discussions with these organisations provided some context in the member states to provide a general background of the economy, the agricultural sector, the barriers to investment into the agricultural sector, trade issues , and opportunities that may exist. Efforts were made during the interviews to identify potential investment opportunities in the agro-processing industry and are reflected later in this report. The detail of the outcomes of these discussions is presented in appendices to this report. The identified stakeholders in the relevant agro-processing sub-sectors have been an essential part of the development process as they contributed experiences and details from their views to the project team.

Figure 3 above depicts the stakeholder engagement process. It is important to note that public-sector-led industrialisation, especially within the agro-processing sector, has given way to a private-sector-led industrialisation through privatisation, divestiture and new establishments. Furthermore, a number of other stakeholders provide land, input credit, technology, extension services and direct market access to smallholder farmers and provide the highest number of formal jobs within the agro-processing industry. Both supply and demand incentives have played an important role in attracting private sector investment. This study is broad in the approach and consulted key stakeholders as mentioned above.

4.1.2 Policies and Strategies

An effort was made with this Final Report to provide a comprehensive analysis of all of the relevant policies and strategies applicable and the most relevant literature on the agro-processing theme in the region. During the various country missions, efforts were made to obtain government policies, sector strategies and other relevant information that may impact this assessment of the various agro-processing vale chains. **Appendix D** provides a summary of governmental policies and strategies that contain agro-processing and agricultural value chain development objectives, at national and regional level. It is a high-level analysis of mostly, SADC member states as well as regional policies and strategies of SADC.

The review comprises a desktop research to provide theoretical basis underscoring the complexities of African agriculture and the agro-processing industry. Desk research and literature review also involved the identification of quantitative as well as qualitative data that is useful in the analysis of selected value chains in the selected corridors/countries. The desk review involved the studying and synthesising of existing information reports, policy documents, government documents in the region and documents from representative organisations. The research also analyses the role of the private sector in enhancing productivity and industrialisation in the face of growing opportunities for the SADC's agricultural sector to transform the region. Information is obtained from regional and international bodies such as United Nations Economic Commission for Africa (UNECA), the Food and Agriculture Organization of the United Nations (FAO), United Nations Industrial Development Organization (UNIDO), United States Agency for International Development (USAID), International Fund for Agricultural Development (IFAD), African Development Bank (AfDB), National Ministries, Nongovernmental organisations, development programmes and projects, newsletters and reviews conducted on the topic of interest.

Developing regional value chains for strategic agricultural commodities, especially those identified by the African Union (AU) Food Security Summit in Abuja, is essential for African countries to enhance their agricultural transformation and global competitiveness (AU, 2006). Having already funded a wide array of projects and programmes in agriculture and agribusiness, donors are increasingly placing an emphasis on the need to promote agribusiness/agro-based private sector development. The international aid effectiveness agenda highlights the importance of aligning donor activities to the recipient country's priorities and improving co-ordination among donors, to minimise duplications and reduce the bureaucratic burden on local administration. In this respect, various aid modalities have been formulated, including sector-wide approaches to agricultural development. Given the cross-cutting nature of such aid, which is closely connected to aid for trade and private sector development, the formulation and implementation of effective agricultural development programmes and agro-processing will remain a major challenge to many African countries. African food and agricultural markets are extremely fragmented along regional, national, and even local lines. This often results in segmented markets of suboptimal size, which do not encourage sizeable private investments in the different stages of the

commodity chain (FAO, 2007a). Therefore, the project team has reviewed key agricultural and agribusiness development programmes to assess their impact over time, identified gaps, and opportunities for investment by the private sector. These matters form part of the literature review and an effort was made to synthesise the various regional value chain programmes relevant to agro-processing industries in the SADC region.

4.1.3 Literature Review

The consulting team conducted a comprehensive review of relevant documents to get a clear understanding what the impact of agro-processing initiatives had been in the past and identify reasons for successes and failures. **Appendix E** provides summaries of the literature reviewed related to this study, including value chain assessments of various crops, specific plant products (such as charcoal production for instance), guidelines on value chain selection, etc.

The team believes that it is important to learn from the experience from fellow development practitioners and not to duplicate research efforts on work that has already been documented. This is also in line with the Paris Declaration on Aid Effectiveness (2005) and the Accra Agenda for Action (OECD, 2008). This section of the work also includes collating and reporting available data about the current status of agro-processing in the region, including production volumes at national level, trade volumes (import/export data), consumption patterns, and existing national value chains. The team also consulted literature that may impact the outcome of implementable projects. Topical literature on SADC's agro-processing industry is already included such as knowledge products and reports from other donors, programmes, think-tanks, private sector service providers, and member states. An effort was also made to identify any overlap or contradictions in priority between member states and SADC.

4.1.4 Value Chains for Deep-Dive VCA

In section 3.2 the methodology was described to identify and select the targeted value chains (VCs). A total of 12 broadly defined value chains were identified and each of these were quantitively rated and qualitatively analysed in Phase 2. A total of 13 criteria (Section 3.2.1) were identified to rate these value chains quantitively (Table 5) and the proposed value chains were described and assessed in section 3.3.

Table 23: Value Chains for Deep-Dive VCA

Value chain	Products	Rating	High-Level VC	Deep-Dive VC
Grains: maize, wheat & rice	Maize & wheat: Meal (flour), meal products	3,9	1	1
	Maize & wheat: Breakfast cereals, bread, rusks, pasta, snacks	4,7		
	Rice: Parboiling, further processing, packaging	4,3		
Legumes: soybeans, drybeans & groundnuts	Small retailed packaged raw product	3,6	2	2
	Pre-packed oil, protein, peanut butter	3,6		
	Canned beans, groundnut snacks, other products	3,0		
Oil seeds and vege-table oils: sunflower, sesame, cotton seed, avocado oil	Prepacked oil	3,6	3	
Fruits, vegetables, nuts: mangos, citrus, Marula, yellow-cling peaches, macadamia nuts, bananas	Shelf-life increase	3,5	4	
	Drying, juicing, packaged	2,9		
	Canning	4,8		
	Nuts (shelled), packaged	3,3		
Fibres: cotton, cotton ginning, sisal to ropes	Cotton ginning, seed de-linting, oil pressing, oil cake, livestock feed	4,3	5	3
	Sisal to ropes	2,5		

Value chain	Products	Rating	High-Level VC	Deep-Dive VC
Plantation crops:	Sugar	4,1	6	
	Coffee	4,6	7	
	Tea	3,7	8	
Biomass: sickle bush, black thorn, yellow thorn, other species	Electricity generation	4,5	9	4
	Livestock feed	4,6		
	Methanol fuel	4,7		
	Timber panels	4,8		
	Quality charcoal	4,4		
Forestry: Eucalyptus, pine, wattle, foreign invaders, etc. (?)	Eucalyptus: Planks, electricity, methanol, times panels, quality charcoal	2,1		
	Pine: planks, electricity, methanol	1,6		
Meat and animal products: beef, goats, sheep, chickens (broilers free range), chickens (eggs), ducks & geese, dairy (cheese & milk), wool & mohair	Ducks and geese: down, skins for fashionwear, meat deboning	4,3	10	5
	Red meat: Grass feedlots, abattoirs	3,2	11	6
	Red meat: Processing, packaging	3,8		
	Chickens: Broilers – batteries	1,3		
	Chickens: Broilers – Free range	2,7		
	Chickens: Eggs	2,7		
Fish: Fresh water, marine fisheries	Freshwater vegetarian (Tilapia)	3,9	12	
	Freshwater carnivorous (Catfish)	2,2		
	Ocean fisheries (Deepsea fishing)	2,8		

Please note that the final rating values are reflected in the table above and is based on the outcomes of Table 4. Initially it was planned that the consulting team will make a proposal for the five value chains from the 12 value chains analysed during Phase 2. It should be noted that the team decided to consider six broadly-defined value chains in an effort to be as inclusive as possible e.g. 'grains' was chosen but included maize, wheat and rice as part of one group of value chains. It was also decided to group legumes, oil seeds and vegetable oils together in one group of value chains. This was decided due to the overlap between some of the crops that are both oil seed and a legume e.g. groundnuts. The SADC Secretariat also requested to exclude fish as a value chain for this study because a separate study is being conducted on fish subsector on behalf of SADC. The following six broadly defined value chains have been selected comprising 13 commodity groups and many more downstream products:

- **Grains:** maize and wheat meal (including flour), high-value products of maize and wheat (bread, pasta, breakfast cereals, etc.) as well as rice (and processing of the rice)
- **Legumes, oil seeds and vegetable oils:** soybeans, dried beans, groundnuts, sunflower, sesame and avocado oil (from fruit)
- **Cotton:** processed cotton products
- **Biomass:** methanol fuel, high-grade charcoal, livestock feed, etc.
- **Poultry:** geese and ducks for downstream processing - leather handbags, fashion items, down for duvets, etc.
- **Red meat:** beef and/or goats and leather products

These value chains have been analysed in-depth in the member states that were visited. During the interviews with interlocutors, stakeholders were requested to provide feedback on the status of each of the six value chains in the particular economy and identify challenges and growth opportunities. Opportunities for scaling value chains regionally and barriers preventing such growth were also identified. The impact on poverty reduction, job creation and selected market insights have been identified during the stakeholder interviews. Value chains were mapped, and it has been based on the format of the various country-specific value chains that were developed during the field visits. Efforts were also made to

address significant data gaps or shortcomings identified in the previous phases of the study, such as shortcomings in the production data available on public platforms (i.e. FAOStat). The team identified similar programme and projects that stakeholders and development partners are involved in to ensure alignment. Project documents were shared with the consulting team and in some cases these projects were still being designed[12].

It should also be noted that the consulting team participated and made a presentation at the SADC Industrialisation Week in Namibia, 30 July to 1 August. The specific breakout session was attended by 75 delegates and the identified value chains and member states were proposed to the meeting. The feedback was positive and there was a lot of enthusiasm for the presented agro-processing opportunities for the various value chains.

4.1.5 Fieldwork for Deep-Dive VCA

4.1.5.1 Preparation for fieldwork

In an effort to conduct a thorough deep-dive VCA, primary data collection was necessary to fill gaps in secondary data, to validate findings and hypotheses from the Phase 2 (pertaining to the prioritised VCs) and gain buy-in from key stakeholders (private sector, civil society, and member states). Quantitative and qualitative data were collected through a mixed-methods approach, consisting of face-to-face interviews and remote interviews by telephone and Skype. The following stakeholders were targeted can broadly be grouped as (with examples):

- Producers, cooperatives, and farmer-based organisations (Cotton SA, farmer unions);
- Input providers (veterinary services providers, feed / fertiliser suppliers, seed suppliers);
- Processors and value adding firms (abattoirs, packaging plants, tanneries, millers);
- Business development services firms and other supporting soft infrastructure providers (SME development agencies, extension service providers);
- Donors and government agencies (AfDB, FAO, IFAD, GIZ, Solidaridad, member state ministries of agriculture, ministries of trade and commerce);
- Civil society, private sector organisations and non-profit entities (WWF);
- National and regional groupings (FANRPAN, COMESA);
- Wholesalers, retailers and lead firms (supermarkets, SMTP, SIM);
- Informal economy actors (formal and informal cross-border traders, etc).

The project team also conducted research to identify which potential stakeholders are working in the selected value chains. Consultants with a good understanding of the local agricultural sector and market conditions were identified and appointed to conduct the field work. They were also able to provide guidance on the stakeholders and agencies to meet and assisted in making these arrangements. It was not possible to meet all the categories of stakeholders in all the targeted member states, but it was possible to meet most the of the groupings identified above during each of the field visits.

Findings from stakeholder interviews, particularly those pertaining to the Most Significant Factors that either underexploit opportunities or constrain the domestic or regional development and integration of value chains, is reported in 5.1: Dealing with Most Significant Factors. More detailed fieldwork findings can be found in Appendix N.

[12] The FAO Representative in Madagascar referred for instance to the PRESAN Project and confirmed that all the value chains identified by this study was is in line with what they have identified. He also shared the draft project document with the team on a confidential basis.

4.1.5.2 Interviews with key interlocutors

During this phase most of the interviews were conducted in person with identified stakeholders. However, due to time constraints and the availability of some interlocutors during the field missions, additional telephonic and Skype interviews were conducted. During the field visits, the team was able to arrange interviews with a wide variety of stakeholders as identified in the previous section.

During these interviews the team also validated some of the initial literature review findings, and captured additional qualitative data where literature was not sufficient or presented information gaps. The targeted stakeholders were primarily high-level intermediary organisations, thought leaders, regional support organisations and other relevant SADC organs and institutions, and donors implementing interventions in regional or global value chain development in SADC.

The goal of these stakeholder engagements was to gather primary field data to supplement the literature research findings. Qualitative and some quantitative data was collected and analysed. During the initial stages it was identified that the production data from the FAOStat database was not as accurate as required and it was decided to try and find updated information during the filed visits. A specific questionnaire was developed for this purpose. Data was gathered through interviews with key actors along the food value chain obtained in each market as well as key stakeholders and support service providers. Agro-processing firms, farmer-based-organisations, input dealers, agribusiness platforms, regional economic commissions, industry experts, development organisations and partners as well as public-sector institutions were interviewed. Survey instruments including open-ended questionnaires, and individual in-depth-interviews. A general questionnaire was developed for this purpose. Direct observations were also used to complement the interviews and secondary data analysis in providing invaluable insights and understanding about the functioning of the chains. This comprised actual observation of activities in and across the different agro-processing chain segments coupled with interviews of key informants.

It also happened during interviews that stakeholders referred to projects, programmes, development partners and government ministries that ware not originally part of the planned visit and in the end fruitful information was obtained through these contacts. It was also interesting that one stakeholder would for instance refer to the work of another stakeholder because many of them collaborate among each other, as well as with government ministries and agencies. Through additional policies, strategies and general information obtained through interviews, it was possible to get a more comprehensive understanding of the challenges and opportunities of specific value chains and at the same gain insight into the wider economic and development context in the member state.

Perspectives were also sought on the role of the private sector, their key challenges, opportunities in the agro-processing sector, incentives required to deepen private sector investment, investment decisions, strategic commodities, emerging trends, successful models, readiness to partner with public sector in adopting development models and potential projects ready for implementation.

4.1.6 Value Chain Mapping and Analysis

The analysis maps, unpacks and interprets alternative operational and supply chain models within VCs, and identified real opportunities for investment that align to SADC's industrialisation and agro-processing priorities. The comprehensive value chain mapping provided the guiding parameters for both data collection and analysis and resulted in the interview questionnaires that have been developed. The questionnaires provided guidance in identifying key opportunities, bottlenecks, strengths and weaknesses of the value chain within definitive actor clusters or groupings (similarly to those discussed in the fieldwork section). This information further highlighted where interventions are currently being applied (and where opportunities for interventions exist), and further expanded on the information presented in the VC profiles developed during Phase 2. A comprehensive profile has been prepared for each prioritised VCs, identifying:

- Advantages in terms of investment, income potential, increases in export, employment opportunity (including potential absorption for youth and women), linkages with other industries, economic proximity, and scalability;
- Potential for rural development opportunities and SME development;
- Investment opportunities for domestic and foreign investment;
- Potential intervention areas to address existing or expected challenges and bottlenecks.

4.2 Value Chain Profiles

4.2.1 Grains

4.2.1.1 Introduction

During the period 2015 to 2017 the SADC region has been a net importer of grain (or cereal) products from the rest of the world (ROW). This was mainly a consequence of unfavourable climatic conditions in the region. However, there may also be other reasons for lower production such as smallholder capacity and low levels of cereal production productivity.

Intra-SADC exports of cereals (HS10) averaged $506,9 m between 2015 and 2017, accounting for 96% of total SADC exports. Meanwhile, SADC averaged $2 370 m in imports from the RoW over the same period (accounting for 80% of total SADC imports – only 20% imports from fellow MS). The low imports from fellow MSs also suggests that limited re-exports of imported cereals occurred and that countries import their own cereals and consume it there. The high level of imports from outside SADC strongly signals that regional demand is substantially bigger than SADC is able to meet, given the current level of cereal production in the SADC region.

Most of the cereals imported are from outside the SADC region. The average imports during the 2015-2017 were rice ($1 038 m), wheat ($947,5 m) and maize ($396). The high volumes of cereal imports into the region signals an important message that one of the most important sources of food is at risk and the region should develop efficient regional value chains (RVCs) to ensure enhanced production within the region and the efficient flow of basic cereal products and processed goods.

The following three value chains will be addressed: maize, wheat and rice.

Table 24: Intra-SADC exports of processed grains products vs imports from RoW

Product	Intra-SADC Exports (USD)	Intra-SADC Exports as % of total SADC Exports	RoW Imports (USD)	RoW Imports as % of total SADC Imports
Cereals (HS 1000)	506 857 000	75,7%	2 369 526 000	80,3%
Rice (HS 1006)	73 553 000	91,5%	1 038 550 000	92,8%
Wheat and meslin (HS1001)	52 997 000	95,9%	947 496 000	91,3%
Maize (HS1005)	375 315 000	72,0%	396 044 000	50,0%

4.2.1.2 Maize

4.2.1.2.1 Regional context for the selection of commodity as a potential value chain

As a main ingredient of staple food products in many SADC countries, the maize products represent well placed opportunities to develop a regional value chain in the region. Sometimes demand is higher than production levels due to changes in climatic conditions (low rainfall, hail, cold conditions and frost). There are a number of barriers to cross-border grain trade including regulatory inefficiencies, trade facilitation issues and Non-Tariff Measures. Another major impediment to grain trade is the absence of a fully integrated railway and harbour systems with required capacities to facilitate the transport of maize grain in the SADC region. By enhancing the processing capacity across the SADC region, it could create the economies of scale needed for small producers to be able to form part of regional value chains. Key interventions in this regard could include the investigation into the feasibility of investment into regional processing facilities that are linked to regional distributors and traders.

Intra-SADC exports of maize (HS1005) averaged $375 m between 2015 and 2017, accounting for 72% of total SADC exports. This suggests that the majority of SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged $396 m in imports from the RoW over the same period (accounting for 50% of total SADC imports). Given that such a large percentage of imports come from

outside of SADC this could suggest that regional demand is substantially bigger than SADC is able to meet , in the light of current production levels. The top producing countries for maize in 2016 were South Africa (8 214 240 tonnes), Tanzania (5 875 860 tonnes) and Zambia (2 873 052 tonnes). The following season South Africa experienced a record crop of 17 551 000 tonnes – an average of 5,86 tonnes per ha under dryland conditions(SAGIS 2019).

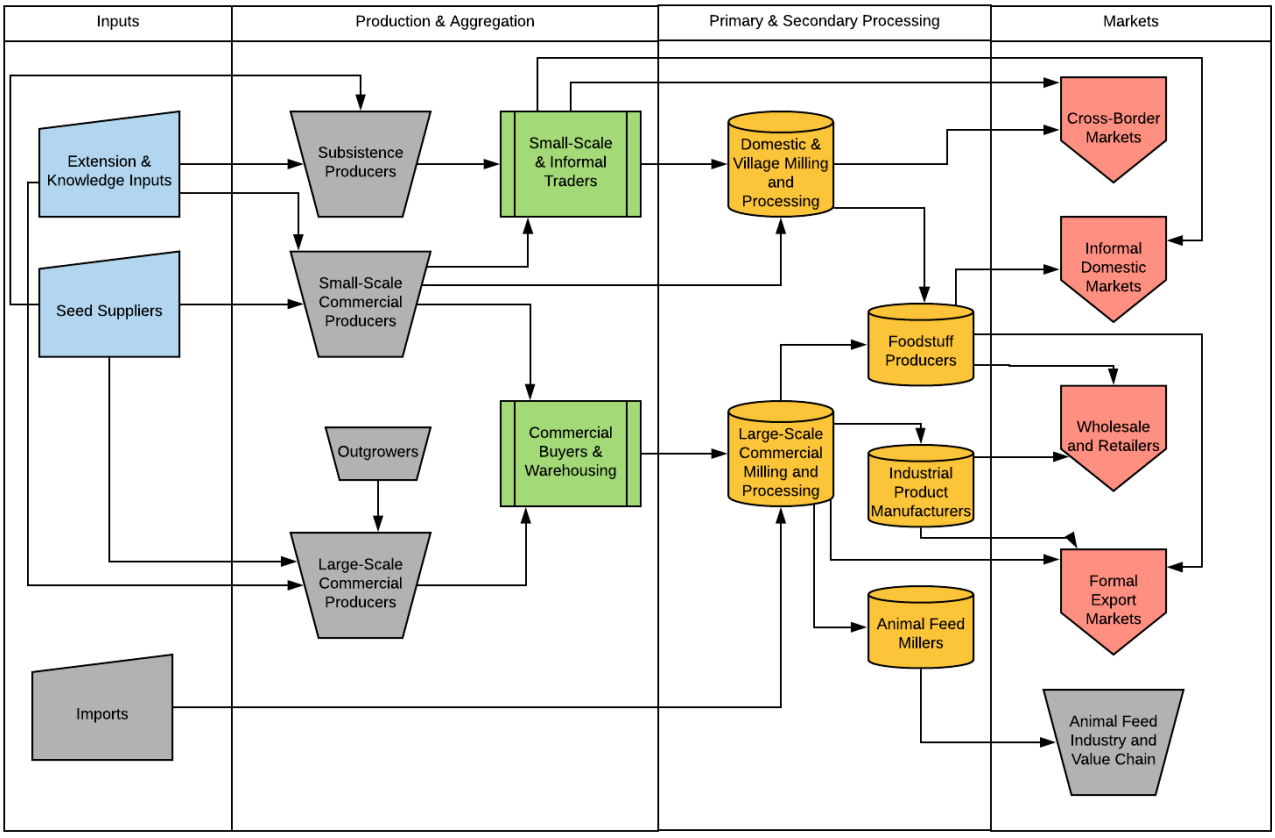
The packaging of processed maize products adds significant value. Given this, the point of intervention toward the establishment of a regional value chain could be decentralising, namely milling capacity and centralising distribution, or centralising aggregation, packaging and distribution.

Commercial level agro-processing activities in the maize value chain in SADC MS are generally dominated by large industrial processing firms. A leading maize processing firm in SADC is Tongaat Hulett Starch (SA), which also produces various products for livestock feed purposes, using a wet-milling process.

Leading firms in the processing of maize are also processing wheat and have been listed (see section on wheat). Some of the leading maize processors in the SADC region include Namib Mills (Namibian-based miller that produces pasta, maize meal and other products for human consumption), Bokomo Foods, Afrisian Ginning Ltd, Lesotho Flour Mills, Ngwane Mills, African Milling, Grandes Moagens de Angola, Premier Foods, Tiger Brands, RCL Foods and numerous others. Many of the mills around Southern African, and in particular the SACU region, are either wholly or partly owned by South African multinationals. Commercial manufacturing of processed maize is dominated by multinational food companies, industrial products manufacturers and animal feed mills producing five groups of grain products. A more comprehensive list of leading firms has been included in Appendix M.

4.2.1.2.2 Value chain diagram

Figure 4: Maize value chain diagram



4.2.1.2.3 Primary inputs

Primary inputs for the production of maize as well as for the other cereals are either sourced via large international corporations with representation in member states. Some input suppliers are from the region itself, while many international companies have their regional representatives based in SA. Most fertilisers are being imported into SADC from international fertiliser suppliers[13]. There is regional production based in SA (Sasol, Omnia, etc.) and some blending facilities in member states. Some smaller fertiliser companies that are based in member states import, blend and distribute fertiliser to the domestic market and neighbouring states. Many of these companies are based in harbour cities and process the imported products here e.g. Beira and Dar-es-Salaam. Some of the examples are: Tanzania Fertilizer Company, Mozambique Fertilizer Company and Export Trading Group. Input-supply chains are well-developed but due to various inefficiencies farm-gate prices (e.g. Morogoro, Tanzania) for fertiliser is about double the landed FOB price at the harbour of Dar-es-Salaam. These high prices are especially applicable to land-locked countries like Malawi and Zambia (AFAP 2016[14]).

The supply of agricultural lime throughout all SADC countries, excluding SA, presents a major problem as lime suppliers are largely absent. The low value and bulkiness of lime, aggravated by the lack of rail transport, represents a major barrier to crop production in the region. Even if high applications of fertiliser are applied with the planting of good quality seed, the presence of high levels of acidity in the absence of lime applications, prevents crops from producing optimally.

Both multinational biotechnology, retail seed, fertiliser, pesticide and mechanisation firms play a critical role in the inputs of the maize VC as they provide critical information and materials. These suppliers, through their licensed operators in the respective countries supply a network of agrodealers with inputs as well as information. Small agrodealers establish demonstration plots, promote the use of good-quality inputs (e.g. radio, farmer-field days) and promote good agricultural practices – good seed, fertiliser, etc. The rural retailers are a primary source of agronomic and extension services to producers. The agrodealers frequently also become off-takers of farm outputs produced, aggregate that and sell it to off-takers.

Multinational corporations such as Syngenta, Monsanto, BASF, Hoechst, Bayer, etc. dominate the supply of inputs in general but use smaller intermediaries operating as agrodealers to smallholder and subsistence farmers. The exception is the providers of small-scale processing equipment. Many of them are based in Zimbabwe and SA but a multitude operate in other countries where they import large volumes of equipment from China, India, Japan, South Korea, etc. Some of the agrodealers distribute the production and processing equipment in the rural areas to smallholder farmers.

The availability of other production inputs, such as irrigation equipment, farm machinery and processing equipment varies between member states, but access is generally limited, and most is being imported. This availability is subject to high costs and primarily accessible to commercial farmers who can offset the costs with improved incomes resulting from higher quality and yields over multiple seasons. Large suppliers of mechanisation equipment include amongst others the following ACO, John Deere, New Holland, Valtra, Massey Fergusson, Caterpillar, Iveco, Case, Landini, Agrico, etc. Irrigation equipment suppliers include firms such as Valley Africa, Senter-360, Zymmatic, Bosal, Agrico, Netafim, Agriplas as well as suppliers of PVC and plastic irrigation equipment. Most of these suppliers have a presence in the region and would be willing to supply machinery and equipment to interested buyers in the region.

State governments and public sector support organisations bridge the availability gap for inputs, particularly for small-scale producers and those transitioning to commercial production. Many govern-

[13] Please also refer to Appendix M for a list of leading fertilizer and other suppliers in the region.

[14] African Fertiliser and Agribusiness Partnership (2016) Assessment of the Enabling Environment for Fertilizer Supply, Distribution and Trade in Tanzania, Rivonia, Johannesburg, 20 January.

ments in SADC subsidise fertiliser or seed to primary producers as a way of support but it also opens the door for abuse. According to recent studies by the African Fertiliser and Agribusiness Partnership (AFAP), a regional support organisation, the landed farm-gate prices of fertiliser in some countries like Malawi and Zambia, are almost double the cost compared to that in developed economies. The high cost of fertiliser and seed is primarily due to inefficiencies in cross-border trade, Non-Tariff Measures and excessive profits. This is a major barrier to trade and investment into the primary agricultural sector. Extension services and production inputs are also often provided freely or highly subsidised by donor-funded programmes. Such interventions have a negative impact on private sector development.

For a summary of input suppliers and leading forms please refer to Appendix M.

4.2.1.2.4 Processing

Table 25: Intra-SADC exports of processed maize products vs imports from RoW

Product	Intra-SADC Exports (USD)	Intra-SADC Exports as % of total SADC Exports	RoW Imports (USD)	RoW Imports as % of total SADC Imports
Maize (HS1005) – total grain	375 315 000	72,0%	396 044 000	50,0%
Maize excluding maize for sowing (HS1005 90)	50 501 000	63,9%	347 167 000	50,0%
Maize meal (HS1102 20)	22 244 000	93,9%	61 522 000	55,0%
Breakfast cereals - yellow maize (HS1904 10)	27 955 000	91,7%	13 079 000	25,4%
Starch products - white maize (HS1108 12)	4 188 000	31,4%	538 000	98,4%

The maize product presents well-placed opportunities to develop regional value chains. It should be noted that yellow and white maize are two different product categories with different uses. There are five different important product lines comprising:

- Yellow maize grain – cattle production
- Yellow maize meal and grit – pig and chicken feed
- White maize meal and samp (‘stamp mielies’) – human consumption
- Yellow maize fractionated – breakfast cereals
- White maize – starch products (e.g. modified starches, wood glue, paper sizing, etc.).

Yellow and white maize grain

Across SADC countries roughly one third of the maize grain (predominantly yellow maize) is utilised as livestock feed. When whole grain maize is fed to cattle, the grain is digested in a different manner than where the maize kernels are milled first. Therefore, maize grain is not normally milled for feeding ruminants and the role of processing the maize is not as prominent as for that of pigs and chickens. It should be noted that some of this maize grain could also have been white maize grain for human consumption since the HS code (HS1005 90) does not distinguish between white and yellow maize. Trading across borders in the SADC countries is therefore not just limited to trading in whole yellow maize but also include white maize. It is also assumed that the white maize grain exported would have to be milled in importing countries for human consumption.

Intra-SADC exports of yellow and white maize (HS1005 90) averaged $50,0 m between 2015 and 2017, accounting for 64% of total SADC exports. This suggests that the majority of SADC’s export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged $347 m in imports from the RoW over the same period (accounting for 50% of total SADC imports). Given that such a large percentage of exports are intra-regional and roughly half of imports come from outside of SADC, this could suggest that regional demand is substantially bigger than SADC is able to meet given current production levels.

Yellow maize meal for chicken and pig feed

For the feeding of chickens and pigs, milling is necessary to ensure proper digestion. More trading opportunities are possible across SADC borders, depending on the milling capacity in each country.

However, as the milling of maize for this purpose is a relatively simple process, milling capacity has been created all over the region and supply and demand across borders determine the trade volumes. Ample opportunities exist for small millers to develop in every country and to participate in trading across borders. At present, however, a number of large players dominate the scene, as they produce blends of various ingredients for different animal types and ages. An important ingredient of that industry is expertise on animal nutritional needs and that expertise is generally in short supply in the rural areas of the SADC countries. Animal nutrition expertise is therefore one of the most important drivers of trade to reduce the ratio of feed inputs to live-mass outputs.

It was not possible to collect more specific trade data for this category of maize products.

White maize meal and samp for human consumption

Roughly a third of the maize consumed goes into maize meal for direct human consumption. But that maize is predominantly white maize and it needs to be roller milled. As roller mills can also be small, it opens up more opportunities for small-scale millers to develop. However, the small millers often do not possess the expertise to prevent infestations of meal moths, grain bugs and a host of other insects which devastate the quality of the meal. This factor places a strong impediment on trading locally and across borders but can be overcome by intensive training and interaction with pesticide suppliers, especially of expensive fumigants. The availability of small-scale packaging is also important.

It was not possible to collect more specific trade data for this category of maize products.

Yellow maize processed into high-value products

The most important processors of maize and other grains into breakfast cereals and other high-value products are situated in SA. That industry is closely linked to a well-developed packaging industry. From those food processors the breakfast cereals are distributed throughout many of the SADC countries. Many of the large supermarkets are South African owned and trading across regional borders constitutes a major movement of goods of high value. However, the food processors also supply their products to smaller outlets and even informal retailers and markets across the region. With the advent of small-scale breakfast cereals machines, it is now possible for local co-operatives and medium-sized companies across the SADC region, to also participate in the highly lucrative trading. The major international food corporations like Tiger Brands, Premier Foods, Bokomo Foods and others presently dominate the processing of maize and other grains into high value breakfast cereals. Processing of maize into starch for applications in the food and other industries is also controlled by those large-scale players.

Intra-SADC exports of breakfast cereals from yellow maize (HS1904) averaged $30 m between 2015 and 2017, accounting for 91,7% of total SADC exports. This suggests that the majority of SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged $13,1 m in imports from the RoW over the same period (accounting for 25,4% of total SADC imports). Given that such a large percentage of exports are intra-regional while such a small percentage of imports come from outside of SADC, this could suggest that regional demand is being largely met by intra-regional trade, requiring little in the way of supplementary imports from outside of SADC.

White maize for starch

Starches and modified starches are being used in a wide range of industries including preparation of confectionary products, production of frozen food products, processing meat, household applications and brewing of beer. In terms of industrial purposes starch is being used is drilling operations, manufacturing of wood glues, paints, paper sizing, preparing pharmaceutical products and animal feed, etc. South Africa is the only country in the region that exports maize starch on a regular basis. Tanzania had a net export of maize starch in the past for an amount of $7,5 m but imported starch in subsequent years of 2015 to 2017 (ITC TradeMap 2019).

Intra-SADC exports of Starch products from white maize (HS110812) averaged $4,2 m between 2015 and 2017, accounting for 31,4% of total SADC exports. This suggests that very little of SADC's export

capacity is being utilised to meet regional demand. Meanwhile, SADC averaged $538 000 in imports from the RoW over the same period (accounting for 98,4% of total SADC imports). Given that such a small percentage of exports are intra-regional and such a small percentage of imports come from outside of SADC, this could suggest that the regional demand for these products is relatively low, requiring little in the way of either intraregional exports or imports from the RoW to meet regional demand.

Packaging

Additionally, the packaging industry should be diversified into the rest of the SADC countries, in order to open up the playing field to other participants. It is a well-known fact that the packaging normally makes up a significant portion of the value of the saleable end products. Packaging and labelling go together and for cross-border trade there is a need for a harmonisation of labelling requirements for products. In recent years an effort was made by SADC to harmonise the labelling standards on fertiliser bags being transported between member states. The design, size, material of bag and labelling of bags as well as tags need to be standardised, weights of bags need to be agreed upon, etc.

Quality

Inspection and quality: In the grain business there are inspection services to certify that grain is of a specific grade and a 'silo certificate' is issued to confirm the quality and the grade of a particular consignment. The holder of the certificate can actually trade the certificate on the open market. To enhance the development of regional value chains in the SADC region there need to be well-developed inspection services, with a grading system that is harmonised throughout the region and inspectors that have been capacitated. Good storage practices need to be designed, developed and enforced e.g. frequent fumigation of the grain and grain products with volatile bromide and phostoxin in storage once in 30 days. These types of protocols need to be agreed upon and formalised within the region.

Leading firms - processing

Leading firms in the processing of maize that could act as key stakeholders in the development of a regional maize value chain in SADC include local millers as well as larger companies such as:

- Angola: Cerangola Flour Mill, Grandes Moagens de Angola, Kikolo Wheat Mill
- DRC: Minotierie de Matadi S.A. (Midema), African Milling
- Botswana: Bokomo Botswana
- eSwatini: Premier Foods
- Lesotho: Lesotho Flour Mills
- Madagascar: AgriVal
- Malawi: Bakhresa Grain Milling Malawi
- Mozambique: Compamhia Industrial da Matola (CIM)
- Namibia: Namib Mills
- Zimbabwe: National Foods
- Zambia: Superior Milling
- South Africa: African Star Grain & Milling, GWK Farms Foods, NWK, OVK Clocolan Roller Mills, RCL Foods, Premier FMCG, Tiger Brands Milling, Western Cape Milling, etc. One of the key actors in the region is the South African National Chamber of Milling (NCM)[15] that presents all the maize and wheat milling industry in SA; Other non-milling companies in the grain sector comprise: Afgri, Senwes, NWK, KaapAgri, OVK, GWK, SuidWes, VKB, etc.

A more comprehensive list of leading firms has been included in Appendix M.

[15] There are more millers than those mentioned here and the contact detail of the members of the NCM is available on the following website: https://www.grainmilling.org.za

4.2.1.2.5 Markets[16]

Maize as a commodity is used primarily for food in all countries in the SADC region with the exception of Mauritius where 95% is used for feed. The following countries also use over 20% of their domestic maize supply for feed: South Africa (45%), Namibia (26%), eSwatini (21%) and Tanzania (21%). The country with the highest food value for *maize and products* was South Africa with 5,3 m tonnes. Countries with high food values for maize, in addition to South Africa, include Tanzania, Zambia, Zimbabwe, Malawi, Mozambique and Angola. With the exception of Zimbabwe whose maize production has declined in recent years, all these countries are major maize producers, but they all rely on imports to complement national production. The same countries have high values for using maize for animal feed. This shows that, without investments it is challenging to increase maize productivity. It was also found that amongst the major maize producers, there is limited potential for exports due to the high domestic demand. The exception to this is Zambia which has very low imports compared to its national production and so is well-placed to increase its national production in order to generate surplus for exports. Potential export markets in the region include countries with high import needs and low production, namely Botswana, eSwatini, Namibia and Mauritius.

Post-harvest losses are a challenge with six countries in the region experiencing losses of over 10%, including Malawi (27%), Angola (17%), Tanzania (15%), Botswana (14%), Namibia (116%), eSwatini (10%). These losses limit the potential of the major producers in this group – Malawi, Angola, Tanzania – to increase their exports, whilst increasing the need for imports amongst Botswana, Namibia and eSwatini.

The markets for the maize value chain vary, depending on the level of processing and product type. Industrial products and milled maize for mixing into livestock feed are primarily produced for domestic markets but are also traded across borders. Maize-based foodstuffs are part of formal supply chains such as the supermarket networks in the region while there are significantly informal cross-border trade as well. In terms of maize the following observations have been made:

- In Table 24 reference was made to the fact that during the period 2015-2017 the SADC region was a net importer of maize (HS1005), importing a value of $396 million (m). A total of 50% of the maize was imported from the RoW and intra-regional exports were 72%.
- The high imports were due to the fact that the region experienced a drought and the biggest producer, South Africa, only produced 8,2 m tonnes during the 2015/16 season (SAGIS 2019).
- About 91% ($24 m) of the other cereal flours (HS1102) – excluding wheat and expected to be mostly maize – was traded within the region, while 58% of these other flours (worth $66,5 m) were imported from outside the region.
- Most of the trade is conducted as whole grains instead of flour (meal) due to the fact that flour is easily contaminated by insects, water and oxidation.
- It could be concluded that for the period 2015 – 2017 most of the grain produced and exported was supplied from within the region – and it was mostly maize.

Product handling limiting trade: One of the challenges of agricultural products and in this case with maize, is that it is bulky, it is heavy (in terms of value per weight) and it is perishable. This makes it important to produce and trade at scale and make sure that the transport and related export costs are not more than the profit to be made or even the value of the commodity being traded. Given the high transport costs and long delays at border posts, it is a real issue to consider. A producer of animal-feed products indicated

[16] The market analysis contains limited quantitative information and the analysis is therefore qualitative in nature. This is mainly due to a lack of updated market information in the region – both at domestic and regional level. International sources of domestic market information that is available in the public domain is dated and sometimes less than accurate. International trade data (e.g. imports, exports, etc.) are available and well developed.

that it was not interested in export destinations further than 2 000 km from its factory because of the high transport costs of the bulky animal-feed products relative to the potential profits it can generate. There is lack of enough grain storage in most SADC countries and therefore storage costs and risks of contamination need to be assessed. The longer an aggregator keeps a bag of maize, the higher the costs will be.

