Industrial Policy for a Just Transition to a Green Economy – The Importance of Regional Food Value Chains in Southern Africa

Lauralyn Kaziboni and Simon Roberts

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Abstract

This paper builds on the theme 'climate change, industrial development, and a just transition and green industrial policy' as part of the working paper series of the SARChI Chair in Industrial Development. The paper underscores the importance of regional food value chains, and the role of industrial policy in supporting a just transition within the SADC region.

Climate change requires rapid, major and systemic economic changes at the local, national and global levels. In particular, these changes need to happen in food, energy and transport. At the same time, the increasing concentration of ownership and control of businesses means many are excluded from meaningful economic participation. Inclusion and sustainability must be addressed together, as the changes needed to respond to climate change require broad-based support from widening economic participation if they are to be implemented. Through in-depth assessment of three value chains and six selected countries, this paper addresses two key challenges. First, what are the changes necessary in food value chains to respond to climate change in Southern Africa? As witnessed in the last decade, climate change is manifesting as extreme weather conditions and is affecting the SADC geographical space in different ways, with Southern Africa being a global climate 'hotspot'. The shocks associated with the Covid-19 pandemic have further highlighted the need to invest in stronger regional food value chains.

The second major challenge is to support industrial development linked to food. Urbanisation has meant a growing demand for processed food products. Understanding changes in food production and consumption requires adopting a regional value chain approach to assess the development of capabilities throughout the levels in the value chains – from the agricultural production and manufacturing of food to the wholesale and retail of products. This paper draws on a growing body of research to set out the key factors that have driven the development of regional value chains over the past ten years and identifies the key industrial policy challenges that need to be confronted for a structural transformation of regional food value chains.

Keywords: Industrial development, Climate change, Finance, Just transition

JEL codes: E24, Q54, I3

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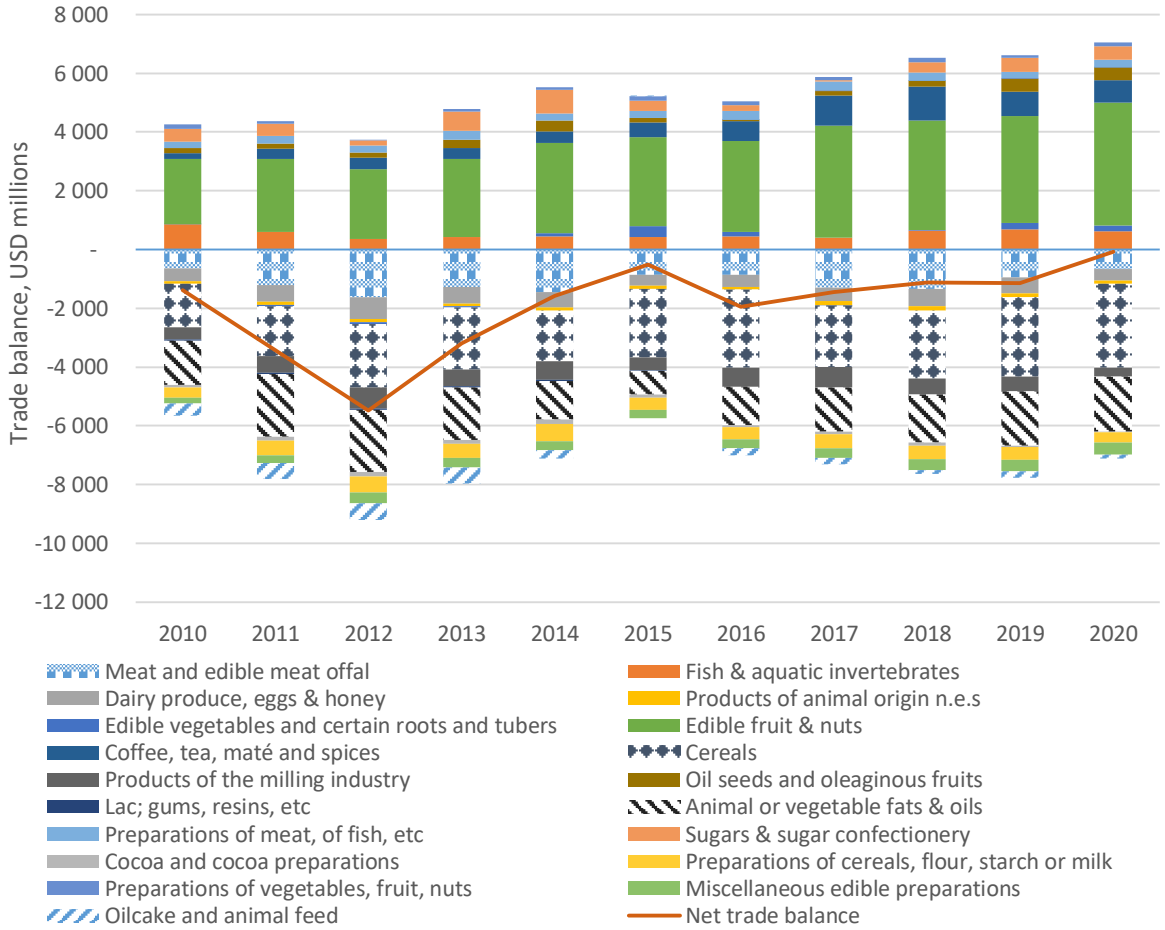
1. Introduction

1.1 Background

Southern Africa is characterised by limited structural transformation, weak intra-regional trade, and an expanding youth population with limited work opportunities. At the same time, the urbanising population is expected to shift towards the middle-income class: in Southern and Eastern Africa, the share of the middle-income population in Southern Africa is expected to grow from 7.4% in 2010 to nearly 50% by 2040 (Tschirley et al. 2014). The combined effect of a growing urban middle-class, from a food perspective, is an increase in food demand and a transformation of dietary preferences towards processed food (OECD/FAO 2021). Middle-income countries and developing countries seek industrialisation and structural change and are increasingly relying on industrial policy to address challenges related to the lack of industrialisation, and in some instances early deindustrialisation.

Yet the SADC has been a net importer of food products over the past decade, even though the deficit reduced to close to zero in 2020 (see Figure 1). The major net imports by the SADC are of cereals, followed by animal fats and oils, and meat and poultry products. This is balanced by exports, especially of fruit and nuts.

Figure 1: The SADC's Net Trade Balance for Main Food Product Categories, USD Millions

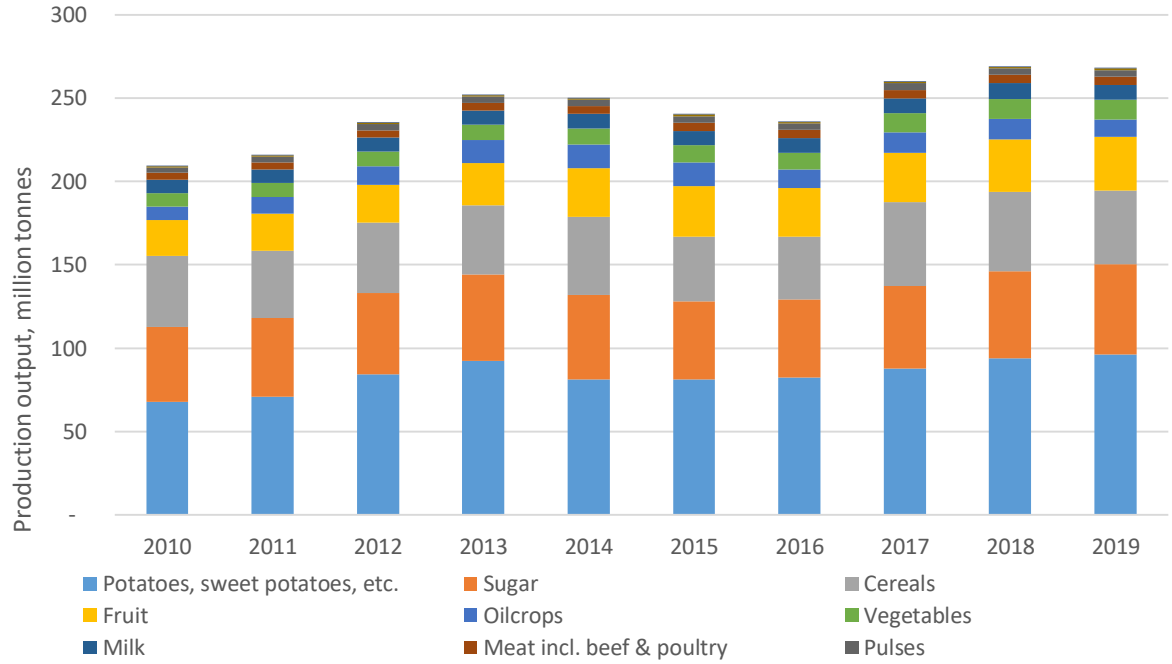


Source: Authors' analysis based on Trade Map (accessed 1 August 2021)

Southern Africa is a climate-change hotspot, with greater than average increases in temperature and declining rainfall in the southern parts of the region. There is good average rainfall and abundant water for agriculture in the northern parts of the region, which is one of the best areas in the world to sustainably expand agricultural production. This potential has been stymied by the lack of effective regional value chain strategies to link increased agricultural production with agro-processing so as to foster rapid industrialisation and economic diversification in food (Annan et al. 2015; Hussein and Suttie 2016). The region is thus faced with a huge challenge, along with having the potential for transformative industrialisation to meet it (Paremoer, 2021).