Future opportunities: The question could be posed what future directions should be taken. What is the potential for taking this important value chain forward? There is no doubt that at local level there are opportunities for small-scale farmers and entrepreneurs to process maize and package the products for local and village markets. To conduct informal cross-border trade could not be classified as a regional value chain but nevertheless an opportunity for an entrepreneur to exploit. A regional value chain could only be labelled as such if some value is added in one state and further value added in a neighbouring country. This would only be possible if scale of production and aggregation took place. There should also be an incentive for producers and aggregators to transport the maize across the border – high maize prices due to a drought or a roller mill that has been established across the border that can process the maize – obviously in the absence of a similar facility back home. There could be both push and pull factors but the costs of exporting the maize should still be less than the profit margins an exporter can realise.

Processing – new market opportunities: The processing of maize offers opportunities in regional and international value chains. In recent years SA produced an oversupply of maize and was not able to export the unprocessed maize grain. However, some animal-feed producers started to process the maize grain into animal-feed products and exported that into the SADC region and even internationally. Maize is a flexible product and could be processed in alternative forms for which there may well be a market.

Retail and compliance: The development and establishment of some SA supermarket chains created a welcome windfall for food producers in the country. The retail businesses that moved into the SADC region created new markets for SA producers and thus 'easy' exports. The corporate buyers preferred to work with the local suppliers because of trusted relationships. The supermarkets have already developed programmes to assist producers of fresh produce and tried to procure good-quality products in guest countries. There have been successes and in this way also helped to support domestic value chains. The cost of compliance to Global GAP certification is expensive for especially smallholder farmers and in some cases unsustainable. Local GAP is new concept that has been developed where typically lead firms or industry bodies require the implementation of certain standards e.g. hygiene, worker safety, water management, traceability, fertiliser and pesticide use (Kuwornu & Mustapha 2013[17])

Competitiveness: One of the most important aspects that needs to be addressed is competitiveness. Could maize be produced competitively against import parity maize prices from international markets? Is it not cheaper to import maize from some of these markets? Farmers will have to understand that if they are part of regional value chains they will have to be able to compete on quality and price. Governments will have to understand that to enable firstly national value chains to succeed, they will have to invest in local infrastructure and enhance efficiencies of regulatory services. To be able to develop regional value chains successfully, national value chains will also become more efficient.

Standards: Contamination of maize by aflatoxin has been reported in Malawi, Mozambique, South Africa and Zambia. It has been reported that the problem starts in the field, contamination levels often increase during storage. One of the key critical control points for rating the hazard of aflatoxin in maize is in storage (LEO Report #35). Capability to test for aflatoxin levels is key to assuring food safety. For many SADC

[17] Kuwornu, J. & Mustapha, S., 2013. Global GAP Standard Compliance and Smallholder Pineapple Farmers' Access to Export Markets: Implications for Incomes. Journal of Economics and Behavioural Studies, 5(2), pp. 69-81.

MS maize exports must be accompanied by a non-GMO certification as well as a fumigation certificate as part of the phytosanitary certification.

Challenges and opportunities (section 4.2.1.4.6) for maize as well as conclusions and recommendations (section 4.2.1.4.7) will be made at the end of section on grains.

4.2.1.3 Wheat

4.2.1.3.1 Regional context for the selection of the commodity as a potential value chain

The wheat sector in the SADC region, defined broadly as the farmers and firms (input suppliers, processors and retailers) based in the countries, make up the wheat regional and domestic wheat VCs. The regional demand for wheat is greater than the current levels of supply from local production and therefore presents an opportunity to create a regional value chain that could yield economic benefits to the region. Supporting and investing in initiatives to develop the wheat VC could increase intra-regional trade and improve socio-economic indicators such as employment and household income for MS' citizens that are involved in the value chain, while bolstering food security in general. There is indeed a great opportunity to increase regional production and value adding activities, specifically through agro-processing.

Large amounts of wheat are being imported into the SADC region from the RoW, but the region has the potential to develop this value chain by increased local production of wheat in the region. Intra-SADC exports and imports of wheat and meslin grain (HS1001) will be discussed in the section below.

SA is the biggest consumer of wheat in the region with an estimated 3,5 to 4 m tonnes per annum, while it only produces between 1,5 and 2 m tonnes per annum (SAGIS 2019[18]). The country has almost no more land and water resources available to produce more wheat. A strong drive currently exists amongst commercial farmers in Zambia to produce more wheat. This is set to increase cross-border activities to result in import replacement within the region. Other countries with potential to grow new wheat (the right land, water and climatic conditions) include Tanzania (Morogoro region), Mozambique (Tete and Manica Provinces), Malawi (Salima District) and Zimbabwe (Tokwe* and Nuanedzi districts). In the past wheat was produced in those areas but generally with mediocre yields, contrary to the conditions in SA with colder climates. An important inhibitor to wheat production in SADC countries in the past, was the fact that existing wheat varieties at the time, did not yield well due to a high requirement for cold temperatures in order for the wheat plants to proceed from tillering (i.e. stooling) to booting (i.e. piping and ear development). In recent years a number of varieties have been developed that yield well with a lower demand for cold which are suitable for planting in most SADC countries during the winter months.

When production gets under way in these new wheat production areas, it will make a significant contribution in the following respects: (i) imports form international suppliers (e.g. Canada, Ukraine, Argentina, Russia, Turkey and the USA) will be reduced; (ii) general economic development of the regional economy will take place; (iii) improved availability of wheat and flour to local millers and bakers in the rural areas; (iv) development of regional value chains; (v) stimulation of the consumption of end-products such and bread and rusks. This major inhibiting factor has now been transformed into a prominent success factor and it opens the way for large-scale production in the SADC region – especially in the rural areas where bread is a scarce commodity.

If the data holds true, it follows that initiatives to support agro-processing activities in the wheat value chain would be better implemented through boosting existing processing capacity, but also new milling and baking capacity. Investing in the regional wheat VC could create new regional linkages and in turn drive demand and with it, the increased trade of value added products.

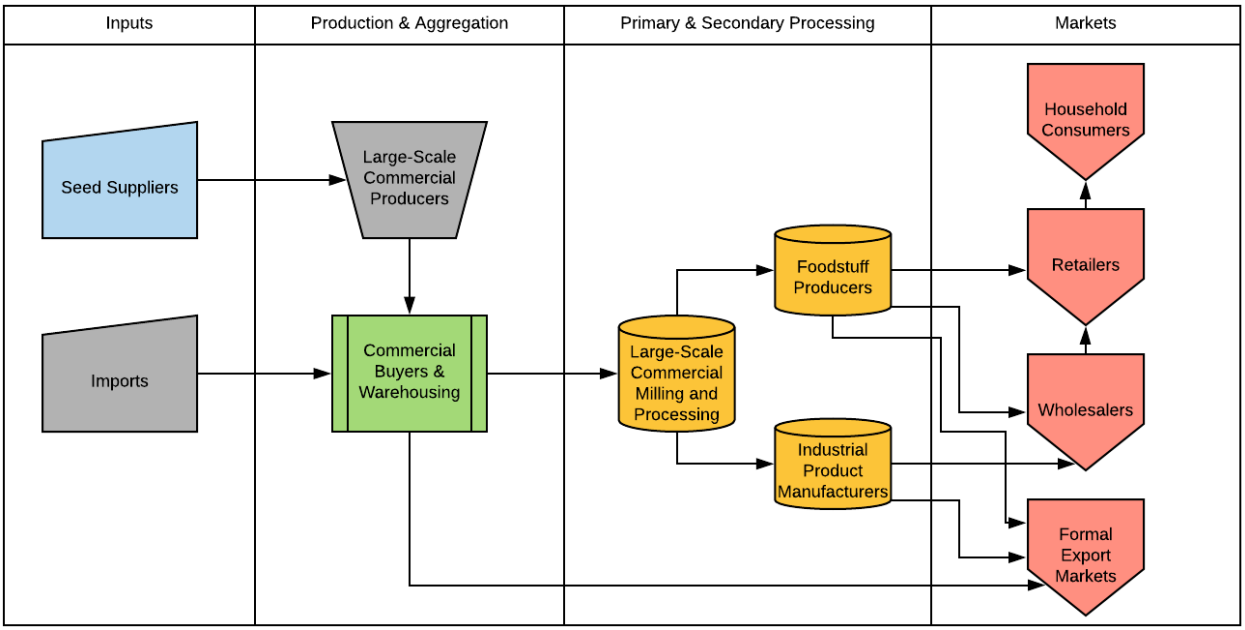
[18] South African Grain Information Service (2019) Historical Production Information, February, http://www.sagis.org.za

Wheat grain is a raw product that must be processed before consumption. Contemporary technology is available for processing, such as small-scale roller milling at much-reduced capital and operating cost involved in the processing of wheat. This alludes to the opportunity for investing into cost-effective processing facilities to increase the capacity of the value chain.

Leading firms: Most grain-processing companies usually mill both wheat and maize because of the roller-mill technology that is being used in the milling process. Please refer to the milling companies that have been identified under the maize value chain.

4.2.1.3.2 Value chain diagram

Figure 5: Wheat value chain diagram



4.2.1.3.3 Primary inputs

Wheat is not grown in large volumes in SADC, except in SA and some in Zambia. It should be noted that SA is also a nett importer of wheat and some of this wheat is in turn being re-exported to the SADC region. Whilst many of the production inputs are similar to those for maize in terms of type and availability, wheat-specific inputs such as heat-tolerant planting seed, wheat planters and combine harvesters are not widely available in the region.

Primary inputs for the production of wheat, similar to that for maize are either sourced via large international corporations with representation in the respective member states.

Specialised wheat seed suppliers provide special wheat selections, while many farmers can replant their own seed harvested the previous season. Other input suppliers of fertiliser, pesticide and mechanisation are exactly the same as in maize and have been discussed[19].

Multinational corporations dominate the supply of inputs in general but also use smaller intermediaries operating as agrodealers to smallholder and subsistence farmers. The exception is the providers of small-scale threshing machines and processing equipment. Many of them are based in SA but a multitude operate in other countries where they import large volumes of equipment form China, India, Japan, South

[19] Please also refer to Appendix X for a list of leading firms in the supply of inputs, processing equipment, etc.

Korea, etc. Some of the agrodealers distribute the production and processing equipment in the rural areas.

The suppliers of other types of production inputs, such as irrigation equipment, farm machinery and processing equipment have also been identified in the maize section.

State governments and public sector support organisations in the case of wheat are the same as in the case of maize and have been discussed.

4.2.1.3.4 Processing

Introduction

Most of wheat being produced in SA is bread wheat, with smaller quantities of durum wheat being produced in certain areas and is used to produce pasta. It is mainly used for human consumption (bread, biscuits, breakfast cereals, rusks, etc) and the remaining wheat is used as seed and animal feed. There are other non-food uses such as absorbing agents for disposable diapers, adhesives and industrial uses as starch on coatings. Producers of wheat are estimated to be approximately 3 800 to 4 000 (DAFF, 2012) in SA.

Both bread and pasta wheat are not consumed as whole grain and the milling industry plays an important role in processing and trading. Again, the control of grain and meal insects requires high levels of expertise. The positioning of roller mills throughout the region is important to provide competitive advantages to traders of flour and bakeries.

It should be noted that with bread preparation from bread wheat (*Triticum aestivum*), a fair amount of water is sold as part of the product. When bread dough is prepared, frozen and sold, the amount of value added is also considerable. A market also exists for the preparation of pre-packed rusks for the lucrative supermarket distribution system in the region. When pasta wheat or durum wheat (*Triticum durum*) is processed into pasta products such as spaghetti, macaroni, noodles, soup noodles and pizzas, the downstream value is considerably enhanced.

Table 26: Intra-SADC exports of processed wheat products vs imports from RoW

Product	Intra-SADC Exports (USD)	Intra-SADC Exports as % of total SADC Exports	RoW Imports (USD)	RoW Imports as % of total SADC Imports
Wheat and meslin (HS1001)	52 997 000	95,9%	947 496 000	91,3%
Wheat or meslin flour (HS1101)	69 580 000	89,3%	283 572	80,3%
Cereal flours (excluding wheat or meslin) (HS1102)	23 992 000	90,7%	66 490	58,0%
Cereal groats, meal and pellets (HS1103)	97 114 000	96,7%	22 013	26,58%
Bread, pastry, cakes, biscuits and other bakers' wares, whether or not containing cocoa; communion wafers, empty cachets of a kind suitable for pharmaceutical use, sealing wafers, rice paper and similar products (HS1905)	77 988 000	86,3%	168 381 000	67,8%
Rusks, toasted bread and similar toasted products (HS190540)	1 833 000	68,8%	6 985 000	72,1%
Pasta, whether or not cooked or stuffed with meat or other substances or otherwise prepared, such as spaghetti, macaroni, noodles, lasagne, gnocchi, ravioli, cannelloni; couscous, whether or not prepared (HS1902)	42 535 000	94,7%	136 273 000	75,3%

The following main product lines have been identified:

Wheat and meslin

Meslin (or bran) is by-product of the roller-milling process in the production wheat flour for the production of bread. Little meslin is ever imported from abroad but is produced where ever wheat is milled and is usually sold to the livestock industry as a supplement to animal feed. Although the trade statistics group 'wheat and meslin' together, meslin is of little significance if compared to the value of wheat.

The wheat agro-processing sub-sector in the SADC region presents an opportunity to create a regional value chain that could yield economic benefits to the region. Supporting and investing in initiatives to develop the processing of wheat could increase intra-regional trade and other socio-economic indicators such as employment and household income for SADC Member State citizens that are involved in the value chain. Data suggests that demand for wheat in the region is higher than regional supply, meaning there could be an opportunity to create regional value chains by investing in key processing nodes across SADC Member States in a manner that consolidates the region into a self-sustaining VC, ranging from production to the consumption and exportation of high value wheat based products.

Intra-SADC exports of wheat and meslin (HS1001) averaged $53,0 m between 2015 and 2017, accounting for 96% of total SADC exports. This suggests that the majority of SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged $947,5 m in imports from the RoW over the same period (accounting for 91% of total SADC imports). Given that such a large percentage of exports are intra-regional and such a large percentage of imports come from outside of SADC, this strongly indicates that regional demand is substantially bigger than SADC is able to meet given current production levels. The top producing countries for wheat in 2016 were SA (1 909 540 tonnes), Zambia (159 533 tonnes) and Tanzania (96 122 tonnes). In the majority of SADC Member States which produce wheat, 89% or more of their production is consumed by domestic demand.

A significant share of wheat produced in the SADC region is processed for the production of bread. Pasta, breakfast cereals and rusks are among other value added products produced from durum (or pasta wheat) and bread wheat processing. As wheat is not consumed as a whole grain the milling industry plays an important role in processing and trading. Support of wheat processing activities, such as the establishment and positioning of roller mills throughout the region could add competitive advantages to traders of flour and bakeries, resulting in the demand for new regional market linkages and creating opportunity for increased exports through a regional wheat value chain.

Currently in SADC, milling and other downstream activities are dominated by medium to large companies. Leading firms in the SADC region include Superior Milling (Zambia), CIM (Mozambique), National Foods (Zimbabwe), RCL Foods Ltd, Premier FMCG, Tiger Brands Milling (South Africa) – also listed above. The competitive advantage of most of these processing companies is the scale of their processing capacity – although the constant supply of grain feedstock is a challenge at times.

Given that considerable value can be added through the agro-processing of wheat into products such as bread and pasta, the following main product lines have been identified as potential opportunities for the development of a regional value chain:

- *Bread wheat:* Most of the large milling companies also bake bread. As the major constituent of bread is water, it is more lucrative to sell bread than flour. However, the distribution of bread is highly dependent on the deployment of transport and the availability of bakery facilities. Many local small bakeries are operating throughout the SADC region. Very little opportunity exists for trading across borders in bread. Apart from flour, much more trading in cookies, biscuits (also called digestives), rusks and other confectioneries can occur across borders on a large-scale.
- *Pasta wheat:* As the consumption of pasta wheat based products is steadily increasing, more pasta wheat can be produced in SADC countries and processed locally for redistribution throughout the region. At present most of the pasta wheat is imported through SA from the EU, the USA, Ukraine, and Canada. Considerable opportunities exist for the processing of pasta wheat into spaghetti,

macaroni, noodles and other products as well as frozen pizzas. Large volumes of pasta wheat products are moving across SADC country borders, under the control of mostly supermarket groups.

- *Other products:* As cookies, biscuits, rusks and pasta products require packaging, much more value is added to the products. The value of the packaging can be as high as four times the value of the product itself.

Wheat and meslin flour

Flour made from wheat or meslin presents an opportunity to create a regional value chain that could yield economic benefit to the region. Supporting and investing in initiatives to develop the processing of flour from wheat could increase intra-regional trade and other socio-economic indicators such as employment and food security. Data suggests that demand for flour in the region is higher than regional supply, highlighting an opportunity to create a regional value chains by increasing processing capacity to supply the already existing regional distribution of flour.

Intra-SADC exports of wheat or meslin flour (HS1101) averaged $69,6 m between 2015 and 2017, accounting for 89,3% of total SADC exports. This suggests that the majority of SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged $283,6 m in imports from the RoW over the same period (accounting for 80,3% of total SADC imports). Given that such a large percentage of exports are intra-regional and such a large percentage of imports come from outside of SADC, this strongly indicates that regional demand is substantially bigger than SADC is able to meet given current production levels. It is assumed that most wheat grain is being processed into wheat flour and therefore the top producing countries for wheat flour in 2016 were SA, Zambia and Tanzania.

This value chain presents a good opportunity as firms having existing processing capacity which can be scaled to meet demand. Leading firms in the processing of wheat into flour in the SADC region, include Lesotho Flour Mills, Bakhresa Grain Milling and Namib Mills, RCL Foods Ltd, Premier FMCG, Tiger Brands Milling – see also Appendix M for a more comprehensive list.

Cereal flours (excluding wheat or meslin)

It should be noted that the original and most commonly designate for the term 'cereals' is reserved for wheat, rye, oats and barley – collectively known as winter grains.

Intra-SADC exports of cereal flours (excluding wheat or meslin) (HS1102) averaged $24 m between 2015 and 2017, accounting for 90,7% of total SADC exports. This suggests that the majority of SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged $66 490 in imports from the RoW over the same period (accounting for 58% of total SADC imports), which is almost meaningless in terms trade. This is proof that flour is not being traded within the SADC region. The meal is vulnerable and attacked by insects, it tends to become rancid due to oxidisation and it attracts moisture from the air which can cause mouldiness.

The processing capacity for cereal flours can be deduced by using the existing flour processing capacity as a proxy. Consequently, an opportunity for the development of a value chain for this product exists in the SADC region. The linking of markets across national borders, harmonisation of the treatment of agricultural commodities and other factors would need to be addressed by regional stakeholders in order to foster an environment for the desired impact of increased capacity to process cereal flours.

It is not impossible that cereal flour could be traded across borders in future, if sealed containers and tanker trucks in increased volumes provided expensive carbon dioxide treatment and other technologies can be utilised. Improved fumigation techniques are also required in transport and storage processes.

Cereal groats, meal and pellets

Intra-SADC exports of Cereal Groats, meal and pellets (HS1103) averaged $97,1 m between 2015 and 2017, accounting for 96,7% of total SADC exports. This suggests that the majority of SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged $22,0 m in imports from the RoW over the same period (accounting for 26,5% of total SADC imports). Given that such a large

percentage of exports are intra-regional and such a small percentage of imports come from outside of SADC, this could suggest that regional demand is being met largely by regional production, with very little surplus left over to be exported outside of SADC.

As in previous subsections of this report under 'Grains', milling and production of cereal groats, meal and pellets, is dominated by medium to large companies such as African Milling, Bokomo Botswana, Premier Foods, Lesotho Flour Mills and Premier Milling among others – see also the other leading firms listed above. There exists an opportunity to conglomerate these key actors into a consolidated regional value chain for intra-regional trade and exports.

Bread, Pastry, Cakes, Biscuits etc.

Bakeries are a constant factor in the economy of most SADC Member States. The ability to convert this relatively fragmented value chain, based on national supply chains and markets, into regional value chains has been illustrated by the private sector. The consolidation of large bakeries in South Africa and eSwatini shows that supporting cross border trade initiatives could yield fruitful value adding linkages between key actors and markets across the region, and potentially abroad.

Intra-SADC exports of bread, pastry, cakes, biscuits, etc. (HS1905) averaged $78 m between 2015 and 2017, accounting for 86,3% of total SADC exports. This suggests that the majority of SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged $168,4 m in imports from the RoW over the same period (accounting for 67,8% of total SADC imports). Given that such a large percentage of exports are intra-regional and such a large percentage of imports come from outside of SADC, this could suggest that regional demand is substantially bigger than SADC is able to meet given current production levels.

Agro-processing in the form of the production of bread, pastry, cookies, biscuits, savoury biscuits, wafers and others, is dominated by medium to large companies. Some these include Bakers Biscuits, Continental Brands, Casa-Mia Biscuits, All Sorts Biscuit Factory, Mantelli's, Biscoplus Manufacturing, Fortune Cookie Factory, North West Biscuits, etc.

Rusks, toasted bread and similar toasted products

Intra-SADC exports of rusks, toasted bread and similar toasted products (HS1905 40) averaged $1,8 m between 2015 and 2017, accounting for 68,8% of total SADC exports. This suggests that the majority of SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged $7 m in imports from the RoW over the same period (accounting for 72,1% of total SADC imports). Given that such a large percentage of exports are intra-regional and such a large percentage of imports come from outside of SADC, this could suggest that regional demand is substantially bigger than SADC is able to meet given current production levels.

Agro-processing in the form of the production of rusks, toasted bread and others, is dominated by medium to large companies. Some of these include Bakers Biscuits, Continental Brands, Casa-Mia Biscuits, All Sorts Biscuit Factory, Mantelli's, Biscoplus Manufacturing, Fortune Cookie Factory, North West Biscuits, RCL Foods (Ouma Rusks) and Bokomo Foods (part of Pioneer Foods). Although the trading in rusks has most of its roots in SA, Zimbabwe, Namibia and Botswana, the consumption is gradually moving northwards and transcends the consumption and markets of cookies and biscuits. Most of these manufacturers are able to produce at scale and are able to export their products in the SADC region at competitive prices. This provides them with a competitive edge.

Pasta, whether or not cooked

The pasta value chain is an opportunity for the SADC region to increase intra-regional trade of value added products. Investing in downstream aggregating, packaging and distribution could give rise to a sustainable value creating value chain, with the ability to service the demand currently being satisfied through imports.

Intra-SADC exports of pasta, whether or not cooked (HS1902) averaged $42,5 m between 2015 and 2017, accounting for 94,7% of total SADC exports. This suggests that the majority of SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged $136,3 m in imports from the RoW over the same period (accounting for 75,3% of total SADC imports). Given that such a large percentage of exports are intra-regional and such a large percentage of imports come from outside of SADC, this could suggest that regional demand is substantially bigger than SADC is able to meet given current production levels.

Agro-processing in the form of the production of pasta is dominated by medium to large companies. Some these include Pioneer Foods, Fatti's and Moni's, M.G. Pasta, Pasta Factory, etc. Apart from increasing consumption of pasta, pizza is gaining popularity all over the region as a fast-food item. Pizza and pasta are produced from primarily from hard winter wheat or durum wheat.

4.2.1.3.5 Markets

Consumption: The country with the highest food value for *wheat and products* was South Africa with 3,2 m tonnes. All countries use 89% or more of their domestic supply quantity for food. In terms of national consumption, using FAOStat Food Balance sheets (2013), South Africa (3 174 000), Angola (874 000) and Tanzania (785 000) have the highest food values. In 2013 national consumption in all countries in the region exceeded national production, with the exception of Zambia suggesting Zambia to have export potential. Countries where over 90% of consumption needs were met by imports include Angola, Botswana, Madagascar, Malawi, Mauritius and eSwatini. This suggests that these countries would be suitable markets for exports from the major wheat producing countries i.e. South Africa, Zambia, Tanzania and Zimbabwe. It should be noted that although South Africa does export wheat, it is importing mare more when that what is being exported to fellow SADC MS.

Regional trade: With the urbanisation of the region's population, there is a tendency to replace maize, which is the main staple food of people in the rural areas, with wheat (mainly bread) but also with rice. SA is the biggest producer and consumer of wheat in the region and only produces between 1,5 m and 1,9 m tonnes per annum while it consumes about 3,4 m tonnes. Regional trade has already been analysed but in terms of wheat the following observations have been made:

- As demonstrated in Table 24 the region is a large importer of wheat grain from the RoW with total imports of $1 037,5 m (91% of imports)(2015 to 2017) and with a negative trade balance with the RoW of $945,2 m.
- The SADC region over the period 2015 – 2017 was a net importer of processed grain products such as bread, pastry, cakes etc., (HS 1905) and imported large amount of $168 m from the RoW with a negative trade balance of $156 m. These processed goods where imported and it could be concluded due to a lack of local production capacity in the region.
- In terms of wheat flour (including meslin flour) (HS1101) a total of $353 m was imported into the SADC region to supply about 80% of the total needs of the region – while only 20% of the wheat flour was supplied from within the SADC region.
- SADC's exports of bread, pastry, cakes etc. (HS1905), were $90 m of which 86% of these products that were exported to SADC member states. The total SADC exports and imports from the RoW were respectively $12 m and $168 m and therefore the net SADC deficit of $156 m.
- In terms of rusks, toasted bread similar toasted products (HS1905 40) there is a small deficit of $6 m.

- For pasta and associated products[20] (HS 1902) SADC exported $45 m, where 95% were exported to the region. SADC imported $134 m from the RoW. SADC is importing a total of 75% of its needs for this product range from the RoW.

Most of the wheat grains being processed and consumed in the SADC region, is being imported and 91% of the wheat imported from the RoW. Some of the wheat grain is being imported into the SADC region, processed and exported as processed products within the region – specifically SA through its super-market and other supply chains. It seems that most of the wheat grain (HS1001) imported stays in the country of importation and only a small amount ($53 m) is being re-exported within the region.

More bread wheat and pasta wheat can be produced in almost all of the SADC countries and the downstream products can be traded among the member states. Both wheat grain and processed products for baking are heavily dependent on imports. Increasing amounts of flour are transported across borders in tanker trucks.

Both bread and pasta wheat are not consumed as whole grain and the milling industry plays an important role in processing and trading. Again, the control of grain and meal insects requires high levels of expertise. The positioning of roller mills throughout the region is important to provide competitive advantages to traders of flour.

Standards: For the high-value products of maize and wheat, food safety standards and good hygiene practice is applicable.

Challenges and opportunities (section 4.2.1.4.6) for wheat as well as conclusions and recommendations (section 4.2.1.4.7) will be made at the end of section on grains.

4.2.1.4 Rice

4.2.1.4.1 Regional context for the selection of the commodity as a potential value chain

The rice sector in the SADC region, defined broadly as the farmers and firms (input suppliers, processors and retailers) that make up the regional and domestic rice VCs, presents an opportunity to create a regional value chain (RVC) that could yield large-scale economic benefit to the region. Rice production in SADC is characterised by numerous small-scale producers and the absence of large-commercial farmers in the region. Rice is for instance cultivated in Malawi as a food and cash crop by an estimated 300 000 farmers, and in Madagascar it is grown by 63% of households, mostly cultivating rice on less than 1 ha. Supporting and investing in initiatives to develop the rice VC, especially in enhancing regional rice production at scale, could increase intra-regional trade and improve socio-economic indicators such as employment and household income for MS citizens that are involved in the value chain, while bolstering food security in general. Data suggests that demand for rice in the region is higher than regional supply, meaning there is indeed a great opportunity to increase regional production and value adding activities, specifically through agro-processing.

Currently large-scale commercial processing facilities are not a significant feature in the rice value chain in SADC; much of the processing is undertaken at farm-level through drum cooking, or through farmer-owned rural mills. Fieldwork results indicate that geographic proximity is a significant factor in the processing of rice. A key stakeholder reflection was that when processing rice harvested from paddy production, about 35% of the harvested crop mass is lost during initial processing. Therefore, farmers do not move the rice produced from paddy over long distances but rather do the initial milling close to where the rice is produced and then move the remaining 65% to a polishing and grading plant.

[20] Pasta, whether or not cooked or stuffed with meat or other substances or otherwise prepared, such as spaghetti, macaroni, noodles, lasagne, gnocchi, ravioli, cannelloni; couscous, whether or not prepared.

Intra-SADC exports of rice (HS1006) averaged $73 m between 2015 and 2017, accounting for 92% of total SADC exports – most exported to regional MS. Meanwhile, SADC averaged $1 038,6 m in imports from the RoW over the same period (accounting for 93% of total SADC imports – only 7% imports from fellow MS). The low imports from fellow MSs also suggests that there are limited re-exports of imported rice and that countries import their own rice and consume it there – i.e. the difference between value of import ($1 038,6 m) and value of export in SADC ($73,0 m). The high level of imports from outside SADC, strongly signals that regional demand is substantially bigger than SADC is able to meet, given current level of rice production.

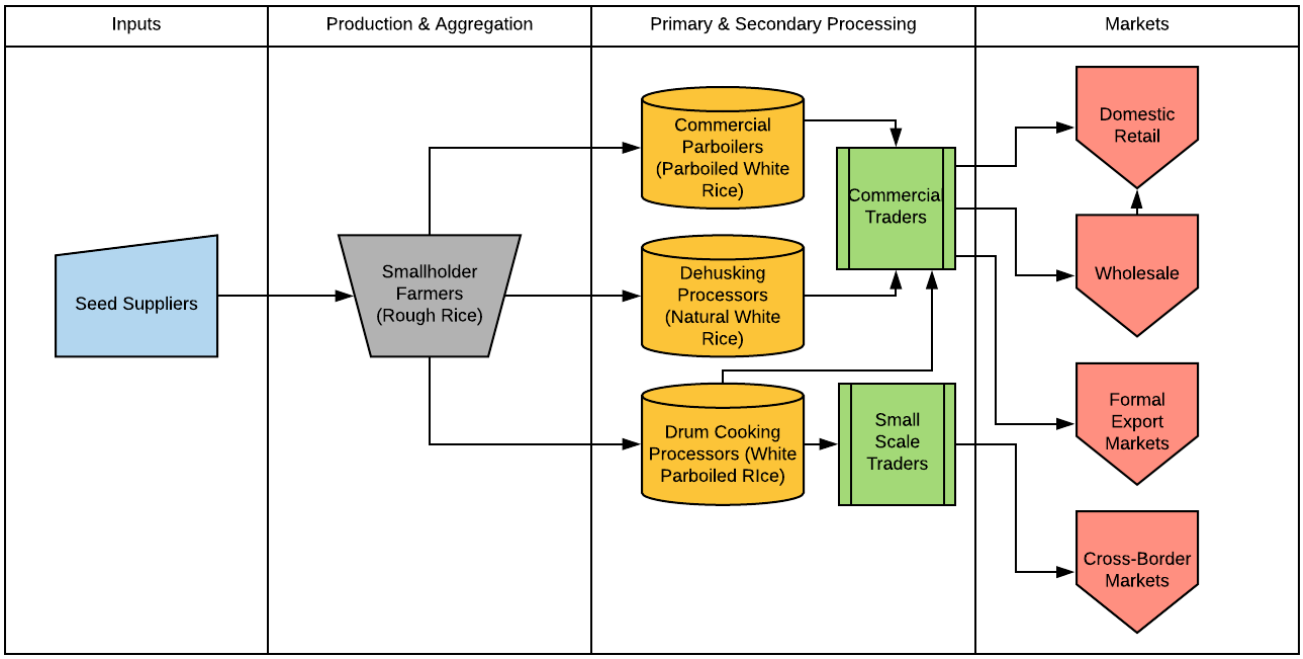
Currently in the SADC region, the rice value chain is fragmented, signalled by the fact that processors generally have no direct contract with smallholders as they source paddy or milled rice from traders and vendors. Investing in the regional rice VC would create new regional linkages and in turn driving demand, and with it, the increased trade of value added products.

Table 27: Intra-SADC exports of processed rice products vs imports from RoW

Product	Intra-SADC Exports (USD)	Intra-SADC Exports as % of total SADC Exports	RoW Imports (USD)	RoW Imports as % of total SADC Imports
Rice (HS 1006)	73 553 000	91,5%	1 038 550 000	92,8%
Rice in the husk, 'paddy' or rough (HS 1006 10)	3 823 000	65,5%	7 976 000	54,9%
Husked or brown rice (HS 1006 20)	594 000	56,1%	3 016 000	79,8%
Semi-milled or wholly milled rice, whether or not polished or glazed (HS1006 30)	46 026	93,9%	898 319	95,0%
Broken rice (HS1006 40)	46 026	93,9%	898 319	95,0%

4.2.1.4.2 Value chain diagram

Figure 6: Rice value chain diagram



4.2.1.4.3 Primary inputs

Rice is not grown in large volumes in SADC, except some in Madagascar, Mozambique, Tanzania and Zambia. It should be noted that SA is also a nett importer of rice and some of this rice is being re-exported to the SADC region. Whilst many of the production inputs are similar to those for maize and wheat in

terms of type and availability, rice-specific inputs such as seed of upland varieties, typical wheat planters and combine harvesters are not widely available in the region.

Primary inputs for the commercial production of rice, similar to that for maize and wheat are either sourced via large international corporations with representation in the respective member states.

Specialised rice seed suppliers provide special upland rice selections, while many farmers can replant their own seed harvested the previous season. Other input suppliers of fertiliser, pesticide and mechanisation are exactly the same as in maize and wheat and have been discussed[21].

Multinational corporations dominate the supply of inputs in general but use smaller intermediaries operating as agrodealers to smallholder and subsistence farmers. The exception is the providers of small-scale threshing machines and processing equipment. Many of them are based in SA but a multitude operate in other countries where they import large volumes of equipment form China, India, Japan, South Korea, etc. Some of the agrodealers distribute the production and processing equipment in the rural areas.

The suppliers of other types of production inputs, such as irrigation equipment, farm machinery and processing equipment have also been identified in the maize section.

State governments and public sector support organisations in the case of rice is the same as in the case of maize and wheat and have been discussed.

4.2.1.4.4 Processing

Introduction

It should be noted that most of the rice being produced currently is under paddy-production (in water) and is mostly conducted by hand. Large mechanisation equipment cannot be used. Smaller 'walk-behind tractors' from China could be used effectively in smaller production systems. These are all inhibiting factors and combined with poor production practices result in the low levels of production of rice in the region. However, there are rice cultivars that could be produced under similar production practices as wheat. These rice cultivars are known as upland rice. This type of rice can be produced at scale and can have a highly positive impact on productivity in the region It can make a meaningful contribution to rice supplies within he SADC region. Rice production amongst smallholders could play an important role in raising production and private sector investors in commercial entities could also make a meaningful contribution to the self-sufficiency in the region.

When production of rice gets underway in existing rice-producing areas as well these new rice production areas (e.g. Barotseland in West Zambia), it will make a significant contribution in the following respects: (i) imports from international suppliers (e.g. Thailand, Vietnam and other exporters of rice in East and South East Asia) will be reduced; (ii) general economic development of the regional economy; (iii) improved availability of rice processors; (iv) development of regional value chains; (v) stimulation of the consumption of end-products of rice and rice products. One of the major inhibiting factors can now be transformed into a prominent success factor and it opens the way for large-scale production in the SADC region – especially in the rural areas where rice is a scarce commodity.

With conventional harvesting methods, the rice has to be harvested when the kernels are still moist in order to prevent sun-drying from causing cracking of the kernels. The rough rice or paddy rice is then slowly dried in cyclone driers and stored. The rough rice is subsequently soaked in water and subjected to high temperatures and pressure in large expensive pressure cookers or parboilers, which allow much of the nutrients in the brown aleurone layer around the kernels to diffuse into the starchy white endosperm of the kernels. The parboiled rough rice is again subsequently dried off in cyclone driers, threshed or de-

[21] Please also refer to Appendix X for a list of leading firms in the supply of inputs, processing equipment, etc.

husked and twice submitted to polishing or grinding actions in polishing machines, to produce white parboiled rice. Through parboiling much of the nutrients remain available in the kernels and the low nutritional value of non-parboiled white rice is overcome. The first polishing layer which is removed through polishing of threshed rice is fed to animals due to the content of some particles of rough husks. The second layer of polishing waste with a pleasant sweet nutty flavour is often added to breakfast cereals. The global upmarket requirement for rice is mostly for long grain white parboiled rice with a maximum content of five percent broken kernels.

Rice must be processed before consumption. With the prospect of much-reduced capital cost of drying and parboiling through novel technologies involved in the processing of rice, a new opportunity is being created. This alludes to the opportunity for investing into cost-effective processing facilities to increase the capacity of the value chain.

Leading firms

Middlemen and traders aggregate rice purchased from smallholders and either sell to medium or large-scale millers, who in turn process the rice and either package it and sell it, or sell it to larger companies who solely clean, brand, and sell the rice to retailers. There are few leading firms involved in the processing of rice in the region. Currently firms such as Tiger Brands in SA are leading in the commercial trade of rice products, through the ownership of popular rice product brands e.g. Tastic Rice, Spekko Rice, Select Rice, Nice Rice. Other importers in the region comprise Pioneer Foods, General Overseas Traders, Industrial Commodity Holdings, Rice Tic South Africa, Atlas Trading Company, Louis Dreyfus, etc. The competitive advantage of these processing firms is the international scale at which they operate and the fact that they can provide products at internationally competitive prices. It seems that although some of these large food companies buy rice at US-subsidised prices, the benefit is not fed through to consumers in these markets and this could be seen as concentration in the market[22]. Please refer also to Appendix M for a more comprehensive list of leading firms.

The following rice products have been identified and may be of relevance in SADC:

Rice in the husk, 'paddy' or rough

Intra-SADC exports of Rice in the husk, 'paddy' or rough (HS 1006 10) averaged $3,8 m between 2015 and 2017, accounting for 65,5% of total SADC exports. This suggests that the majority of SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged $8 m in imports from the RoW over the same period (accounting for 54,9% of total SADC imports). Given that such a large percentage of exports are intra-regional and roughly half of imports come from outside of SADC, this could suggest that regional demand is substantially bigger than SADC is able to meet given current production levels.

Rice – husked or brown rice

Intra-SADC exports of Husked or Brown Rice (HS1006 20) averaged $594 000 between 2015 and 2017, accounting for 56,1% of total SADC exports. Meanwhile, SADC averaged $3 m in imports from the RoW over the same period (accounting for 79,8% of total SADC imports). Given that only half of exports are intra-regional while a large percentage of imports come from outside of SADC, this could suggest that regional demand is substantially bigger than is being met by intra-regional exports, despite SADC having the capacity to export more. As such, they may be prioritizing foreign markets over meeting regional demand.

[22] Please note that this is pure speculation and no research has been conducted to verify this statement.

Rice – semi-milled or wholly milled rice, whether or not polished or glazed

Intra-SADC exports of Semi-milled or wholly milled rice, whether or not polished or glazed (HS1006 30) averaged $46 m between 2015 and 2017, accounting for 93,9% of total SADC exports. This suggests that the majority of SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged $898,3 m in imports from the RoW over the same period (accounting for 95% of total SADC imports). Given that such a large percentage of both intra-regional exports and imports from RoW come from outside of SADC, this could suggest that regional demand is substantially bigger than SADC's production capacity, and thus demand needs to be met using substantial imports from outside of the region.

Rice - broken

Intra-SADC exports of Broken Rice (HS1006 40) averaged $23,1 m between 2015 and 2017, accounting for 94,5% of total SADC exports. This suggests that the majority of SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged $129,2 m in imports from the RoW over the same period (accounting for 83,1% of total SADC imports). Given that such a large percentage of both intra-regional exports and imports from RoW come from outside of SADC, this could suggest that regional demand is substantially bigger than SADC's production capacity, and thus demand needs to be met using substantial imports from outside of the region.

4.2.1.4.5 Markets

Consumption: Based on the FAOStat Food Balance sheets (2013), the country with the highest food value for *"rice (milled equivalent)"* was Madagascar with 2,4 m tonnes, followed by Tanzania (1,0 m), South Africa (919 000), Mozambique (605 000), Angola (174 000) and Zimbabwe (143 000). All countries use 90% or more of their domestic supply quantity for food, except for Angola, which only uses 51,8% on food; Madagascar, which only uses 81% on food and Tanzania, which only uses 88% on food. In 2013, Madagascar and Tanzania's production exceeded national food values; if investments are made to strengthen production in these two countries, both Madagascar and Tanzania have the potential to export their surplus to countries where consumption needs greatly exceed production needs. These countries include South Africa, Mozambique, Zimbabwe, Angola and Mauritius.

Trade: Between 2015 and 2017 most of the rice being consumed in SADC has been imported from outside of the region – a total of $898 m p.a. and a total of 95% of the rice imported by SADC member states. This is to be expected, given the small scale of production.

- On average over the 2015 – 2017 period, the SADC region was a net importer of rice (HS 1006), importing a total of $1,12 billion (bn) with a negative trade balance of $1,03 bn with the RoW.
- Of the $1,12 bn of rice imported into the SADC region, 7% or $81 m was sourced from within the region.
- Rice in the husk (paddy or rough) (HS 1006 10) was traded in smaller volumes and only $6 m worth of product was imported into SADC from the RoW.
- The same applies to husked (brown rice) where SADC only imported $2 m from RoW. The demand is low and most of the rice is not being traded in this form i.e. 'rice in husk' and brown rice.
- In terms of 'semi-milled or wholly milled rice, whether or not polished or glazed' (HS 1006 30): The total net SADC imports from RoW has been estimated to be $895 m per annum (p.a.) for the past three years while broken rice has been estimated at $128 m.

Standards: For the high-value products of rice, food safety standards and good hygiene practice is applicable.

Challenges and opportunities (section 4.2.1.4.6) for rice as well as conclusions and recommendations (section 4.2.1.4.7) will be made at the end of section on grains.

4.2.1.4.6 Challenges and opportunities

The policy environment regarding maize, and to a lesser extend for rice, is highly unpredictable and creates uncertainty with value chain stakeholders, leading to problems with commitment from the private sector to develop agricultural markets and depriving smallholders of services and markets. There are certain commercial producers that steer away from producing maize in some of the member states.

The trading environment is characterised by a lack of harmonisation in cross-border trade, standards and significant non-tariff barriers such as domestic regulations. Administrative procedures imposed to ensure food security, product safety and addressing environmental issues are distorting the trade of goods, services and factors of production. Such an environment creates an uncertain investment climate that disincentivise private sector actors to make significant investments. A few years ago, a large agribusiness company invested into one of the member states and had off-take agreements with international buyers. Due to a looming maize shortage a political decision was made to impose a maize export ban and the currency devaluated at the same time. The company lost millions, could not honour its off-take agreements and decided to disinvest from the particular member state. It was such a bad experience for this particular agribusiness that it has since refrained from making new investments in the region.

Most grain production in the SADC region is being conducted under rain-fed (or dryland) conditions and therefore production varies between different seasons. There are food reserve agencies in some countries that buy up maize for emergency and strategic stocks but even so at times shortages occur. Therefore, the trade in maize grain will continue to be an important feature in the region between countries – from those who have more stocks to those who experience shortages. The transport of maize grain is a challenge between countries – mainly because it is cheaper to use railway transport at a lower cost per tonne. However, due the lack of an integrated and functioning railway system, road transport is being used and that results in high maize prices. Regional value chains could be developed where maize is being exported to countries where there are shortages and processed at the destination. There is also evidence that some agribusinesses export some maize meal in bulk by using tank containers to neighbouring states, but it is riskier to do so due to contamination of the meal by insects.

There are great opportunities for countries to produce wheat and rice within the SADC region and in this report reference is made to areas that could be developed to plant both crops. The potential is also there to process the wheat and there are existing large industrial-size mills in most of the region to do just this. It should be noted that it is better to export the wheat grain to its destination and mill it there than to process the wheat in the country of production. Wheat flour can easily be contaminated. The value chain for wheat is short and it does not have many applications for value addition. Therefore, the potential for a comprehensive regional value chain is limited.

For rice a longer value-adding process exists which is more comprehensive and provides more opportunities for creating a regional value chain. It is clear that currently limited large-scale rice processing capacity in the region exists through which to produce export-quality rice. Most of the processing takes place on-farm for own consumption and the rest of the rice is being sold as raw and unprocessed rice. With the high imports of rice by the SADC community and the large local production potential, creates an opportunity not to miss. Rice production offers an opportunity that could be developed as a successful regional value chain, given the needed investment and management.

There are other opportunities to be explored through the process of processing of maize into animal feed and exporting it to neighbouring countries. Mauritius is a large importer of concentrated animals feed as well as Lesotho. In recent years animal feed producers in SA have successfully exported animal feeds to neighbouring countries, helping to process the excess maize that was available in SA.

Attractive small to medium-sized roller and hammer-milling equipment is available to decrease the opportunity cost of grain products at primary producers' level. Through such actions multitudes of rural people can benefit, not only as end users, but also as entrepreneurs involved in local trading. Reducing barriers to establishing processing facilities can improve the establishment of regional value chains in the informal streams of the grain value chains.

It is clear that processing of maize and other grains into breakfast cereals is limited to large capital-rich players. With the processing of maize into breakfast cereals and snacks, the amount of value added is staggering – up to 15 to 30 times. However, novel technology and medium to small-scale equipment is presently available to process maize grain into breakfast cereals and snacks and to bring about competition. Distribution of the products can be done through rural shop outlets and these technologies can add value already in rural villages.

It should be noted that opportunities for each of the value chains identified have been addressed in the phase 2 of the study i.e. 'High-Level Value Chain Assessments'.

4.2.1.4.7 Conclusions and recommendations

Cereals are the most important group of crops in the region and SADC is a net importer – mostly of rice, wheat and in recent years also maize. Most of the grains in the SADC region are being cultivated under rain-fed conditions and therefore farmers are exposed to changes in weather conditions, particularly droughts. The production of all grains is mostly conducted on small scale and with low levels of technology, poor application of good agricultural practices and low productivity. An opportunity exists for SADC MS to extend production areas, make use of new technology (e.g. good quality seeds, fertiliser, crop protection chemicals) and enhance production. Upland rice cultivars could be planted, and mechanisation could be enhanced to increase yields in contrast to low-level productivity and labour-intensive paddy production. There are large farming areas that could be planted under wheat – South Africa has no more capacity to plant additional wheat and has to import it from international markets. Maize production varies from season to season and some years the region is also a net importer of maize.

Given the instability of grain production it is important that risks be mitigated. One way would be to create well-functioning regional value chains that can efficiently facilitate the transport and minimise other costs associated the movement of grains. Markets in the region should be open for free trade and export bans should be minimised where possible. There should be predictability of policy at domestic level and a coherence of policies at regional level. Post-harvest losses should be limited through the provision of rural infrastructure – silos and other storage facilities. Processing of grains can add value and limit the post-harvest losses. To support the development of regional value chains, SADC MS will have to make investments into the agriculture industry by providing physical infrastructure like rural roads, market facilities (storage, processing, cooling) and in the process also to capacitate farmers through exposing them to the next generation of grain and fertiliser technologies needed to upscale production. Farmers and rural entrepreneurs could be exposed to new processing technologies (e.g. hammermills, rollermills, packaging in paper bags, baking and dough-making equipment, etc.) to add value in the rural areas. Another way to mitigate drought conditions will be for investments to be made in irrigation infrastructure to enhance grain production during periods of drought. Regional infrastructure, especially an integrated rail network will make the transport of grains much easier and cost-effective in the region. Governments should also collaborate with private sector entities to develop structured commodity markets – especially for grain crops. Zamace is a futures exchange that was established in Zambia to provide farmers with hedging against risk as well as to reduce transaction costs between farmers and maize traders. Financing is a cross-cutting issue for farmers and processors alike and needs to be addressed.

Informal cross-border trade also shows significant promise to develop small regional value chains; informal traders and producers' data is, by nature of the activities, limited, but still makes up a significant proportion of intra-regional trade in grain and grain products.

Regional value chains in the grain sector will only function well when well-developed market information is available. SADC has played a leading role in establishing the Agriculture Information Management System (AIMS), a system that provides early warning of imminent disasters, assesses vulnerabilities, monitors weather patterns and provides an integrated database for use in Food Security Planning for the

SADC region (SADC 2019[23]). That kind of information provides signals to the regional agricultural sector. Although AIMS provides very important information to the region there is an additional need to enhance the distribution of market information across relevant value chains and empower farmers and processers to identify market opportunities.

The development of well-developed grain value chains in the region is of great importance to enhance production of especially rice and wheat to supply fellow regional MS. The market opportunity is there and needs to be addressed at domestic level. At regional level SADC could play a leading role to ensure the coherence of policies, functioning of trade facilitation processes and for market information to be provided. SADC could also play a role to ensure that investment opportunities are showcased to potential international investors and partnerships are developed with leading firms and other key-stakeholders in the grain sector.

4.2.2 Oil seeds and Legumes

4.2.2.1 Introduction

The primary legumes, oil seeds and vegetable oils VCs explored were soybeans, dry beans, groundnuts, sesame and sunflowers, which are grown for their value as protein rich sources or oil content. Each of these show significantly differing characteristics.

The seeds of some legume (bean) crops such as soybeans and groundnuts contain both substantial amounts of vegetable oil and protein. Whereas soybeans have to be processed to be of use to humans and livestock, good quality groundnuts should preferably not be crushed for oil as the nuts have a much higher value in a whole form. Most legume crops such as drybeans, lentils, faba beans, cowpea, field peas and many others do not contain much vegetable oil. Those legume crops are utilised for direct consumption by humans. In addition to legume crops, a number of other non-legume crops such as sunflowers, oil palm, coconuts, canola and many more, are cultivated for the production of vegetable oil. Cotton seed, obtained after the ginning of seed cotton, also contains some vegetable oil and is pressed for edible oil.

Oil seeds and vegetative oils

Apart from soybeans, some groundnuts and sesame, cotton seed, canola and especially sunflowers are processed for much needed vegetable oil. Due to the chronic shortfalls and good market demand in SADC, it is also logic to produce more groundnuts in the area.

Soybeans: This crop is in high demand because of the high-quality oilcake which is a residue once the oil has been pressed out for cooking oil and other uses. One of the main drivers of the growth in demand is the cattle, pork and poultry industries that utilise roasted and processed soybean in animal feeds.

Sunflowers and sesame: Both are in demand for their high oil content and the high value of their residues after oil extraction.

Avocados and coconut: These plant oils can be produced in large volumes as the oil yield per hectare s high and the prices good.

Groundnuts: Certain types of groundnuts are in high demand for roasted peanuts in pre-packaged form. Some other types are popular for processing into peanut snacks with chocolate and caramel coating. The poorer quality groundnuts is commonly processed into peanut butter. As groundnuts are in strong demand for roasting and consumption of pre-packed peanuts, it is too valuable to be crushed for edible oil. Despite the fact that it is not logic to press groundnuts for cooking oil, it is notwithstanding generally

[23] https://www.sadc.int/themes/agriculture-food-security/food-security/

done in most SADC member states outside of SA, due to a lack of cooking oil and a lack of knowledge. Large volumes of groundnuts are imported from China, but the flavour of the Chinese types is not conducive for processing of the nuts into confectionery items. More Spanish type varieties with round medium sized beans should be grown in SADC countries, which will stimulate cross-border trade.

Legume crops

This group of crops has for the last century been an important part of agricultural production in SADC countries. As beans, lentils and cowpeas can be readily prepared and consumed, a considerable proportion of the production is consumed domestically and the amounts available on the open markets are generally limited. However, those bean types are much traded across borders to balance the shortfalls in production in various countries.

Dry or dried beans: This group of crops is in demand for cooking or canning with or without tomato sauce. Trading of those commodities between countries in the region occurs and chronic shortages occur in SA, where the canning industry is well-developed. The canned baked beans are re-exported as canned beans to the other SADC countries. Beans are underestimated as a food crop and has potential to grow in production, while processing activities could create employment. The value adding chain is short, particularly if the supply of tomato puree can be improved as well by stimulating factory tomato production with a high lycopene content to increase the quality of the canned beans.

In terms of regional value chains for soybeans, it has been found that there are six SADC member states with potential to play an important role in regional value chain development comprising the DRC, Madagascar, Malawi, SA, Zimbabwe and Zambia. It also suggested that Malawi and SA can become highly competitive along the entire value chain over a period of five years (i.e. from about 2016) and would be able to also export soybean products (animal feeds) to international export markets[24]. At the time of the research, 2014/15 trade figures were analysed (World Bank), and it was found that SA was a large importer of soy products – produced that season 1,1 m tonnes. However, during the past 2018 production season a harvest of 1,6 m tonnes was realised – enough for its own consumption in the animal feeds sector (SAGIS 2019[25]).

4.2.2.2 Oil seeds - overview

Oil seeds comprise mainly soybeans, sunflowers, sesame and cotton seed. Soybeans and sunflowers have been emphasised in this analysis since these two value chains are the most prominent in the SADC region. The demand for the production and processing of vegetable-oil crops is driven by the demand for cooking oil. Vegetable-oil crops, including soybeans, sunflower seeds, sesame seeds, and cotton seed, are processed to produce various oil-based products. The value of products that can be made from crude vegetable oil is a significant basis for the establishment of a regional oil crop value chain, based on contemporary processing technologies to produce and package effectively for distribution across the SADC region.

The most significant factor driving demand for oilseeds is the demand for cooking oil. Refined vegetable oil can also be made into a variety of products including foodstuffs, margarine, printing ink, and oil-based paints. Leading firms that provide points of synergy in the establishment of a regional oil crop value chain

[24] Boshoff D (2018) Personal interview: According to the Animal Feed Manufacturers Association (AFMA) the forecast exports indeed materialized during 2018 after a record maize crop and feed manufacturers were able to export large quantities of animal feed to the Middle East and Indian Ocean island states (Mauritius, Reunion, Seychelles). The animal feed exported was produced from maize, soybean, sunflower cake and Lucerne.

[25] SA Grain Information Service (2019) Historic Summary – Hectares and Production, Date accessed: 22 February; http://www.sagis.org.za/historic%20hectares%20&%20production%20info.html

include companies such as Dulux, Chamberlains, Plascon, Warrior, Tiger Brands, African Products, Premier Foods and others.

Data on the volumes that are processed is outdated (where available), and many member-states either do not capture or report such data. However, trade data provides insights into the value of processed intermediary and finished products that are imported into the region.

The following processors of oil seeds have been identified:

- Animal feed: AgriVal (Madagascar), National Foods (Zimbabwe), Namib Mills (Namibia), CIM (Mozambique), Cerangola Flour Mill (Angola), African Milling (DRC), Feedmaster (Namibia), Crane Feeds (eSwatini), etc. Most of the animal feed producers are in SA with 24 feed producers. One of the key-stakeholders is the Animal Feed Manufacturers Association (AFMA) that is presenting the industry in SA. Some of the leading milling companies are: Premier Feeds, Voermol, Meadow Feeds, Afgri, Nova Feeds, Foodcorp, De Heus, Alzu Enterprises, Banlab, etc.
- Food for human consumption (cooking oils): Epic, Unilever, Nola, Premier Foods, Foodcorp.
- Many of the leading firms in the SADC region have been identified in Appendix M.

The following oil seeds will be analysed: soybeans, sunflowers, sesame, cotton seeds:

4.2.2.3 Oil seeds - Soybean

4.2.2.3.1 Regional context for the selection of commodity as a potential value chain

Table 28: Intra-SADC exports of soybean products versus imports from RoW

Product	Intra-SADC Exports (USD)	Intra-SADC Exports as % of total SADC Exports	RoW Imports (USD)	RoW Imports as % of total SADC Imports
Soya beans, whether or not broken (HS 1201)	29 218 000	88,1%	61 896 000	69,9%
Soya-bean oil and its fractions, whether or not refined (excl. roasted / cooked)(HS 1507)	69 701 000	95,6%	298 326 000	73,0%
Flours and meals of oil seeds or oleaginous fruits (including soya meal & excluding mustard) (HS1208)	16 793 000	65,5%	9 476 000	34,3%
Soybean oil cake (HS2304)	86 835 000	94,9%	225 117 000	76,5%

Soybean is an important and versatile crop. While highly sought after in the global market, it also forms a critical part of many agricultural value chains such as the livestock feed value chain and vegetable oil value chain. While production of soybean in the SADC region is absorbed by regional demand, there is also room to develop processing and production capacity in the region to gain more of a share in the trade value of soybean in the region, which is currently dominated by imports.

Intra-SADC exports of soybeans (HS1201) averaged $29,2 m between 2015 and 2017, accounting for 88% of total SADC exports. This suggests that the majority of SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged $61,9 m in imports from the RoW over the same period (accounting for 70% of total SADC imports). Given that such a large percentage of imports come from outside of SADC this could suggest that regional demand is substantially bigger than SADC is able to meet at current production levels. The top producing countries for soybeans in 2016 were South Africa (742 000 tonnes), Malawi (132 417 tonnes) and Zimbabwe (70 000 tonnes). Soya is one of the largest oilseed crops in South Africa, driven largely by increased consumer demand for poultry products across the SADC region. Soya is also used for the manufacturing of livestock feeds for cattle and pig production. South Africa has been a net importer of soybean and soybean products in recent years. However, during

the 2018 production season a harvest 1,6 m tonnes was realised – enough for its own consumption as animal feed (SAGIS 2019[26]).

Similarly, intra-SADC exports for soybean oil (HS1507) averaged $69,7 m over 2015 – 2017 (95,6% total exports) while imports from the rest of the world averaged $298,3 m (73% of total imports). This is resultant both from value added in the processing of soya beans, as well as in the substantial demand for processed soya bean products within the SADC region. Although South Africa has large oilseed processing facilities it is a net importer of edible soya oil. Local production only constitutes a third of the country's crushing capacity and therefore this signals opportunities for increased production and cross-border trade. Production capacity has increased from 1,1 m tonnes in 2015 season to a harvest of 1,6 m tonnes during the 2018 season (SAGIS 2019).

At the same time, Intra-SADC exports of Soybean oil cake (HS2304) averaged $86,8 m between 2015 and 2017, accounting for 94,9% of total SADC exports. This suggests that almost all of the SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged $225,1 m in imports from the RoW over the same period (accounting for 76,5% of total SADC imports). Given that such a large percentage of imports come from outside of SADC as well as a large percentage of exports being intra-regional, this could suggest regional demand is much bigger than can be met by regional production alone and requires foreign imports to supplement regional demand. This is further supported by SADC being a net exporter overall.

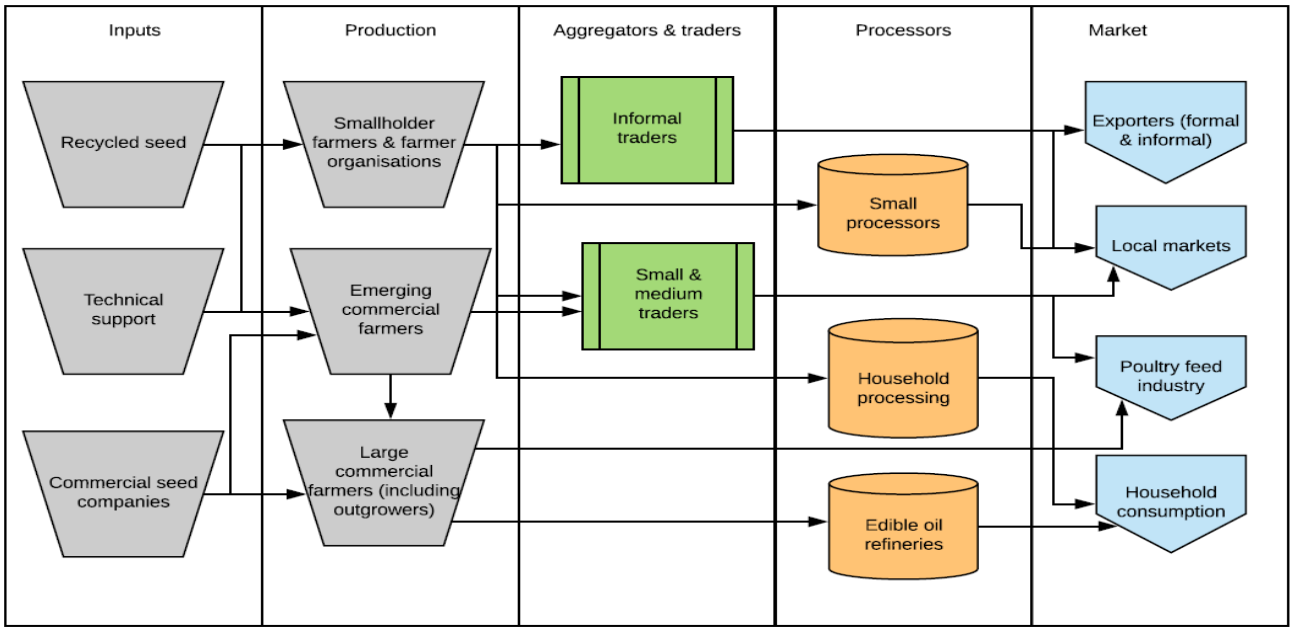
Intra-SADC exports of Flours and meals of oil seeds or oleaginous fruits (including soya meal & excluding mustard) (HS1208) averaged $16,8 m between 2015 and 2017, accounting for 65,5% of total SADC exports. This suggests that most of the SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged

Applications for processed soybean products range from human consumption products such as margarine and cooking oil, to animal feed. Leading firms in the SADC region include AgriVal (Madagascar), National Foods (Zimbabwe), Namib Mills (Namibia), CIM (Mozambique), Cerangola Flour Mill (Angola), African Milling (DRC), Feedmaster (Namibia), Crane Feeds (eSwatini), Tiger Brands (SA), and Premier Milling (SA) among others. Please refer also to Appendix M where many of the leading firms in the region have been identified.

[26] SA Grain Information Service (2019) Historic Summary – Hectares and Production, Date accessed: 22 February; http://www.sagis.org.za/historic%20hectares%20&%20production%20info.html

4.2.2.3.2 Value chain diagram

Figure 7: Soybean value chain diagram



4.2.2.3.3 Primary inputs

Inputs for the production of soybeans and other oil crops are either sourced via international corporations with representation in member states. Some input suppliers are from the region itself, while many international companies have their regional representatives based in either SA or some adjacent East African states.

Multinational corporations dominate the supply of inputs in general but use smaller intermediaries operating as agrodealers to smallholder and subsistence farmers. Many of these input manufacturers are based in the region but many imports also occur from the Far East. Some of the agrodealers and larger business entities in the region also distribute production and processing equipment in the farming areas.

The suppliers of other types of production inputs, such as irrigation equipment, farm machinery and processing equipment have also been identified in the maize section. Most of the leading firms have been identified and listed in Appendix M.

4.2.2.3.4 Markets

The largest demand for oilseeds is for cooking oil, foodstuffs such as mayonnaise and margarine. There are also several industrial uses in the printing and paint industries. The demand for vegetable oils for cooking purposes in SADC is sizeable. It should be expected that cross-border trade is considerable, but it is not the case.

In terms of oil seeds, Tanzania produced in 2014 a total of 2 190 158 tonnes of oil seeds (mostly sun-flower, groundnuts and sesame seed) and SA a total of 587 000 tonnes (858 605 tonnes in 2018) The export value was $762 m but the intra-regional trade within SADC was only 18% of the total exports. It was found that Tanzania is the biggest global exporter of oilseeds but only exports 2% to fellow SADC states. This indicates an untapped potential to trade within SADC. It was also found that there is a large gap between global imports and regional importers and therefore a gap that could be serviced by regional supplies (World Bank, forthcoming).

In the trade statistics, it is mentioned that oil seeds are being traded between Zambia and Zimbabwe. In terms of regional value chain development there appears to be little regional interaction in the value chain except for soybean products (beans, oils and meal. This provides an opportunity to increase production in some areas that have the potential to grow their soybean production. There may also well be the

potential for enhanced cross-border investments in production and processing – mainly animal feed for the poultry and livestock industries (World Bank, forthcoming). It may well be that most SADC exports go to fellow-member states and that there is not enough product available in the region. This is confirmed (Table) by the fact that most soybean products are being imported from international markets. The average value of soybean (including oil and fractions) (HS 1597) per annum for the period 2015 to 2017 that has been imported was $298 m from the ROW while $69,7 m (96%) of the exports were traded within SADC – a net import of soybean for $295 m. This indicates that there was too little production in the region and that demand is bigger than production (especially since 96% of soybean exports were within the region). In terms of the average export value of sesame oil (HS 1515 50) between 2011 and 2017, Tanzania was the biggest exporter with $39 m over that period.

The value chains for vegetable oils are short and downstream processing is readily accessible to primary producers, provide small amounts of capital can be made available. With new small hand-cranked or mechanically-operated oil presses the oil crops can be pressed for vegetable oil in all member countries. The crude vegetable oil cannot be readily sold in more sophisticated markets as it contains some water, free fatty acids, colourants and odours, but it is acceptable in the rural markets. For the oil to be marketable in supermarkets and globally, it has to be refined in factories which have expensive refining facilities. These factories mostly belong to multinational companies.

In view of the growing demand for vegetable oils for cooking purposes globally and especially in the SADC area, it is projected that the production of soybeans, sunflowers, canola and other sources of vegetable oils would be stimulated, providing that the primary producers would be afforded the opportunity to obtain small oil-pressing machines and to obtain some shareholding in the downstream processing of oil refineries.

4.2.2.4 Oil seeds - Sunflower

4.2.2.4.1 Regional context for the selection of commodity as a potential value chain

Table 29: Intra-SADC exports of sunflower seeds versus imports from RoW

Product	Intra-SADC Exports (USD)	Intra-SADC Exports as % of total SADC Exports	RoW Imports (USD)	RoW Imports as % of total SADC Imports
Sunflower products				
Sunflower seeds, whether or not broken (HS 1206)	2 455 000	60,2%	20 091 000	88,0%
Crude sunflower-seed or safflower oil (HS1512 11)	4 880 000	33,3%	115 266 000	96,0%
Sunflower-seed or safflower oil and their fractions, whether or not refined, but not chemically modified (excluding crude) (HS1512 19)	73 554 000	85,2%	29 157 000	29,6%

The supply of sunflower seeds in the SADC region is outdone by the demand. This presents an opportunity to fill the vacuum through creating processing capacity that will allow producers to access markets for their raw produce. As only some member states produce this crop, the opportunity exists to increase capacity by strategically placing aggregators and processors in key regional distribution routes. The creation of a regional sunflower value chain will take advantage of the strengths of all Member States' production, processing and distribution located in strategic areas in the region.

Intra-SADC exports of sunflower seeds (HS1206) averaged $2,5 m between 2015 and 2017, accounting for 60,2% of total SADC exports suggesting that a large amount of SADC's export capacity is being utilised to meet regional demand. However, there is still a substantial amount of production surplus leaving the region as exports to the RoW. Meanwhile, SADC averaged $20,1 m in imports from the RoW over the same period (accounting for 88% of total SADC imports). Given that such a large percentage of imports come from outside of SADC this could suggest that regional demand is substantially bigger than

SADC is capable of supplying at current production levels. The top producing countries for sunflower seeds in 2016 were Tanzania (890 000 tonnes), South Africa (755 000 tonnes) and Zambia (61 072 tonnes). Sunflower seed production in Tanzania increased drastically from 300 000 tonnes in 2010 to 2 800 000 tonnes in 2016, before falling off sharply in 2017 with a production of only 890 000 tonnes. Despite remaining the biggest producer in 2017, Tanzania exported only $512 000.

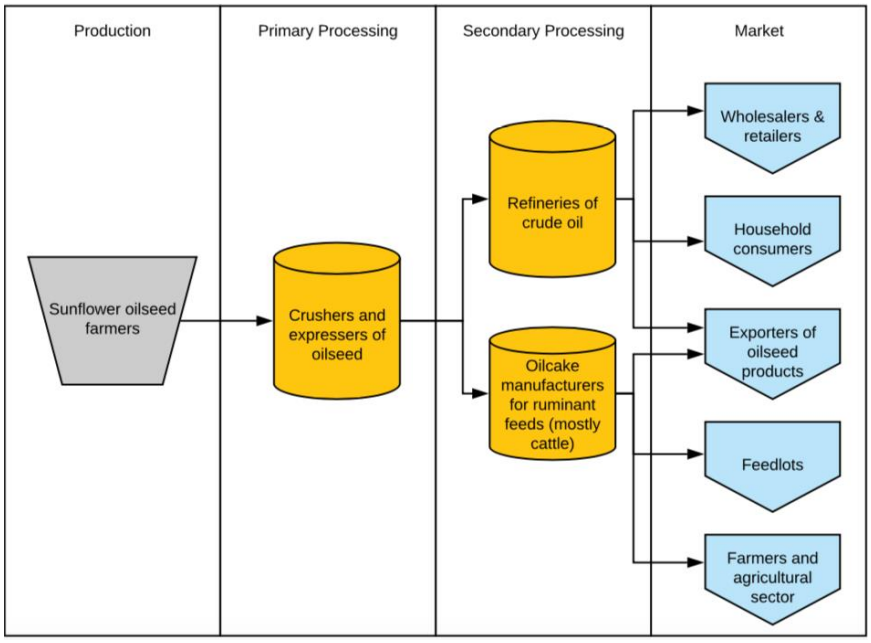
However, Tanzania exported $10,1 m of crude sunflower oil (HS1512 11) in 2017, almost all of which went to Switzerland. This comprised almost 40% of SADC's total crude sunflower oil exports in 2017. This alone accounts for a large part of why total intra-SADC exports of crude sunflower oil averaged only $4,8 m between 2015-2017 (only 33% of total exports). Conversely, average 2015-2017 imports from the RoW in sunflower seed oil were $115 m and comprised 80,7% of total imports. This suggests that the majority of Tanzania's sunflower seed production capacity is going towards domestic processing, with sunflower oil being exported instead. This is creating a vacuum in the region, with demand needing to be met using imports from outside of SADC.

Intra-SADC exports of sunflower-seed or safflower oil and their fractions (excluding crude) (HS1512 19) averaged $73,6 m between 2015 and 2017, accounting for 85,2% of total SADC exports suggesting that most of SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged $29,2 m in imports from the RoW over the same period (accounting for 29,6% of total SADC imports). Given that such a small percentage of imports come from outside of SADC this could suggest that regional demand is small enough to be met entirely by regional production and does not require supplementary imports from outside of SADC.

Apart from cooking oil, there are various other applications for sunflower seeds, including in the production of food snacks in raw or roasted form.

4.2.2.4.2 Value chain diagram

Figure 8: Sunflower seed value chain diagram



4.2.2.4.3 Primary inputs

Inputs for the production of sunflower and other oil crops are either sourced via international corporations with representation in member states. Some input suppliers are from the region itself, while many international companies have their regional representatives based in either SA or some adjacent East African neighbouring states.

Multinational corporations dominate the supply of inputs in general but use smaller intermediaries operating as agrodealers to smallholder and subsistence farmers. Many of these input manufacturers are based in the region but many imports also occur from the Far East. Some of the agrodealers and larger business entities in the region also distribute production and processing equipment in the farming areas.

The suppliers of other types of production inputs, such as irrigation equipment, farm machinery and processing equipment has also been identified in the maize section. Most of the leading firms have been identified and listed in Appendix M.

4.2.2.4.4 Markets

The largest demand for oilseeds is for cooking oil and is also used in the production of margarine. There are also several industrial uses in the printing and paint industries. The demand for vegetable oils for cooking purposes in SADC is sizeable. It is expected that cross-border trade should be considerable, but it is not the case.

In terms of oilseeds, Tanzania produced in 2014 a total of 2 190 158 tonnes of oilseeds (mostly sunflower, groundnuts and sesame seed) and SA a total of 587 000 tonnes (858 605 tonnes in 2018) and the export value was $762 m but the intra-regional trade within SADC was only 18% of the total exports. It was found that Tanzania is the biggest global exporter of oilseeds but only exports 2% to fellow SADC states. This indicates an untapped potential to trade within SADC. It was also found that there is a large gap between global imports and regional imports and therefore a gap that could be serviced by regional supplies (World Bank, forthcoming).

In the trade statistics, it is mentioned that with oil seeds, in terms of regional value chain development there appears to be little regional interaction in the value chain except for soybean products (bean, oils and meal) being traded between Zambia and Zimbabwe. This provides an opportunity to increase production in some areas that have the potential to grow their soybean production. There may well be also the potential for enhanced cross-border investments in production and processing – mainly animal feed for the poultry industry (World Bank, forthcoming). It may well be that 60% of SADC exports go to fellow-member states and that there is not enough product available in the region. This is confirmed (Table 29) by the fact that 88% of the sunflower products are being imported from international markets.

The average value of total imports sunflower seeds (whether or not broken)(HS 1206) per annum for the period 2015 to 2017 that has been imported was $22,8 m with a negative trade balance of $18 m with the RoW – thus SADC is net importer of sunflower seed. This indicates that there was perhaps too little production in the region and that demand is bigger than production, especially since 60% of sunflower exports occurred within the region.

The value chains for vegetable oils are short and downstream processing is readily accessible to primary producers. With new small hand-cranked or mechanically-operated oil presses the oil crops can be pressed for vegetable oil in all member countries. The crude vegetable oil cannot be readily sold in more sophisticated markets as it contains some water, free fatty acids, colourants and odours, but it is acceptable in the rural markets. For the oil to be marketable in supermarkets and globally, it has to be refined in factories which have expensive refining facilities. These factories mostly belong to multinational companies.

In view of the growing demand for vegetable oils for cooking purposes globally and especially in the SADC area, it is projected that the production of soybeans, sunflowers, canola and other sources of vegetable oils would be stimulated, providing that the primary producers would be afforded the opportunity to obtain small oil-pressing machines and to obtain some shareholding in the downstream processing of oil refineries.

4.2.2.5 Oil seeds - Sesame

4.2.2.5.1 Regional context for the selection of commodity as a potential value chain

Sesame is an important oil crop all over Africa but receives less attention in the SADC region, but plays an important role in some member states like Tanzania and to a lesser extent Mozambique and Zimbabwe. Its increasing popularity, pleasant taste and texture present an opportunity to establish advantages in the creation of a SADC sesame seed value chain. While its main uses include human consumption in snacks and baked goods, the production of the high value sesame seed oil offers the basis for establishing a regional value chain. Through increasing processing capacity, particularly the pressing of sesame seeds to produce oil, producers will have a domestic value chain on which to base their justification for increasing production.

Table 30: Intra-SADC exports of sesame oil versus imports from RoW

Product	Intra-SADC Exports (USD)	Intra-SADC Exports as % of total SADC Exports	RoW Imports (USD)	RoW Imports as % of total SADC Imports
Sesame				
Other oil seeds and oleaginous fruits, whether or not broken (excluding edible nuts, olives, soya beans, groundnuts, copra, linseed, rape or colza seeds and sunflower seeds)(HS1207)	8 713 000	6,1%	6 679 000	47,7%
Sesame seeds, whether or not broken (HS1207 40)	745 000	0,6%	2 761 000	75,6%
Sesame oil and its fractions, whether or not refined, but not chemically modified (HS1515 50)	295 000	0,4%	733 000	80,7%

Intra-SADC exports of other oil seeds (HS1207) averaged $8,7 m between 2015 and 2017, accounting for 6,1% of total SADC exports suggesting that most of SADC's export capacity is being utilised to meet demand in the RoW. Meanwhile, SADC averaged $6,6 m in imports from the RoW over the same period - accounting for 47,7% of total SADC imports. Sesame seeds is the largest contributor to this category (HS1207).

Intra-SADC exports of sesame seeds, whether or not broken (HS1207 40) averaged $745 000 between 2015 and 2017, accounting for only 0,6% of total SADC exports suggesting that almost none of SADC's export capacity is being used to meet regional demand. Meanwhile, SADC averaged $2,8 m in imports from the RoW over the same period (accounting for 75,6% of total imports).

Intra-SADC exports of sesame oil (HS1515 50) averaged $295 000 between 2015 and 2017, accounting for only 0,4% of total SADC exports suggesting that almost none of SADC's export capacity is being used to meet regional demand. Meanwhile, SADC averaged $733 000 in imports from the RoW over the same period (accounting for 80% of total imports).