In terms of production measured in volume terms, there has been growth over the past decade, albeit with a drop in the drought years of 2015/2016 (Figure 2). Leading up to 2015, fruit (including citrus, grapes and apples) recorded strong growth from a low base, along with oil crops (including sunflower and soybean). Cereals production declined in the drought years; however, it bounced back quite strongly. Notably, meat production has been constrained by the supply and costs of animal feed (with substantial imports to meet demand). The expansion in crop production has been largely due to an increase in land area under cultivation, even though this has resulted in land degradation and soil nutrient depletion (OECD-FAO 2016; Badiane et al. 2021). There is an urgent need to improve productivity, along with more sustainable production, and to improve resilience to droughts (Jayne et al. 2018; Goedde et al. 2019).

Figure 2: SADC's Production of Main Food Products, Million Tonnes



Source: Authors' analysis based on FAO (accessed in August 2021). Data is reported based on calendar years.

The food systems in Southern Africa are undergoing structural change due to changes in demand, technological advancements and linkages between science and policymaking to support the use of evidence in policy innovation, the expansion of transnational corporations and climate change (Bosiu and Vilakazi 2020; Badiane et al. 2021). These major transformations are occurring along the entire value chain, from the upstream farming activities, all the way to the downstream processing, retail and consumption (Jayne et al.

2014). The transformations are shaped by the power dynamics along the value chains, driven by the lead firms, which include large-scale traders and input suppliers (Das Nair et al. 2018a).

The climate changes of overall warming and greater variability in precipitation (more frequent droughts and floods) place great pressure on producers and require urgent adaptation measures (Engelbrecht and Monteiro 2021). While there is projected to be lower rainfall in the southernmost areas, there will continue to be abundant water in the SADC region as a whole. Moreover, when there is drought in El Niño years (such as 2015/2016), such as in South Africa, Eswatini, southern Mozambique, Zimbabwe, Malawi, Botswana and Namibia, good rains are recorded in much of Zambia, northern Mozambique, the DRC and Tanzania. Regional trade, coupled with climate-resilient agricultural practices among smallholder agriculture and improved regional logistics and storage facilities, can assist in meeting the region's demand and curtail the impact on consumers (Nsomba et al., 2021).

Adaptation to climate change needs to be a central objective of Southern Africa's industrialisation strategy. Meeting food demand requires climate-smart agriculture, along with capabilities related to processing, packaging, design and engineering, and transport and logistics, which are synonymous with the process of economic upgrading. Regional integration with upgrading requires disseminating skills and technology across the region, overcoming coordination failures, and investing in shared regional infrastructure. Without industrialisation, Southern Africa's rising demand for food will be met by deep-sea imports.

This paper makes three main contributions. First, the paper analyses the regional dimensions that have given rise to the changes in the patterns of production and consumption, and the footprint of large retailers in the region. Second, the paper examines the value chain linkages, governance and policies as they have influenced the industry developments that are necessary for inclusive and resilient food regional value chains (RVCs). Finally, the paper identifies the key industrial policy challenges to industrialising the food systems and proposes a green industrial policy to develop inclusive and resilient food RVCs.

1.2 Methodology

We draw on a growing body of research to set out the key factors that have driven the development of regional value chains over the past ten years and to identify the key industrial policy challenges. The paper identifies a set of 'traps' and 'gaps', following Andreoni et al. (2021b), that have undermined the region's ability to industrialise and develop climate-smart food regional value chains. Through coordinated efforts in industrial policy interventions, constraints on regional industrial development can be addressed.

The SADC Industrialization Strategy and Roadmap 2015–2063 (SADC 2017) recognises regional value chains as an important tool in driving structural change and industrialisation but does not follow through on what this means for coordination and concrete policies. The SADC has prioritised six value chain clusters for potential development, with agro-processing being one of them. Several areas are identified within agro-processing (Table 1). However, it is important to engage with the linkages required and the governance of the value chains if upgrading and growth are to be realised, along with wider participation. For example, soybean is not a value chain in itself but is used almost entirely for animal feed, and thus needs to be considered as part of meat and fish production. Similarly, sugar is an input in confectionary and baked products.

Table 1: Agro-processing Value Chains Selected by the SADC for Enhancement

Agro-processing cluster	Countries
Soya	South Africa, Zimbabwe, Zambia, DRC, Malawi, Madagascar
Sugar	Malawi, Mozambique, South Africa, Eswatini, DRC, Tanzania, Zambia, Zimbabwe, Mauritius, Botswana
Meat products (poultry and beef)	Botswana, South Africa, Zambia, Zimbabwe, Namibia, Eswatini, 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, Eswatini
Fish and fish products	Angola, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Zambia, Madagascar, Malawi, Tanzania, DRC, Zimbabwe
Horticulture (fruits, vegetables and flowers)	Eswatini, 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 (medicinal, cosmetics, essential oils and other herbal products)	DRC, South Africa, Angola, Madagascar, Eswatini, Mozambique, Zimbabwe, Zambia, Namibia, Tanzania, Malawi, Mauritius
Other food and drinks	Angola, DRC, Lesotho (maize), Zambia (oilseeds and livestock products), Malawi (oilseeds), South Africa, Zimbabwe, Eswatini, Madagascar (rice, maize, black-eyed beans, peas), Namibia, Tanzania (maize, rice, oilseeds)

Source: Costed Action Plan for SADC Industrialization Strategy and Roadmap (SADC 2017)

In this paper we focus on three regional food value chains – maize to maize flour, animal feed to poultry, and sugar to confectionery. These are selected for the following reasons.

- Maize is the most important cereal in the SADC and accounts for a substantial percentage of caloric intake. Maize production in most countries aside from South Africa is due to large numbers of small-scale farmers. Maize is also an important component of animal feed.
- Poultry is the most important and fastest-growing meat, as well as being among the cheapest sources of protein. There are substantial net imports. The competitiveness of the region's poultry sector depends on animal feed and competitive soybeans, which the SADC region is well suited to farm. While soybean production has expanded substantially in recent years, there is still a large regional deficit.
- Sugar is one of the major cash crops in the SADC and has received government support and trade protection. Furthermore, sugar is a key input in a wide range of foods for which there is a growing demand from urban consumers with rising incomes.

The paper draws on the growing body of literature that has been produced over the last decade. The regional value chain analysis interrogates production and trade data, as well as power and governance issues. In terms of data, while the production and trade data include the SADC region as a whole, the detailed analysis focuses on six selected economies in the region, namely Malawi, Mozambique, South Africa, Tanzania, Zambia and Zimbabwe. These economies account for a significant proportion of GDP, production and trade within the SADC. Furthermore, these countries include areas of important agriculture production and are linked by overland transport routes to major cities. Angola and the DRC are not covered due to limited overland trade, as well as relatively poor information, while Botswana, Eswatini, Lesotho and Namibia are relatively small economies.

The paper is structured as follows: Section 2 sets out the framework of regional value chains (RVCs) employed in the paper, reviews recent contributions on Southern Africa, discusses the climate change data and implications for industrial policy. Section 3 reviews the SADC's trade and production performance by drawing on the experiences of the three selected value chains and focusing on the six selected countries. Section 4 concludes by setting out the critical issues for a green industrial policy for food production in the region.

2. Regional Food Value Chains, Climate Change, and Industrial Development

We draw on the value chain framework to consider the linkages between activities from agricultural production through processing to wholesale and retail, and the challenges posed by climate change (Gereffi and Fernandez-Stark 2011). We consider recent studies on RVCs in Southern Africa, the developments that have taken place along food regional value chains in the last decade, and the nature of governance and integration. This is followed by a discussion on climate change, the need for climate adaptation, and a green industrial policy.