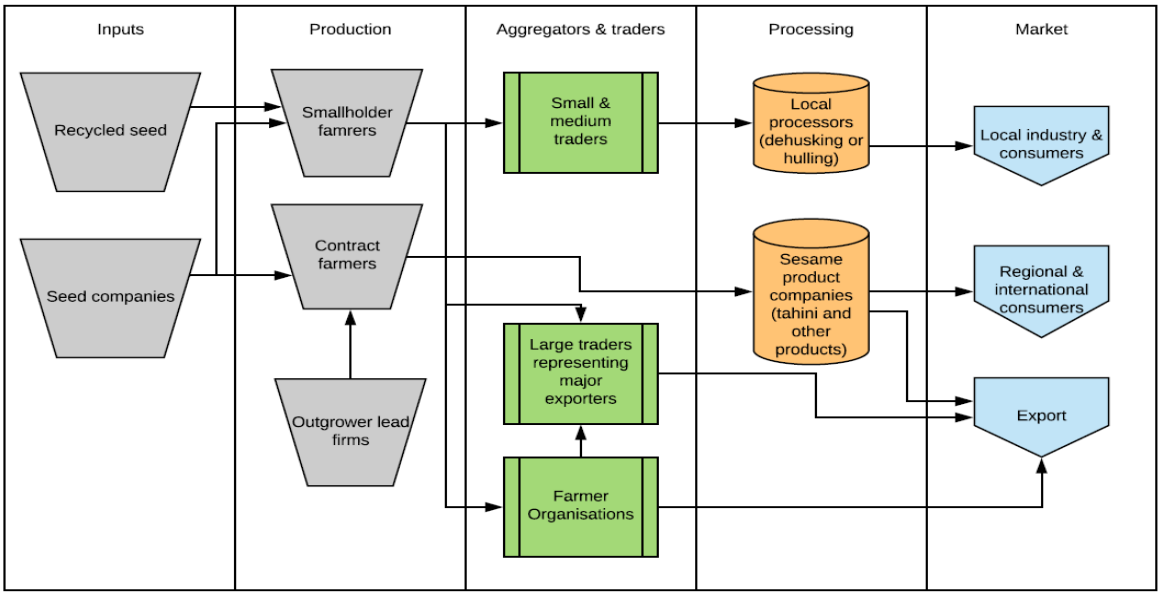
The top producing countries for sesame in 2014 were Tanzania (544 293 tonnes) and Mozambique (9 088 tonnes). Given how small intra-regional exports are, as well as SADC being a net exporter of sesame overall, this could indicate that the intra-regional demand for sesame is small and as such surplus production is being exported outside of the region.

Sesame seed is pressed for household oil, while the roasted seeds are popular on bakery products. The seed is also de-corticated, milled in food factories and processed into tahini, a widely used ingredient in foodstuffs as well as the production of halva, a popular snack over the entire Middle East and Mediterranean countries. After de-cortication, a high value substance called sesamolin is extracted from the seed hulls and used in the bakery and confectionary industries. New harvesting techniques have been developed to ensure that the seed is not lost onto the ground at harvesting of the open pods. If investment

into the sesame seed value chain were to be significant, it could yield notable economic benefits and increased intra-regional trade.

4.2.2.5.2 Value chain diagram

Figure 9: Sesame seed value chain diagram



4.2.2.5.3 Primary inputs

Inputs for the production of sesame and other oil crops are either sourced via international corporations with representation in member states. Some input suppliers are from the region itself, while many international companies have their regional representatives based in either SA or some adjacent East African neighbouring states.

Multinational corporations dominate the supply of inputs in general but use smaller intermediaries operating as agrodealers to smallholder and subsistence farmers. Many of these input manufacturers are based in the region but many imports also occur from the Far East. Some of the agrodealers and larger business entities in the region also distribute production and processing equipment in the farming areas.

The suppliers of other types of production inputs, such as irrigation equipment, farm machinery and processing equipment has also been identified in the maize section. Most of the leading firms have been identified and listed in Appendix M.

4.2.2.5.4 Markets

Sesame is an ideal export crop that could be cultivated by smallholder farmers with a relative high value. Basic processing adds to the value of the seed before it is exported. Little domestic production, consumption and market data is available, but some analysis has been conducted with available trade data. The following observations have been made as an average for the period 2015 to 2017 (ITC TradeMap 2019 [27]):

- SADC had total exports oil seeds (HS1207) of $133,4 m with the RoW i.e. 93,9% of SADC exports and positive trade balance with the RoW of $126,7 m.
- Sesame seeds is the largest contributor to this category (HS1207) and during the 2014-2017 period the SADC region exported $185,4 m on average and had a positive trade balance of $204,4 m.

[27] International Trade Centre (2019) TradeMap database, 8 March, www.trademap.org; Please note that these figures are not reflected in table in the report but were obtained from TradeMap database.

- SADC had total exports sesame seed (HS1207 40) of $124,4 m with the RoW i.e. 99,4% of SADC exports and positive trade balance with the RoW of $121,6 m.
- During this period 2014-2017 Tanzania exported sesame seed (HS1207 40) at an average per annum of $164,5 m, Mozambique exported $19,7 m and smaller quantities by Zimbabwe, Malawi and South Africa.
- During 2017 Tanzania exported 80 396 tonnes of sesame seed at a value of $74,1 m i.e. 87% of the total SADC exports of $81,5 m.

It could be concluded that SADC in a net exporter of 'other oil seeds' (comprising mostly of sesame seed) although most local sesame oil production is being exported and small volumes are being exported within the region. It could be concluded that the main market is outside the borders of SADC and could be classified as an export crop. The biggest importers during the past 2018 season were China with an import value of $145 m, Japan ($20,8), Germany ($1,6 m) and Greece with ($1,0 m).

In terms of the average export value of sesame oil (HS 1515 50) between 2011 and 2017, Tanzania was the biggest exporter with $39 m over that period. It seems that during the 2018 small volumes have been traded with value of $1 m to Namibia, $38 000 to the DRC and $23 000 each to China and the USA.

4.2.2.6 Oil seeds - Cotton seed

4.2.2.6.1 Regional context for the selection of commodity as a potential value chain

The export of a large quantity of raw cotton seed oil indicates an opportunity for further value adding. While an increase in processing capacity should ideally be matched by strong production capacity, the creation of a regional value chain would need to encourage the value addition of crude cotton seed oil into high value products such as toilet soaps.

Table 31: Intra-SADC exports of cotton seed versus imports from RoW

Product	Intra-SADC Exports (USD)	Intra-SADC Exports as % of total SADC Exports	RoW Imports (USD)	RoW Imports as % of total SADC Imports
Cotton seeds, whether or not broken (HS1207 20)	4 309 000	92,8%	107 000	51,0%
Cotton seeds for sowing (HS1207 21)	2 137 000	90,5%	383 000	7,0%
Cotton seeds (excluding for sowing) (HS 1207 29)	245 000	43,8%	270 000	40,2%
Crude cotton-seed oil (HS1512 21)	279 000	100,0%	167 000	46,1%
Cotton oil cake (HS2306 10)	16 588 000	23,7%	6 786 000	41,4%

Intra-SADC exports of cotton seed, (comprised of HS1207 20, HS1207 21 and HS1207 29) averaged $6,7 m between 2015 and 2017, accounting for only 88,4% of total SADC exports. This suggests that almost all of SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged $759 000 in imports from the RoW over the same period (accounting for 11,95% of total SADC imports). Given how large intra-regional exports are, as well as SADC being a net exporter of cotton seed products, this suggests that regional demand is being almost fully met by regional production, however there is a small surplus beyond that to be exported outside of the region. The top producers of Cottonseed in 2014 were Tanzania (155 000 tonnes), Malawi (132 000 tonnes) and Zimbabwe (123 000 tonnes).

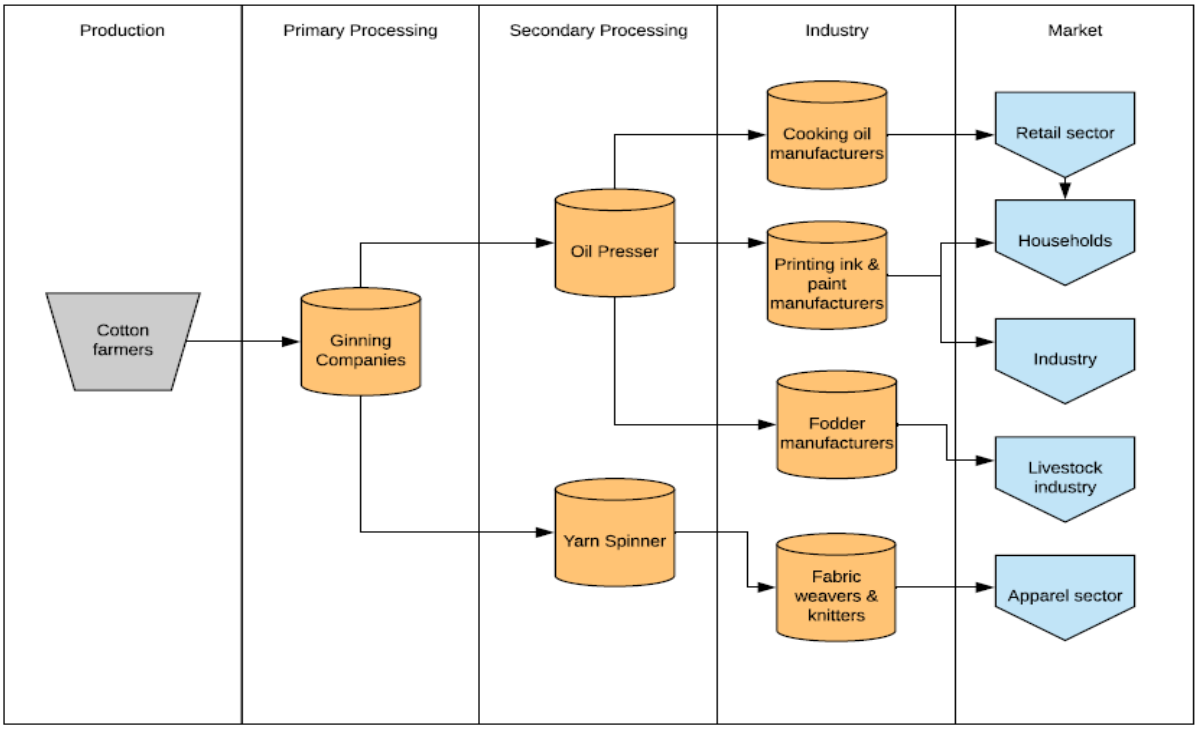
Similarly, intra-SADC exports for crude cotton seed oil (HS1512 21) averaged $279 000 over 2015 – 2017 (100% total exports) while imports from the rest of the world averaged $167 000 (46% of total imports). Since the entire export capacity of SADC is being used to meet regional demand, and almost 50% of imports are still coming from outside of the region, this indicates that regional demand exceeds regional production capacity. The top producers of cotton seed oil are Malawi (24 061 tonnes), Tanzania (20 528 tonnes) and Zimbabwe (11 900 tonnes).

Intra-SADC exports of cotton oil cake (HS2306 10) averaged $16,6 m between 2015 and 2017, accounting for only 23,7% of total SADC exports. This suggests that very little of SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged $6,8 m in imports from the RoW over the same period (accounting for 41,4% of total SADC imports). Given how small both intra-regional exports and imports from RoW are, this suggests that regional demand is relatively low, and requires little supply from either intra-regional exports or imports from outside of SADC.

The processing of cotton seed oil into high value products such as skin care and candles emphasises the opportunity for the establishment of a regional value chain. Proctor & Gamble, Johnson and Johnson, Unilever, Colgate-Palmolive Company are leading firms that have experience in the distribution and marketing of premium skincare and other household products, which would be key to the successful establishment of a cotton seed oil regional value chain.

4.2.2.6.2 Value chain diagram

Figure 10: Cotton value chain diagram



4.2.2.6.3 Primary inputs

Inputs for the production of cotton seed and other oil crops are either sourced via international corporations with representation in member states. Some input suppliers are from the region itself, while many international companies have their regional representatives based in either SA or some adjacent East African neighbouring states.

Multinational corporations dominate the supply of inputs in general but use smaller intermediaries operating as agrodealers to smallholder and subsistence farmers. Many of these input manufacturers are based in the region but many imports also occur from the Far East. Some of the agrodealers and larger business entities in the region also distribute production and processing equipment in the farming areas.

The suppliers of other types of production inputs, such as irrigation equipment, farm machinery and processing equipment has also been identified in the maize section. Most of the leading firms have been identified and listed in Appendix M.

4.2.2.6.4 Markets

At present the small farmers deliver the seed cotton (i.e. the seed is still embedded into the cotton fibre) to the ginneries. They do not benefit from the selling or processing of the seed. The lint is removed and baled and sold for further processing. The cotton seed is either mechanically or acid de-linted and some of the seed is made available for re-planting next season. The bulk of the seed is pressed for cooking oil and the residual oilcake is fed to cattle after heating to get rid of the slightly toxic gossypol toxin in the seed hulls.

In terms of cotton seed (it is seed without cotton fibre), little domestic production, consumption and market data is available, but some analysis has been conducted with available trade data. The following observations have been made:

- During this period 2014-2017, SADC had total exports of cotton seed (whether or not broken)(HS1207 20) of $4,6 m of which 93% were exported to fellow SADC exports and positive trade balance with the RoW of $203 000.
- During this period 2014-2017 the SADC region exported cotton seed (whether or not broken)(HS1207 20) with an average value of $5,2 m (21 231 tonnes), Mozambique - $7,8 m (11 866 tonnes), Zambia - $2,3 m (9 134 tonnes).
- During this period 2014-2017 the SADC region imported cotton seed (whether or not broken)(HS1207 20) with an average value of $214 000 (336 tonnes), Mozambique - $134 000 (148 tonnes), Zambia - $25 000 (127 tonnes) and Malawi - $20 000 (59 tonnes).
- During this period 2014-2017 the SADC region exported cotton oil cake (HS2306 10) with an average of $254,5 m (278 000 tonnes) per annum and the biggest exporter was Tanzania with an average value of $179,9 m (24 487 tonnes), Zambia - $24,1 m (18 325 tonnes), Zimbabwe - $6,1 m (8 094 tonnes), Mozambique - $3,8 m (6 342 tonnes), Malawi - $1,1m (11 806 tonnes) and South Africa - $579 000 (459 tonnes).
- During this period 2014-2017 the SADC region imported cotton oil cake (HS2306 10) with an average of $20,1 m (73 766 tonnes) per annum and the biggest importer was South Africa with an average value of $18,4 m (67 211 tonnes), Namibia - $1,3 m (4 084 tonnes), Zimbabwe - $248 000 (1 681 tonnes) and Botswana - $74 000 (405 tonnes).

It could be concluded that during the period 2015-2017, SADC was a net exporter of cotton seed (HS1207 20 and HS1207 29) while the region has a negative trade balance with the RoW in terms of cotton seeds for sowing (HS1207 21). In terms of cotton seed oil cake (HS2306 10) SADC is a net exporter and it exported a total of a value of $254,5 m (278 000 tonnes) and imported a value of $20,1 m (73 766 tonnes).

4.2.2.7 Oil seeds - Groundnuts

4.2.2.7.1 Regional context for the selection of the commodity as a potential value chain

Table 32: Intra-SADC exports of groundnuts versus imports from RoW

Product	Intra-SADC Exports (USD)	Intra-SADC Exports as % of total SADC Exports	RoW Imports (USD)	RoW Imports as % of total SADC Imports
Groundnuts, whether or not shelled or broken (excluding roasted or otherwise cooked) (HS1202)	15 042 000	37,0%	30 363 000	65,76%
Groundnut oil and its fractions, whether or not refined, but not chemically modified (HS 1508)	775 000	62,4%	238 000	20,8%

Footnote: Average amounts for the period 2015 to 2017; ROW – rest of the world; Please note that cotton seed is an oil seed.

Intra-SADC exports of groundnuts (HS1202) averaged $15 m between 2015 and 2017, accounting for only 37% of total SADC exports. This suggests that very little of SADC's export capacity is being utilised

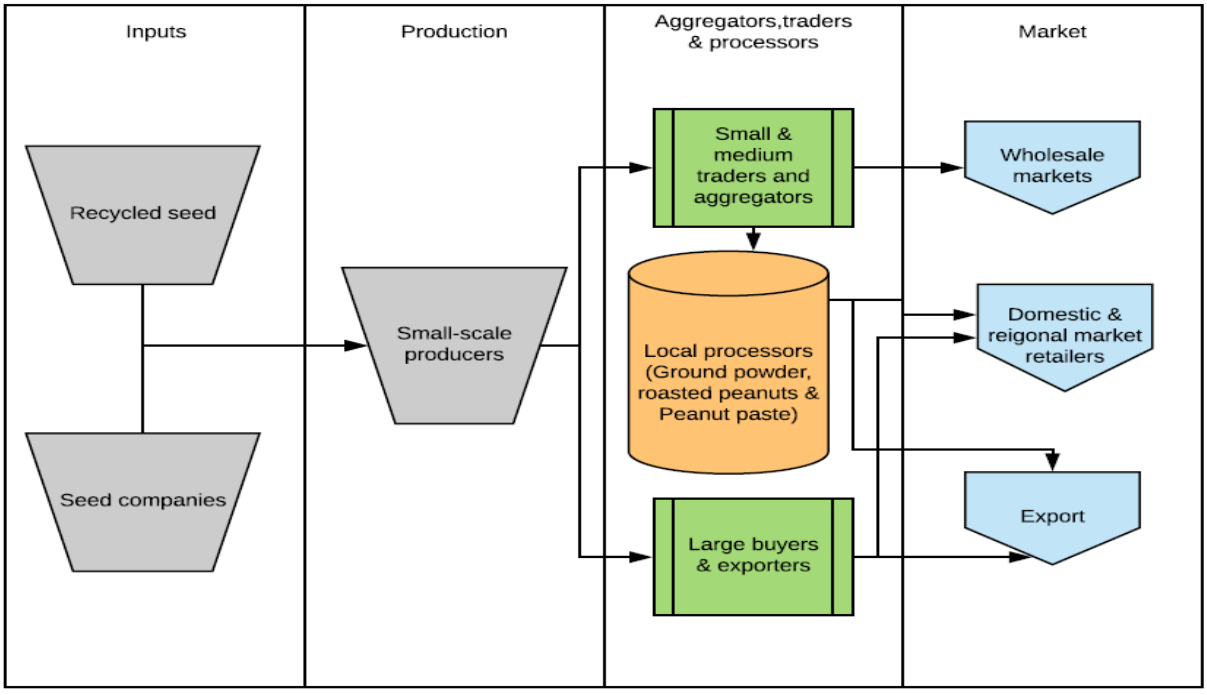
to meet regional demand. Meanwhile, SADC averaged $30,3 m in imports from the RoW over the same period (accounting for 65% of total SADC imports) which suggests that the demand for groundnuts is much higher than what is being exported regionally. Given how small intra-regional exports are, as well as SADC being a net importer of groundnuts, this suggests that SADC is prioritizing foreign export markets over regional demand. The top producing countries for groundnuts in 2016 were Tanzania (550 000 tonnes), DRC (421 000 tonnes) and Mauritius (275 070 tonnes).

Similarly, intra-SADC exports for groundnut oil (HS1508) averaged $775 000 over 2015 – 2017 (62,4% total exports) while imports from the rest of the world averaged only $238 000 (20% of total imports). The import and export figures for ground nut oil are lower overall, as groundnuts are the more valuable commodity. As a whole, imports from the RoW are relatively low, while intra-regional exports are relatively high suggesting that regional demand is being largely met by regional production, with a small surplus being exported outside of SADC. The top producing countries for Groundnut Oil in 2014 were Angola (42 793 tonnes), Malawi (30 600 tonnes) and DRC (20 316 tonnes).

A considerable shortfall in production of various types of groundnuts occurs in SADC countries and therefore large quantities are imported for processing in ultra-high value snack products. The processing of groundnuts into chocolate and caramel products is relatively simple and highly profitable. However, the correct varieties should be produced as required by the markets.

4.2.2.7.2 Value chain diagram

Figure 11: Groundnut value chain diagram



4.2.2.7.3 Primary inputs

Inputs for the production of groundnuts, other legumes and most other oil crops are either sourced via international corporations with representation in member states. Some input suppliers are from the region itself, while many international companies have their regional representatives based in either SA or some adjacent East African neighbouring states.

Multinational corporations dominate the supply of inputs in general but use smaller intermediaries operating as agrodealers to smallholder and subsistence farmers. Many of these input manufacturers are based in the region but many imports also occur from the Far East. Some of the agrodealers and larger business entities in the region also distribute production and processing equipment in the farming areas.

The suppliers of other types of production inputs, such as irrigation equipment, farm machinery and processing equipment has also been identified in the maize section. Most of the leading firms have been identified and listed in Appendix M.

4.2.2.7.4 Markets

There is good market demand in the SADC region and in recent years there has been production shortfalls. During the period 2015 to 2017, SADC has been a net importer of groundnuts with the ROW – the average negative trade balance was $4,8 m. There is therefore a need to increase regional production of groundnuts – the same as the rest of the oil seed crops and oil crops as well as legume crops.

- The average values (2015 to 2017) of imports and exports between SADC and ROW for the following groundnut products have been analysed in an effort to determine local production patterns (ITC TradeMap 2019[28]):
- Groundnuts, whether or not shelled or broken (excl. roasted or otherwise cooked)(HS 1202) with a value of $30,4 m were imported from ROW while $15,0 m (37%) was re-exported within SADC. The region exported product to the ROW with a value of $25,6 m and had a negative trade balance of $4,8 m.
- During 2017, SA imported 29 302 tonnes of groundnuts (HS 1202) with a value of $46,4 m and had a negative trade balance of $19,6 m. Other net importers included Tanzania with 11 846 tonnes and negative trade balance of $6,193 m, Zimbabwe with 3 923 tonnes and negative trade balance of $3,4 m and Mauritius with 1 371 tonnes and negative trade balance (also the import value – no local production) of $1,8 m.
- Groundnut oil and its fractions, whether or not refined, but not chemically modified products, whether or not shelled or broken (excl. roasted or otherwise cooked)(HS 1508) with a value of $238 000 were imported from ROW while $775 000 (62%) was re-exported within SADC. The region exported product to the ROW a value of $467 000 and had a positive trade balance of $230 000.
- During 2017, Botswana imported 858 tonnes of groundnuts (HS 1202) with a value of $1,0 m and had a negative trade balance of the same amount (i.e. no local production). Other net importers included DRC with 190 tonnes and an import value of $130 000, Angola with 42 tonnes and an import value $117 000. Form these figures it seems that countries prefer to import groundnuts and then process it themselves than to trade the oil.
- In terms of exports in 2017, Malawi exported 21 949 tonnes with an export value of $19,7 m, SA exported 9 477 tonnes with a value of $12 451, Madagascar exported 27 370 tonnes.

Based on the average exported value between 2011 and 2017, the biggest groundnuts exporter was Madagascar with $32 m over that period and the biggest groundnuts importer was South Africa with $23 m over that period. By comparison, it imported $32 m in 2017, making it the biggest importer in 2017.

Groundnut varieties and types have vastly different nut sizes, flavours and application areas. Although South Africa does not produce sufficient volumes of the Spanish type varieties, the production shortfall cannot be complemented by imports from China, because most of the groundnuts from that country taste badly in snacks and are rather used as colour sorted roasted peanuts. Therefore, the peanut processors are constantly searching for groundnut production of certain varieties from Malawi and elsewhere. The producers have to ensure that they produce the correct types for processing into high value snacks. This creates a good opportunity for better regional trade in SADC countries. If the correct groundnut types are produced in Malawi, Zimbabwe and Zambia, South African and other international companies would

[28] International Trade Centre (2019) Trade Statistics for international Development, Accessed: 23 February https://www.trademap.org/

consider establishing processing facilities in those countries. The end products have extremely high values.

Whereas bulk groundnuts is selling for $1 400 per tonne and $4 200 to $8 400 per tonne in pre-packaged form, the chocolate and caramel coated snacks command prices of $14 300 per tonne. If the primary producers can participate in that downstream value chain, they would benefit considerably. It can be accomplished with proper structuring of new medium-scale ventures. Groundnuts should be graded, roasted, packaged and sold into the lucrative peanut market.

Groundnuts have the peculiar reproductive habit of pushing its pollinated flower bases with their embryonic pods into the soil and develop pods below the soil surface. A conventional practice has been for groundnut producers to use hoes or tractors to pile some soil onto the bases of the groundnut plants, with the intent to assist the crop with the development of the pods underground. However, it is common knowledge that with that earthing action, soil lands on the lower leaves of the plants and allows fungi, namely *Aspergillis flavus* and *Aspergillis niger* to develop and produce a highly toxic substance called aflatoxin, a potent liver toxin. It infects groundnut pods and is highly unwanted in the food industry. Therefore, groundnuts have to be colour graded meticulously to remove any pods or beans with discolouration which is an indication of aflatoxin infection.

4.2.2.8 Legumes – Dried beans

4.2.2.8.1 Regional context for the selection of commodity as a potential value chain

Table 33: Intra-SADC exports of dried beans versus imports from RoW

Product	Intra-SADC Exports (USD)	Intra-SADC Exports as % of total SADC Exports	RoW Imports (USD)	RoW Imports as % of total SADC Imports
Dry bean products				
Dry beans - Fresh or chilled beans 'Vigna spp'., 'Phaseolus spp .', shelled or unshelled (HS0708 20)	3 787 000	34,5%	2 113 000	38,5%
Dried beans – Vigna mungo - Dried, shelled beans of species "Vigna mungo [L.] Hepper or Vigna radiata [L.] Wilczek", whether…(HS0713 31)	9 197 000	31,0%	1 628 000	12,2%
Dried, shelled kidney beans "Phaseolus vulgaris", whether or not skinned or split (HS0713 33)	3 296 000	16,5%	48 612 000	93,5%
Other dried beans - shelled - Dried, shelled beans "Vigna and Phaseolus", whether or not skinned or split (excluding beans... (HS0713 39)	5 912 000	22,6%	26 624 000	82,31%
Dried, shelled broad beans "Vicia faba var. major" and horse beans "Vicia faba var. equina... (HS0713 50)	190 000	45,3%	226 000	9,9%

Footnote: Average amounts for the period 2015 to 2017; ROW – rest of the world; Please note that cotton seed is an oil seed.

While the processing of beans in SADC is currently limited, there is potential to develop canning capacity in other SADC member states that could create new employment opportunities. Cross-border trade will have to be explored and exports to international destinations could be a possibility if firm capacity to process and package is developed, and regional linkages between key actors are established.

Intra-SADC exports of dried, shelled beans (comprised of HS0713 31, HS0713 33, HS0713 39 and HS0713 50) averaged $18,6 m between 2015 and 2017, accounting for only 24,4% of total SADC exports. This suggests that very little of SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged $77 m in imports from the RoW over the same period (accounting for 77,1% of total SADC imports), which suggests the majority of SADC's import demand is being met by imports

from outside of the region. Given how small intra-regional exports are, as well as SADC being a net importer of dried, shelled beans, this suggests that SADC is prioritizing foreign export markets over regional demand. Similarly, Intra SADC exports for fresh dry beans (HS0708 20) averaged $3,8 m over 2015 – 2017 (34,5% total exports) while imports from the rest of the world averaged only $2,1 m (38,5% of total imports). Given how small both intra-regional exports and imports from the RoW are, this suggests that the regional demand for dry beans is relatively small and is being met by using a small fraction of SADC's export capacity as well as some small amount of imports from outside of the region. The top producers for dry beans are Tanzania (1 158 039 tonnes), Angola (367 255 tonnes) and DRC (222 694 tonnes).

Dry beans do not have much value-added possibilities except for harvesting and packaging into retail-size packaging for consumer markets in both rural and urban markets. Beans and legumes are, however, some of the most underrated foods. They are excellent sources of dietary fibre, protein, B-vitamins and many other important vitamins and minerals. The beans can also be cooked or processed at home into bean soup, which is a popular protein rich meal.

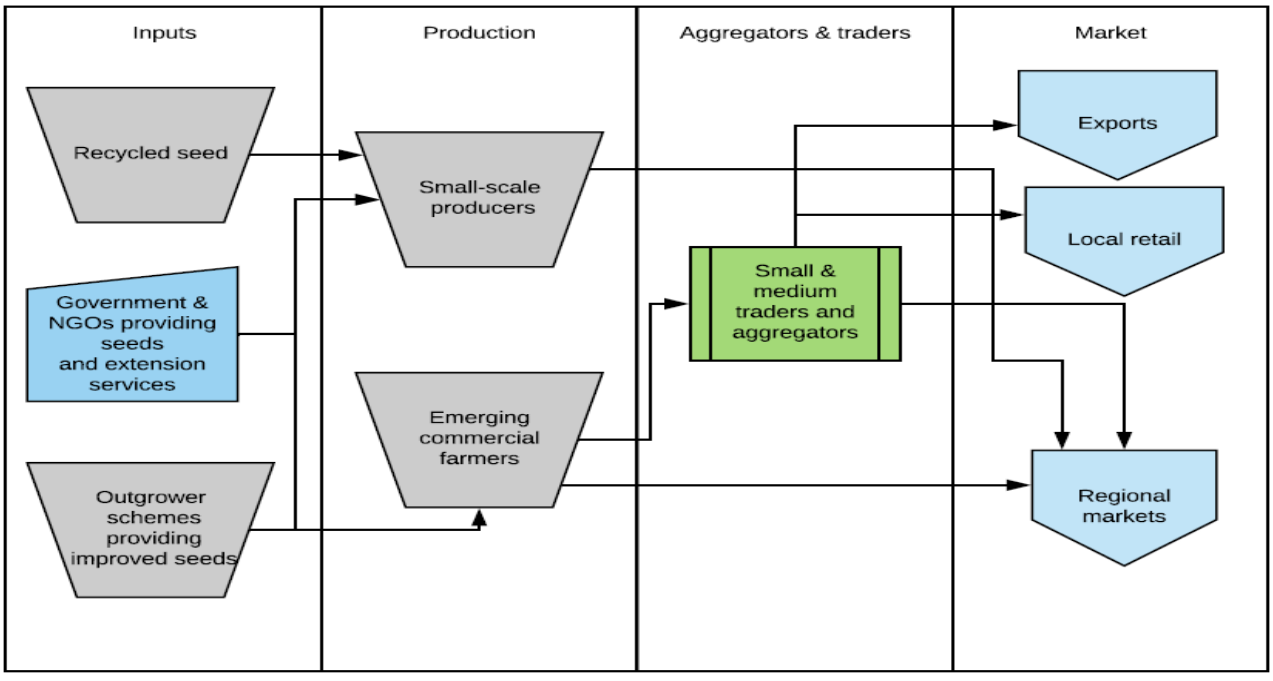
There is potential to enhance dry-bean processing by canning activities. The processing of dry beans into baked beans and then canning it, is a relatively simple manufacturing process. Tomatoes puree is being used in the caning of beans and the demand could stimulate tomato production. Technology systems exist and it is possible to establish small canning operations. However, scale is important and therefore sizable investments are needed to establish the production of beans, tomatoes, canning operations, packaging, labelling and trading across borders of member countries. Canned beans have a long shelf life and could be easily distributed through the sprawling supermarket chains in the region.

It should be noted although dry beans are an important crop, it has limited processing applications and the value-adding chain is relatively short. The opportunities for small-scale farmers to share in value adding are limited, mainly due to limited amounts of value-adding processes.

Most of the processing of beans is currently being conducted in SA but there is potential to develop canning capacity in other SADC member states that could create new employment opportunities. Cross-border trade will have to be explored and exports to international destinations could be a possibility, but manufacturing entities should be internationally be able to compete.

4.2.2.8.2 Value chain diagram

Figure 12: Dry bean value chain diagram



4.2.2.8.3 Primary inputs

The position with input materials such as fertilizer, lime for dry bean production is similar to that with the other legume and oilseed crops. The exception is that new Rhizobium and Bradyrhizobium species of beneficial symbiotic bacteria have been developed and the inoculation of the seeds of dry beans, soybeans and groundnuts with those eliminate the need for expensive nitrogenous fertilizers, with resultant reduction in production cost. Specialised dry bean seed suppliers provide special virus free selections, while many farmers can replant their own seed harvested the previous season.

Inputs for the production of dry beans, other legumes and most other oil crops are either sourced via international corporations with representation in member states. Some input suppliers are from the region itself, while many international companies have their regional representatives based in either SA or some adjacent East African neighbouring states.

Multinational corporations dominate the supply of inputs in general but use smaller intermediaries operating as agrodealers to smallholder and subsistence farmers. Many of these input manufacturers are based in the region but many imports also occur from the Far East. Some of the agrodealers and larger business entities in the region also distribute production and processing equipment in the farming areas.

The suppliers of other types of production inputs, such as irrigation equipment, farm machinery and processing equipment have also been identified in the maize section. Most of the leading firms have been identified and listed in Appendix M..

4.2.2.8.4 Markets

Dry beans are compact and transportable when dried and are not as perishable as many other crops. They have a relatively high value per weight. Relatively large volumes move between countries and are imported from India and other African countries further north, depending on the production conditions which have been experienced in different parts of SADC. Contracts can be obtained from baked bean canneries at better prices. It is recommended that the production and marketing of bean crops be promoted at all levels.

In terms of the market in the SADC region it seems like a ‘mixed bag’. Some beans are mostly being imported into the region and SADC is a net exporter. The average values (2015 to 2017) of imports and exports between SADC and ROW for the following dry-bean products have been analysed in an effort to determine local production patterns:

- Dry beans (fresh or chilled) (HS 0713 31) with a value of $2,1 m were imported from ROW while $3,7 m (35%) was re-exported within SADC. Therefore, most of the fresh beans exported within SADC were produced in the region. The region exported product to the ROW with a value of $7,2 m and had a positive trade balance of $5,1 m. It could be speculated that some of these fresh bean exports could have been part of the exports originating from SA and being sold through the supermarket outlets in regional member states.
- Dried beans (shelled)(HS 0713 31) with a value of $1,6 m were imported from ROW while $9,2 m (31%) was re-exported within SADC. Therefore, most of the beans exported within SADC were produced in the region. The region exported product to the ROW with a value of $20,5 m and had a positive trade balance of $18,8 m.
- Dried kidney beans (shelled)(HS 0713 33) with a value of $48,6 m were imported from ROW while only $3,3 m (16,5%) was re-exported within SADC. Therefore, most of the beans were imported for own consumption within member states and mainly because of a shortage in supply. The region exported product to the ROW with a value of $16,7 m and had a negative trade balance of $31,9 m.
- A similar situation emerged from other dry beans (shelled)(HS 0713 39) with a value of $26,6 m were imported from ROW while only $5,9 m (23%) was re-exported within SADC. Therefore, most of the beans were imported for own consumption within member states and mainly because of a shortage in supply. The region exported product to the ROW with a value of $20,2 m and had a negative trade balance of $6,3 m.

From the above four groups of dry beans described, it seems that there is a $14,4 m negative trade balance – implying that the SADC region is importing more from the ROW than what is being produced within the region. This indicates that more could be done to enhance dry bean production in the region.

4.2.2.9 Challenges and opportunities

The following challenges and opportunities have been identified in terms of the legumes and oil seed subsectors. The information below was augmented with findings of the World Bank (forthcoming 2019).

Challenges

Soybeans: Most of the inputs for soybean production have to be imported in some countries – seed, fertiliser, etc. Certified soybean seed is expensive and therefore farmers use recycled seed, which has a negative impact on the levels of production. The soybean market has been described as volatile and unstructured in one of the MS. Quality issues have been experienced with high levels of moisture and dust in some soybean sourced from farmers. There seems to be low levels of production of soybean cake and poor quality of production – most probably due to insufficient processing facilities and weak levels of demand.

Sunflowers: In one MS where sunflower production has been neglected, it was stated that farmers 'have forgotten' about the crops and its value – this trend was perhaps also a result of the absence of extension services that should have 'reminded' farmers of the value of sunflower and the production of sunflower oil. In order to promote the cultivation of sunflower a need was identified for inputs to be more readily made available, while investment is needed to 'make this happen'. There are no new varieties of sunflower seeds unless imported and imported seeds are very expensive. At the same time there is a lack of market information on the demand for sunflower and its processed products.

Groundnuts: Specific challenges have been identified that foliar fungal diseases are expensive to control and the presence of aflatoxins in groundnuts restricts exports. It was identified that there is a lack of the correct plant varieties, which limits market opportunities as the two available varieties are not best suitable for the international market. It was also found that farmers use recycled virus-infested seed that leads to low yields and poor quality products. It has been found that processing of groundnuts for some domestic markets is not financially sustainable. In some MS it was found that production costs were too high to be financially sustainable – mainly due to high labour costs of handling the harvest. Groundnut oil is expensive in view of the relatively high value of the groundnuts for eating purposes the price has been undercut by sunflower oil and soya. In some countries there was a lack of awareness of the danger of aflatoxins and the ways to mitigate the condition.

Crosscutting: In some of the MS a 16% value-added tax (VAT) applies on legumes, cooking oil and other edible oils that drives up the prices of locally-produced products. It has a negative impact on the industry's competitiveness against cheaper imports. According to some stakeholders in some seasons an oversupply of product occurs while other stakeholders in the same country indicated that demand was not met – demonstrating a lack of domestic market information. The lack of infrastructure, especially the availability of storage facilities, leads to high post-harvest losses and contamination.

Opportunities

Soybeans: In recent years soybean strategies and development plans have emerged to support regional value chain development. The crop has a strong potential to have a developmental impact because an estimated 20% of registered production is currently coming from smallholder farmers. Although soybean production is low, there is an opportunity for increasing productivity through contract farming.

Groundnuts: New groundnut varieties are becoming available, representing an opportunity for increased trade and hopefully also increased productivity. In the production of groundnuts, less inputs are needed if compared to other oil crops, apart from expensive fungal disease control. South Africa has a shortage of groundnuts and is constantly looking for new sources of supply, but importers and traders are interested in good quality products that are free from aflatoxins for the domestic consumer market.

Drybeans: The production of this crop can be enhanced with better production techniques, especially the inoculation of seed with new Rhizobium bacteria races which have lately been isolated. This can boost the yield. Contracts can be obtained from baked bean canneries at better prices.

Sesame: This is an ideal crop for smallholder farmers to produce – it is labour intensive and provides an opportunity for communities to become part of down-stream processing activities. Sesame is a popular input in the baking industry and there is demand in export markets.

Crosscutting: With rural oil pressing in small mechanical presses, the smallholder farmers can gain much and participate in the downstream value of the cooking oil. Contracting or toll manufacturing is an alternative way to approach processing. It is an arrangement through which one company uses its own specialised processing equipment to produce oil for a farmer – also known as 'contract manufacturing'.

It should be noted that opportunities for each of the value chains identified have been addressed in the Phase 2 of the study i.e. 'High-Level Value Chain Assessments'.

In terms of a regional assessment the following constraints have been identified for the oil seed subsector in terms of regional value chain development (World Bank, forthcoming):

- The production and processing systems were fragmented.
- There was a lack of policy and regulatory frameworks in several member states.
- It was found that there were price distorting policy regimes.
- Industry organisations are uncoordinated.
- Limited information available – except for Tanzania and South Africa.
- Limited or no exchange of information between associations and co-operatives.
- The lower FAO oil seeds price index may also reflect high production levels of the largest soybean producers.

In the same assessment, the following constraints were identified with regard to the soybean sector in the region:

- Poor extension services for small-scale farmers – specifically in Zambia and Zimbabwe.
- Limited access to low-cost inputs.
- Challenges finding markets outside SA for downstream products.
- Unpredictability to policies related to soybean.
- Inconsistencies regarding taxation.
- Export bans and government support for competing crops.
- Challenges regarding an environment that is not conducive to the development of regional value chains
- Extensive regional collaboration is needed to enable RVCs to become a reality.

4.2.2.10 Conclusions and recommendations

It could be assumed that second to cereals, oil seeds and legumes are the most important group of food crops to provide adequate nutrition to the inhabitants of the SADC region. Most of these crops have to be processed before it can be consumed, and it provides a significant proportion of the protein and energy requirements of the world population. During the 2015-2017 period SADC had a negative trade balance for soybeans (HS1201), soybean oil (HS1507), sunflower seeds (HS1206), groundnuts (HS1202), crude sunflower seed oil (HS1512 11), crude cotton oil (HS1512 11), cotton seed for sowing (HS1207 21). dried beans (HS0708). However, the region had a positive trade balance for groundnut oil (HS1508), dried beans (HS0713), sesame seed (HS1207 40) and sesame oil (HS1207 50), cotton seed (HS1207 20 and HS1207 20), cotton oil cake (HS2306 10). In terms of the volumes and value it is difficult to perform exact calculations because not all the products have been listed here. It could be concluded that much of what has been imported during the 2015-2017 period could be produced in the region. Volumes of some crops have increased in the region in recent years e.g. South Africa has increased production of soybeans from 1 070 000 tonnes in 2016 to 1 550 800 tonnes in 2018. Due to the high rate of utilisation of soybeans by

the country in especially animal feeding, it could lead to less imports in the region and therefore impact the overall deficit of SADC.

Soybeans: In view of the generally favourable growing conditions for soybeans in many SADC countries, soybean production and processing can assume large proportions and increased trading within the region. Soybeans and oilcake form the backbone of protein feeding of chickens, pigs and cattle and the production of soybeans should receive strong focus from primary production to downstream processing. Many of the processes are relatively simple and can be conducted at primary production level, such as small-scale oil pressing and marketing, roasting of the beans for full fat soya as well as roasting of oilcake. Even margarine production is within the reach of small to medium-scale producers. Cotton seed, sun-flower and other oils are a parallel to soybean oil. Cotton oilcake also needs heating to destroy the harmful gossypol, while sunflower oilcake does not require the same processing.

Sunflowers: Although sunflower seed from the farms could be traded, the value could be enhanced if the seed is processed to oil – increasing the farm-gate value if processed at point of production. There is need to commercialise the value chain, capacitate farmers to improve production practices and gain a better understanding of market needs. Improved technologies could have a positive impact on the incomes of sunflower growers and traders. Technologies may include the use of first generation seeds, fertilisers, fungicides or other inputs. Governments should enforce seed laws against those who knowingly contaminate seed and sell counterfeit seed. A need has been identified to establish and strengthen producer and trade associations in the value chain to increase their bargaining power. There is also a need to facilitate access finance and input supply services.

Sesame: The crop has limited levels of production in the region because production processes are expensive to mechanise, hence it is labour intensive and therefore high labour costs. However, Tanzania is the largest producer in the region and successfully exports sesame seed and sesame oil – mostly to international export markets. It is also an ideal smallholder crop and is successfully produced in the region. There is international demand for the product, and it is relatively scarce. It is a crop of which production can be pursued by other countries but there must be a focus on export opportunities and provision of good quality standards.

Groundnuts: There are various varieties and types that have vastly different nut sizes, flavours and application areas. There is a demand in the region for the Spanish-type varieties with even sized kernels and there is usually a production shortfall. Consumers in the region do not have a preference for snacks produced from the groundnuts from the Far East. There is a potential to produce more Spanish varieties for the local consumption and processing. Post-harvest handling of groundnut production is also labour intensive, and some commercial farmers shy away from producing the crop. The largest groundnut producer in SA (6 000 ha) at one stage contracted smallholder farmers in the Gambia to produce product for the region. The product also lends itself to value-addition activities like chocolate and caramel coated snacks. Shortfalls cannot be complemented by imports from China, because most of the groundnuts from that country taste badly in snacks and as colour sorted roasted peanuts. Therefore, the peanut processors are constantly searching for groundnut production of certain varieties from Malawi and elsewhere. The producers have to ensure that they produce the correct types for processing into high value snacks. This creates a good opportunity for better regional trade in SADC countries.

If the correct groundnut types are produced in Malawi, Zimbabwe and Zambia, South African and other international companies would consider establishing processing facilities in those countries. The end products have high values. Groundnuts should also be graded, roasted, packaged and sold into the lucrative peanut market. The product lends itself to regional VCs in terms of production, processing and value-addition activities.

Dried beans: In terms of this group of legumes there are opportunities to trade within the region and buy from regional producers rather than importing from outside the region. This could be a result of existing clients in RoW that are being serviced by current export activities. However, it could also be a result of poor market information systems in the SADC region. Improved market information systems to gather

and disseminate data could enhance regional trade flows and support regional value chain development. Due to the inherent nature of legumes, the value-add potential is limited but processing opportunities exist for canning of beans. Regional value chain potential is limited due to the nature of the product and the limited alternatives to add value. Improved information flows could enhance intra-SADC trade opportunities for countries with product and those importing due to a lack of production capacity. The trade patterns are also highlighted by the fact that there is room for an increase in production volumes through planting more areas but also improving productivity by using improved inoculated seeds. Canning of beans for potential regional and international export markets creates an opportunity to be considered. From the research that was conducted it transpired that some producers in the region found it difficult to compete with imports from the region.

Crosscutting: The following recommendations have been proposed for the soybean industry in one of the MS but have application across most of this group of oil seeds and legumes, comprising: Creation of a comprehensive database of daily, weekly and monthly price, output, imports and exports; Financing of farm and processing operations - farmers require special financial institutions and banks to address the particular needs of farmers through special concessionary interest rates to promote the expansion of production; Technology upgrading in processing plants by large established processors whose technology has now become obsolete; Irrigation upgrading and consistent input supply to improve soybean yields.

There is evidence that some of the oil seeds are actively being traded within the region such as 88% of the exports of soybeans (HS1201), 96% of soybean oil (HS1507), 93% of cotton seed (HS1207 20) and 66% of oil cake (HS1208) are being exported within the region to fellow MS. These value chains need to be strengthened to ensure higher efficiencies. All types of oil seed cake have potential to be traded in the region due to the high demand for the production of animal feed. There are other crops like sesame seed and oil that is more focussed on international markets while dried beans and groundnuts are currently more focussed on domestic markets. However, regional opportunities for trade exist for the export and processing of groundnuts and dry beans (canning).

4.2.3 Cotton

4.2.3.1 Overview

Several thousands of farmers are involved in cotton growing in the SADC region – in Mozambique alone there are estimated to be about 160 000 cotton producers. Most of the cotton production represents a majority of smallholder farmers. Relatively little of the cotton lint produced in the region is locally processed into yarn, fabrics, coloured materials and garments. Most of the cotton lint is exported to RoW and downstream value-added products, primarily clothing, are re-imported into SADC. Cotton seed is traded between member states for livestock feed and for oil production and has been analysed in the section on oil seeds.

Cotton (Gossypium hirsutum): It is notorious as a crop species as it attracts a multitude of insect types from the seedling stage to the ripening of the bolls. It is one of the crops with the largest number of insect pest types afflicting it, necessitating the use of expensive insecticides, unaffordable to small farmers. Therefore, the seed companies were hard pressed to build systemic resistance to insects into it. As the small-scale cotton farmers of the SADC area do not all have access to seed of genetically modified cotton varieties, the cotton bollworm and other insect infestations annually create havoc with the seed cotton quality. Despite the problems encountered and heavy losses in yield and quality by small cotton farmers, they still deliver large volumes of seed cotton.

If the SADC member countries can manage to develop a uniform policy on the use of genetically modified cotton varieties with built-in resistance to insect pests, the cost of production can be reduced considerably. Then small-scale cotton farming can even become more profitable than maize farming. That implies that crop farming can bring about large-scale improvement in trade across borders**.**

Table 34: Intra-SADC exports of cotton products versus imports from RoW

Product	Intra-SADC Exports (USD)	Intra-SADC Exports as % of total SADC Exports	RoW Imports (USD)	RoW Imports as % of total SADC Imports
Cotton (HS 52)	178 832 000	58,2%	521 978 000	75,4%
Cotton sewing thread, whether or not put up for retail sale (HS5204)	2 308 000	97,2%	2 285 000	47,7%

Footnote: Average amounts for the period 2015 to 2017; ROW – rest of the world

There are various sub-value chains comprising cotton and cotton sewing thread. It should be noted that cotton seed has been addressed under the section dealing with oil seeds.

4.2.3.2 Regional context for the selection of commodity as a potential value chain

The production and processing of cotton in the SADC region presents an opportunity for the further development of a regional value chain. With high imports of garments and other processed cotton products (fabrics), the linking of producers, processors and markets in the region could spark economic growth in the SADC region as a whole.

Intra-SADC exports of Cotton (HS 52) averaged $178,8 m between 2015 and 2017, accounting for 58,2% of total SADC exports. This suggests that a large amount of SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged $522 m in imports from the RoW over the same period (accounting for 75,4% of total SADC imports). Given that such a large percentage of imports come from outside of SADC this could suggest that regional demand is bigger than SADC is able to meet, based on current production levels. However, since 50% of exports are going to the RoW this could also be due to SADC prioritizing foreign export markets over meeting regional demand.

Of this, intra-SADC exports for Cotton sewing thread, whether or not put up for retail sale (HS5204) averaged $2,3 m over 2015- 2017 (97,2% of total exports) while imports from RoW were $2,3 m (47,7% of total imports). This could suggest that regional demand for sewing thread is substantially higher than regional production capabilities, resulting in large foreign imports to help meet the deficit.

In the development of agro-processing activities in the cotton subsector, the leveraging of existing activities would be a key starting point. Cotton processing or ginning in the SADC is well advanced regarding methods and technologies but could benefit from cross border linkages in order to create a self-sustaining value chain, capable of exporting high value finished products beyond the SADC region.

Ginneries belong to large companies which often manipulate the price of the seed cotton paid to the farmers. If the measures recommended by this report are thoroughly considered, rapid improvements in the lives of many of rural people can be accomplished, if provided with the opportunity to share in the lucrative business of ginning and further processing of the cotton seed and other products.

The cotton seed which is a product of ginning has been listed under oil seeds.

The value chains for synthetic fibres utilised in textiles are notorious for being long and having loose standing elements. The lengths of the value chains of natural fibres are even longer. It consists of harvesting the seed cotton, ginning, spinning it into yarn, weaving the yarn into fabrics, colouring the fabrics and treating them to attain certain qualities, cutting it into garment portions and sewing them together.

During the last six decades, but especially during the last three decades, the respective links of the long downstream value chain have been dislodged, mostly through the unthoughtful and rent-seeking activities of some public entities is some countries. As a result, virtually only the primary production has prevailed, together with some other struggling downstream elements and the multitudes of small-scale farmers have been plunged back into the poverty trap. Huge amounts of clothing are dumped onto member countries from China, Vietnam, India, Bangladesh, Pakistan and other Far Eastern countries as a result of porous

borders and non-compliant border officials. As a consequence, numerous industries associated with the textile industry were forced to close and tens of thousands of employment opportunities were lost.

Once the seed cotton has gone through the ginning process, the lint is processed further into yarn. The yarning process is an important driver of certain value chains, as the yarn can be directly processed into T-shirts, knitting yarn, chinos (pants), underwear and towels. In all three of those categories the SADC countries, and especially SA are competitive against imports from the Far East and elsewhere. In SA between 100 000 and 130 000 bales of local cotton lint is being turned into yarn at present. With the initiative to enhance traceability the entire textiles industry has the potential to grow considerably.

A lot of the yarning capacity which existed in the region have closed down due to various reasons. A new plant has recently opened in Mozambique. The remaining local industries plan to replace even more of the imports with locally produced lint. Whereas the percentage of locally processed cotton-based textiles was only 10 percent in 2014 it is already more than 30 percent in 2019. A large part of the above-mentioned garments manufactured in SA are exported into other SADC member countries. The same cross-border trade can happen with the products produced in the other SADC countries.

Apart from yarning, the so-called Cut, Make and Trim (CMT) processes are performed in Mauritius, with the most advanced integrated textile industry as well as Madagascar and SA. The Tai Yuen Textiles company in the town of Mooi River is fully integrated from yarning to selling finished garments, while Da Gama Textiles and The Frame Textile Group were also integrated in the past, but their spinning plants have been closed down recently. Certain other companies in SA are still spinning yarn, with the installation of expensive new plants underway to ensure the achievement of higher quality products.

A strong inhibiting factor for the SADC textile industry is the fact that considerable government support by China, India, Vietnam, Pakistan and others is provided in order to create jobs in their countries and that fact causes major distortion in the production cost structure. It places production and trade, especially cross-border trade in the SADC area at a serious disadvantage against imported products. The high degree of manipulation experienced at harbours and other border posts further aggravates the situation. However, it can be remedied if the SADC countries can cooperate to level the playing field.

Fortunately, various initiatives have recently been initiated whereby the traceability of the cotton can be assured in SA and possibly in other member countries. It is foreseen that once the new initiatives have been pulled off successfully, the downstream value adding elements would be revived once more and localised textile industries can again assume the importance they had in days gone by. The cotton value chain is a prime example where the co-operation between the respective member states can be the cause of prolific cross-border trade between them. That can form the basis of significant economic development from the rural areas through to the urban centres, with exports of popular fabrics and clothing with distinctive African characteristics and patterns.

Apart from the cotton fibre-based industries the coordination of the cotton seed trade, processing into edible oil and oilcake for livestock, can be developed into a significant driver of wealth creation throughout the region.

It can be concluded that cotton is one of the most important crops in the SADC region. Considerable cross-border trade occurs in lint and seed cotton. If traceability can be enhanced, the cotton-based value chain can become a powerful tool in the promotion of cross-border trade and general development.

As the cotton crop is a fairly drought resistant crop and mostly planted under dryland (i.e. rain-fed) conditions, the production and processing of cotton is a stable industry. Should the necessary measures be taken, cotton production can expand on a large scale and seed cotton processing can benefit millions of SADC inhabitants. The member countries should concentrate efforts to ensure traceability of the cotton, in order to promote regional trade and the entire fibre-textile-clothing value chain for the benefit of member countries.

Ginneries belong to large companies which often manipulate the price of the seed cotton paid to the farmers. If the measures recommended by this report are thoroughly considered, massive improvements in the lives of millions of rural people can be accomplished if provided with the opportunity to share in the lucrative business of ginning and further processing of the cotton products. Leading firms in the production of cotton products in the SADC region include Afrisan Ginning (Tanzania); METL Ginning Company (Tanzania) and Alliance Ginneries Ltd (Tanzania).

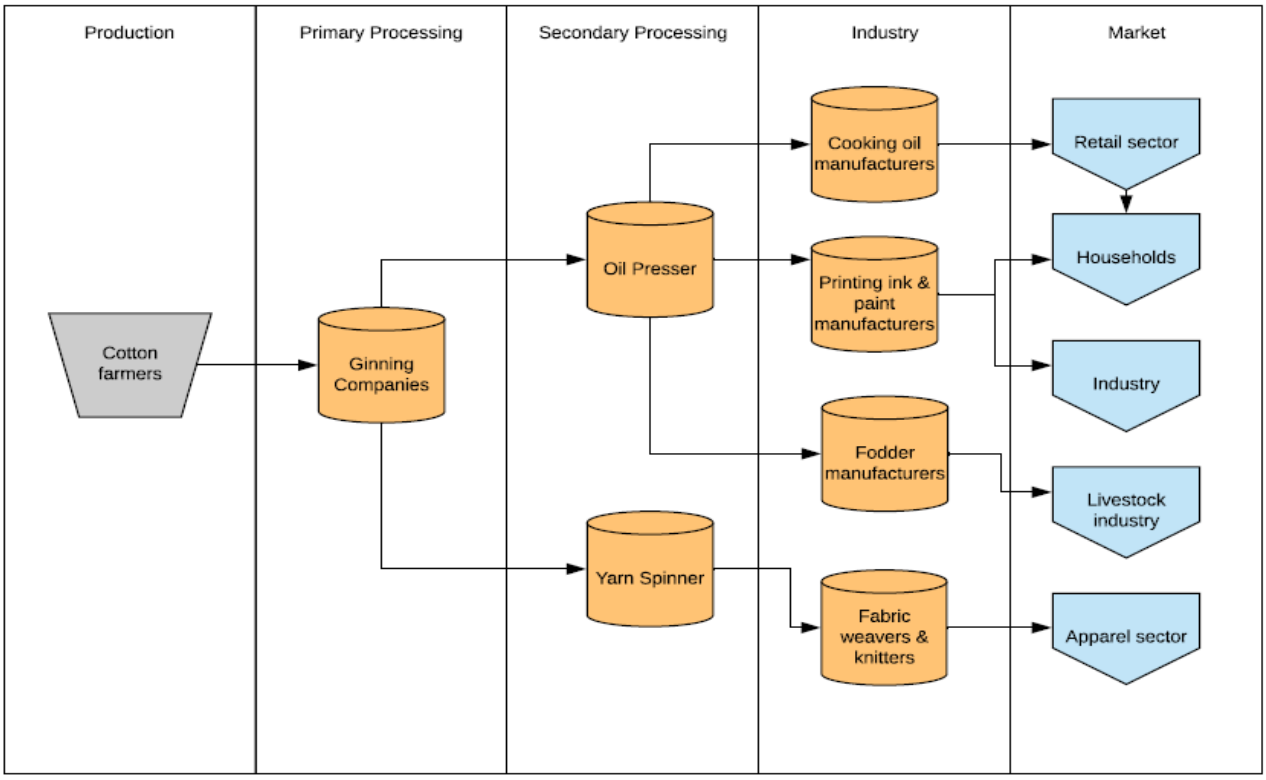
- In most cotton-producing member states there is a lack of clothing and textile industries and therefore limits value addition in-country.
- In most countries, ginneries are operating at low capacity levels.

Cotton is a hardy crop which can withstand moisture stress fairly well. If insect control can be assured with the planting of insect resistant GM varieties, the yields of high-quality fibre seed cotton can be assured. The cotton seed obtained after ginning of the seed cotton, is a valuable source of vegetable oil as well as livestock feed. It is an ideal crop for millions of small farmers in the SADC region.

Data on the volumes that are processed is outdated (where available), and many member-states either do not capture or report such data.

4.2.3.3 Value chain diagram

Figure 13: Cotton value chain diagram



4.2.3.4 Primary inputs

Inputs for the production of cotton are either sourced via international corporations with representation in member states or through cotton buyers (mostly ginners) supply inputs to farmers. Some input suppliers are from the region itself, while many international companies have their regional representatives based in either SA or some adjacent East African states.

Multinational corporations dominate the supply of inputs in general but use smaller intermediaries operating as agrodealers to smallholder and subsistence farmers. Many of these input manufacturers are based in the region but many imports also occur from the Far East. Some of the agrodealers and larger business entities in the region also distribute production and processing equipment in the farming areas.

The suppliers of other types of production inputs, such as irrigation equipment, farm machinery and processing equipment have also been identified in the maize section. Most of the leading firms have been identified and listed in Appendix M.

4.2.3.5 Markets

International markets remain attractive for processed cotton products, driven by the 'skin feel' of the fibres, as opposed to the negative 'skin feel' of many synthetic fibres. Regional textile industries present significant opportunities. In the SADC region, South Africa provides a ready and strong market for the transformation of the value chain into a regional chain.

In terms of cotton (HS 5200) the average exported value between 2011 and 2017, the biggest cotton exporter was Zimbabwe with $116 m over that period. By comparison, it exported $28 m in 2017. Based on the exported value in 2017, the biggest exporter was South Africa with $45 m. Other major exporters in 2017 included Mauritius ($45 m), Tanzania ($43 m), Zambia ($38 m), Lesotho ($28 m) and Zimbabwe ($28 m). Exports of cotton have been in decline across the SADC region as a whole since 2012, with total exports in 2017 valued at $253 m compared to $781 m in 2012.

The region had a negative trade balance with the RoW on average for the period 2014-2017 of an amount of $393,5 m comprising of 75% of its cotton-based products imported. SADC is a net importer of mostly processed cotton products during 2017 such as:

- Woven fabrics of cotton containing >= 85% cotton by weight and weighing <= 200 g/m² (HS5208) - $272,6 m
- Cotton, neither carded nor combed (HS5201) - $127,5 m
- Woven fabrics of cotton, containing >= 85% cotton by weight and weighing > 200 g/m² (HS5209) - $126,4 m
- Cotton yarn other than sewing thread, containing >= 85% cotton by weight (excluding that put . . . (HS5205) - $109,5 m
- Woven fabrics of cotton, containing predominantly, but < 85% cotton by weight, mixed principally . . . (HS5206) - $47,0 m
- Woven fabrics of cotton, containing predominantly, but < 85% cotton by weight, mixed principally . . . (HS5211) - $39,2 m

During 2017 the SADC region imported a total value of cotton products (HS52) for an amount of $757,9 m and the biggest importer was South Africa with an amount of $183,0 m, Mauritius - $171,3 m, Madagascar - $117,3 m, Lesotho - $95,2 m and eSwatini - $64,1 m. Except for South Africa, the rest of these countries are processors of cotton and also export cotton products manufactured in these countries – although all of them still have a negative trade balance in cotton.

During 2017 SADC had an overall negative trade balance of $457,4 m but countries that had a positive balance of trade was Zambia - $36,7 m, Zimbabwe - $29,6 m, Tanzania - $29,6 m and Mozambique - $4,0 m. The rest of the SADC states all had a negative trade balance with the RoW.

Overall countries with high import needs for cotton and low national production include South Africa, Madagascar and Mauritius, suggesting these are potential export markets for the major cotton producers (Tanzania, Zimbabwe, Malawi, Zambia and Mozambique). However, declines in production across the region since 2012 show that investments need to be made to strengthen cotton production in these countries so that they are able to respond to export demands. It is noticeable that the amount of value added during the respective processes varies but is in general high. For simple processes such as the weaving of T-shirts, towels and others directly out of yarn, the amount of value added is lower than for garments where cutting, trimming and sewing is done, but the profit margin can still be considerable, bearing in mind the much lower capital deployment with direct weaving.

4.2.3.6 Challenges and opportunities

In most countries in the SADC region there are opportunities to develop the cotton industry along the value chain – from farm-level production to ginneries to produce lint, yarning, weaving, knitting, finishing (colouring) and then to CMT (cut, make and trim) of clothing.

Challenges

Primary level production: The low level of productivity amongst smallholder cotton farmers is a challenge and poor quality seed is one barrier to productivity. The practice of side-selling by primary producers of seed cotton, produced with financial support of ginneries, is widespread and a number of pricing issues also exist. A need has been identified for both technical and infrastructure support to farmers in an effort to develop the primary production subsector of the cotton industry. The procurement of good quality seed is a challenge and governments have been requested to provide support to cotton producer organisations to procure seed on their behalf. In one of the MS only 38% of the cotton areas is under production. An important barrier to smallholder development is the fact that primary producers seldom own a share in the facilities that are processing cotton e.g. cotton ginneries.

Processing: Most ginneries in the region operate at a low capacity and the region has a low capacity for spinning/yarning, weaving and knitting. A limited number of clothing and textile factories exist in the SADC region which limits in-country value addition. A fair amount of the spinning/yarning capacity that existed in the region two decades ago have ceased to exist and few ginneries in the region are still active. There is a need for new investments to be made and existing cotton processing facilities need to be upgraded. The same applies to the textile industry that has generally gone backwards and now requires investment in new technology which will enable it to compete with imports into the SADC region from the Far East. One of the island states recently shifted their very efficient CMT facility to another SADC MS that has lower labour rates – all in an effort to remain competitive. The processing industry is also in need of capacitating management and technicians with the necessary skills.

Markets: Some intermediaries in the cotton industry find it easy to manipulate the producer prices and many of the farmers are underpaid for their seed cotton. Some commodity trading companies work backwards in determining the prices that farmers should get for their product – making farmers to bear the risk of international price and currency fluctuations. There is a need to create hedging mechanisms to introduce stability and predictability in the market. A lot of raw cotton (seed cotton) is being exported without any in-country value-addition processes. A need has been identified for the creation of a joint-venture to process cotton, produce textiles, manufacture clothing and lead the marketing operations – an integrated cotton value chain. Cheap clothing imports from South Asia (India, Pakistan and Bangladesh), South East Asia (Vietnam) and the Far East (China) makes it difficult for the local cotton-processing and the clothing industries to compete. The textile and clothing industries in many of these countries mentioned are subsidised by their respective governments and cause major distortion in the cost of production.

Opportunities

Primary level production: In one of the MS only 38% of the traditional cotton areas is currently under production and has the potential to increase levels of production. Cotton is a crop which is fairly easy to cultivate in areas with a relatively high rainfall. It is a popular crop in most MS and many smallholder farmers are familiar with the production of the crop. With certain structural adjustments of the cotton industry in the region it is possible that the production of cotton can increase dramatically. It was found that some producers are paid up to 40% below the accepted world price. It is possible that primary producers can become shareholders in processing facilities such ginning and seed processing entities. In this way farmers can benefit from the sales of the cotton seed, cotton oil and duff by being part (e.g. shareholding) in processing and value-addition processes.

Processing: Second-hand cotton ginneries are available on the international market and can be deployed in many SADC countries. With an inclusive approach to farmer development, the correct structuring,

shareholding and financing of these ginneries, primary producers can become part of the down-stream value chains. Such an initiative can bring about considerable increase in the wellbeing of many smallholder farmers in the region.

Markets: Internationally cotton prices have appreciated in recent years. South Africa provides a ready and strong market for the transformation of the value chain into a regional chain.

The opportunities have also been addressed in the phase 2 of the study i.e. 'High-Level Value Chain Assessments'.

4.2.3.7 Conclusions and recommendations

Conclusions

Primary-level production: Cotton production is not at an optimal level due to various reasons such as poor quality seed and with farmers having low productive capacity, there is an opportunity to enhance production at the same time. Side-selling activities break down the trust of off-takers that supply inputs in advance with the undertaking that farmers will supply product by the end of the season. Rural infrastructure is a need in the rural areas and is an inhibitor of the development of the cotton industry. Access and affordability of good quality inputs is a challenge – seed, fertiliser, crop protection chemicals, equipment (knapsack sprayers), etc. Not all cotton-production areas are being utilised. Cotton farmers do not benefit from downstream value-addition activities. Farmers do not have access to finance. Cotton is an easy crop to grow and production techniques are familiar to many producers. It is possible to enhance the level of production given the supply of good inputs and extension services. Innovative and inclusive models for development could be structured in such a way that smallholder farmers share in the downstream benefits of cotton processing.

Processing: Cotton processing facilities and textile manufacturing in most of the region is in a poor state and in dire need of investment and upgrading. Many of these facilities cannot obtain enough seed cotton to process. Second-hand ginneries are available on the international markets that could support local processing capacity.

Markets: International price and currency risks are carried over by intermediaries to cotton farmers. There is need for a hedging scheme to be developed with predicable pricing mechanisms. Cotton processing entities cannot compete with subsidised cotton-based products that are being imported from Asia – especially due to the poor state of processing facilities.

Crosscutting: Business environment must be conducive for investments to happen. Development of agricultural development entities that are private-sector driven could mobilise funding for the following aspects: mechanisation services; purchases of lime and fertilizer; acquiring seed of insect resistant GM varieties; acquiring shareholding in additional cotton ginneries and provision of operational costs of primary production and processing.

Recommendations

Cotton farmers need to be capacitated through extension services and training by both government and private sector actors – ginneries and other intermediaries. Governments could encourage private sector investments into the input-supply sector to ensure the availability of reasonably-priced seed, fertiliser and other inputs. Legislation should be enforced to curb side-selling activities and other rent-seeking activities. Public investments should be considered in rural infrastructure such as roads, storage facilities and markets. There is a need to develop policies to regulate uncompetitive practices by large cotton buyers, intermediaries and processors – also addressing price-forming mechanisms. Guidance could be provided to private sector investors to consider shareholding and empowerment mechanisms for farmers to benefit from downstream-processing activities through possible shareholding schemes. Governments could consider tax incentives to investors into the cotton industry – new ginneries and spinning facilities. To ensure foreign direct investment there is need for business friendly environment that support private sector investment. Create Public-Private-Producer-Partnerships (including cotton farmers) through the

creation of platforms to discuss mutual interests and policies. Governments could help to ensure that there is predictability of policies and implementing disruptive policies should be avoided. Create agriculture development entities that could lead development of commercial and small-scale development in the promotion of cotton production.

Overall SADC is a large net importer of mostly processed cotton products of a wide variety. The region has the potential to produce higher volumes of raw cotton (seed cotton) and at the same time it has the potential to process cotton through the different phases of the value chain. The solution is not a quick fix but a combination of various inhibitors that need to be assessed in a systematic way. Government-subsidised cotton processing, textile and clothing products from Asia have flooded the regional markets and local industries have not been able to complete effectively.

To turn the cotton industry around is possible and has recently been demonstrated in the South African cotton industry. The government has supported the development of an Integrated Supply Chain Program that increased cotton sales from a mere ZAR 21,7 m in year 1 of the project to a ZAR 6,8 bn in year 5; jobs created increased from 1 179 over the period to 7 224, 600 SMEs were involved over the period and the number of cotton bales increased from 95 000 to 400 000 bales of cotton. The Sustainable Cotton Cluster was formed and the whole supply chain collaborated – from farmers to the retailers. A vertically integrated supply chain was developed, and a comprehensive traceability system was implemented. The farmers that participated in the project comprised both smallholder and commercial farmers (IQ Logistica Thentic 2017[29]).

4.2.4 Biomass

4.2.4.1 Overview

In almost all of the SADC member countries a strong need exists to selectively remove millions of hectares of smothering encroaching bush thickets to break their stranglehold on natural grazing. Synergies could be developed for member states that experience the same challenge. Available harvest and process technology is available and could be shared. Useful products can be produced, and large numbers of rural job opportunities created.

It should be noted that this is a new value chain opportunity that is still being developed. Therefore, data on existing trade and markets is limited and examples on regional value chains are limited. The opportunity to develop regional value chains from excessive biomass is still being investigated and benefits and costs are evaluated.

The products being delivered could be exported within the region or even to international markets. The processing of unwanted and excess biomass could be creating cross-border trade opportunities. Namibia has been exporting large volumes of packaged (5 kg) bags of high-quality charcoal to SA and abroad.

Table 35: Intra-SADC exports of charcoal and methanol versus imports from RoW

Product	Intra-SADC Exports (USD)	Intra-SADC Exports as % of total SADC Exports	RoW Imports (USD)	RoW Imports as % of total SADC Imports
Charcoal				
Wood charcoal , incl. shell or nut charcoal (HS 4402)	9 889 000	24,6%	2 253 000	18,3%
Methanol				

[29] IO Logistica Thentic (2017) Who we are and what we do, A presentation, Centurion, 1 June.

Product	Intra-SADC Exports (USD)	Intra-SADC Exports as % of total SADC Exports	RoW Imports (USD)	RoW Imports as % of total SADC Imports
Methanol (HS 2905 11)	1 066 000	35,2%	8 276 000	87,0%

Footnote: Average amounts for the period 2015 to 2017; RoW – rest of the world

There are various sub-value chains comprising charcoal, methanol and a range of products that could be produced like wood panels, animal feed pellets, etc.

4.2.4.2 Regional context for the selection of commodity as a potential value chain

In all of the SADC countries bush encroachment occurs at various levels. Therefore, large amounts of biomass should be removed selectively in order to restore the grazing capacity of the rangelands. Where the excess biomass is presently posing serious problems for grazing and soil conservation, it can be utilised for the generation of large income to the local communities. Development of various efficient technologies have been undertaken and trials has been conducted over the last four decades for the conversion of the biomass into:

- Animal feed.
- Electricity.
- Composite timber panels for conversion into furniture and wall cladding panels.
- High quality export charcoal used in stainless steel furnaces, silicon chips production and other uses.
- Motor vehicle fuels, namely methanol, poly-oxy fuel and anti-knock agent for engines.
- Organic acids namely oxalic acid used in automotive industries.
- Large numbers of employees can be involved with the harvesting of the encroaching bush species. The thinner stems of the biomass are then processed into animal feed.
- The thicker stems are sawn up and processed into furniture panels for the cladding of buildings and manufacturing of furniture.
- The waste materials are utilised for the low-cost generation of electricity and production of high-quality charcoal.
- Some of the materials can be utilised for conversion into combustible oil and motor-vehicle fuels.
- This presents many opportunities for the development of a regional biomass value chain, and vibrant sector. Data suggests that considerable opportunities exist for the production and processing of charcoal and methanol.
- With the utilisation of encroaching bush material, many inhabitants of rural areas in SADC countries would be refrained from indiscriminatingly cutting down forests for the production of low quality charcoal and rather benefit from the production of high value products.

4.2.4.2.1 Charcoal

Intra-SADC exports of wood charcoal, intra-SADC exports of inclosing shell or nut charcoal (HS 4402) averaged $9,9 m between 2015 and 2017, accounting for 24,6% of total SADC exports. This suggests that very little of SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged only $2,3 m in imports from the RoW over the same period (accounting for 18,3% of total SADC imports). Given that such a small percentage of exports are intra-regional and such a small percentage of imports come from outside of SADC, this acts to mirror the above analysis for HS4401. The top producers of charcoal in 2016 were the DRC (2 475 018 tonnes), Tanzania (1 924 687 tonnes) and Madagascar (1 560 024).

4.2.4.2.2 Methanol

Intra-SADC exports of methanol (HS 2905 11) averaged $1,1 m between 2015 and 2017, accounting for 35,2% of total SADC exports. This suggests that very little of SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged only $8,3 m in imports from the RoW over the same period (accounting for 87% of total SADC imports). Given that such a small percentage of exports is intra-

regional and such large percentage of imports comes from the RoW, this suggests that SADC may be prioritising foreign export markets over meeting regional demand.

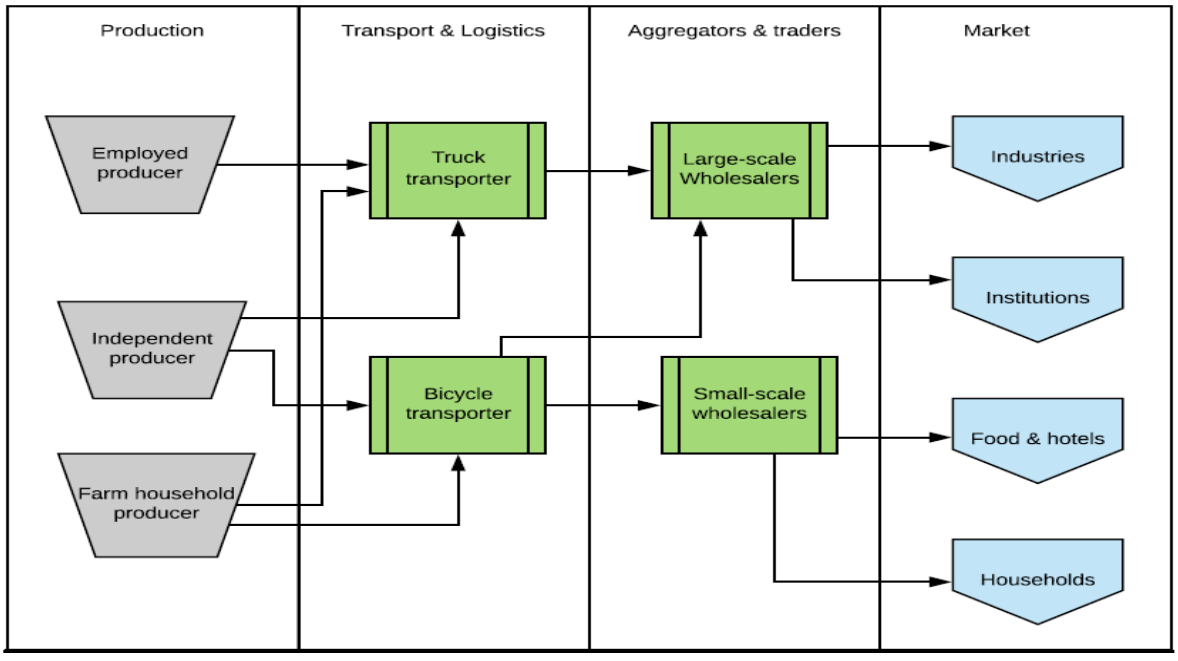
4.2.4.2.3 Other products

The following products can be manufactured by using feedstocks being produced from processed biomass:

- *Composite timber panels:* To feed the lucrative market for composite timber panels in SA and especially abroad, movable equipment is utilised. That includes mounted circular saws, panel sizing equipment, as well as strapping and bulk loading equipment. Although most of the suppliers of that equipment are based abroad, some of them would consider establishing regional factories if the volumes become attractive.
- *Livestock feed pellets:* In order to provide equipment for livestock feed pellets production, which can also serve to stimulate the livestock production and exports, timber chippers, hammermills, blending equipment and pelletising equipment is needed. That equipment is manufactured in SA and certain other SADC member states. The feed pellets enjoy strong demand from Middle Eastern and other countries abroad. For the transport, large containers and trucks are provided by international shipping companies and local transporters.
- *High quality charcoal:* Although large quantities of charcoal are already traded across borders, the potential for more trade in high quality charcoal exists, especially for the production of high value end products. The Gayllard retorts used are presently manufactured in SA, but they can also be produced in all of the member countries as the design is fairly simple. Mild steel plates make up the bulk of the materials. For the occasional relocation of the retorts, block and tackle equipment as well as low-bed trailers are required. Where the lump charcoal is transformed into plate briquettes, the equipment utilised is modified brick forming equipment, aided by the use of natural gums or starch.
- *Electricity generation:* Locally generated electricity can be traded across borders by rural communities. The Vortex generators are imported from the USA and the cables, switchgear and pylons are manufactured in a number of member countries.
- *Vehicle fuels:* The fuels, primarily methanol and combustible oils, but also poly oxyfuel can be traded across borders and especially exported to countries further afield. The syngas reactors, catalysts and advanced technologies are provided from SA and certain overseas suppliers.

4.2.4.3 Value chain diagram

Figure 14: Charcoal value chain diagram



4.2.4.4 Primary inputs

For the encroaching bush-harvesting operations, some of which are already occurring and many more are being finalised, a multitude of suppliers of equipment and technology in the region can benefit. Namibia has for instance in recent years been developing one of the products within this value chain i.e. high quality charcoal. Research has been supported by both donors (GIZ) and the government. Private sector has collaborated with government to develop the processing technology and develop export opportunities for the local industry.