2.1 From GVCs and RVCs

Global value chains (GVCs) map activities coordinated by lead firms and enable us to consider the capabilities and governance structures that influence participation, upgrading, and how value is captured by various actors. The structure and dynamics in an industry can be examined in relation to four key dimensions – the input-output structure, the geography, the governance structure, and the institutional context. The interactions of these variables determine the extent to which firms, countries or regions move to higher value activities and benefit from participating in global (or regional) production systems. The governance structures within GVCs determine where value is created and captured, and by whom (Gereffi and Lee 2014).[1] The GVC framework helps to explain how lead firms can directly exert power on suppliers by specifying requirements, standards and protocols that should be adopted (that is, bargaining power). Industry associations and government policies can also influence the conditions for inclusion and exclusion in value chains through various institutional arrangements. Furthermore, environmental standards instituted by third-party certifications can directly exclude firms, while best practices or (implicit) quality standards can inadvertently exclude firms that are unable to access the knowledge and capabilities required to meet these expectations (Gereffi and Lee 2014; Dallas et al. 2019).

[1] Gereffi and Korzeniewicz (1994: 97) defines governance as "authority and power relationships that determine how financial, material and human resources are allocated and flow within a chain".

The concept of regional value chains is rooted in the GVC literature (Keane 2015; Arndt and Roberts 2018; Das Nair 2021). In the context of Southern Africa, studies have pointed to the potential for RVCs to provide a platform for African firms to upgrade and develop internationally competitive capabilities (Arndt and Roberts 2018; Das Nair et al. 2018b; Black et al. 2020). The growth of regional value chains has been driven by regional trade agreements, lower barriers to entry, and the regional expansion of multinational firms. In the case of food and agriculture, RVCs can be part of meeting the increasing demand for processed and packaged foods under rapid urbanisation (Sitko et al. 2018).

The GVC literature has conceptualised power in terms of buyer-driver and producer-driver relationships (Gereffi and Wu 2020), while more recent scholarship defines it more broadly as "the capacity of an actor to exercise and achieve control over a particular strategic outcome in its own interest" (see Dallas et al. 2019). Power can be understood by examining the transmission mechanism (diffuse and direct) and the actors (including lead firms, industry associations, government bodies and related institutions) that are involved in the dispersion of power. Power can be exerted through formal and explicit mechanisms (through contracts, for example), or in less identifiable and vague ways (for example through best practices that influence business conduct and are not easily enforceable). These dimensions – actors and transmission mechanisms – yield four broad categories of power, namely bargaining power, demonstrative power, institutional power and constitutive power (Dallas et al. 2019).

In the SADC, the structural transformation of the agricultural sector plays a crucial role in economic and rural transformation (Timmer 1988; Jayne et al. 2019; Badiane et al. 2021). In this case, transformation entails shifting from traditional, low-productivity subsistence production systems to high-productivity commercial production systems with scope for increased value addition, and the production of more complex processed products (McMillan et al. 2014; UNCTAD, 2021). For this to occur, firms require productive capabilities such as technology, infrastructure, capital and skills, alongside industrial, technology and innovation policies that facilitate the transformation (Bell et al. 2018). The acquisition of productive capabilities by firms relates to upgrading along the value chain in the forms of improved products and processes, as well as wider functional and chain upgrading. There are a range of 'traps and gaps' to achieving positive structural transformation (Andreoni and Tregenna 2020; Andreoni et al. 2021b). These include being stuck or trapped in low-value parts of the value chain, including through entrenched lead firms exerting market power to capture the value. The gaps include weak or missing linkages along value chains, and a failure to build institutions of industrial policy that support skills development and technological capabilities, such as testing facilities.

2.2 Developments in RVCs in Southern Africa

Value chains in Southern Africa remain dominated by South African exports, which in turn are concentrated in the hands of a very few lead firms (Das Nair 2021). This is the case in food value chains while, in terms of agriculture, productivity in Southern Africa remains relatively poor (Jayne et al. 2018; Badiane et al. 2021). Improvements have been stifled by limited access to essential inputs, including fertiliser, modified seeds, pesticides and herbicides, as well as machinery and equipment and ICT services (AGRA 2019). The input segment is highly concentrated, with a few lead firms (AGRA 2019). Regional farmers have limited market options for fertiliser, a key production input that accounts for 30% to 50% of production costs

for grain and oilseed producers. Along with two South African producers, Sasol and Omnia, countries must rely on imports from a very few major suppliers and traders with a record of collusive conduct (Ncube et al. 2016a; Roberts 2019). Moreover, the price of fertiliser in the region is inflated by the high cost of transportation, storage and trading. Like the fertiliser market, the seed market is highly concentrated, with only a few multinational companies involved in seed development, including DuPont (Pioneer), Monsanto and Syngenta (Chisoro and Kaziboni 2017).

There has been an expansion of large-scale agro-dealers across the region, not only as aggregators but as suppliers of input credit and extension services (Sitko et al. 2018; AGRA 2019). These input retailers and wholesalers determine the farmers' access to inputs, the pricing, and other market terms such as access to credit finance and extension services. Zambia and Kenya have witnessed an increase in maize sales to large-scale traders since the early to mid-2000s. In South Africa, the largest agro-conglomerates are integrated with international finance and trading companies (Bernstein 2013; Makhaya and Roberts 2013).

Outside South Africa, small-scale farmers are an important producer group in SADC countries, while there has been growth in medium-scale farmers in response to commercial opportunities in crops such as soybean (Jayne et al. 2019). There is also evidence pointing to an increase in investments among smallholder farmers through public-private partnership investments in development corridors, such as the case in Tanzania (see Hartmann et al. 2020). However, despite these investments, the small farm sector remains characterised by low levels of productivity, weak capabilities, and limited access to non-farm and cash-cropping activities (FAO 2017; Jayne et al. 2021). A massive scaling up of capabilities is required to improve productivity and diversify into higher value crops, including investments in equipment – especially for irrigation and storage, along with technical know-how (through extension services to advise on soil and disease management) (Rapsomanikis 2015).

Evidence from developed economies illustrates that improved market arrangements can lower transaction costs, improve profit margins, and de-risk the participation of smallholder farmers through market security (Reardon and Timmer 2012). This can include large-scale traders investing in storage and providing farmers with access to credit lines and extension services (Sitko et al. 2018). However, high levels of concentration in trading and poor storage alternatives can subject small farmers to unfair pricing practices (exercised through bargaining power), meaning that they sell their harvest at low prices while powerful traders can then on-sell it at much higher prices, unduly benefitting from big profit margins. The evidence in Southern Africa is mixed.[2] The recent study by Bonilla Cedrez, Chamberlin, Hijmans, (2020) draws on different sources of data for major cereals crops, including maize, on which there is the best data. It finds pronounced temporal and spatial variations in prices in Eastern and Southern Africa, likely due to a combination of export restrictions, poor infrastructure and lack of competition in transport and storage, and poor market price information.

[2] See Sitko et al. (2018), Bell et al. (2020), Bonilla Cedrez, Chamberlin, Hijmans (2020), Bonilla Cedrez, Chamberlin, Guo, Hijmans (2020). There are high levels of concentration in commodity trading globally (IPES-Food, 2017; Shand and Wetter, 2019; Blas and Farchy, 2021), concerns about common ownership across some of the major traders (Clapp 2019), and collusion between them (for example, with regard to fertiliser see Vilakazi and Roberts (2019); for grain storage and trading in South Africa, see Roberts (2020)).

Processing capabilities in Southern Africa have increased rapidly in the last 50 years (Reardon, et al., 2021). However, the processing capacity for food products is concentrated in South African lead firms such as Tiger Brands, RCL Foods, Pioneer Foods and Astral Foods. There are a few notable large and internationalising processors in other countries, including Tanzania's Bakhresa, Trade Kings in Zambia and Innscor in Zimbabwe. Small-scale processing capacity has long existed to meet the demand for minimally processed foods; however, large-scale food processors have developed over the last three decades to meet the demand for more highly processed food products, including highly refined specifications of maize meal.