Basic hand tools for manual harvesting include suppliers of saws, axes, ropes, chain saws, cutting oil, tractors and farm trailers. Certain of these suppliers are based abroad, but many are established in the SADC region.

Some of the leading firms that have been identified:

- *Charcoal production:* Hi-Lite Briquettes and Charcoal Suppliers, Namchar Namibian Braai Charcoal & Briquettes, Green Charcoal, Blaze Charcoal Manufactures, Ignite Charcoal Products, CARBO Charcoal Namibia, Namibian Retort Charcoal, Lazy Spade Charcoal, Namibia Charcoal Association (presenting manufacturers in Namibia).
- *Equipment suppliers:* Lasher Tools, Okapi, Zimplough, Zhauss, Agrinet, Gardena, Garden Master, etc.
- *Machinery suppliers:* Tractors, trailers and other equipment have already been referred to.

Please note that a comprehensive list of leading firms has been inserted in Appendix M.

4.2.4.5 Markets

To determine the size of the market for biomass product is complicated. Most of the charcoal are being produced and consumed at domestic level. Charcoal is a bulky product with a relative low value per weight ratio. Namibia is a successful exporter of charcoal and exported $41,9 m of product while South Africa exported $15,7 m during 2017. eSwatini, DRC and Angola exported smaller amounts. The following countries were net exporters with the trade balance of: Namibia ($25,7 m), South Africa ($4,7 m) and DRC ($75 000). In 2018 most of the SADC exports went the UK ($21 m), Germany ($3,6 m), France ($3,2 m), the Netherlands ($3,1 m), Greece ($2,8 m) and Australia ($1,0 m). South Africa (10,7 m) was after the UK the second largest importer – mostly from Namibia. Namibia has a well-developed charcoal value chain in the country and conduct the business at a scale that makes it profitable. The SADC region total imports were $12,3 m and only a small amount from the RoW (18% of imports) and the region had a positive trade balance of $28,1 m with the RoW – therefore a net exporter to the RoW.

Most other countries in the region have small rural enterprises that functions on an informal basis and sell their products at discounted prices to aggregators and traders that transport the products to the urban areas where the products are being sold to retailers and directly to consumers. The informal nature of the domestic charcoal markets makes it difficult to assess. Most rural and a large percentage of urban dwellers still use wood and wood products as a source of energy.

Methanol is mostly being utilised for industrial use and the SADC region imported a total of $9,5 m during the 2015-2017 period and had a negative trade balance of $6,3 m. There is therefore a need that is being supplied from outside the region although at the same time 65% of its exports go to the RoW. There is thus an opportunity to produce more and trade more with fellow SADC MS.

Most of the other products that have been analysed are still in development stage such as the possibilities to use it as an animal feed and production of timber panels. Markets will have to be developed and tested but offer great potential to be developed.

4.2.4.6 Challenges and opportunities

Challenges

There are large areas of land that have become unusable due to over-grazing activities, which has led to encroaching thorn bushes and little or no grass left for grazing. Most countries in the region have an unmet energy need, especially for people in the rural areas. Charcoal remains cheaper than most other energy alternatives and its traditional production has a very negative impact on the environment. Slash-and-burn activities when clearing new land for crop production is still a challenge in certain MS. Biofuels would be a viable alternative if the cost of utilising it is less than those of fossil fuels. There is a general lack of interest by farmers and private sector in biomass – it needs to be integrated with the production of other crops.

Opportunities

It is estimated that there could be as much as 120 m ha (about the surface area of South Africa) in the SADC region that is currently under invasive species and that has the potential to be exploited. Work is being conducted in some MS to develop biomass alternatives. There are production technologies available to harvest and process the encroaching thorn bushes. Rural economies can benefit from such an intervention. Modest investments are needed to operationalise such ventures. There are markets for the off-take of animal feeds, charcoal, methanol, processed wood products, etc. Some countries in the region are interested in export of processed biomass resources once domestic demand has been met. There is favourable legislation in some countries and environmental agencies provide guidelines on the disposal of waste and cutting of trees. Collaboration between ministries should be strengthened to ensure rehabilitation and reforestation of previously cultivated agriculture lands. With proper organisation of the utilisation of the processes for excess bush material, it would be possible for many rural people to participate in downstream processing. The harvesting of the biomass can be conducted without large-scale expenditure on capital equipment. The organisation of such technically advanced downstream processing requires the intervention of a well-organised leading actors – most probably private entrepreneurs. The development of new agricultural projects that lead to deforestation should fully mitigate the impact on existing indigenous forests and natural rangelands. There is a move from traditional ways of making charcoal to modern approaches that are more environmentally friendly. In one of the MS there is a ‘green charcoal’ project that is being developed through the application of environmentally friendly production activities.

The opportunities have been addressed in the phase 2 of the study i.e. ‘High-Level Value Chain Assessments’.

4.2.4.7 Conclusions and recommendations

Conclusions

Encroaching thorn bushes made large areas of land in the region unusable for grazing by livestock and unusable for any agricultural activities. The harvesting of these invader species creates economic benefits from the processing the biomass into animal feed, charcoal, methanol, timber products, etc. as well as creating job opportunities in the rural areas. The biomass resources are huge and could have a regional impact. The processing technologies are available in the region and capital requirements are modest. Rural development project and specifically reforestation should be conducted in collaboration with local communities with clearly identified synergies for all stakeholders involved.

Recommendations

Government agencies and various ministries should not conduct their business in silos but should collaborate and synergise their efforts – especially ministries of agriculture and environment. Development efforts to address deforestation should have an inclusive focus to ensure synergies are being maximised – involve local communities and demonstrate mutual benefits clearly. Mitigate negative impacts on the environment when new agricultural projects are being developed. Provide funding and other

support for the commercialising of technologies such as co-generation, co-firing, carbonisation, gasification and liquefaction that are not fully exploited.

The exploitation of biomass does provide opportunities to share the approach and technology across borders and develop cross-border trade activities of improved quality charcoal products, timber products, animal feed and methanol for industrial use. It should be noted that the value chains are short, starting from the harvest of the bush material and processing of the material in the fields in the rural areas. Local and international traders and transporters would play an important role in the distribution of the products. The electricity that could be generated would be handled either by local authorities, certain industries (e.g. sugar mills) or the national electricity utilities.

It should be noted that this proposed value chain is a fairly new concept with high potential rewards and some initial work has recently been conducted in Namibia on the development of this opportunity. The investment opportunities still need to be developed in full business proposals and feasibility studies still need to be conducted for countries in the region. This value chain does not necessarily apply in its current form and concept to all countries (not all MS have a problem with invasive species) but could be adapted to country-specific conditions. Deforestation is a challenge in most member states and wood is still a major source of energy in the region – especially in the rural areas where the 'last-mile' destinations have not been reached with electricity networks. It is sufficient to note that the present disaster and liability concerning the depleted grazing land in the MS is set to be converted into a large-scale asset. The rapidly changing international environment regarding the management of the global natural resources has been playing a decisive role in the dimensioning of these production and systems.

4.2.5 Poultry

4.2.5.1 Overview

Due to various reasons that have been highlighted earlier in the text (see section 3.3.12) it was decided not to focus on broiler chicken production but rather on geese and ducks as an opportunity for the region. The production cost and production risk for ducks and geese is much lower than for that of chickens as those bird types can digest grasses and sedges and also eat snails, insects and other unwanted organisms. They can also be used to keep orchards and crop rows clean of weeds and pests. They are complementary to other productive activities, such as Aquaculture where waste is used to fertilise fish ponds.

A flock of geese can keep on breeding for up to 30 years. Apart from the consumption of the meat, lucrative export markets exist for down and duvets, as well as tanned leather products for the high value fashion industry.

Those bird types can be kept around homesteads and provide handsome income to rural communities. The technologies for the leather tanning are available through this consultancy group and more discussions with the European fashion houses have to be re-opened in order to narrow down the best markets for those items with the best prices.

The subject has been discussed above in section 3.3.12. Few geese and ducks are produced in the SADC countries and this element can form an attractive large-scale alternative to battery produced broiler chickens.

Table 36: Intra-SADC exports of live poultry and poultry meat versus imports from RoW

Product	Intra-SADC Exports (USD)	Intra-SADC Exports as % of total SADC Exports	RoW Imports (USD)	RoW Imports as % of total SADC Imports
Poultry				

Product	Intra-SADC Exports (USD)	Intra-SADC Exports as % of total SADC Exports	RoW Imports (USD)	RoW Imports as % of total SADC Imports
Live poultry, "fowls of the species Gallus domesticus, ducks, geese, turkeys…: (HS 0105)	13 137 000	95,7%	16 765 000	54,8%
Meat and edible offal of fowls of the species Gallus domesticus, ducks, geese…: (HS 0207)	94 115 000	96,9%	766 770 000	92,1%

Footnote: Average amounts for the period 2015 to 2017; ROW – rest of the world

There are various sub-value chains comprising carcasses, meat portions, pieces processed in batter, sausages, off-fall, livers and other products.

4.2.5.2 Regional context for the selection of commodity as a potential value chain

While the poultry sector in the SADC region can generally be described as fragmented, with producers trading mostly within the confine of national borders, there are opportunities to promote nuanced high value poultry products such as free-range farm chickens, geese and ducks.

Data suggests that demand is higher than supply in the SADC region, which highlights opportunities both in the traditional chicken sub-sector, as well as in less prominent products such as geese and ducks.

4.2.5.2.1 Live poultry

Intra-SADC exports of live poultry, chicken, ducks, geese, turkeys (HS 0105) averaged $13,1 m between 2015 and 2017, accounting for 95,7% of total SADC exports. This suggests that the majority of SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged $16,8 m in imports from the RoW over the same period (accounting for 54,8% of total SADC imports). Given that such a large percentage of exports are intra-regional and roughly half of imports come from outside of SADC, this could suggest that regional demand is substantially bigger than SADC is able to meet given current production levels.

4.2.5.2.2 Meat and other products

Given the data explored above, this report suggests that the support of high value niche poultry products is an opportunity for the SADC region to become somewhat specialised in a market that is not too crowded, regionally and globally.

The main products to be supported at a regional level and produced are:

- Duck meat for restaurants and goose meat for sausages.
- Down and feathers for export and the manufacturing of duvets by elderly women and disabled people.
- Tanned goose skins to be further processed into high value fashionwear such as hand–bags, gloves, coats and others.

Although limited numbers of domestic ducks and geese are kept by rural people in the SADC member countries, this resource offers large-scale benefits for the future. The numbers of those domesticated water birds are unknown but with the unlocking of development opportunities, it could enhance population growth of these birds.

The birds can be kept around homesteads where they also act as guardsmen against crime. In such an extensive production system few structures are needed to be erected and the production process can be undertaken without significant capital investment and at very low production cost. Please note more information has been provided in section 3.3.12 to the various crops and livestock production as well as the agro-processing opportunities of the identified value chains.

The fact that those birds are able to eat grass, sedges and weeds as well as insects, reduces the feeding costs to almost nothing, contrary to chickens which need to receive complementary feeding in the form

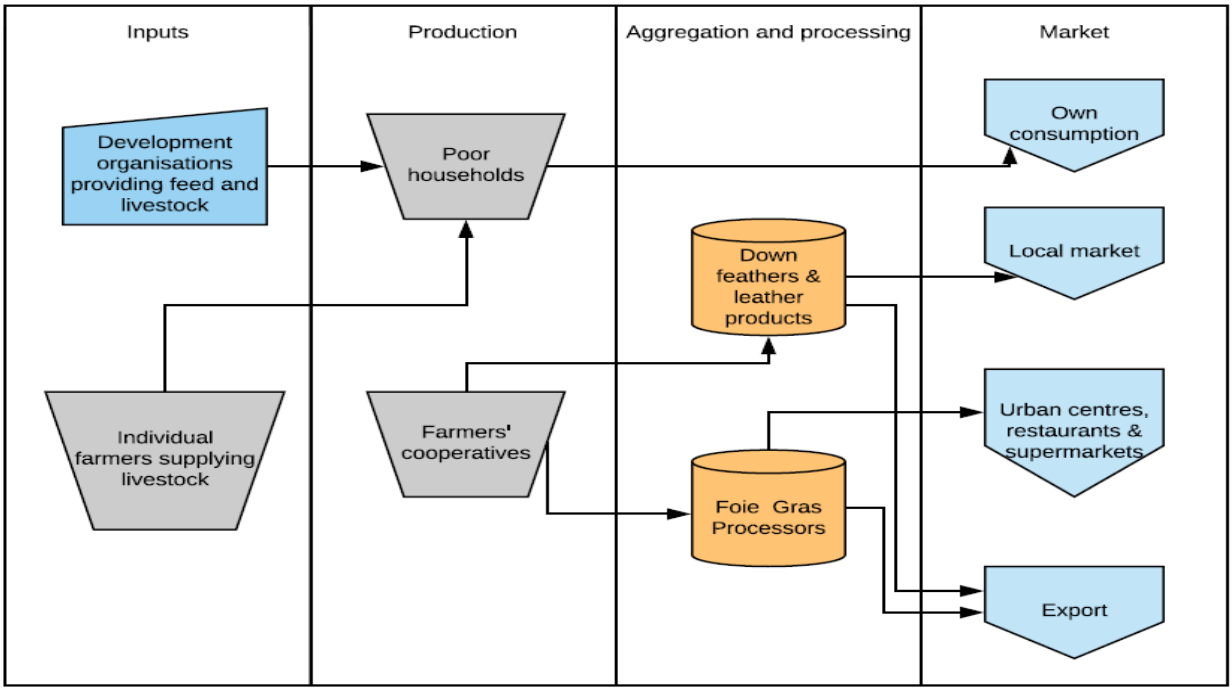
of expensive grains and proteins to produce well. In addition to the low feeding and production cost, the birds can be plucked once or twice per year to yield soft belly down to be used in the production of high value duvets and pillows. With plucking it is essential for producers to adhere to internationally accepted norms for the plucking in a manner which is not cruel to the birds.

As part of the marketing exercises, certification needs to be obtained beforehand to ensure compliance to the standards. When the birds are slaughtered for meat, the skins are tanned for the production of high-value ladies ware such as gloves, handbags, belts and others, much like the use of ostrich, emu and cassowary leather. The technology for tanning of the leather as well as equipment can be supplied from SA and Eastern Europe and the expertise and equipment for the processing of the leather into leather garments is sourced from EU.

The value chains are fairly diversified. The handling of the meat and meat products would be in the hands of small to large traders and the processing of the meat would be undertaken by medium to large-scale food processors. Trading of the down and feathers would be in the hands of specialised businesses, including the processing into pillows and duvets. The tanning of the leather is a specialised undertaking and would be handled by medium-scale processors situated in urban areas, where the tanning materials are more freely traded. After the tanning has been accomplished, the conversion of the leather would be handled by specialised manufacturers of fashion ware.

4.2.5.3 Value chain diagram

Figure 15: Poultry value chain diagram



4.2.5.4 Primary inputs

Limited materials are needed for production. Fencing is necessary and some incubators to increase the rate of multiplication of young. Basic heating equipment is sometimes needed. All of this equipment is readily sourced in the countries of production. For the slaughtering basic amenities are needed if the meat is marketed locally. For the processing of the carcasses, small hygienic abattoirs and de-boning machines are required, where the feathers can also be washed and dried.

No leading firms have been identified – it is a new value chain opportunity.

4.2.5.5 Markets

Considerable opportunities exist for cross-border trading in deboned meat, sausages, down and feathers, duvets, exported tanned leather and high-value leather products. For optimal trading to occur, various measures have to be taken by member countries to ensure that bird flu and other contagious diseases are dealt with and for the meat products to be traded properly. The meat products can assist to off-set the imports of dumped chicken from abroad. New measures should be implemented to prevent the imports of meat contaminated by Salmonella and Listeria bacteria. It is probable that initially most of the tanning would occur in certain of the member countries and SA and that the production of leather garments would be done in SA.

The meat and leather of duck and geese are currently mostly demanded by international export markets and therefore some of the data has been analysed.

Imports of duck and geese meat

- Fresh or chilled ducks, geese and guinea fowls of the species domesticus, not cut into pieces (HS 0207 32) – United Arab Emirates imported in 2017, a total of 368 tonnes at value of $895 000, Guyana 5 tonnes ($18 000), Sao Tome and Principe 1,6 tonnes ($6 000).
- Frozen ducks, geese and guinea fowls of the species domesticus, not cut into pieces (HS 0207 33) – United Arab Emirates imported in 2017, a total of 225 tonnes at value of $555 000, Guatemala 40 tonnes ($203 000), Antigua and Barbuda 15 tonnes ($48 000) and Mozambique 15 tonnes ($43 000).

The meat market is limited but there are export opportunities that could be explored in especially the Middle East as well as in Portuguese-speaking countries. It was interesting to note that Mozambique has imported 15 tonnes of frozen ducks and geese products (HS0207 33). The meat market for geese and duck meat in region is limited and the inhabitants in the region have not developed a common taste for the water birds' meat.

Imports of all leather products

Articles of apparel and clothing accessories, of leather or composition leather (excluding footwear and headgear and parts thereof) (HS 4203) – in 2017 the World's imports was $7,3 bn, the US imported a total value of $1,5 bn, Germany $640 m, France $546 m, etc. It should be noted that these figures are not only for geese and goose leather but for all types of leather (statistics are not available for geese and duck leather only). It demonstrates the size of the potential market for this group of products. More research needs to be conducted to determine the international demand.

It is believed that some cross-border trading opportunities in the respective products can be stimulated in view of the fact that the conditions for production are favourable in most member countries. Regional value chains could be developed in terms of production of meat, down and leather. Processing of the skins into leather that could be exported could be taking place at one or perhaps two tanneries in the region. It could perhaps also be combined with existing tanneries that specialise in processing of sheep and goat skins, cattle hides or even ostrich skins.

4.2.5.6 Challenges and opportunities

Challenges

Geese and ducks are not as well-known as chickens amongst the citizens of the SADC MS. Certain investments will have to be made by governments if this type of industry is to be promoted. Training of farmers and agro-processing entrepreneurs will have to take place amongst rural communities. Facilitation and market access arrangements will have to be developed.

Opportunities

The rearing of geese and ducks is very simple, and their presence does not impact negatively on the activities of households. It would be possible for the rearing large numbers geese and ducks in the region at household level. The downstream processes can be mustered within communities. Attractive profits

can be attained through this de-centralised and diversified project. Duck meat is served in selective restaurants and goose meat is mostly utilised in the production of processed meat products.

The opportunities have been further addressed in the phase 2 of the study i.e. 'High-Level Value Chain Assessments'. For more information kindly refer to section 3.3.12.

4.2.5.7 Conclusions and recommendations

It should be noted that this proposed value chain, as in the case of biomass value chain, is a relatively new concept with high potential rewards. The production of geese and ducks is an old tradition in developed markets like the EU, central Europe and the Far East. People in these regions are used to eating the meat of these birds while in Southern Africa, it is a more unknown type of meat. The processing of duck and goose leather is an established tradition in especially central Europe and has been supplying to the manufacturers of handbags, purses, wallets, etc. This investment opportunity still needs to be developed in a full business proposal and a feasibility study needs to be conducted for countries in the region. It is recommended that investment promotion agencies in the region consider this as a possible opportunity to develop local capacity and processing of the leather products. It also has the potential to create rural jobs that could benefit from downstream activities. It also has the potential for regional value chains developing not only to enhance production but also in processing the leather and possible manufacturing for international export markets.

4.2.6 Red meat

4.2.6.1 Introduction

The establishment of a regional red-meat value chain in SADC offers opportunities for socio-economic benefits for SADC Member States. There are however political and structural obstacles such as the shifting national trade positions on beef products from protectionist, to regionally aligned. This would involve initiatives to support the harmonisation of SPS standards and regional planning for integration of domestic value chains into an interconnected regional value chain for red meat. In general, the data suggests that demand for unprocessed and live red meat products is being met by regional supply (or domestic value chains).

Demand for processed beef products however is being met by large quantities of imports from the rest of the world (RoW). In an ideal scenario where, red meat is traded with little barriers across national borders, the regional value chain could be supported by supporting processing pre-packed cuts, salami's, sausages, polonies, salted silverside beef, cold meat blocks and other supply chain components such as cold storage and transport.

Table 37: Intra-SADC exports of bovine and goat meat and products thereof versus imports from RoW

Product	Intra-SADC Exports (USD)	Intra-SADC Exports as % of total SADC Exports	RoW Imports (USD)	RoW Imports as % of total SADC Imports
Meat of bovine animals, fresh or chilled (HS 0201)	43 251 000	26,6%	6 892 000	19,1%
Meat of bovine animals, frozen (HS 0202)	66 672 000	49,0%	115 352 000	69,4%
Meat of bovine animals, frozen and boneless (HS 0202 30)	56 906 000	56,0%	95 604 000	71,7%
Live goats (HS 0104 20)	8 345 000	91,2%	594 000	7,6%
Goat and sheep meat, fresh, chilled or frozen (HS 2404)	17 743 000	83,0%	38 709 000	70,1%
Goat meat, fresh, chilled or frozen (HS 0204 50)	128 000	8,6%	1 253 000	93,5%

Product	Intra-SADC Exports (USD)	Intra-SADC Exports as % of total SADC Exports	RoW Imports (USD)	RoW Imports as % of total SADC Imports
Sausages and similar products of meat, offal or blood; food preparations based on these. (HS 1601)	16 828 000	97,8%	92 031 000	87,4%
Meat of bovine animals, salted, in brine or smoked (HS 0210 20)	3 186 000	97,4%	19 528 000	87,8%
Fresh or chilled edible offal of bovine animals (HS 0206 10)	1 835 000	90,1%	194 000	12,4%
Raw skins of sheep or lambs, fresh, or slated, dried, picked or otherwise preserved, whether or not dehaired or split (excl. with wool on, etc.) (HS 4102)	1 304 000	1,9%	81 000	17,1%

Footnote: Average amounts for the period 2015 to 2017; ROW – rest of the world;

There are various sub-value chains comprising fresh and chilled beef, frozen beef and frozen and boneless. Then there are live animals being traded, specifically goats. Processed meat comprises sausages and processed meat. By-products also comprise an important component i.e. offal of bovine animals and raw skins from sheep.

4.2.6.2 Regional context for the selection of commodity as a potential value chain

4.2.6.2.1 Cattle meat (beef)

Intra-SADC exports of meat of bovine animals, fresh or chilled (HS 0201) averaged $43,2 m between 2015 and 2017 (only 26,6% of total SADC exports). This suggests that very little of SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged $6,9 m in imports from the RoW over the same period (accounting for 19,1% of total SADC imports) which suggests that the demand for red meat is much higher than what is being exported regionally. Given how small both intra-regional exports and imports from the RoW are, as well SADC being a net exporter overall, this suggests that the regional demand for meat of bovine animals is relatively small and is being met using a small fraction of SADC's export capacity as well as some small amount of imports from outside of the region.

Similarly, Intra SADC exports for frozen or chilled meat of bovine animals (HS0202) averaged $66,7 m over 2015 – 2017 (49% total exports) while imports from the rest of the world averaged only $115,4 m (69,4% of total imports). SADC is a net importer of frozen bovine meat, with the bulk of that coming from outside of the SADC region. While intra-regional exports are close to 50%, suggesting that regional demand is being supported by regional production, however a much larger portion is coming from the RoW. This could indicate either that exporters are prioritizing foreign markets to a certain extent, and as a result of this the remaining export potential is insufficient to meet regional demand. Of this, meat of bovine animals, frozen and boneless (HS 0202 30) follows a similar trend, with $56,9 m in intra-regional exports (56% of total exports) and $95,6 m in imports from the RoW (71,7% of total imports).

The top producing countries for beef (cattle meat) in 2016 were South Africa (1 109 096 tonnes), Tanzania (322 982 tonnes) and Zambia (202 762 tonnes). However, given the relatively low export figures, these countries are likely supplying the bulk of that production to their domestic markets.

Following the data supporting the regional red meat value chain would involve drawing from existing synergies in the agro-processing sub-sector of red meat. Key actors or firms already involved in the processing of beef include Karan Beef (South Africa), Botswana Meat Commission, Swaziland Meat Industries, and Meatco (Namibia). While processing is generally limited to domestic value chains, with some SADC Member States exporting globally, the establishment of high capacity agro-processing facilities (abattoirs and feedlots) at key locations in the region (coupled with a more relaxed trade

environment) could lead to an increase in the intra-regional trade and export of high value beef products. Please also refer to Appendix M for more information on leading firms in the region in the red-meat sector.

4.2.6.2.2 Goat meat (chevon)

Intra-SADC exports of goat and sheep meat, fresh, chilled or frozen (HS 0204) averaged $17,4 m between 2015 and 2017 (83,0% of total SADC exports). This suggests that most of SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged $38,7 m in imports from the RoW over the same period (accounting for 93,5% of total SADC imports) which suggests that the demand for goat and sheep meat is much higher than what is being exported regionally, and demand has to be supplemented with imports from outside of the region.

Intra-SADC exports of goat meat, fresh, chilled or frozen (HS 0204 50) averaged $128 000 between 2015 and 2017 (8,6% of total SADC exports). This suggests that very little of SADC's export capacity is being utilised to meet regional demand and 91% of the goat meat exported in to the RoW. Meanwhile, SADC averaged $1,3 m in imports from the RoW over the same period (accounting for 93,5% of total SADC imports) which suggests that the demand for goat meat is much higher than what is being exported regionally. However, with $1,5 m meat being exported to the RoW – it seems imports and exports with the RoW are more or less the same. It could be remarked that currently goat meat is not a highly tradable product across borders in the region.

The top producing countries for goat meat in 2016 were Malawi (44 772 tonnes), Tanzania (43 231 tonnes) and Zimbabwe (23 121 tonnes). Of this, goat meat, fresh, chilled or frozen (HS 0204 50) has intra-SADC exports of only $128 000 (8,6% of total exports), while imports from the rest of the world were $1,2 m (93,5% of total imports). This follows the same trend and suggests that the demand for goat meat specifically is far too big to be met by regional exports alone.

Considering this, meat-processing activities could well be an ideal opportunity to stimulate regional value chain development. Processed meat has a relative high value per weight and could fairly easily be traded, even though a cold-chain environment may be required to do this successfully. To implement a successful meat-processing plant, various kinds of equipment are needed for processing (to produce sausages and salamis), cooling facilities (fridges and deep-freezes), specialised transport vehicles (refrigerated trucks and pickups), etc. The equipment needed could be used in primary and secondary processing. All of these inputs provide an opportunity for intra-regional trade to enhance livestock systems.

Data suggests that the demand for processed goat meat is larger than regional supply. This presents an opportunity to formalize the agro-processing activities in the goat sub-sector, including aggregation and trading. Leading firms and key actors in this regard are few and far between in the SADC region, but there is opportunity to scale up production as most SADC countries already have existing informal and small scale goat production.

4.2.6.2.3 Goats live

Intra-SADC exports of live goats (HS 1404 20) averaged $8,3 m between 2015 and 2017 (91,2% of total SADC exports). This suggests that most of SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged $594 000 in imports from the RoW over the same period (accounting for 7,6% of total SADC imports), which suggests that regional demand is being almost entirely met by regional supply, with very little needed to be imported from outside of SADC. In term of production, the largest producers of live goats in 2016 were Tanzania (18 721 705 tonnes), Malawi (7 348 361 tonnes) and South Africa (5 618 473 tonnes).

4.2.6.2.4 Processed meat

In terms of processed goods, meat of bovine animals, salted, in brine or smoked (HS0210 20) has intra-SADC exports of $3,2 m (97% of total exports), while imports from the rest of the world are $19,5 m (87,8% of total imports). Overall SADC is a net importer, despite the bulk of exports going towards meeting regional demand.

Intra-SADC exports of sausages and similar products of meat, offal or blood; food preparations based on these (HS 1601)) averaged $16,8 m between 2015 and 2017 (97,8% of total SADC exports). This suggests that almost all of SADC's export capacity is being utilised to meet regional demand. Meanwhile, SADC averaged $92 m in imports from the RoW over the same period (accounting for 87,4% of total SADC imports) which suggests that despite almost all regional exports going to meet regional demand, there is still a substantial deficit which needs to be met by large volumes of imports from outside of SADC.

Considering this, processing capacity is a key point of intervention in the support of the processed meats value chain. Key-actors could be leveraged in the development of the processed meat value chains and they include firms such as Tiger Brands (Enterprise), Eskort, Feinschmecker, Rica Cold Meats, Shoprite, Pick n Pay, etc., among many others.

4.2.6.3 Value chain diagrams

Figure 16: Beef value chain diagram

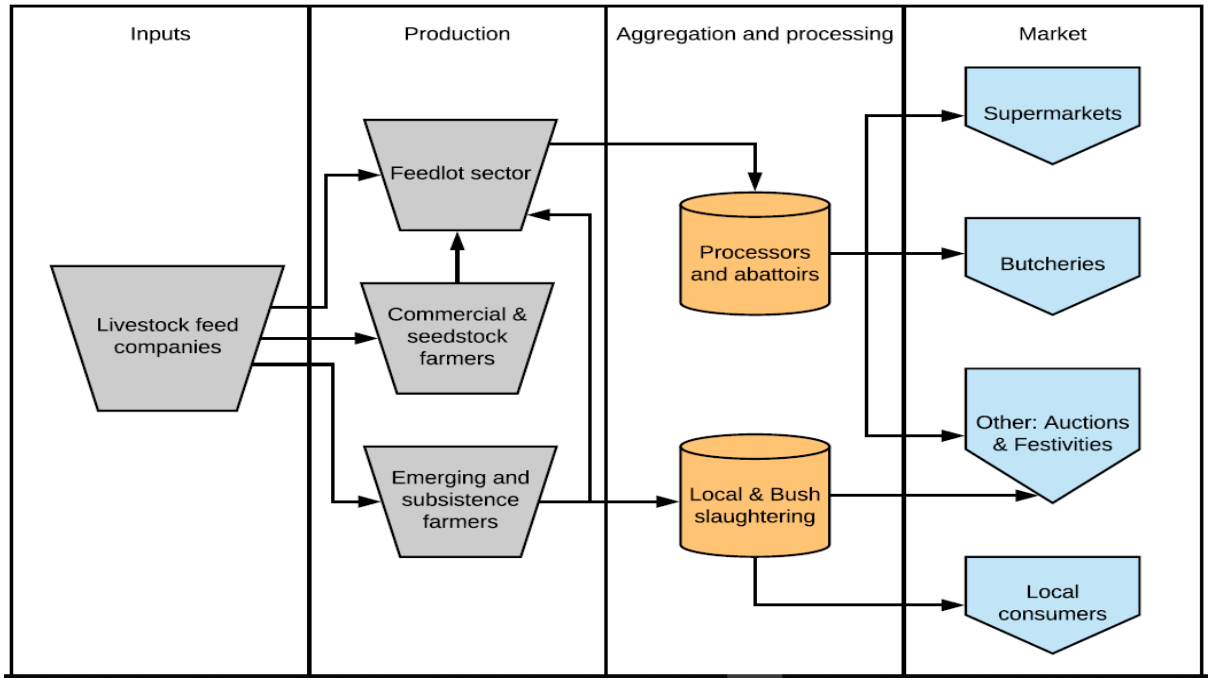
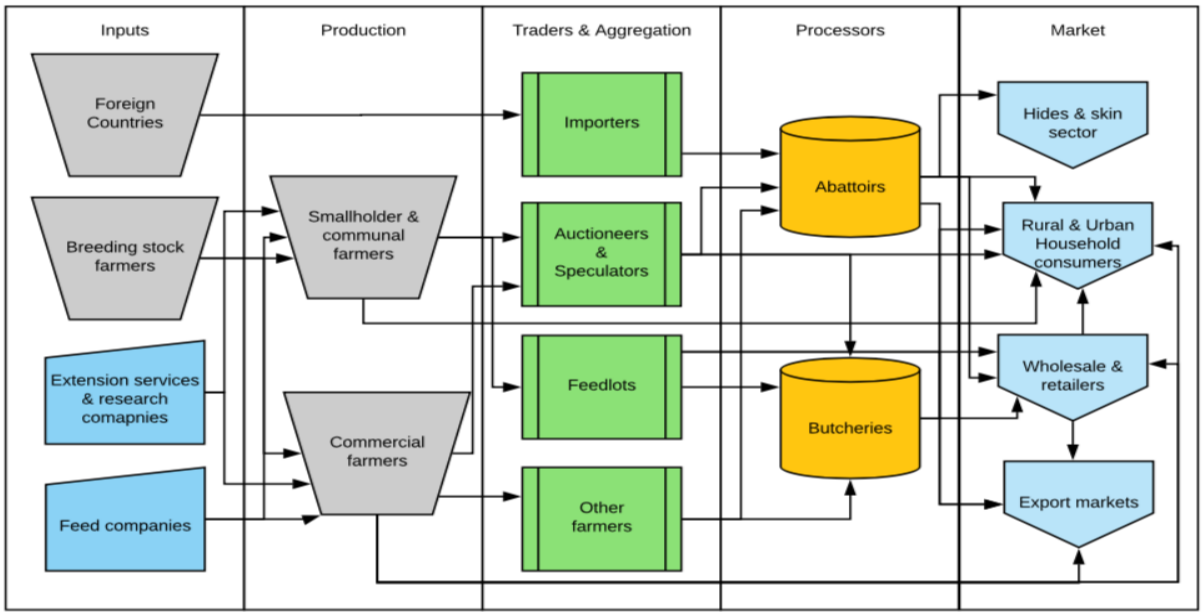


Figure 17: Goat value chain diagram



4.2.6.4 Primary inputs

Input value chains for the livestock industry plays an important role in the region comprising the trade of improved live cattle for breeding purposes and goat breeds, animal medicines, vaccines and dosing inputs, animal handling equipment (neck clamps, loading ramps, etc.), slaughtering equipment, processing equipment (to produce sausages and salamis), cooling facilities (fridges and deep freeze facilities), specialised transport (refrigerated tracks and pickups), etc.

Genetic material

Across the red-meat value chains it is evident that improved genetic material e.g. new animal breeds and bull and ram semen for artificial insemination can play an important role to upgrade the quality of herds and flocks. Improved breeding materials enable farmers to produce livestock that provides quality meat for the market. There are various suppliers of goods and services in this industry providing bull and ram semen and embryos. Service providers provide artificial insemination and embryo-in-planting services to farmers. Some of the leading firms in this field are mostly in SA comprising: Holland Genetics, ABS Genetics, World Wide Sires, Semex Canada, CRI Genetics and Sersia France – most of these companies are international suppliers. In the region there are also breeder associations for various cattle and goat breeds. These associations are the best developed in SA – a total of about 32 beef-cattle associations and five goat associations. The organisation that brings all these breeders together is Studbook that can direct enquiries to respective breeder associations.

It should be noted that the slaughtering percentage of cattle in many SADC countries is often hardly 33 percent. That implies that the ratio between bones and meat is extremely low. With cross-breeding in SA a slaughtering percentage of as much as 66 percent is achieved after feed-lotting of the weaner calves for 120 days. If the slaughtering percentage of the cattle can be increased with better breeding and feed-lotting, the sustainability of the entire industry in the SADC are can be drastically improved.

Farm-produced pastures

In the SADC region, most feed consumed by livestock under extensive conditions is natural grass, shrubs and bushes. The more intensive production methods (feedlots) involve the utilisation of feeds with staples (maize) and pulses (soybean) but roughage plays a very important part of animal diet – without which the concentrated feed could not be digested. The natural grazing areas would continue to play a dominant role in future commercial livestock production in the region but in an effort to sustain the natural resources available over the long term, additional roughage will have to be cultivated. There is specifically a need for winter pastures and fodder that needs to be established and cultivated by farmers. Fodder is food for animals that has been harvested and processed while pasture has been planted and needs to be utilised by animals while it remains on the land where it was initially planted[30]. Some of the cultivated fields will have to be planted with pastures and fodder crops for winter so that livestock production could not only be sustained but could be produced in a profitable way.

Animal feeds

This is one of the most important inputs needed in the production of good-quality red meat – concentrated feeds (licks and feeds) and roughage sources (lucerne and grass bales) and is being traded across borders. The bulkiness and weight (relative to the value) determine the distances that animal feeds could be transported economically by road. Some of the prominent input value chains comprise animal feed that is produced from 80% yellow maize, 15% protein rich oilcake (what is left after the oil has been extracted from soybeans and roasted), 5% micro-nutrients (salt, feed-grade phosphorous, urea). Some

[30] The difference between fodder and pasture is that fodder is food for animals that has been cut and dried; that which is fed to cattle, sheep and goats, such as hay, cornstalks, vegetables, etc. while pasture is land on which cattle can be kept for feeding and also includes forage remaining on the land as a consequence of harvest e.g. maize residues.

of the leading firms in animal health are: AgriVal (Madagascar), National Foods (Zimbabwe), Namib Mills (Namibia), CIM (Mozambique), Cerangola Flour Mill (Angola), African Milling (DRC), Feedmaster (Namibia), Crane Feeds (eSwatini), etc. Most of the animal feed producers are in SA with 24 feed producers. One of the key-stakeholders is the Animal Feed Manufacturers Association (AFMA) that is presenting the industry in SA. Some of the leading milling companies are: Meadow Feeds, Afgri, Nova Feeds, Foodcorp, De Heus, Alzu Enterprises, Banlab, etc.

Animal health products

There are a wide range of input products that are being utilised by livestock farmers such as vaccinations against specific diseases, products against parasites and resistant organisms with external (dips, pour-on) and internal parasites, etc. Some of the leading firms are: Afrivet, Ceva Animal Health, Bayer Animal Health, Onderstepoort Biological Products, Virbac, Merial, Intervet/ Schering-Plough, Norbrook Laboratories, etc. Most of these firms are international businesses and are represented throughout the region. In SA there is also an association that represents all these suppliers, known as the South African Animal Health Association.

Other production inputs

There are a range of other inputs needed in the livestock industry comprising: animal handling equipment (neck clamps, loading ramps, etc.), fencing material for grazing camps, ear-tags for marking animals to attain traceability, etc. Some of the leading firms include: Axxon, Tal-Tec, Animal Handling and Safety Equipment Services, etc.

Mechanisation and on-farm processing equipment

tractors, trailers, hammer-mills, pelletisers, etc. Some of the leading firms include: John F Marshall, Roff Industries, Bessemer, Drotsky Aktief, as well as the tractor and equipment firms: New Holland, John Deere, Massey Fergusson, Krone, etc.

Please note that a comprehensive list of leading firms and key actors have been inserted in Appendix M.

The input industry for livestock production is of great importance and without those service providers it would be difficult to develop domestic and regional value chains – even at primary level of production. The level of input supplies varies in the SADC region from well-developed to poor distribution systems, mostly operated by small rural agrodealers. These suppliers are usually obtaining their supplies from importers in greater towns and cities and will supply farmers with animal health products – while at the same time sell fertiliser, seed and some small mechanisation equipment. Many of these agrodealers will also provide advice to clients on how to apply the medicines or vaccinations to animals and try and identify the symptoms of livestock. Most livestock farmers in the region have knowledge of animal health products but it is not always available and because of high transport and transaction costs expensive. The same applies to animal feeds that are expensive and difficult to transport.

State governments and public sector support organisations bridge the availability gap for inputs, particularly for small-scale producers and those transitioning to commercial production. Many governments in SADC subsidise some of the animal health products such as vaccines and products to treat parasites. Governments would sometimes provide free treatment to prevent the spread of outbreaks. Veterinary services of governments will also manage outbreaks of Foot and Mouth Disease that can imply a status of an epidemic across an entire country. There are also NGOs working in this field like GALVmed that promote animal health products through small private sector operators.

4.2.6.5 Processing

Key challenges to be mitigated in the development of agro-processing activities in the red meat value chain in general include the state of disrepair of many large facilities due to lack of investment. Additionally, many of abattoirs and processing facilities are government-owned and lack of public funding have delayed timely investments in maintenance and upgrading. Many of these facilities are managed by government or semi-government officials with making a profit low on the agenda. Most abattoirs find

it hard to make a profit due to low slaughtering fees, inefficiencies in management and high costs of inputs. Another challenge is also the availability of qualified and specialised staff like animal health officials, public health, laboratory staff, meat inspectors, grading specialists, etc. Supporting services like testing laboratories are either absent, dysfunctional or inefficiently run by government officials.

Secondary processing is the phase after the animals have been slaughtered and processed into carcasses that are sold to meat processors, wholesalers, supermarkets, butcheries and other retailers. The slaughter process also has by-products that need to be processed and reference is made to the '5th quarter' – meaning the rest or what is left after the animal was slaughtered. The by-products comprise the following and are usually processed and sold:

- Hides (cattle) and skins (sheep and goats) – tanning
- Specialised products: liver, kidneys, tail and tongue – sold to consumers through the same supply chains as meat
- Offal: head, feet, intestines, heart, unborn calves (foetuses) – sold to meat processors for further processing and the manufacturing of polonies, sausages and other processed meats
- Animal bones: gelatine and fertiliser (bone-meal) – sold to animal feed and fertiliser manufacturers
- Manure: could be processed for organic compost

All the above by-products offer economic opportunities with the processing of leather through tanneries, to be processed again into apparel (luggage, handbags, purses, wallets, belts) and footwear (shoes, sandals, etc.). Most of the value is not in the tanning process but the real income generation is in the products made of leather. It offers an ideal opportunity to implement on a regional basis – especially if a facility like a tannery is in close proximity and accessible from a neighbouring country with an abattoir. The motor vehicle leather-seat industry, a subsector within the automotive industry, provides employment for many people in the region. At one stage SA was producing leather-seat covers for all the luxury German vehicle manufacturers – in and outside the country. Another example of a successful regional value chain in this sector is the abattoir in Maseru that sells hides and skins to traders that export it to SA for processing at a tannery in Bloemfontein – due to the absence of a local tannery in Lesotho. After processing, it is imported back into Lesotho to be processed through a stitching facility producing leather-seat covers for a German-car manufacturer in Rosslyn, north of Pretoria.

The capacity of some of the listed key actors is the following:

- Botswana Meat Commission: Cattle abattoir with a processing capacity of 650 head per day (cattle and small stock) across two abattoirs with an annual capacity of 11 700 tonnes
- Swaziland Meat Industries: Cattle abattoir with a processing capacity of 7 259 tonnes of red meat per annum, handling and processing beef and pork meat and also producing sausages
- Kapani Meats (Malawi): Poultry and red-meat abattoir and processing company with cold chain and retail outlets
- Agriterra Chimoio Abattoir (Mozambique): Cattle abattoir and feedlot business with a processing capacity of a 1 000 head of cattle per month
- Meat Corporation of Namibia (Meatco): Cattle abattoir with a processing capacity of 28 600 tons per annum. In 2017/18 production year it processed 19 504 tonnes with a processing capacity utilisation of 68%
- Surrey Meats (Zimbabwe): Beef cattle and other meat processing with a slaughtering capacity of 100 head of cattle per day
- Karan Beef (South Africa), abattoir and feedlot business with a processing capacity of 2 040 head of cattle per day, and the feedlot accommodates 150 000 head of cattle on 2 330 ha
- Red Meat Abattoir Association (RMAA) is an independent membership-based organisation and presents the red-meat abattoir owners in SA, comprising approximately 470 abattoirs ranging from rural to high throughput.

Secondary processing refers not only to by-products but also processing of the meat itself into smaller cuts (sections or pieces) that could be sold directly to consumers. It is usually packaged by the retailers and basic processing is also being conducted by butcheries – such as the production of mincemeat, sausages ('boerewors'), biltong (dried meat), dried sausages ('droëwors'), smoked and salted hams and marinated cuts. There are also specialised meat processors that produce all kinds of sausages, salamis, hams, polonies, etc. These types of processed red-meat products are usually expensive, and much value is added. It was interesting to note that SADC countries imported during 2015 to 2017 an average $92 m of processed meat products into the region. Meat processing activities and businesses are limited in most of the SADC region and it could be that consumers in the region views these products as luxury items and may have a preference for more basic meat cuts.

Some of the leading firms in the region that are providing services and products to the abattoir and meat-processing industry comprise: Divac, JF Equipment, Jarvis Products Corporation, Van Vliet de Wet and Partners, Ice-cold Bodies, Freddy Hirsch Group, Crown National, John F Marshall, etc.

4.2.6.6 Markets

Consumption

Consumers' demands in the region vary but in general more affluent people in urban areas prefer higher quality meat and less affluent people in rural areas prefer cheaper meat even though the quality could be of a lower grade. It was recently found in Lesotho that most consumers are not fussy about the sheep's meat they buy – it could be either the cheaper grade-C mutton or more expensive grade-A lamb – as long as it is sheep's meat. The premier meat is lamb (grade-A meat) and is in general the most expensive meat in the region, while grade-C meat can be cheaper, the meat of old ewes and rams, especially if households slaughter the animals themselves.

With the urbanisation in the SADC region and incomes rising there is a growing demand for high-quality beef and to a lesser extent also for goat meat. This higher demand renders an opportunity for livestock producers to become part of an integrated value chain and benefit from highly-priced value-added meat products. Over the past decades Namibia and Botswana have successfully exported beef to developed markets and recently SA has also started to export beef to the Middle and Far East. It is estimated that about 80% of the meat that is being provided to the Botswana Meat Commission (BMC) originates from small livestock producers in the country.

There are also opportunities to export live animals within the region – especially good breeding material. SA commercial and stud farmers have been selling an estimated 12 000 good-quality Merino rams on an annual basis to livestock farmers in Lesotho. The SA feedlot industry buys about 170 000 weaners (usually 8 to 9 months old) for on-growing in local feedlots and selling the beef into the local market and since recently also for the international market. At the same time there are also potential export markets in need of live animals for consumption – especially sheep and goats.

Traceability and governance

The implementation of these systems plays an important role in regional trade of red-meat products and even more so in global value chains. The Botswana Meat Commission worked with the EU to enhance their level of compliance in developing the Livestock Traceability System (LITS) for the beef industry in the country. Boluses (small polony-sized plastic containers containing information of the specific animal, place of birth, etc.) were inserted into the stomachs of cattle and used as part of a traceability system. At the time of slaughter, it was possible to determine where animals came from and who the livestock producer of each animal was. Due to fraudulent actions, poor management and bad governance issues, the system collapsed, with dire consequences for the industry in that country. Some cattle did not have

boluses, or the boluses contained no information (GOB, 2012[31]) or the cattle with boluses originated hundreds of kilometres from the required locations. During the past year BMC has been restructured and its export monopoly has been taken away, paving the way for competition from other local abattoirs. The government maintained a 50% share in the BMC and created an opportunity for the existing 80% suppliers, who are small-scale livestock farmers in the country, to obtain a share in the other 50% of BMC[32].

Standards – general observations

The SPS (sanitary and phytosanitary) and TBT (technical barriers to trade) requirements for each link need to be identified e.g., the food safety legislation and regulations pertaining to food safety and hygiene practices which need to be adhered to by the value chain. Food safety standards commonly used are Hazard Analysis Critical Control Points (HACCP), ISO 22000 and Food Safety System Certification 22000 (FSSC 22000) while the FAO also sets food standards. Besides the quality management systems, the conformity assessment requirements for each link must be identified e.g., testing, certification and inspection requirements. This would include assessing the availability of these accredited services. Labelling of products also needs to comply with health and legal metrology legislation and regulations for the protection of the consumer.

Standards – regional value chains

The application of SPS measures and food safety standards need to be adhered to in order to ensure the development of sustainable regional value chains. Packing and labelling depends on domestic regulations but should be harmonised in the region to facilitate trade between countries. The development of the supermarket supply chains in the SADC region also facilitates trade flows of consumer products and particular food products between member states. Initially the goods sold were almost exclusively from the country of origin. However, the tide has changed and more products from local industries appear on the shelves. Consistent quality supplies of especially fresh vegetable products have been a challenge in guest countries. Some of the supermarkets even provided training to capacitate local farmers to deliver the right quality in the required volumes. Except for Namibia and Botswana, as well as Zambeef in Zambia, it is not certain if red-meat products are being procured as yet in host countries by supermarket chains, but it certainly renders an opportunity for the livestock sector in the region.

Standards – international markets

In terms of international red-meat exports, it should be noted that imports of fresh meat and meat products into the EU are subject to veterinary certification - which is based on the recognition of the competent authority of the non-EU country by the Directorate-General for Health and Food Safety. This formal recognition of the reliability of the competent authority is a pre-requisite for the country to be eligible and authorised to export such products to the EU. Legally legitimate and adequately empowered authorities in the exporting country must ensure credible inspection and controls throughout the production chain, which cover all relevant aspects of hygiene, animal health and public health. The requirements of leather users and consumers need a definition of each of the requirements applicable to controlling the quality of the raw materials and the processes used to convert the raw materials into the finished products. The quality of the leather articles (stitching, durability etc.) also needs to be stipulated. Quality and quality control are what builds the reputation of leather, the capability of the tanners, the leather goods manufacturers and the traders.

[31] Government of Botswana (2012) http://www.gov.bw/en/News/Tombale-aims-to-turn-BMC-around/, Date accessed 22 February 2018

[32] Masokola A (2018) MBC monopoly comes to an end, Weekend Post, 12 March (http://www.weekendpost.co.bw/wp-news-details.php?nid=4915)

With reference to SADC is a net exporter of fresh and chilled beef and a net importer of frozen beef. However, the volumes of fresh and chilled beef are still greater than the imports of frozen products. Most live goat exports were within the region (91% of exports) and the 9% to the ROW. SADC is a net importer of fresh and chilled sheep and goat meat with a value of $35 m. SADC is a net exporter of goat meat to the RoW and only a small amount of goat meat is traded within SADC. It could be concluded that most of the $35 m of imports of sheep and goat meat would indeed be meat from sheep (i.e. mutton and lamb combined). It could be concluded that currently goat meat is not a highly tradable product across borders in the region. However, there may well be a high potential for increased regional trade in the region.

In terms of processed meat (HS 1601) SADC was a net importer at a value of $88 m – thus a great opportunity. The same applies for slated and smoked beef (HS 0210 20), where SADC is a net importer for an amount of $19 m. SADC is a net exporter of beef and goat meat and a net importer of sheep meat. It also imports processed meat for an amount of $107 m. Given the high imports from the EU into the SADC region, there is potential to enhance local production of processed meat into salami products, polonies, smoked ham and other processed meat products. It will not only provide opportunities for the regional market but with the right quality and food safety standards these products could be exported to the EU and other developed markets.

4.2.6.7 Challenges and opportunities

Challenges

Input supplies: Lack of raw materials for animal feed production; In many member states there is a lack good-quality breeding material – poor local breeds and lack of artificial insemination services and genetic material (bull and ram semen); Supplementary feeds are not always available and could be expensive; Animal health products can be expensive

Primary production level: Poor animal husbandry and lack of extension services to train farmers in good livestock practices is a key constraint across countries. In most countries it was found that farmers do not treat cattle rearing as a business. Livestock farmers are dissipated and uncoordinated in production and marketing activities. Prevalence of diseases and parasites and high cost of drugs and poor access to veterinary services. Low conception rates of livestock, low weaning percentages and high mortality rates. Poor disease management amongst livestock farmers. Some livestock has a social prestige value and some animals will only be sold in a case of emergency. Cattle is for instance utilised for animal-traction purposes (draft animals), to plough or pull transport vehicles. The value of red meat is not realised by many smallholder livestock farmers in the region e.g. wool and mohair farmers in Lesotho focus more on the production of wool and mohair than red-meat products. No or little emphasis on the production of pastures and fodder production. Extension services to farmers are either not at the required level or is totally absent. Absence in the investment in the development water infrastructure for animals to drink water on a regular basis. Farmers need to be trained to understand the importance of herd and flock management and replacement of old female animals and developing a breeding herd/flock.

Processing: Poor quality of production affects processing opportunities – in one member state up to 60% of the hides are lost due to tickborne diseases and some of the hides are damaged by thorny shrubs or horn stabbing by competing animals. SADC export demand for red meat is subdued because of influx of cheap poultry and red meat into SADC from Europe and USA through SA under its bilateral EPA and AGOA deals. As the cost of erecting high-quality abattoirs and meat processing plants is high and the management demanding, it is not easy for small-scale farmers to participate in the down-stream value chains.

Markets: With the expanding middle class and improvement in the economies of some states, there is a rise in the demand for goat meat – providing an opportunity for goat production. Lack of market information has hindered the production of the livestock sector in most member states. Objective pricing mechanisms should be developed that is transparent and understandable for both farmers and traders alike. Foot and Mouth Disease (FMD) and other similar diseases could have a very negative impact on

the livestock industry at domestic level but also affect regional and international trade e.g. Zimbabwe that lost an EU quota (EUR 2 bn) as well as South Africa that recently had an outbreak. Farmers are dissipated and uncoordinated in production and marketing.

Crosscutting issues: In some countries in the region, there is poor knowledge of the real contribution that livestock production makes to the national economy, thus resulting in the neglect of the sector when investment priorities are being developed by policy makers. Sustained public sector investment is needed to support smallholder livestock production and marketing – including physical infrastructure, research and development, capacitating farmers through extension services. Quality assurance infrastructure is in need of rehabilitation and modernisation of regulatory laboratories is needed. Samples need to be tested in South Africa and even further afield like the USA and the EU – all this increases the cost of compliance and make exporters less competitive.

Opportunities

Primary-level production: Smallholder livestock farmers could participate in the rounding off of young animals for slaughtering or selling to the feedlot industry. The production of pastures for grazing and fodder production provide an opportunity to rear animals throughout the year. The implementation of traceability systems could lead to an increase in the value of the livestock in the rural areas.

Processing: Small rural abattoirs and meat processing operations could be established to serve the discerning upmarket clients in the cities and abroad. Due to the relatively low cost of animal feeds at present and for the foreseeable future, it is possible for more livestock producers to round-off weaner calves for slaughtering. The creation of feedlots does offer an opportunity for farmers to add on-farm value to their livestock. Grass-based feedlots comprise larger designated areas with natural grazing combined with supplementary feeding sources. Most successful feedlots are vertically integrated from farm to feedlot to abattoir and in some cases also closely linked to retail businesses.

Markets: Development livestock auctions could create new marketing opportunities. The development of grading criteria could support the development of objective price determining systems.

The opportunities have been addressed in the phase 2 of the study i.e. ‘High-Level Value Chain Assessments’.

4.2.6.8 Conclusions and recommendations

Conclusions

Input supplies: Lack of animal feed production, poor good-quality breeding material, supplementary feeds and animal health products and services.

Primary production level: Livestock are not capacitated to produce high-quality livestock and red-meat production is not seen as a business opportunity; Good animal husbandry practices are mostly absent; extension services are poorly developed and animal health support systems are weak; Levels of productivity is low and there is lack of public services like extension, research and investment in public goods; Pasture production could enhance livestock production; Intensification of livestock systems could create now opportunities.

Processing: Poor quality of production affects processing opportunities; Demand for red meat is subdued and high capital costs of meat processing activities complicates inclusive models for development; Public health practices at abattoir and butcheries are weak and testing laboratories not well capacitated.

Markets: Absence of market information and price determining systems; Uncoordinated marketing activities; Development livestock auctions could create new marketing opportunities.

Recommendations

Greater efforts should be put into achieving the following and benefit the primary producers to participate down the value chain:

- There are examples of successful regional value chains e.g. leather processing and car-seat manufacturing, supermarkets procuring red-meat from suppliers in South Africa and from the local suppliers.
- There is an opportunity for third countries to become part of international value chains by supplying intermediary goods e.g. a quota of 170 000 per annum of 7-month-old weaner calves being supplied to South African feedlots for possible export of meat.
- There are international export opportunities for live goats – especially to the Middle East.
- There is a great opportunity to process more meat in the SADC region – a total of $88 m from abroad of processed meat was imported into the SADC region from international markets.
- Fodder production and storing at farm level will be an important step to improve nutrition of cattle and goats.
- For regional value chains to function well, harmonisation of standards and protocols should be ensured.
- For international export markets, well-developed governance systems and traceability measures needs to be in place – Botswana, Namibia and South Africa are examples of what could be achieved with international exports.
- Better disease control, inspection, certification measures and services by governments.
- Establishment of smaller rural abattoirs and slaughterhouses to facilitate slaughtering activities under 'relative hygienic' conditions.
- Special efforts need to be made to enforce the control of Foot-and-Mouth Disease among cattle and other ungulates. Poor enforcement of regulations by governments frequently lead to losses for the farmers and the meat-processing industry – one country in the region lost a last EU contract for beef export.
- Semen and live animals from Europe and other areas where the dreaded Kreutzfeld Jacob disease (mad-cow disease with cattle and Scrapie with sheep) caused by hitherto untraceable micro virus or psion particles occurs. The occurrence of that disease has caused up to a 40% decline in the sales of meat products in certain European countries in the past due to a scare that more people would contract the slow brain consuming disease caused by the consumption of beef and mutton infected with mad-cow disease.
- A strong positive factor in favour of SADC is the fact that the SADC area is one of the only areas where the disease does not occur, and this threat opens up opportunities for the export of many types of meat products.

SADC is a net exporter of fresh and chilled beef and a net importer of frozen beef. However, the fresh and chilled beef export is still greater than the imports of frozen products. Most live goat exports were within the region (91% of exports) and the 9% to the ROW. SADC is a net importer of fresh and chilled sheep and goat meat with a value of $35 m. SADC is a net exporter of goat meat to the ROW and only a small amount of goat meat is traded within SADC. It could be concluded that most of the $35 m of imports of sheep and goat meat, would indeed be meat from sheep (i.e. mutton and lamb combined). In terms of processed meat (HS 1601) SADC was a net importer at a value of $88 m – thus a great opportunity. The same applies for slated and smoked beef (HS 0210 20). SADC is a net importer for an amount of $19 m. SADC is a net exporter of beef and goat meat and a net importer of sheep meat. It also imports processed meat for an amount of $107 m.

With the urbanisation in the SADC region and incomes rising there is a growing demand for high-quality beef and to a lesser extent also for goat meat. This higher demand renders an opportunity for livestock producers to become part of an integrated value chain and benefit from highly-priced value-added meat products. Over the past decades Namibia and Botswana have successfully exported beef to developed markets and recently SA has also started to export beef to the Middle and Far East. There are also opportunities to export live animals within the region – especially good breeding material. At the same time there are also potential export markets that are in need of live animals for consumption – especially sheep and goats.

4.3 Future Growth Prospects

4.3.1 The Future of Agro-Industrial Production

Background

In the context of understanding the present and projected performance of the agro-industrial sector on the African continent, this study focuses on Sub-Saharan Africa (SSA) and in particular the SADC region, with further reference to the African continent. Key factors that determine the trajectory of the agro-industrial sector in the SADC region include urbanisation, population growth and the consequential change of dietary habits and food consumption. Studies based on Sub-Saharan Africa and SADC Member States have projected rapid population growth and urbanisation. Using UN data, Crush et al. projected that by the year 2030 eight of the fifteen SADC Member States will have more than 50% of their population living in urban areas, representing a 3-5% rate of urbanisation per annum in most SADC countries (Crush & Frayne, 2010). The implication of urbanisation includes a change of dietary patterns, from a largely starch and carbohydrate rich diet, to increased consumption of protein. Considering these factors, SADC imports are projected to grow proportionally to urbanisation and population growth to meet the demands related to urban protein requirements. SADC in general is a net importer of food products. Hence this study suggests that the strengthening of agro-processing capacities would have a positive impact on food security through producing value-added products via regional value chains, bolstering regional trade and having a positive effect of the region's trade deficit in agricultural and food trade.

For every ton of protein produced eight tonnes of starch rich components are on average consumed by livestock and other animals which are the sources of many protein rich foods. Less starch material is needed for the production of chickens and eggs, although the poultry require a much higher amount of protein in their feeds than livestock. As a result of the higher amounts of protein required by urbanised people, great pressure is increasingly exerted on the amounts of starch rich materials produced in the countryside and greater demands placed on the overall available natural resources.

Owing to the generally negative conditions experienced for agricultural production on the continent, as compared to the other continents, the prospects for dramatically increased production and yields are limited. As a result, images of large-scale and growing food shortages, population upheavals and migrations are conjured up as the present century unfolds.

SADC has been experiencing a chronic inability during the last century to produce higher yields of crops and other agricultural products and the alarming tendency exists that production of the majority of food and other products in many countries is dwindling. Looking at cereal production as a proxy for food production in the SADC region, we see that production has declined at an average of minus eighteen percent (-18%) over five (5) years between the years 2012 and 2017 (SADC, 2018). Additionally, local communities in the SADC region are also often construct non-agricultural structures (homes, etc) on the best agricultural land, thereby reducing the land availability for food production. The practice of slash-and-burn as well as torching the natural environment for the benefit of hunting for 'bush meat' further devastates the productive capacity of the land.

In recent years the SADC region has import large quantities of basic commodities such rice, wheat, maize in some years, oil seeds (soybean and sunflower) and cotton products – all of which could be produced in the region. When considering the considerable deficiencies in the present and forecast agricultural production capacity prevailing in the SADC region, it is concluded that the imports would be growing steadily for most of the commodities. The imports of protein rich foodstuffs such as dairy products, fish and processed meat as well as vegetable oils are projected to be higher than that of carbohydrate rich foods, vegetables and fruits. It is also forecast that the items in the downstream value chains of most of the products would represent an important component of imports.

Global food markets

During the past ten years international demand has weakened – especially in China. It is therefore expected that the prices of commodities in the agricultural sector will remain low. Population is the main driver of increases in demand and the demand is expected to be flat at an international level (OECD; FAO;, 2018). Most of the demand for cereals and oilseeds will be for animal feed driven by a growing demand for meat in China, although a slowdown is expected globally. However, it is expected a growing demand for food will come from geographical areas with high population growth – including Sub-Saharan Africa (SSA), India, and the Middle East and North Africa. Forecasts predict that global agricultural and fish production will grow on average by an estimated 20% during the next 10 years. This growth is likely to be much higher in SSA and imports are expected to increase, particularly from the Americas (OECD; FAO;, 2018). It is also expected that exports of dairy products to Africa will increase during the next ten years and that by 2026 Africa will be importing about 20% of the world's growth in dairy imports, compared with the 2014-2016 base period. The world demand is expected to reach 14 million tonnes by 2026 and SSA will be one of the target markets for growth (OECD; FAO;, 2017). Global food demand is expected to increase 60% by 2050 if compared with the levels in 2005-2007 period. However, the need for food in SSA will increase even further and the region will be at the greatest food security risk – mainly due to population increases that will be 2 to 2,5 times current levels. The research concluded that maize yield will have to increase by 80% of the yield potential to realise self-sufficiency by 2050 – compared with the 20% in 2010. Even though regional countries may close the yield gap, increase cropping intensity, and expand irrigation production areas that is potentially available, there is still a likelihood that the path to self-sufficiency will include additional imports of cereals (Van Ittersum, 2017).

Conclusions

It could be concluded that due to the fact that population growth is a key driver for the growth in food demand there will be a significantly greater demand for food in Africa by 2050 and beyond. The challenge would be can Africa produce enough food. One of the areas that has to be addressed is the productivity of farmers in Africa and there is reason to be concerned if the literature is considered – especially for cereals and more specifically for maize. The other challenge relates to the integration of agricultural food markets in SSA. There are efforts by leaders to create food self-sufficiency on the continent but that would only be possible if there are higher levels of regional integration. Applied duties on food imports need to decrease even further, and more food should be traded intra-regionally. Most of the food imports are still originating from non-regional countries but the growth in the share from fellow SSA countries did grow at rate of 12% per annum over the past 15 years. It was also proven that the biggest growth came from high-value products that underwent some form of processing. It is estimated that in 2015 there were $8 bn intra-regional trade and cereals was the second largest product traded – 11% of total imports. During the past 15 years, the trade in vegetables, fish and meat realised average annual growth rates higher than 13% while cereal grew 10% per annum (BFAP, 2017).

Implications for the SADC region

The dependency on imports and the consistent lack of locally-produced food supplies need not be the case. The same applies to the fibre sector such a cotton. Solutions are at hand but need to be implemented in a coherent way within the region. At domestic level there needs to be an effort to enhance production but there are investments needed to support these production efforts. At a regional level, value chains need to be promoted to ensure that there is deeper regional integration and policy coherence.

There are opportunities to enhance trade within the region and there are demonstrated successes in global markets – the sesame seed exports from Tanzania or the beef exports to global markets from Botswana and Namibia. The biggest importers of beef (fresh of chilled) during 2017 was the USA ($2,8 bn), Japan, Germany, Italy (each about $1,9 bn) and the Netherlands ($1,6 bn). In terms of frozen beef imports in 2017 were: China ($3 bn), USA ($2,2 bn), Hong Kong ($1,8 bn), South Korea ($1,5 bn), etc. There is a great opportunity to export live goats and live sheep to the Saudi Arabia – imports were $80 m and $600 m respectively in 2017. Another success in the region is the fact that South Africa is currently

having 17% of the global citrus exports and it is expected that will surpass Spain as the biggest exporter (21%) within the next five years. In the past Zimbabwe was part of this South African citrus value chain and its products were exported – this could be revived in future. Lesotho leather is being tanned in South Africa then sent back for leather seats to be made and send back to South Africa to installed in luxury German vehicles destined for international export markets.

There are many other examples of successes and potential international export opportunities that could be considered in future. The international market opportunities are not the issue – they are there. To become part of global value chains, there are stringent compliance requirements that need to be adhered to and significant investments will have to be made at domestic level. This has been done successfully in the region before and many such global value chains are currently operational. However, it is suggested that the SADC region first consider addressing the current needs, i.e. to enhance production, processing and productivity at country level and advance regional value chains as a tool to support economic growth. The SADC region does not need to be an importer of cereals, oil seeds and legumes – all of these could be cultivated here – although competitiveness will remain important.

In this report many challenges have been identified across value chains analysed and suggestions have been made on ways to addresses these challenges. The biggest challenge would be to implement these proposed processed and recommendations that have been shared – both at domestic and at regional level.

4.3.2 Future Growth and Future Demand

During the past ten years there were a lot of changes in food prices on the international markets, but this has stabilised of late. Overall, food supply has also stabilised, driven primarily by an increase in the production of agricultural commodities and record-levels of production globally. Commodities that experienced high levels of production include cereals, meats, dairy and fish products. During the same period demand has weakened – especially in China. It is therefore expected that the prices of commodities in the agricultural sector will remain low. Population is the main driver of increases in demand and the demand is expected to be flat at an international level (OECD; FAO;, 2018).

According to the same publication most of the demand for cereals and oilseeds will be for animal feed driven by a growing demand for meat in China, although a slowdown is expected globally. However, it is expected a growing demand for food will come from geographical areas with high population growth – including Sub-Saharan Africa (SSA), India, and the Middle East and North Africa. Forecasts predict that global agricultural and fish production will grow on average by an estimated 20% during the next 10 years. This growth is likely to be much higher in SSA and imports are expected to increase, particularly from the Americas (OECD; FAO;, 2018). It is also expected that exports of dairy products to Africa will increase during the next ten years and that by 2026 Africa will be importing about 20% of the world's growth in dairy imports, compared with the 2014-2016 base period. The world demand is expected to reach 14 million tonnes by 2026 and SSA will be one of the target markets for growth (OECD; FAO;, 2017).

'Can sub-Sahara Africa feed itself?' The question has been asked by a group of researchers recently. According to research conducted in 10 countries in West, East and Southern Africa (including SADC Member States, Tanzania and Zambia[33]), focusing on cereals; these countries represent 54% of the population and 58% of the arable land in SSA making it representative of the rest of the continent. Global food demand is expected to increase 60% by 2050 if compared with the levels in 2005/2007. However, the need for food in SSA will increase even further and the region will be at the greatest food security risk – mainly due to population increases that will be 2 to 2,5 times current levels. The research concluded that maize yield will have to increase by 80% of the yield potential to realise self-sufficiency by 2050 –

[33] The 10 countries comprise: Burkina Faso, Ghana, Mali, Niger, Nigeria, Ethiopia, Kenya, Tanzania, Uganda and Zambia.

compared with the 20% in 2010. Even though these countries may close the yield gap, increase cropping intensity, and expand irrigation production areas that is potentially available, there is still a likelihood that the path to self-sufficiency will include additional imports of cereals (Van Ittersum, 2017).

It could be concluded that due to the fact that population growth is a key driver for the growth in food demand there will be a significantly greater demand for food in Africa by 2050 and beyond. The challenge would be can Africa produce enough food. One of the areas that has to be addressed is the productivity of farmers in Africa and there is reason to be concerned if the literature is considered – especially for cereals and more specifically for maize. The other challenge relates to the integration of agricultural food markets in SSA. There are efforts by leaders to create food self-sufficiency on the continent but that would only be possible if there are higher levels of regional integration. Applied duties on food imports need to decrease even further, and more food should be traded intra-regionally. Most of the food imports are still originating from non-regional countries but the growth in the share from fellow SSA countries did grow at rate of 12% per annum over the past 15 years. It was also proven that the biggest growth came from high-value products that underwent some form of processing. It is estimated that in 2015 there were $8 bn intra-regional trade and cereals was the second largest product traded – 11% of total imports. During the past 15 years, the trade in vegetables, fish and meat realised average annual growth rates higher than 13% while cereal grew 10% per annum (BFAP, 2017).

The challenge would be for farmers to intensify production, utilising improved seed varieties, increase the use of organic and chemical fertilisers, mechanise production (even if low-level technology) and climatic-friendly production techniques (e.g. minimum tillage). Alongside enhanced productivity, there will have to be an effort to improve regional integration of countries in SSA and a good start will be within regional economic communities. Trade agreements will have to adhere to and proactively facilitate the harmonisation of standards, and agencies such as the Alliance for Commodity Trade in Eastern and Southern Africa (ACTESA) should continue supporting the implementation of trade facilitation measures aimed at food trade. Regional economic communities should also continue to work closely with member states to improve member state compliance with regional commitments. It can be concluded that given the population growth production high-lighted above, there will be an off-take the food being produced. The challenge to farmers will be if they would be able to produce enough food and to political and trade leaders, will the food get to the people who want it and will it be at an affordable price.

5 CHALLENGES AND RECOMMENDATIONS

5.1 Dealing with Most Significant Factors

Questionnaires were developed based on issues and hypotheses found during the high-level VCA, literature review, and trade data analysis, and relevant to the entire SADC region. Interviews conducted with key stakeholders in all countries provided information on what representatives from the private sector, government, development organisations, NGOs and farmer organisations consider to be 'Most Significant Factors (MSF)' for the development of the value chains at national and regional levels. The in-country fieldwork aimed to validate the prevalence of these issues in sample countries identified earlier in this report.

In total, 309 responses from interview and an additional 71 data entries from secondary sources were analysed – i.e. 380 data entries. The responses were classified according to 18 categories, of which 11 categories were common to all countries (356 responses), and across a number of value chains (7 categories and 24 responses).

5.1.1 Primary MSFs found across all countries

Table 38: Primary MSFs reported in all countries

No. (ranked)	MSF Category	Number of responses	Percentage
Primary categories			
1	Smallholder capacity	49	12,9%
2	Processing capacity	49	12,9%
3	Regulatory environment	40	10,5%
4	Standards and SPS	40	10,5%
5	Market access and information	39	10,3%
6	Inputs	35	9,2%
7	Access to finance	31	8,1%
8	Environment	21	5,5%
9	Infrastructure	20	5,3%
10	Government capacity	20	5,3%
11	Energy access	12	3,1%
Total responses in common categories		**356**	
Responses in less common categories (see Table 39)		24	6,3%
Total responses		**380**	**100%**

The objective of this section is to propose high-level responses to the identified MSFs identified. From the MSFs analysis, challenges and opportunities were identified. These were primarily offered by stakeholders interviewed during fieldwork, but also include some that resulted from literature reviews or the VCA. The same applies to the suggested role that private sector actors play help address some of these issues. It should be noted that some of the suggestions to government have been further developed in 5.2 Policy Responses for RVC Development in SADC".

5.1.2 Productivity Issues

Limited smallholder capacity is a common theme across all countries and value chains. Stakeholders cited lack of knowledge and skills related to good agronomic and animal husbandry practices as having a significant impact on productivity and quality across all value chains, leading to low yields and unmet market demands. This is exacerbated by the limited capacity of government extension services to provide

timely knowledge and advice. There is a potential opportunity to use contract farming arrangements as a means of increasing extension support (i.e. firms provide extension support or contract companies to provide extension support as part of their agreement with the farmers), but widespread side-selling under existing agreements disincentivises increased private sector investment in this area. Private sector also noted concerns relating to quality control when sourcing produce directly from farmers.

In addition to smallholder capacity constraints at production level, stakeholders cited a lack of smallholder capacity in agro-processing (i.e. a lack of skills and knowledge, in addition to lack of access to capital and equipment) which limits smallholder farmers' potential to participate in downstream value adding processes.

Stakeholders further cited lack of smallholder capacity in farmer organisation, this limits the aggregation of produce and restricts producers' market access and bargaining power. This was seen as a challenge in all countries, particularly in the livestock sector, legumes and oilseed sector and cotton sector.

Primary challenges that need to be addressed at national and regional level include:

Member states should undertake the following to address smallholder capacity issues:

- *Governments' provision of public goods:* In line with the Maputo Declaration of 2003 governments agreed to invest 10% of their GDP in the agriculture sector but few countries have been able to reach this objective as yet. The Comprehensive African Agriculture Development Programme (CAADP) and the Regional Agricultural Policy from SADC both support research, development and capacity enhancement of farmers through the provision of extension services.
- *Enforcement of the rule of law:* Governments could play a role in developing policies that could protect contracting firms to prevent side-selling activities but at the same time protect farmers from exploitation and abuse by large multinational companies. Legal contracts should be enforced by the state.
- *Market information:* Market access is a challenge to farmers and governments need to invest in market information systems and work with private sector to share information with farmers – through mobile devices. Farmers do not have bargaining power, are disenfranchised and are price takers. This was seen as a challenge in all countries, particularly in the livestock sector and legumes and oilseed sector.
- *Agro-processing technology:* Governments should facilitate the establishment of commercial projects in which local communities obtain shareholding and the opportunity to access innovative technologies.

Involvement of the private sector should include:

- *Contracting agreements:* There are various forms of contracting agreements and out-grower schemes – especially in fixed value chains in cash crop commodities like sugarcane, coffee, tea, cotton, etc.
- *Finance and technology:* Private companies could provide guidance, extension support, seasonal loans for inputs and can provide advanced technologies that could lower production cost.
- *Private sector extension*: Contract farming arrangements can enhance extension support – part of their agreement with the farmers.

5.1.3 Processing Capacity

Processing capacity constraints is a barrier common to all countries which prevents firms from capitalising upon opportunities to add value in-country. This includes an absence of generic and value chain specific processing facilities, such as a lack of packaging facilities (cited as a barrier in Mozambique and Malawi), and the lack of and/or collapse of local textile industries, cited as a missed opportunity for value addition in the cotton sector in Zambia, Zimbabwe and Mozambique. Stakeholders in South Africa also cited insufficient processing capacity in the cotton sector as a key constraint. Similarly, in the livestock sector in all countries, limited processing activities constrains value addition opportunities.

Where there are processing facilities, obsolete equipment and a lack of enforcement of standards leads to poor quality of produce, with examples shared from the rice sector in Malawi, and the oilseed sector in Madagascar, South Africa, Zimbabwe and Zambia (for example, poor quality processing of sunflowers in Zambia means that the final product is unfit for supply to the intended market of the poultry feed sector). Low productivity is also a challenge for processing firms; cotton processors in all countries and livestock processors in Zimbabwe shared the challenge of operating at very low capacity. Processors in South Africa noted that traditional processing operations tend to require large capital investments and they operate on a large scale; this limits the opportunity for farmer participation in downstream processing. The emergence of new small-scale processing technologies, for example in the oilseed sector, presents an opportunity for addressing this constraint. Facilitating knowledge and technology transfer relating to these new technologies could help stimulate increased agro-processing at smallholder level. Challenges to be addressed are:

Recommended actions for member states:

- *Processing capacity:* Government should capacitate agro-processors to produce improved quality products for exports – provide skills training on expectations of export markets.
- *Business facilitation:* Governments should attract (entice) and facilitate private sector to investment in new agro-processing activities; ensure that investors function optimally – provide a one-stop-shop.
- *Investment incentives:* Governments should provide tax and other investment incentives.
- *Import duty rebates:* Government could provide duty-free imports of agro-processing equipment.

Private sector investors should follow inclusive models for development and off-take agreements with local farming communities. They can further provide training on good agricultural practices and required quality standards, and finance for inputs and market outlet for contracted out-growers.

5.1.4 Regulatory Environment

The regulatory environment can be both a barrier and an opportunity, depending on the tools deployed by national governments. Whilst private sector operators cited specific tariffs as constraining their development (e.g. 16% VAT on cooking oil and other edible oils in Zambia; zero tariffs on wheat imports in Zimbabwe), the introduction of new tariffs and other fiscal measures was also recommended as an opportunity to stimulate local production (e.g. stakeholders suggested the introduction of tariffs on imported clothes to help revitalise the textiles industries; and tax incentives on specific value chains to help incentivise production). Other examples of regulatory policies that are seen as opportunities for stimulating increased national production include protectionist policies relating to broiler imports in Zambia (which are considered conducive to the development of the Zambian poultry sector), and the introduction of new mechanisms to facilitate increased transparency and traceability in the cotton sector in South Africa.