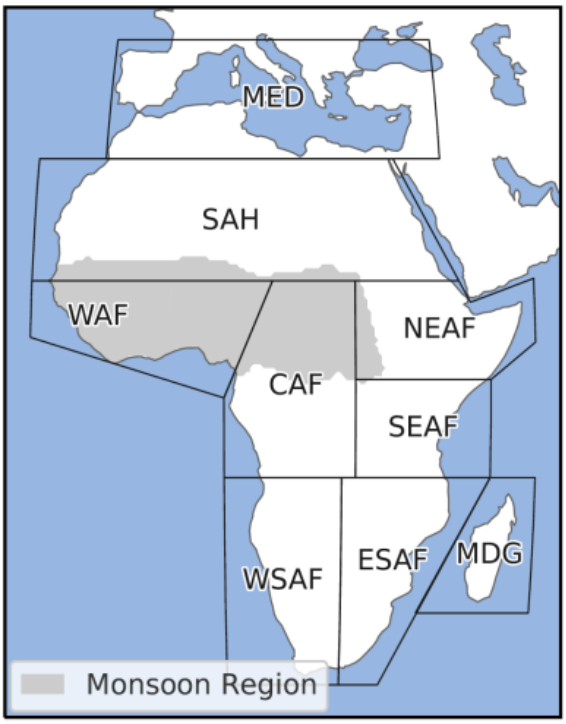
In considering the food value chains in Southern Africa, the role of supermarkets stands out. Supermarkets are integrating the region through their expansion, investment in distribution centres and logistics, and the private standards they impose on suppliers (Das Nair et al. 2018a; Das Nair 2019). South African supermarkets are the lead firms, while South Africa's influence in the region is also due to the geographic importance of the greater Johannesburg area as the largest concentration of consumer spending and the major industrial centre by far.

2.3 Climate Change and Adapting Food Value Chains

The agriculture and food systems are naturally among the most vulnerable to the effects of climate change (Ramasamy 2012; World Bank 2015; Von Braun 2020). Climate projections suggest that effects will include shifting growing conditions, increased climate and weather variability, and more uncertainty in predicting weather conditions, which will disrupt supply chains (IPCC 2021). Extreme weather events (droughts and flooding) and climate patterns directly cause significant production volatility, which can induce secondary transition risks (TCFD 2017).

The rapid warming of the globe holds serious risks for the SADC (Shepard 2019; Engelbrecht and Monteiro 2021). Southern Africa has experienced severe droughts, especially in 2015/2016, which are associated with extremely high temperatures. At the same time, other parts of Southern Africa, such as Mozambique, Malawi and Zambia, have experienced a significant increase in rainfall and pluvial flooding, including the two consecutive Category 5 tropical cyclones Idai and Kenneth in April 2019 in Mozambique and Malawi. As the IPCC (2021) has projected (Figure 3), as rainfall reduces in Southern Africa (west and east), Eastern Africa is expected to experience increased rainfall accompanied by flooding, especially along the coastal areas. The changes and increased variability in weather places further pressure on producers, food systems and rural livelihoods.

Figure 3: IPCC's Segmentation of the African Continent into Blocks Likely to Experience Similar Climate Change Patterns



Notes:

West Southern Africa (WSAF) has observed decreases in mean precipitation, despite an increase in heavy precipitation and pluvial flooding. An increase in aridity, and agricultural and ecological droughts is expected. Increases in mean wind speed and fire weather conditions are also projected.

East Southern Africa (ESAF) has observed decreases in mean precipitation and increases in meteorological droughts. It is projected to experience an increase in fire weather conditions, mean wind speed and heavy precipitation.

Southern East Africa (SEAF) is projected to experience an increase in the frequency and/or the intensity of heavy precipitation and pluvial flooding.

In Central Africa (CAF), decreases in mean precipitation and the standardised precipitation index have been observed. An increase in agricultural and ecological droughts has been observed, with projected increases in heavy precipitation and pluvial flooding.

Source: IPCC WGI Interactive Atlas (https://interactive-atlas.ipcc.ch/)

Urgent changes are required to manage the adaptation to climate change. Farmers will require access to inputs that can withstand the harsh weather conditions, including improved seed varieties that are drought resistant, heat tolerant and flood tolerant (FAO 2013). This needs to be complemented by adjusting irrigation strategies based on water availability. Farmers should be able to access extension services that can promote conservation agriculture and sustainable mechanisation. In regions where farmers are unable to adapt production to the changing weather conditions, support is needed to diversify into other crops or even agro-forestry, which has a high potential for carbon sequestration. Investments are required in water management, irrigation and improved storage infrastructure (Newell et al. 2019; Ramachandran Nair et al. 2019; World Bank 2021).

In terms of policy, extreme weather events and associated price changes can result in reactionary shifts in legal and policy frameworks to protect national economies at the cost of regional food security (World Bank 2015). Such cases of the imposition of grain export bans have already been experienced in Southern Africa, with countries such as Malawi, Zambia and Zimbabwe limiting the maize output that can be exported following drought periods.

Technologies related to 'precision' and 'smart' agriculture techniques, where improved data analytics are combined with analysis of soil and weather conditions, and irrigation patterns where possible, can improve the management of water and the effectiveness of the application of nutrients and agrochemicals (Das Nair and Landani 2020). Digitalisation and the extension of mobile telecommunications can facilitate the integration of these techniques among smallholder farmers if there are appropriate policies. For example, solar-powered, efficient micro-irrigation is increasing farm-level incomes by improving yields by up to 300% and reducing water usage by up to 90% (WMO 2020). Ultimately, climate-smart agriculture

can result in three outcomes simultaneously, namely improvements in productivity, better resilience, and lower emissions (Chang-Gil 2012).

Adaptation mechanisms at the processing and retail level will require coordination and strong capabilities to support industrialisation. Processing firms will need to upgrade packaging standards and develop packaging that maintains quality and safety under harsh conditions (e.g. extreme heat). Furthermore, processing firms will need to work closely with retailers to reduce transportation distances and minimise food loss. In Southern Africa, retailers can leverage big data and blockchain technologies to develop flexible and efficient supply chains (Chisoro-Dube et al. 2019; Das Nair and Landani 2020). Along with food value chains, retailers and customers are driving the need for improved transparency and traceability, with retailers increasingly demanding that producers provide information, such as carbon reporting. Furthermore, blockchain technology ensures that producers can report information on carbon intensity without concerns about a breach of confidentiality (Das Nair and Landani 2020). Other solutions can include operating cold chain solutions with solar energy to minimise carbon emissions, while leveraging the region's abundant sunshine

In addition to climate adaptation, regional exporting firms need to gear up for trade policies (e.g. carbon border adjustment mechanisms (CBAMs)) that are designed to circumvent carbon leakage (see UNCTAD (2021) for a detailed discussion on the effect of CBAMs on developing countries). Developed economies are rolling out CBAMs on heavy industries, including iron and steel, cement, fertiliser, aluminium and electricity generation. While these CBAMs initially focus on heavy industries, food exports will urgently need to adhere to involuntary eco-labelling standards such as the UK's red-light initiative.[3] These standards disincentivise consumers from purchasing carbon-intensive products. The agricultural sector is a major source of GHG emissions, mostly stemming from fertiliser application, enteric fermentation (cattle digestion), manufacturing and pasture management, and fuel use (Poore and Nemecek 2018; Crippa et al. 2021). Ultimately, regional exporters will need to consider not only climate adaptation, but also climate-mitigation interventions.

2.4 An Industrial Policy for a Just Green Transition

Climate change requires a regional industrial policy in the SADC for food and agriculture value chains. This is currently lacking, and one of this paper's main contributions is to set out the core elements of such a policy framework. The SADC Climate Change Strategy and Action Plan (2015) provides a general framework (SADC 2015); however, it is not articulated as part of a concrete set of measures for structural transformation through building industrial capabilities. In the absence of such measures, the pursuit of national interests at the expense of regional outcomes will undermine regional growth and development.

[3] The UK government, alongside lead retailers, launched a food-labelling pilot initiative in the UK through Foundation Earth in June 2021. The pilot initiative is geared towards increasing awareness of the environmental effects of food products and is increasingly receiving interest from food and beverage multinational companies, including PepsiCo, Danone, Starbucks and Nestlé. Packaged food products will carry 'eco-scores' on the front of the packaging to allow customers to evaluate whether they are purchasing low carbon-footprint products. The eco-scores will rank from A to G, with colour coding, where green is reserved for environmentally friendly products and red for carbon-intensive products (Foundation Earth 2021; Iqbal 2021). In buyer-driven value chains, such involuntary standards can dissuade consumers from purchasing carbon-intensive products and, in turn, influence retailers to consider the products they stock. This shift is expected to disrupt global supply chains.

Traditional industrial policies have sought to support structural change by shifting workers from low-productivity activities to high-productivity and more complex activities that offer better income and sustainable economic development (McMillan et al. 2017). In regional food value chains, structural transformation involves enhancing capabilities and productivity along the value chain, and within the segments. High-value activities can involve maintaining the quality and preserving the shelf life of fresh produce at the farming level or undergoing agro-industrialisation, which is associated with developing capabilities and capacity to process food products and the complementary ancillary services (e.g. packaging, health and safety and quality standards) (see Chisoro-Dube and Roberts 2021; Cramer and Chisoro-Dube 2021). Importantly, industrial policies should anticipate the relevant long-term trends in technology and industrial development and incentivise firms (in the present) to adapt and take advantage of the expected future changes (Altenburg and Rodrik 2017).

The Industrial Development Policy Framework (IDPF) adopted by the SADC in 2012 sought to leverage regional production and trade policies and harmonise the regional approach to industrialisation (Byiers et al. 2018). The IDPF identified three reinforcing components linked to industry competitiveness, industrial linkages, and regional value chains (McCarthy 2014). However, the ambitious strategy has been undermined by protectionist national policies (Byiers et al. 2018). For example, Mozambique's sugar rehabilitation programme relied on a surcharge on imported sugar, while South Africa's industrial policy relies on local content regulations that do not offer regionally produced goods and services any preference. For regional growth and development to be sustainable, a regional industrial policy that takes into account the dynamics of regional (and global) value chains and promotes regional linkages is necessary.

As climate-change mitigation challenges industrial development, environmental policies need to be designed to protect the environment and support structural change and industrial development (Altenburg and Rodrik 2017). If the policies do not broaden participation, then they will not receive the wide support required. At present, global measures could burden producers in the South with carrying the high cost of decarbonising, while also bearing the brunt of adaptation to climate change caused by historic emissions in the North. For instance, the imposition of trade rules (e.g. carbon-border adjustments) and eco-labelling could undermine the development of more inclusive value chains. Instead, shifts towards renewable technologies need to spur technological innovation and create new industries in developing countries (Altenburg and Rodrik 2017). In the highly interdependent agricultural and agro-processing sectors in Southern Africa, with strong forward and backward linkages and the potential for regional growth, it is essential that a regional approach is adopted. This can include concrete bilateral agreements to strengthen linkages between neighbouring countries (Ncube and Tregenna 2021). However, trade policies that restrict trade (such as export bans and local content policies) undermine the ability to scale up production and build capabilities.

3. Case Studies on Food RVCs

3.1 Introduction

This section reviews the growth and development of three selected value chains in the SADC – maize to maize flour/meal, soybean and animal feed to poultry, and sugar to confectionery. The SADC's demand for poultry and confectionery (including baked goods) is expected to increase to meet the growing and transforming food demand in the region. Maize meal is the main staple across the region, and maize is also a component of animal feed. We examine the regional dimensions of the value chains, the key linkages and issues of governance, and challenges for industrial policy to respond to climate change. For each value chain, we begin by unpacking the broad trade and production patterns over the last decade and map out the key drivers of imports and the leading exporters. This is followed by considering the value chain dynamics in the six selected countries, namely Malawi, Mozambique, South Africa, Tanzania, Zambia and Zimbabwe.

It is important to highlight at the outset that there is substantial scope to increase the agricultural production of crops such as soybeans, maize and rice. Countries such as Zambia, Tanzania, the DRC and Angola have land and water resources available for increased agricultural production. This can be linked to growth in processing activities to meet the increasing food demand. In instances where upgrading has taken place, such as in the poultry sector, this has primarily been driven by vertically integrated lead firms, which are mostly based in South Africa. To drive the growth and deepening of regional value chains, there is an urgent need to address traps and gaps in the value chains: traps where regional firms have limited know-how for more sophisticated processed products and/or where entrenched dominant firms control value chains, extracting profits without supporting broad-based investment in capabilities; and gaps along the value chains, where regional firms have failed to coordinate across borders and build the necessary institutional framework for regional technological capabilities and skills.

3.2 Maize to Maize Meal

3.2.1 An Overview of the Regional Value Chain

Maize is the main staple crop in the SADC region, followed by crops such as wheat and rice (OECD/FAO 2021). The bulk of the white maize is processed into maize meal for human consumption, while yellow maize is used as an input in animal feed production. Maize also has a wide range of other industrial applications in food and beverages, pharmaceuticals, personal care and cosmetics, as well as in chemical industries and for generating bioenergy (Grant et al. 2012). However, in South Africa it is excluded from the biofuel programme for food security reasons. For this analysis, we focus on the maize-to-maize meal value chain.

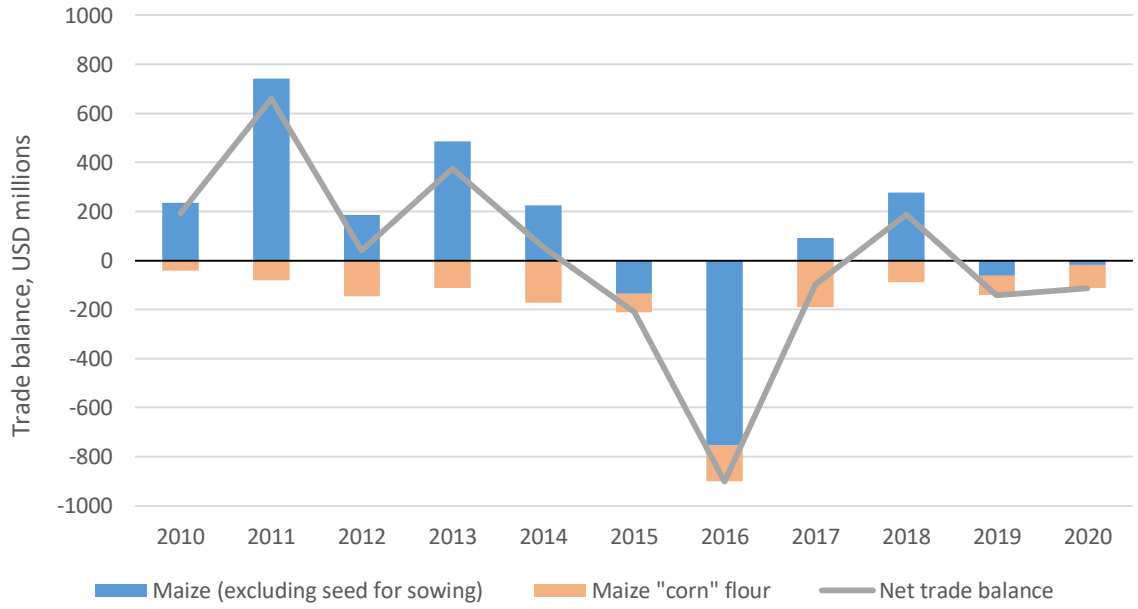
The maize-to-maize meal value chain in South Africa is dominated by large-scale farmers, while in the rest of the SADC, small-scale and medium-scale farmers are important producers. The maize sector is a recipient of substantial government support, especially concerning input subsidies and trade protection. Despite the concerns related to climate change, commercial maize cultivars are resilient and can be grown in various geographical locations and under different agronomic conditions. Small-scale and medium-scale processors are widespread in

each country, often meeting domestic demand for unbranded wholegrain maize meal products. On the other hand, large-scale mills in South Africa are packaging, branding and distributing highly refined products through the regional supermarket chains to urban consumers.

3.2.2 The SADC's Overall Performance

The SADC has been a net importer of maize and maize-related processed products in five of the past six years, from 2015 to 2020 (Figure 4). The region recorded the largest trade deficit, of $901 million, in 2016 because of extreme drought conditions affecting the southern part of the region. Poor rains and extreme weather conditions were also recorded in several countries in 2018/2019, reflected in their production. The SADC's trade deficit for maize meal has persisted throughout the past decade while, other than in three years, the SADC region recorded net exports of maize grain. The maize meal imports have been driven largely by Angola's imports, pointing to the failure to improve agro-processing capacity, along with intra-regional trade to meet growing demand.

Figure 4: Trade Balance for the Maize-to-maize Meal/Flour Regional Value Chain in the SADC



Source: Authors' analysis based on Trade Map

Zimbabwe, Botswana, Mozambique, Namibia and Eswatini have recorded the largest negative trade balances for maize, with their demand being met in most years by exports within the region, led by South Africa (the largest maize exporter, accounting for 80% of the SADC's total exports). However, South Africa is particularly vulnerable to climate change, meaning that it is important to expand production in countries with better and more sustainable water availability.