An additional constraint related to the regulatory environment is the costs and time associated with the certification of produce, the procurement of trade and export certificates, the procurement of phytosanitary permits. Stakeholders in all countries noted the high transaction costs for these mandatory processes.

Key opportunities to stimulate RVC development through the regulatory environment are:

- *Import duties*: Recommended as an opportunity to stimulate local production - stakeholders suggested the introduction of tariffs on imported clothes to help revitalise the textile and apparel industries. It is, however, necessary that this is done in compliance with multilateral trade agreements, both within SADC and beyond.
- *Tax incentives:* Support development of specific value chains to help incentivise production.
- *Safeguarding:* Other examples of regulatory policies that are seen as opportunities for stimulating increased national production include responsible development and application of legislation for safeguarding infant industries.

- *Transparency and traceability:* The introduction of new mechanisms to facilitate increased transparency and traceability in the cotton sector in South Africa turned the cotton sector around.

Action that can be undertaken by member states include:

- *Investment-friendly policies:* Governments should ensure that policies and regulations that have a negative baring on existing and new investment, be scrapped.
- *Regulatory governance:* Governments must ensure that regulations are applied in an efficient manner and governance should be adhered at all times.

5.1.5 Standards, SPS, and TBT Issues

In all countries, the poor implementation of standards and SPS measures limits exports, with specific examples of exports being returned (e.g. beans in Madagascar and groundnuts in Malawi and Madagascar) and/or export bans being imposed on particular products (e.g. goats in Zimbabwe). Challenges include a lack of government capacity in terms of human resources and physical infrastructure to ensure the implementation and oversight of phytosanitary and veterinary regulations and controls. Where such services are outsourced either to the private sector (e.g. aflatoxin testing in Madagascar) or cross-border (e.g. livestock companies in Zimbabwe sending samples to South Africa for testing), this drives up the costs for producers and greatly limits the competitivity of exports.

At production level, specific challenges include aflatoxins in groundnuts, moisture content in soybeans, poor rice quality affecting export opportunities, Fall Army Worm in maize, high levels of pesticide residue, and high prevalence of diseases and parasites in livestock. The high costs of inputs (e.g. pesticides, vaccines) and the limited bio-security services and government extension services (including e.g. poor access to veterinary services) limits producers' abilities to address these challenges.

The broader challenges most prevalent are:

- *Implementation of standards:* SPS measures limits exports – a challenge in all countries – exports being returned (e.g. beans in Madagascar and groundnuts in Malawi and Madagascar) and/or export bans being imposed on particular products (e.g. goats in Zimbabwe).
- *Government capacity:* Lack thereof – specifically human resources and physical infrastructure to ensure application and oversight of SPS and veterinary regulations and controls.
- *High outsourced costs:* Services by local private sector (e.g. aflatoxin testing in Madagascar) or region (e.g. livestock companies in Zimbabwe sending samples to South Africa for testing) – drives up production costs and negatively impacts export competitiveness.
- *Regulatory governance:* Improper testing techniques and under-sampling of trans-border traded goods.

Government responses should include:

- *Standards-related infrastructure:* Governments should invest in proper infrastructure like testing laboratories.
- *Capacitate regulatory staff:* Capacitate staff to conduct proper sampling techniques and governance arrangements.
- *Regulate standards services*: If outsourced to private sector, there should control of excessive testing fees.
- *Policies and regulations*: Develop policies to facilitate and regulate the involvement of private sector.
- *Capacitate farmers:* Train farmers to prevent high aflatoxin and residue levels.
- *Bio-security services:* Capacitate under-staffed government veterinary services – appoint more staff, provide comprehensive training and address governance issues.

Private sector actors should collaborate and support the provision of improved government services on standards and SPS issues.

5.1.6 Market Information

Market information and issues relating to market access including pricing issues, producer and trader relations and visibility of market demand were identified as a common theme to all countries. Whilst a number of the constraints are value chain specific (e.g. price volatility and side-selling in the cotton sector), a common barrier is that of lack of market information. Stakeholders cited a poor visibility of market opportunities at regional level (for example, lack of information on specific market opportunities within the SADC region), as well at national levels (for example, an unmet demand for soybean in Malawi caused in part by farmers' reluctance to produce for what they consider to be an unreliable market, and a growing, but as yet untapped, market for goat meat in Zambia). Key stakeholders also cited examples where producers have not adapted their produce to meet to changing consumer demands (for example, changes to consumer demands for de-odourising vegetable oils in South Africa). There is an opportunity to increase visibility of market information – where the market opportunities are available - in order to incentivise farmers to increase production and operators to invest in processing activities.

Responses from member states at national level, and the SADC Secretariat at regional level, should include:

- *Bureau for Agricultural Market Information:* Government should facilitate the creation and operation of such an entity – operated as a private sector entity.
- *Regional market information:* Governments should also take the lead in collaboration with regional economic communities to implement regional information systems to enhance regional and market integration.

Private sectors should, in collaboration with government, disseminate information to farmers and agro-processors.

5.1.7 Availability of Inputs

All countries cited access to affordable and quality inputs as a key factor affecting production, processing and market access. In the grains, legumes and oilseeds and cotton sectors, farmers use recycled seeds as quality, certified seeds are either unavailable (e.g. absence of formal seed supply systems in the grain sector in Madagascar and the cotton sector in Malawi) or available imported seeds are very expensive (e.g. in the case of the oilseed sector in Malawi, Zambia and Zimbabwe). The use of recycled seeds affects productivity. The cotton sector in South Africa also cited the example of the latest generation seeds not being available on the market in South Africa due to ongoing registration processes. In the livestock sector, livestock feed processors and livestock producers have to import inputs (e.g. fertiliser, vaccines) due to the lack of local input supply; this increases the cost of production.

Government actions that can significantly address challenges are:

- *Less taxes:* Remove import duties and valued added tax from any agricultural inputs that are imported.
- *Simplify regulations:* Cut the red-tape in the regulatory processes to make it easier for importers
- *Act against corruption:* address and eliminate corruptive practices by customs and other government officials.
- *Remove non-tariff barriers:* Create a business-friendly environment where private sector could thrive.
- *Partner with private sector:* Governments should actively facilitate private sector investment in commercial projects in which local communities and farmers have shareholding.

Private sector players should play a role in:

- *Input supplies – import and value addition:* Private sector could invest in importing and input distribution businesses to support agricultural development – there is a need for fertiliser blending plants, mining of lime and phosphates.

- *Input supplies – wholesale and retail:* Distribution companies could also promote the use of good quality seeds and crop protection chemicals and work with local small enterprises and larger wholesalers.
- *Promotion of novel technologies:* Distributors and retailers could invest in demonstration plots and farmer field days to promote these new improved technologies – seed, fertiliser, crop protection chemicals, animal health products, agricultural machinery and processing equipment.

5.1.8 Access to Finance

Access to finance is a key barrier which is common to all countries and across all value chains. Specific constraints identified included a lack of financing mechanisms to support activities across the value chain, including limited financing to support on-farm production, processing operations and trade finance. Existing financial mechanisms have stringent requirements which limit their uptake by farmers and processors, and interest rates on available financial products are very high (e.g. 20-40%). Lack of access to capital hinders growth across the value chain. At production level, farmers have limited access to inputs (e.g. quality seed, fertiliser, vaccines) which impacts on quality and quantity of production, and at processing level, operators lack the capital to upgrade machinery, invest in new technologies or expand their operations. In some cases, this challenge is related to a lack of land tenure; stakeholders in Madagascar and South Africa noted the need to support farmers to have access to resources which would enable them to attract finance (for example, a title deed, tradeable lease or other tenure security model).

There are opportunities, on the production side, for increasing contract farming arrangements under which farmers receive loans for inputs, particularly in the cotton and legume and oil seed sectors. However, high levels of side selling under existing contract farming agreements (specifically in the cotton sector in Madagascar and Malawi) limits the appetite of the private sector to increase support to farmers.

Recommendations for member states include:

- *Finance policies:* Governments should create finance policies to facilitate the finance of smallholder farmers through contracting arrangements by agro-processors and traders.
- Enforcement of legal contracts: Value chain finance should be encouraged, and governments should act against side-selling and other illegal practices.
- *Act against corrupt practices:* Governments should act to prevent corrupt practices and act against officials who demand upfront payments to facilitate project establishment.
- *Governance:* Structures should be in place and the regulatory framework should be instituted to limit these kinds of activities.
- *Investment incentives:* Government could provide facilitation fees to assist prospective investors in the agro-processing sector – local travel expenses and to conduct surveys.
- *Lower import duties:* Waiving or decreasing import duties on agricultural production inputs and capital equipment for farmers and – make it easier for input suppliers to import and distribute much-needed production inputs.

The private sector should endeavour to work with government to provide an environment that is conducive to provide value chain finance to smallholder farmers and out-growers under contracting arrangements.

5.1.9 Environment

Environmental challenges, specifically climate issues, were identified as being barriers to production by stakeholders in all countries. Value chains dependent on rain-fed agriculture, particularly grains, legumes and oilseeds and cotton, are impacted by variable rainfall patterns which affect yields. Climate change is also impacting on the availability of pasture for grazing. There is a need to mitigate against these climate issues through investments in research, development and dissemination of improved crop varieties and

investments in irrigation. Other environmental challenges include bushfires in Madagascar and Zambia which destroy large areas of land and impact on forage production, affecting the productivity of livestock. In Madagascar and Mozambique, degraded soils characterised by low soil fertility and erosion, are further affecting crop yields.

States should endeavour to:

- *Contingency planning*: Climatic extremes are more common, and governments should have contingency plans to support the farming communities and agro-processors in cases of external shocks – droughts, flooding, bushfires and power failures.
- *Good agricultural practices*: Governments could support soil fertility programmes and promote good agricultural practices amongst farmers.

The private sector should focus on:

- *Diversification:* Farmers should have diversification strategies and farming activities e.g. planting more than one crop, invest in irrigation, keep livestock and conduct on-farm processing with low-tech machinery and equipment.
- *Irrigation development:* The development of irrigation infrastructure and water reticulation systems could also address spells of drought.

5.1.10 Infrastructure

Infrastructure refers to national infrastructure (e.g. roads, rail networks) and agricultural infrastructure (e.g. irrigation, mechanisation of value chain processes, post-harvest-handling facilities). Obsolete, degraded and non-existing infrastructure was cited as a key barrier to agricultural growth across all countries, and one that has an impact on all value chains. Poor road and rail connectivity reduce the movement of goods and increases the costs of transport, driving up prices and impacting on competitiveness. A lack of investment in physical infrastructure or mechanisation at production levels, for example in the livestock sector, drives up the cost of production; whilst the absence of mechanisation in the grain value chains limits productivity and quality. Limited investments in storage facilities are a particular concern for the legumes and oilseeds sector and lead to increased post-harvest losses and contamination of produce. Lack of irrigation infrastructure is a key constraint, particularly in the face of a changing rainfall patterns caused by climate change.

States should focus on:

- *Investment facilitation:* Governments should ensure that international funding resources allocated for the infrastructure development should be utilised for the intended purposes.
- *Maintenance:* Plan and budgeted for and conducted maintenance on a regular basis.

Private sector involvement should include:

- *Integral part of projects:* Commercial projects should be developed in which local infrastructure is created as part of the project – including rural access roads, bridges, clinics, nursery schools (to allow women to work on projects) and electricity generation.
- *Partnership:* Partner with governments on developing much-needed infrastructure; In South Africa farming communities help to repair rural roads in partnership with local governments (municipalities).

5.1.11 Government Capacity

Government capacity is a prevalent MSF which is linked to, and impacts on, a number of other factors. Government ministries in all countries cited low capacity of government extension services to provide support and monitoring to farmers on areas such as Good Agricultural Practices, post-harvest handling, animal husbandry, improved breeding, seed certification, pest and disease management and control. This has a direct impact on smallholder capacity which in turn affects agricultural productivity.

Government services also have limited human, financial and technical resources to ensure the implementation of SPS measures and compliance to standards across all value chains. This has a direct impact on food safety and the ease of exports. Additionally, stakeholders noted limitations in the capacity of government research agencies and an absence of government capacity and support for farmers to participate in downstream value addition processes.

Government services in Madagascar and Mozambique also cited the challenge of insufficient or inadequate data collection on key production metrics impacting planning decisions. For example, in Mozambique it was felt that poor knowledge of the real contribution of livestock to the national economy results in the sector being neglected when investment priorities are being defined.

The role of member state governments should be:

- *Capacitate farmers*: Limited government capacity is directly linked to first MSF discussed above – the 'limited capacity of smallholder farmers' which in turn affects agricultural productivity.
- *Capacitate institutions and officials:* Various government service entities need to be capacitated, staff needs to be trained to have an understanding of the real on-the-ground issues that farmers experience, extension officers need to receive well-developed practical training, need to understand the challenges that smallholder farmers experience, gain an understanding of what it entails to run a small business (which is what smallholder farmers are in running – farming is a business), undergo technical and financial literacy training, gain an understanding of the quality requirements of markets, knows the quality standards and SPS measures and compliance to standards across all value chains. This has a direct impact on food safety and the enhance exports.

The private sector can support the state by:

- *Partner with government:* Private sector through farmer organisations, trade associations and chambers of commerce could share with governments what are their expectations from government.
- *Create platforms:* These organisations could play a leading role to create private sector-led platforms to engage governments and create public-private-producer partnerships (PPPP) – a concept that is advocated by IFAD.

5.1.12 Energy Access

Access to energy was cited as a key barrier to increasing agro-processing in all countries. Limited access to energy due poor coverage of the national grid and insufficient energy supply to the national grid in areas where there is coverage (for example, in Malawi there are power cuts on two days/week) limits processing activities across all value chains. The high cost of back-up or alternative energy supplies, e.g. fuel for generators, drives up production and processing costs for firms.

High-level government actions should focus on:

- *Governance of regulations*: Governments should ensure that energy regulating agencies and government ministries involved, applies energy policies that are conducive to agro-processing development.
- *Focussed infrastructure:* There should be an effort to improve energy infrastructure where many agro-processing activities could take place – close to the production areas and feedstock suppliers – to be used as inputs to agro-processing activities.
- *Conducive policies - alternatives:* Legislation and the regulatory environment should provide for renewable energy to be fed back into the grid and should be encouraged by governments through tax incentives.

Private sector involvement should include:

- *Finance of energy:* It is possible for private sector financial institutions to invest into renewable energy technologies (solar, hydro, wins, etc.) but it would be important for government to create an

environment of policy certainty. Private sector should be offered reasonable rates for electricity that is pumped back into the network.

- *Communicate with government:* Agro-processors should communicate current and future energy needs to government

5.1.13 Other Highlighted MSFs

Table 39: Prevalent but less significant MSFs

No. (ranked)	MSF Category	No. of responses	Comments
12	Land access / land security	7	Mentioned as an issue in six responses: In Madagascar, Mozambique and South Africa in relation to all value chains, and in Zimbabwe in relation to the wheat sector.
13	Biomass specific	6	Only of relevance to the biomass value chain, specifically in Madagascar and Mozambique.
14	Research	4	Lack of research mentioned as an issue in four instances: in livestock in Mozambique (2 mentions), in beans in Malawi and in oil seeds in South Africa.
15	Insecurity	4	Only mentioned as an issue in Madagascar and South Africa. It is an issue which affects all value chains in Madagascar and was cited in relation to the red meat value chain in South Africa (i.e. animal theft)..
16	Social	1	Specific to cotton in Malawi: Children working on cotton plantations in Malawi.
17	Cultural	1	Specific to rice in Madagascar: An affinity to rice in Madagascar limits crop diversification.
18	Lack of private sector to identify opportunities	1	Specific the lack of private sector companies and investors in South Africa to see production and other opportunities in other SADC countries.
Total		24	

A number of other categories also emerged from the interviews. Seven times **access to land and land security** were raised, six responses regarding **biomass-specific** issues, four times lack of agricultural research were mentioned, **insecurity** was mentioned four times (twice in both Madagascar and South Africa), one **social issue** (child labour in Malawi), one **cultural issue** (an affinity to rice that limits crop diversification in Madagascar) and one time '**lack of private sector to identify investment opportunities**' – specifically South African private sector to see production and other opportunities in other SADC countries.

5.1.14 SADC Regional MSFs

In addition to the barriers and opportunities identified above, which are common to all the countries in the region, the MSF analysis also identified the following barriers and opportunities which should be considered at regional level.

Whether viewed as a development opportunity or trade barrier, it is clear that **proliferation of standards** represents a significant challenge to African countries. Whilst the discussion above highlights some of the challenges at national level, there are specific challenges relating to the SADC region as a whole. This includes emerging inconsistencies in country-specific GMO labelling laws across SADC region which is a potentially trade-restricting barrier. Decisions to extend particular standards or measures across the region could impact on the competitivity of specific countries. For example, increasing focus on the traceability of meat from fork to farm could render Zimbabwe's organic veld-reared beef and goat meat from small-scale communal farmers technically non-tradable because establishing a traceability system

for communal herds would be too financially costly. Stakeholders in Zambia are of the firm position that any attempt to extend mandatory aflatoxin testing in maize across the region would add unnecessarily to cost for Zambian producers.

In this context, the SADC Secretariat and regional structures should endeavour to:

- *Identify barriers to trade:* There is a need for the SADC Secretariat and MSs to address the emerging inconsistencies in country-specific GMO labelling laws across SADC region which is a potentially trade-restricting barrier.
- *Impact of standards:* SADC will have to be able to measure the impact of particular standards or measures across the region on the competitiveness of specific countries' value chains - increasing focus on the traceability of meat.
- *Capacitate MSs:* Identify areas where MSs need to be capacitated and provide examples of successes along the various value chains and share information e.g. the success of the cotton and citrus industries in South Africa.

Private sector involvement across the region should include:

- *Cross-border challenges:* Farmer organisations and chambers of commerce will have to position themselves and negotiate a dispensation (in terms of TBTs, NTBs, trade facilitation issues, etc.) that is beneficial to farmers and agro-processors, over the long-term.
- *Adopt and implement compliance measures:* An improve traceability regime could open new export markets but it will have to be phased in over a period of time.

The **SADC region as a market** is an issue that represents both an opportunity and a barrier. For example, SADC export demand for red meat is subdued because of influx of cheap poultry and red meat into SADC from Europe and USA through South Africa under its bilateral EPA and AGOA deals. This has an impact of the export potential of other SADC countries. Conversely, whilst stakeholders in Zambia, Zimbabwe and Mozambique all identified the collapse of the local textile industry as limiting the market for cotton, there is a ready textile market in South Africa which could be exploited by these countries.

In terms of increasing **intra-regional trade**, whilst trade facilitation progress is being made (such as the implementation of one-stop-border-posts, and the implementation of simplified trade regimes for smaller-scale cross-border trade), there is a need for increased trade facilitation efforts to address continuing barriers. Constraints identified include delays at borders, road blocks, corruption, government inefficiencies and red-tape, all of which serve to drive up the costs of exports and limit intra-regional trade opportunities.

Opportunities that were present during stakeholder interviews included:

- *Off-takers in the region:* Whilst stakeholders in Zambia, Zimbabwe and Mozambique all identified the collapse of the local textile industry as limiting the market for cotton, there is a ready textile market in South Africa which could be exploited by these countries. South Africa is only able to supply one-third of the cotton for the local market – the rest needs to be imported in textiles and finished clothing products.
- *Trade facilitation:* The One-Stop-Border-Post (OSBP) concept, which has boosted trade facilitation across borders by harmonising border control regulations and procedures and, thus, enabling expeditious and more effective border control mechanisms - the Chirundu OSBP, serving Zambia and Zimbabwe, is considered the first fully functional OSBP in Africa.

SADC could play a leading role to encourage MS to participate and act on the following activities:

- *Regional agreements:* This is a complex matter that needs to be addressed on both a bilateral and a multilateral basis within the SADC trade structures – the regional FTA should address issues like this.
- *Market opportunities:* Governments should be encouraged to see SADC as a natural and a close-by market and promote it as such whilst encouraging private sector to invest in and trade with fellow SADC MSs; SADC could encourage the creation of market information systems in the region.

- *Investment promotion*: Governments should entice investors – working with leading firms – to their respective countries.
- *Business environment:* Ensure that there is a favourable investment climate – a predictable policy regime is a key-requirement of leading business leaders in the region.
- *Enhance trade facilitation:* NTBs should be removed and cross-border trade should be facilitated.

5.2 Policy Responses for RVC Development in SADC

5.2.1 Key considerations – a guide for developing value chains

It has been noted that most countries refer in their development strategies to global value chain participation (61%) but only 3% developed specific strategies to participate in GVCs. Five key considerations have been identified and could provide guidance to policy makers in utilising value chains in the agro-processing sector comprising (AfDB, 2014):

- Policies must be focussing on specific value chains when being developed.
- The value chains being focussed upon should be these with the greatest potential without negatively impacting other existing value chains in a specific country – trade-offs are expected.
- Entrepreneurship and a functioning public-private-partnership to ensure a successful value chain development.
- Power and ownership structure of value chains will determine what value will be added in the local economy – especially in the case of regional and global VCs.
- The development of value chains is not the only answer to inclusive growth and the transformation of economies.

This policy framework comprises the following sets of policy measures and will be analysed in this section (AfDB, 2014):

- Developed infrastructure and conducive business environment;
- Regional integration and openness to trade;
- Capacity to be responsive to value chains;
- Partnerships government and private sector;
- Established policy framework – social and environment.

Table 40: Policy Measures and Related MSF

No.	Sets of policy measures	MSFs	No. responses	Percentage MSF	Total percentage
1	Developed infrastructure and conducive business environment	9. Infrastructure	20	5,7%	
		11. Energy access	12	3,3%	
	Sub-total		32		9,0%
2	Regional integration and openness to trade	2. Regulatory environment	40	11,2%	
		4. Standards and SPS	40	11,2%	
		5. Market access and information	39	11,0%	
		6. Inputs	35	9,8%	
	Sub-total				43,2%
3	Capacity to be responsive to value chains;	3. Smallholder capacity	49	13,8%	
		4. Processing capacity	49	13,8%	
		7. Access to finance	31	8,7%	
	Sub-total				36,3%

No.	Sets of policy measures	MSFs	No. responses	Percentage MSF	Total percentage
4	Partnerships government and private sector	10. Government capacity	20	5,6%	
	Sub-total				5,6%
5	Established policy framework – social and environment.	8. Environment	21	5,9%	
	Sub-total		21		5,9%
	Total		356	100%	100%

The areas dealt with below specifically highlight the role that the governments of member states can play to facilitate and unlock the potential for VC development.

5.2.2 Developed Infrastructure and Conducive Business Environment

Under this set of policy measures – to develop infrastructure and create a conducive business environment – the following MSFs have been addressed: (i) Infrastructure; (ii) Energy; (iii) Standards infrastructure. To be able to entice private sector to make investments into countries there is a need for well-developed infrastructure. There is evidence that poor transport infrastructure limits development efforts. Infrastructure refers to transport infrastructure (e.g. roads, rail networks) and agricultural infrastructure (e.g. irrigation, mechanisation of value chain processes, post-harvest-handling facilities). Access to energy was cited as a key barrier to increasing agro-processing in all countries. Standards and SPS infrastructure have been discussed in greater detail in the next set of policy recommendations – 'regional integration and opens to trade'.

Challenges include:

- Transport infrastructure was rated by some interlocutors as 'obsolete, degraded and non-existing' as a key barrier across countries and all value chains. Due to poor road conditions the transport costs were high that made the landed prices of goods high and sometimes uncompetitive.
- Productive on-farm infrastructure and mechanisation poor or non-existing.
- Rural storage [and processing] facilities were scarce or absent and irrigation infrastructure poor.
- Limited access to energy due to poor coverage and insufficient energy supply where there is coverage – it limits processing activities across all value chains
- High cost of alternative energy sources, diesel, renewable energy – results in low-levels of competitiveness.
- There is a lack physical infrastructure to ensure application and oversight of SPS and veterinary regulations and controls.

5.2.2.1 Recommendations

Governments should:

- Invest in new and upgrading existing transport infrastructure – trunk and rural roads, railway systems, ports, etc.
- Invest in non-transport infrastructure such as storage, cooling, packing, processing facilities, irrigation (reservoirs, canals, irrigation equipment, etc.).
- Determine infrastructure needs for specific value chains need to be identified.
- Improve energy infrastructure where many agro-processing activities could take place – close to the production areas and feedstock suppliers.
- Develop legislation and the regulatory environment should provide for renewable energy to be fed back into the grid and should be encouraged by governments through tax incentives.

- Partner with private sector – local, regional and international 'lead firms' to develop infrastructure to support the development value chains – private sector could fund renewable energy projects (successful in South Africa) – off-take policies needs to predictable, secure and agreements firm.

5.2.3 Regional Integration and Openness to Trade

At a regional level, the proliferation of standards and the implementation of regional agreements have been identified as key challenges. At a national level the 'regulatory environment' is in many cases a barrier for investment and the operation of new businesses. In some cases, the regulatory environment can create new opportunities. In all countries, there were poor implementation of standards and sanitary and phytosanitary (SPS) measures, including veterinary regulations and controls. Market information and issues relating to market access, including pricing issues, producer and trader relations and visibility of market demand were identified as a common theme to all countries. All countries cited access to affordable and quality inputs as a key factor affecting production, processing and market access. Availability of these inputs as a key factor affecting production, processing and market access. Inputs include good quality seeds (hybrid, GMO, etc.), unadulterated fertilisers, crop protection chemicals, animal health products and mechanisation equipment.

Challenges faced at regional level include:

- There has been a proliferation of standards – a significant challenge to most SADC countries. Other issues include amongst others: (i) GMO labelling (potentially trade-restricting barrier); (ii) Decisions to extend particular standards or measures across the region could impact on the competitivity of specific countries (e.g. traceability requirements); (iii) Mandatory testing - aflatoxin testing of maize in Zambia.
- Bi-lateral agreements of one country impacts on the bilateral trade and market potential of other countries – an issue that represents both an opportunity and a barrier and has an impact of the export potential of other SADC countries.

Challenges at national level that are impediments to market integration and RVC development:

- *Regulatory environment:* (i) Compliance and quality certification of agricultural produce high direct and indirect costs; (ii) Specific taxes and import duties constrain private sector development.
- *Standards and SPS issues – government level:* (i) Poor implementation of SPS measures limits exports and exports being returned and/or export bans being imposed on particular products; (ii) Lack government capacity - human resources and physical infrastructure to ensure application and oversight of SPS and veterinary regulations and controls; (iii) High outsourced costs of services by local or regional private sector testing facilities – drives up production costs and negatively impacts competitiveness; (iv) Poor regulatory governance - improper testing techniques and under-sampling.
- *Standards and SPS issues – producer level:* (i) Quality of products - aflatoxins (groundnuts), moisture content (soybeans), poor rice quality (not exportable); (ii) Fall Army Worm high residue vales (maize); (iii) high prevalence of diseases and parasites (livestock: (iii) High production costs (pesticides, vaccines); (iv) Bio-security services - a challenge under-staffed government veterinary services and trans-border diseases (South Africa); (iv) Government extension and veterinary services.
- *Market access and information – regional level:* Poor visibility of market opportunities at regional level.
- *Market access and information – national level:* (i) Unwillingness of farmers to produce for unpredictable markets - more information needed; (ii) Farmers do not align production with consumer preferences (de-odourising vegetable oils); (iii) Price volatility and side-selling by small producers (cotton).
- *Inputs:* (i) Absence of quality seed – no formal seed supply systems in some countries; (ii) High cost of certified seed (oilseed sector in some countries); (iii) Low productivity of recycled seed; (iv) Delayed regulatory process of the latest generation Bt-Cotton seed; (v) Absence of local input manufacturing and high costs of imports – fertilisers, seed, crop protection chemicals, vaccines, medicines – resulting in high cost of production.

5.2.3.1 Recommendations

SADC level:

- *Standards:* SADC needs to: (i) Identify barriers to trade and address emerging inconsistencies (e.g. country-specific GMO labelling regulations); (ii) Measure the impact of particular standards on competitiveness of specific countries' value chains (e.g. traceability of meat); (iii) Capacitate MSs to improve national VCs and share examples of successes (e.g. cotton and citrus industries in South Africa); (iv) Harmonisation of standards within SADC for key commodities – inputs (harmonise fertiliser packaging and labelling standards) and outputs (as mentioned above GMO labelling, etc.).
- *Trade agreements:* SADC needs to: (i) Facilitate and implement regional agreements; (ii) Share market and investment opportunities; (ii) Encourage the creation of a regional market information system; (iii) Support investment promotion activities, entice investors and work with lead firms; (iv) Help to create a favourable business environment (e.g. a predictable policy regime); (v) Enhance trade facilitation (e.g. NTBs should be removed and cross-border trade should be facilitated).

National level:

- *Regulatory environment:* Governments should ensure that: (i) Implementation of business-friendly policies and regulations; (ii) There is regulatory governance – applied in an efficient manner.
- *Standards and SPS issues:* Governments should: (i) Invest into standards-related infrastructure (testing laboratories); (ii) Capacitate regulatory staff; (iii) Regulate standard-related services; (iv) Develop policies to facilitate and regulate the involvement of private sector; (v) Capacitate farmers to prevent high aflatoxin and residue levels; (vi) Capacitate under-staffed bio-security and veterinary services – appoint more staff, provide comprehensive training and address governance issues.
- *Market access and information:* Governments should: (i) Create agricultural market information systems; (ii) Enforcement of contracts – put policy measures in place to address side-selling and other illegal practices; (iii) Lead and collaborate SADC to create and implement regional market information systems to enhance regional and market integration.
- *Inputs:* (i) Remove import duties and valued added tax from agricultural inputs that are imported; (ii) Simplify regulations - cut the red-tape of regulatory processes; (iii) Address and eliminate corruptive practices by customs and other government officials; (iv) Remove non-tariff barriers and create a business-friendly environment where private sector could thrive; (v) Partner with private sector facilitate private sector investment in inclusive commercial projects.

5.2.4 Capacity to be Responsive to VCs

In terms of the capacity to be responsive to value chains the following MSFs have been identified to be applicable: (i) Smallholder capacity; (ii) Processing capacity; (iii) Access to finance. In terms of 'smallholder capacity' there is a lack of knowledge and skills related to good agronomic and animal husbandry practices as having a significant impact on productivity across all value chains, leading to low yields and unmet market demands. Processing capacity constraints is a barrier common to all countries which prevents firms from capitalising upon opportunities to add value in-country. Access to finance is a key barrier which is common to all countries and across all value chains. Specific constraints identified included a lack of financing mechanisms to support activities across the value chain, including limited financing to support on-farm production, processing operations and trade finance.

Significant challenges include:

- *Smallholder capacity:* (i) Limited capacity of knowledge and skills (good agronomic and animal husbandry practices) – impacts productivity and quality across all value chains; (ii) Extension services is either poor or absent – it exacerbates the situation; (iii) Dishonouring contract farming arrangements – widespread side-selling and disincentivises increased private sector investment (cotton but especially loose value chains); (iv) Concerns by private sector (supermarkets) about quality control when sourcing products directly from farmers (residues, aflatoxins and moisture); (v)

Lack agro-processing capacity amongst smallholder farmers (skills, knowledge, capital and equipment); (vi) Poor organising capacity – limits aggregation of produce and restrict producers' market access and bargaining power.

- *Processing facilities*: (i) In general an absence of processing capacity; (ii) Some countries have capacity but limited demand (Zimbabwe collapse of textile industries); (iii) Limited processing capacity in livestock sector; (iv) Disrupting processing capacity by political interference – Madagascar grain milling operations; (v) Outdated processing equipment – result in poor quality outputs; (vi) A lack of enforcement of standards leads to poor quality of produce; (vii) Poor productivity of processing firms – cotton processors (in all countries except South Africa); (viii) Traditional processing operations are capital intensive and operate on large.
- *Access to finance*: (i) Stringent requirements of existing financial mechanisms limit uptake by farmers and processors: (ii) High interest rates of available financial products unaffordable by farmers and processors at 20-40%; (iii) Lack of access to capital by farmers – hinders growth across value chains and limited access to inputs and impacts on quality and quantity of production; (iv) Lack of access to capital by processors – lack the capital to upgrade machinery, invest in new technologies or expand their operations; (v) Security of land tenure - the absence of collateral capital make finance a challenge e.g. a title deed, tradeable lease or other tenure security model; (vi) Enforcement of legal contracts – high levels of side-selling practices under existing contract farming agreements – limits the appetite of the private sector to increase financial support to farmers.

5.2.4.1 Recommendations

- *Smallholder capacity:* Governments should: (i) Invest 10% of GDP in agriculture (Maputo Declaration of 2003); The SADC Regional Agricultural Policy support research, development and capacity enhancement of farmers through extension services; (ii) Enforce the rule of law – policies to protect contracting firms and prevent side-selling activities; (iii) Provide market information and empower farmers by providing bargaining power – disenfranchised and usually price takers; (iv) Promote agro-processing technology and facilitate the establishment of commercial projects.
- *Processing facilities:* Governments should: (i) Capacitate agro-processors to produce improved quality products for exports; (ii) Attract and facilitate private sector investments in new agro-processing activities; ensure that investors function optimally – provide a one-stop-shop; (iii) Provide tax, cost-recovery incentives (plants & equipment) and other investment incentives; (iv) Provide duty-free imports of agro-processing equipment.
- *Access to finance*: Governments should: (i) Create finance policies to facilitate the finance of small-holder farmers through contracting arrangements by agro-processors and traders; (ii) Enforce legal contracts and encourage value chain finance – act against side-selling and other illegal practices; (iii) Act against corrupt practices and act against rent-seeking officials; (iv) Ensure governance structures are in place within regulatory frameworks; (v) Provide facilitation fees to assist prospective investors in the agro-processing sector; (vi) Waive or decrease import duties on agricultural production inputs and capital equipment for farmers and ease the way for input suppliers to import and distribute much-needed production inputs (fertiliser, seed, mechanisation equipment, etc.).

5.2.5 Partnerships between Private and Public Sectors

Government ministries in all countries cited low capacity of government services to provide extension services to farmers, to provide SPS and other standards-related services to traders and exporters, absence or weak research capacity and weak data collection and analysis (some countries).

Government capacity is a cross-cutting theme which is linked to, and impacts on, a number of other MSFs. Reference has been made and policy recommendations proposed with regard to the 'capacity of government' under MSFs such as: 'smallholder capacity', 'processing capacity', 'regulatory environment' and 'standards and SPS'. These MSFs have been addressed mostly under two sets of policy measures:

number 2: ‘Regional integration and openness to trade’ and number 3: ‘Capacity to be responsive to value chains’.

Challenges worth noting are:

- *Government capacity:* (i) Government ministries in all countries cited low capacity of government extension services to provide support and mentoring to farmers on a number of areas; ‘Capacity to be responsive to value chains’; (ii) Government services have limited human, financial and technical resources to ensure the implementation of policies and regulations; (iii) Limited capacity of government research agencies and an absence of support for farmers and rural enterprises to participate in agro-processing activities; (iv) Insufficient or inadequate data collection on key production metrics impacting planning decisions.
- *Partnership with private sector:* (i) Private sector is weak in most countries; (ii) No or little relationships with lead firms; (iii) Incentives not value-chain specific; (iv) Many government entities view private sector as a source of ‘extra income’ and not as true partner for development.
- *Standards and SPS capacity*: Lack thereof – specifically human resources and physical infrastructure to ensure application and oversight of SPS and veterinary regulations and bio-security controls (see section 5.2.3).

5.2.5.1 Recommendations

- *Government capacity*: Governments should (i) Capacitate farmers but due to limited government capacity it cannot materialise – directly linked to first MSF discussed above – the ‘limited capacity of smallholder farmers’ which in turn affects agricultural productivity; (ii) Capacitate institutions and officials – government service entities, extension staff needs need well-developed practical training, ‘how to run a small business’, undergo technical and financial literacy training, quality standards and SPS measures and compliance to standards across all value chains, etc.; (iii) Ensure there is a good education system to provide well-educated young people to supply specialised services in agro-processing sector; (iv) Provide skills training to citizens on the short to medium-term to work on future agro-processing investments – investors value skilled staff more than tax incentives.
- *Partnership with private sector:* Governments should: (i) Reach out private sector through farmer organisations, trade associations and chambers of commerce could share their expectations from each other; (ii) Assist to create private sector-led platforms to engage with government and create public-private-producer partnerships (PPPP) – a concept that is advocated by IFAD; (iii) Develop relationships with lead firms to develop regional and global value chains; (iv) Provide incentives to attract lead firms through cost-recovery incentives (investment allowances – processing plants and equipment); (v) Support regional and global VCs develop linkages to local suppliers (localisation); (vi) Support deeper VC development.
- *Standards and SPS capacity:* Governments should: (i) invest into capacitating staff and testing facilities or contract these services to provide sector but regulate pricing structures to be affordable to agro-processing and exporting businesses.

5.2.6 Established Policy Framework

This section refers to trade-offs and choices that governments should make. There should be a solid social and environmental framework with explicit social polies in place i.e. to enforce labour standards. There should also a need for environmental safeguards to reduce negative impacts. There is a greater demand than ever before for environmentally certified products – ‘going social going green’ (AFDB, 2014).

In the MSF analysis that was conducted, it materialised that climatic extremes are more prevalent and climate change has been identified as a barrier to production by stakeholders in all countries. It should be noted that ‘social environment’ was not identified in the MSF analysis – based on the interviews, however, it is not to say it is not an important issue.

- Environment: (i) Value chains dependent on dryland conditions, particularly grains, legumes and oilseeds and cotton; (ii) Climate change is also impacting on the availability of natural pastures for grazing; (iii) There is a need to mitigate against these climate issues through investments in research, development and dissemination of improved crop varieties; (iv) Available water resources are not being utilised to irrigate crops and investments are needed to develop irrigation infrastructure; (v) Bushfires in Madagascar and Zambia destroy large areas of land and impact on forage production, affecting the productivity of livestock; (vi) Degraded soils characterised by low soil fertility and erosion, are further affecting crop yields – true of most SADC MSs.

5.2.6.1 Recommendations

Governments should: (i) Conduct contingency planning for climatic extremes that are more common; (ii) Support the farming communities and agro-processors in cases of external shocks – droughts, flooding, bushfires and power failures; (iii) Promote good agricultural practices: Governments could support soil fertility programmes and promote good agricultural practices amongst farmers.

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