Lesotho, Mozambique, the DRC and Malawi are the largest maize meal importers after Angola. South Africa is the leading maize meal exporter, accounting for 68% of SADC exports between 2010 and 2020. However, in the last three years, South Africa's trade surplus for maize meal has declined quite rapidly: from $35 million in 2018 to $13 million by 2020.

3.2.3 Analysis of Selected Countries

South Africa's maize production is much larger than that of any other country in the region; however, the effect of the 2015/2016 drought can be seen in the sharply lower production in South Africa in those years. In Malawi and Zimbabwe, output in 2016 was also some 40% to 50% lower than two years previously, in 2014 (Table 2). Production in Tanzania, Zambia and Mozambique fell by much smaller proportions in this period, reflecting relatively good rains (although Mozambique had experienced sharply lower levels in 2013, from which it had not recovered). Production levels in several countries fell again in 2019 and, over the ten years, production levels have been volatile.

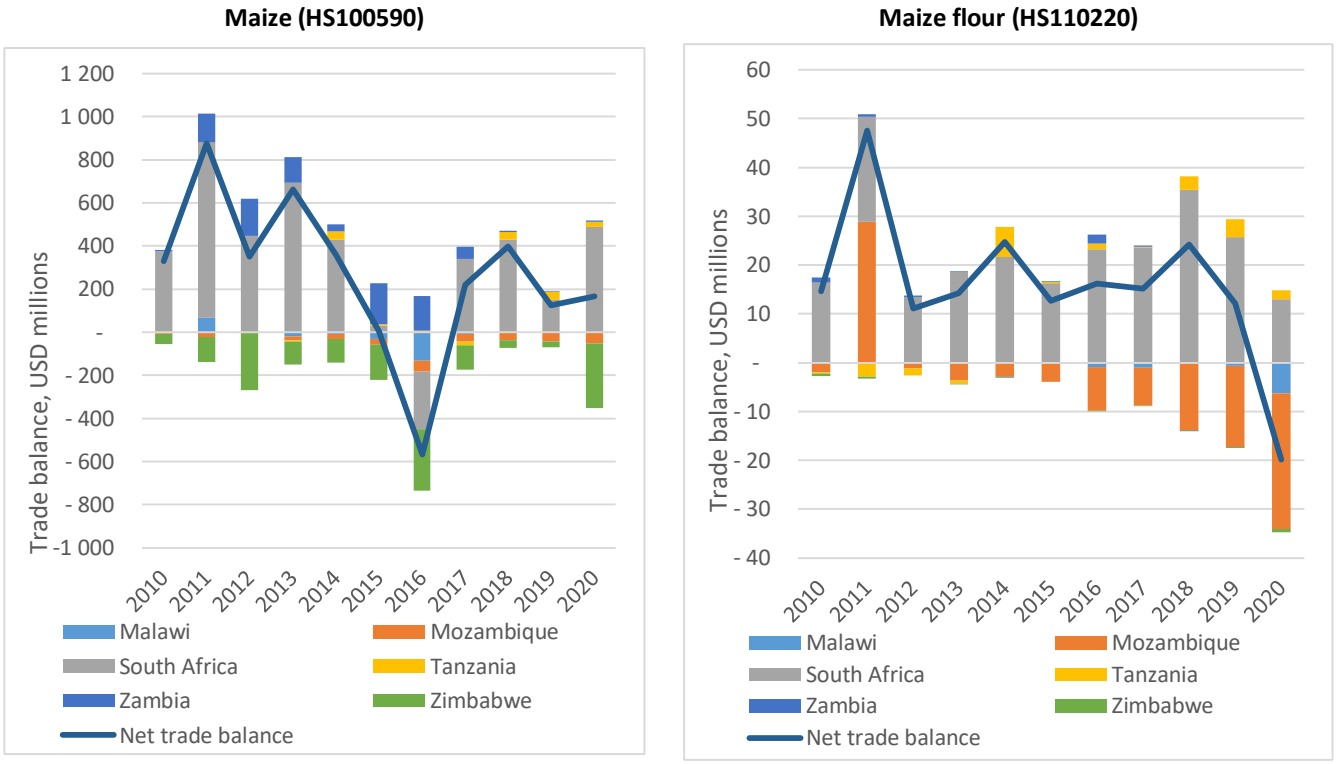
Table 2: Maize Production: Selected Countries in the SADC, '000 Tonnes

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Malawi	3 419	3 699	3 619	3 640	3 978	2 776	2 369	3 464	2 698	3 030
Mozambique	2 090	2 179	2 355	1 174	1 357	1 262	1 217	1 224	2 496	2 085
South Africa	12 815	10 360	12 121	11 811	14 250	9 955	7 779	16 820	12 510	11 276
Tanzania	4 733	4 341	5 104	5 356	6 737	5 903	6 149	6 681	6 273	5 652
Zambia	2 795	3 020	2 853	2 533	3 351	2 618	2 873	3 607	2 395	2 004
Zimbabwe	1 192	1 010	1 096	939	975	643	512	1 533	1 560	777

Source: https://www.fao.org/faostat/en/#data/QCL (**accessed October 2021**)

The effect of the extreme weather events on maize production in these countries is evident in the trade data (Figure 5). During the drought period in 2015/2016, South Africa's maize trade balance swung from +$430.5 million in 2014 to -$267.0 million by 2016. The country managed to bounce back in 2017 and 2018 to pre-drought levels, before again being affected by the drought in 2019, and recovering once again in 2020. On the other hand, Zambia maintained a relatively strong trade surplus during the 2015/2016 period. Tanzania's maize production has improved quite remarkably over the years, but this has not translated into the country being a significant net exporter. The record also points to the importance of a production recovery in Zimbabwe so that it would no longer run a persistent deficit. The 2015/2016 drought in Southern Africa is a major warning of the effects that need to be anticipated for the next El Niño episode. The import demand from countries such as Botswana and Namibia also needs to be borne in mind.

Figure 5: Maize-to-maize Flour Trade Balances: Six Selected Countries in the SADC



Source: Authors' analysis based on Trade Map

By comparison, the combined trade balance for maize meal for the six countries has weakened substantially since 2018, largely due to growing net imports by Mozambique. The net trade balance (for all six countries) remained stable during the 2015/2016 drought period, reflecting the imports of maize grain, which were milled locally and enabled increased maize meal exports through South African supermarkets, which are mostly destined for Angola, Lesotho, Malawi and Zimbabwe. This illustrates the importance of developing regional processing capacity to meet growing demand, along with the measures to ensure sustainable maize grain agricultural production.

3.2.4 Power, Governance and Climate Change

The preceding data analysis points to the opportunities and importance of developing effective regional integration and support for the expansion of maize production and maize meal processing in the SADC region to aid food security. The changing climate will affect patterns of regional production, as countries such as South Africa (the largest producer) become less ideal for maize production, while Zambia, Tanzania and the northern regions of Mozambique remain conducive. The costs of not doing are already evident in the price spikes in response to the extreme weather events in recent years (the drought in 2015/2016 and the cyclones in 2019) (Figure 6).

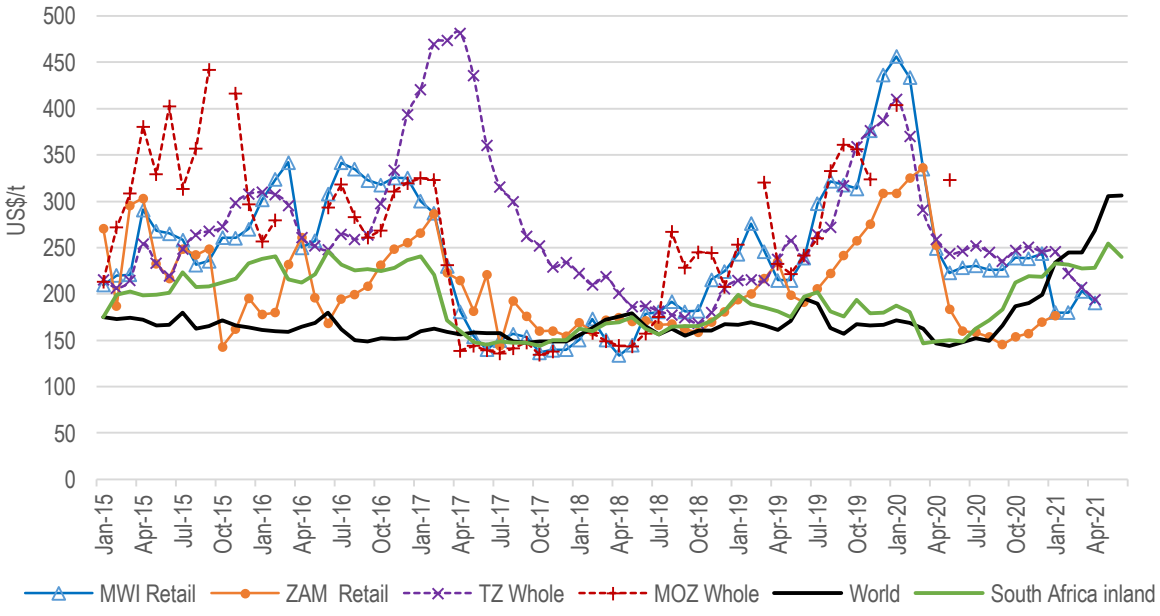
Maize is a relatively low value-to-mass product, meaning transport costs are relatively high as a proportion of the value of the product. Costly overland transport and storage facilities exacerbate price spikes in towns and cities being supplied from inland areas. Trade policy interventions, particularly export bans, have further undermined the development of regional value chains, entrenching the position of large-scale farmers, traders and millers in determining where value is created and captured. This raises the question of how power manifests in the regional maize-to-maize meal value chain and the way it influences the growth and development of climate-smart production.

Maize Production and Limited Bargaining Power for Small-scale Farmers

In most SADC countries, aside from South Africa, small-scale farmers are very important for production. The farmers generally rely on rain-fed production rather than irrigation, and do not have the capacity and resources required to adapt to weather changes. Nor do they have weather- and pest-monitoring systems or good access to storage silos, weather-resistant cultivars or effective extension services. Small-scale farmers are reliant on large traders for these services, alongside government entities. As a result, the farmers are price-takers and, if large-scale traders do not procure the maize, the farmers lack alternative routes to markets and incur high storage costs, as much as 50% of the maize selling price in some countries (see IFPRI Malawi 2021).

The benchmark maize prices in the SADC are set in South Africa (inland, at Randfontein close to Johannesburg) because of the country's (current) dominant maize production. South Africa's benchmark price is typically based on what can be earned in international export markets, given its normal substantial surplus. In other countries, the market-clearing prices are based on imports or exports, depending on the demand and supply balance; however, the price differences from the South African benchmark are often far above what would be reasonably expected given transport costs (Nsomba et al. 2021). At times, prices have been $200/t or even $300/t above South African and world prices (Figure 6), when overland transport or sea freight should not be more than $50 to $100/t.

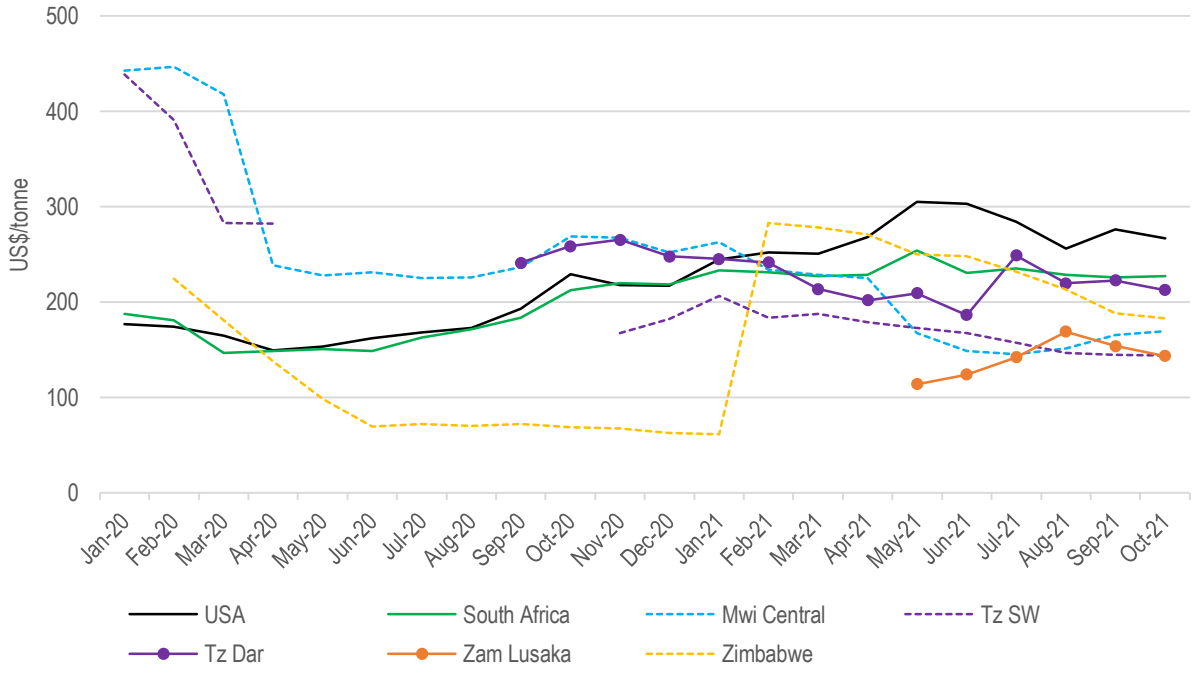
Figure 6: Maize Prices: Selected Countries in the SADC



Sources: Nsomba et al. (2021)

In 2020/2021 we have seen the opposite picture. This year has seen the most severe drought in a century in Brazil, along with drought in Mexico and extreme weather in the USA, and international benchmark prices increased sharply (Figure 7). The USA export price doubled from $150/t in mid-2020 to above US$300/t in May 2021. In contrast, there have been very good harvests in the SADC region. Drawing on more comparable wholesale price data (for which we do not have a long series for most countries), we can see that prices in Zambia, Malawi and Tanzania are all substantially below international prices as well as South African prices (Figure 7). Maize prices across Zambia were around $120 to $130/t in mid-2021, lower than they have been for many years, and a price difference from South Africa that is larger than justified by transport costs. Prices in the south-west of Tanzania are also extremely low compared to Dar es Salaam, by much more than justified by transport costs, suggesting that farmers are being squeezed by buyers. At the same time, prices in Nairobi have been even higher, at over $400/t, which – given that Tanzania and Kenya are in the East African Community and Kenya and Zambia are in COMESA – are huge margins over producing areas.[4] The maize price to farmers in Zimbabwe has been fixed by the government, with imports being banned. All maize production may be sold only to the Grain Marketing Board. The price variation is thus due to the changes in the parallel exchange rate used to convert prices to US$.

Figure 7: Maize Producer/Wholesale Prices in Regional and International Markets



Source: Nsomba et al. (2021)

Maize Processing and Opportunities for Upgrading

Across the SADC, maize millers vary in scale, with the largest millers mostly based in South Africa (Chigumira 2019). South Africa's large-scale millers produce highly refined (and fortified) maize meal, which is supplied to the region through supermarket chains such as

[4] Kenya has had restrictions on imports due to concerns about the standards of imports, specifically aflatoxin; however, this restriction was lifted earlier in 2021. See Nsomba et al. (2021) for more details.

Shoprite and Pick n Pay (reflected in exports, Figure 5 above). The supermarkets have stringent regulations related to packaging, labelling and branding. The supermarkets and large-scale millers have mutually reinforcing influences over consumer preferences, pushing them towards highly refined product with standards that smaller millers struggle to meet.

South Africa's commercial maize-milling industry is relatively concentrated in very few large firms, with some, such as Tiger Brands, also having spread across the region (Department of Agriculture, Forestry and Fisheries [DAFF] 2017; Bowman 2021). There is also a group of dynamic medium-sized provincially based millers that have close linkages with agriculture, coupled with advanced technological capabilities. The level of concentration in maize processing varies by country. While maize processing in Tanzania is also highly concentrated (Lunogelo et al. 2020), smaller and medium-sized millers play a much bigger role in Zambia (Chigumira 2019). Maize processors in Zambia increased from only 35 millers in 2007 to 78 by 2018, of which more than half are medium- and large-scale millers. Furthermore, the Presidential Empowerment Initiative Fund (PEIF) programme invested in solar hammer mills across the country to boost agro-processing in remote areas (Chigumira 2019). The growth of small-scale millers in Zambia is also linked to consumer preferences in the opposite direction to that promoted by the major supermarkets, that is towards wholegrain maize meal, which is richer in nutrients (FEWS NET 2016).

Power dynamics in South Africa's maize processing industry

The South African maize value chain, the largest by far in the SADC, is characterised by high levels of concentration in the production, trading and processing segments (Bowman 2021). Although historically dominated by large-scale firms, significant growth among dynamic medium-scale firms has diluted concentration somewhat, pointing to alternative trajectories (Bowman 2021). Notably, retailers and wholesalers play a pertinent role in coordinating activities in the value chain, with a diversity of retailers outside the major supermarkets in the township, peri-urban and rural markets providing routes to market for smaller producers (Chisoro-Dube et al. 2018).

Small processing firms have struggled to expand in commercial milling for various reasons, such as technical challenges and volatile maize prices where consumers, especially low-income consumers, are sensitive to price changes (Bowman 2021; for Tanzania, see Lunogelo et al. 2020). In recent years, the increasing demand for nutritious maize meal through fortification has also driven up the cost of production. To promote the growth and development of small black-owned millers in South Africa, the government implemented several industrial policy initiatives under the Industrial Policy Action, and the Agriculture and Agro-Processing Masterplan process initiated in 2020. Without recognising the integral governance links between retailers and millers, and the bargaining power of retailers, the millers remain trapped in small market segments, and participation is not widened. As well as branding and packaging requirements, retailers have invested in centralised advanced supply chain systems that require processors to upgrade and synchronise their stocking systems. Such technological advancements and strict standards make it difficult for small enterprises to catch up to advanced medium- and large-scale processes without concerted government support (Bowman 2021).

Responding to the challenges of climate change, while opening up markets to greater inclusion, requires addressing gaps and traps along the value chains. The appropriate capabilities, storage infrastructure and improved logistics have to be supported urgently for

farmers across the region to improve production and resilience to weather shocks. This is especially important, given the rainfall projections for South Africa and its current position as the major regional producer, in addition to the need to meet growing demand from cities such as Dar es Salaam, Maputo and Lusaka. To support the upgrading of millers across regions, it is essential to recognise the role that retailers play in shaping consumer preferences and providing the routes to market. Recent experience points to different models in this regard, with the potential for smaller millers to focus on less-refined and more nutritious meal, provided consumers are aware of the benefits.

3.3 Animal Feed to Poultry

3.3.1 An Overview of the Regional Value Chain

Meat consumption, particularly in the case of poultry, is expected to increase in the foreseeable future as a result of rising income levels and urbanisation in the SADC region (Ncube et al. 2016; Ncube 2018; OECD/FAO 2021). Demand in Africa already substantially outstrips supply, and the demand for poultry is expected to grow faster than that for any other meat (Mottet and Tempio 2017). There are opportunities to capitalise on this growth, given that the poultry sector has strong backward linkages to animal feed, including soybeans and their processing. To date, the growth and development of this regional value chain has been driven by South African firms that expanded their footprint in the region in a highly concentrated sector.

Vertical integration along the value chain allows the large players in this industry to make coordinated investments and realise the competitive potential. The animal feed-to-poultry value chain starts with the production and processing of soybean and maize alongsidedthe breeding the chicks that are reared as broilers. These initial stages of the animal feed-to-poultry value chain occur through coordinated industrial processes and are followed by the processing and distribution of fresh and frozen poultry meat. Animal feed – comprised of crushed soya and maize, and supplements – is the largest cost component of poultry production. On average, animal feed accounts for 50% to 70% of broiler production costs, with yellow maize and soybean accounting for nearly 80% (Ncube et al. 2016; Davids and Meyer 2017).

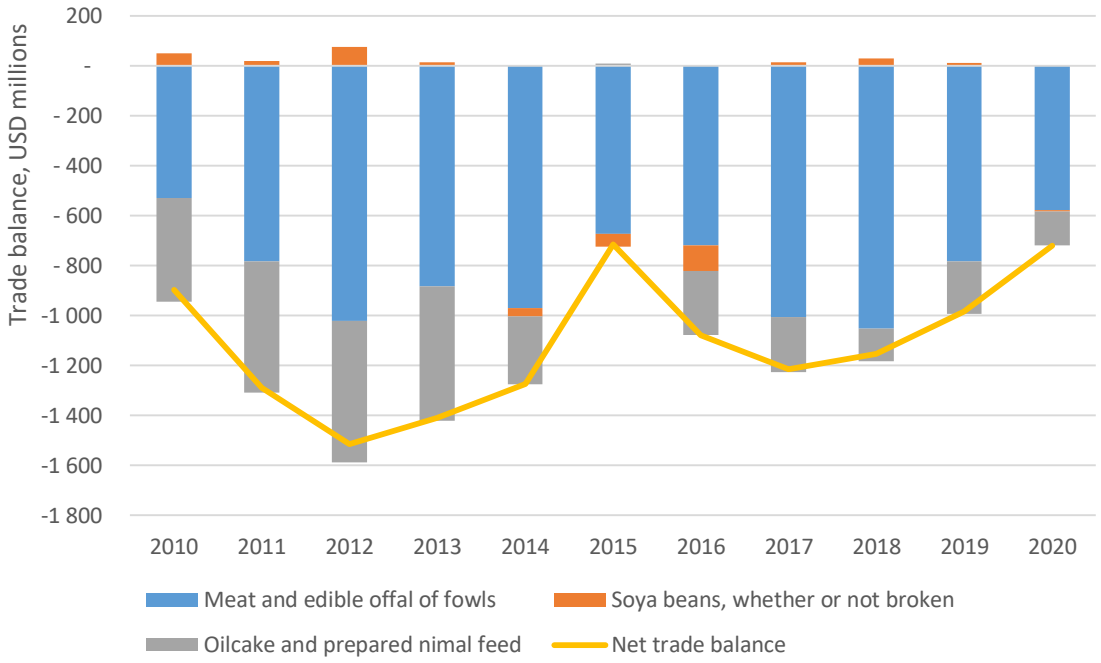
The poultry industry in the SADC is reliant on breeding stock for day-old chicks that are sourced from two multinational corporations, Aviagen Broiler Breeders (part of the EW Group) and Tyson Foods of the USA (Ncube et al. 2016; Ncube 2018). The main breeds are licensed by these companies to local poultry-breeding businesses. The competitiveness of the final product depends on the coordination of production and investment through the various levels, and the ability to acquire the key raw materials at a reasonable price (Paremoer 2021).

3.3.2 The SADC's Overall Performance

The SADC's trade balance for the animal feed-to-poultry value chain has fluctuated, even while demand has grown strongly (Figure 8). Between 2010 and 2020, the SADC's import demand for the value chain peaked in 2012, reaching a net trade balance of -$1.5 billion. The deficit was at its lowest at -$720 million in 2020. The deficit is driven mainly by poultry meat imports, followed by oilcake and animal feed, with soybeans at times being in surplus and in other years experiencing a small deficit. A regional value chain strategy can improve the

competitiveness by increasing competitive supply back to the constituents of animal feed and their processing, alongside improvements in poultry breeding and cold-chain capabilities.

Figure 8: Trade Balance for the Animal Feed-to-poultry Regional Value Chain in the SADC



Source: Author's analysis based on Trade Map

Across the SADC, nearly all the countries have recorded deficits for oilcake and animal feed, except for Tanzania, Zambia and Malawi. Most of the SADC's imports of oilcake are sourced from Argentina, even though there is potential to expand production in Zambia. With regard to soybeans, substantial deficits have been run by Zimbabwe, South Africa, Botswana and Angola. On the other hand, Zambia and Malawi have mostly maintained a positive trade balance, even during the 2015/2016 and 2019 drought periods. Soybean production in Argentina (and Brazil) is increasingly coming under scrutiny, particularly where production expanded following massive land-clearing and deforestation (threatening biodiversity and emitting vast amounts of greenhouse gases) (WWF 2014). With increasing attention being paid to emissions, this provides an opportunity for countries like Zambia, Malawi and Tanzania to sustainably expand production (see Voora et al. 2020).

The SADC net trade deficit for the poultry sector is driven primarily by growing imports by Angola, South Africa, the DRC, Mauritius and Mozambique. For example, South Africa imports around 15% to 20% of its demand, representing a major growth opportunity if the competitiveness of the sector can be improved sustainably through regional actions. Poultry imports are met mostly by producers from the USA, Brazil, Australia, Argentina, the UK and the EU.

3.3.3 Analysis of Selected Countries

Over the last decade, soybean production in the six selected countries has grown quite rapidly and has led to an improvement in the net trade balance (Table 4 and Figure 9). The SADC region is well suited for soybean production, characterised by similar agronomic and climatic conditions to those of the leading producers in Latin America. Specifically, Zambia, Tanzania

and the northern part of Mozambique are well placed to expand soybean production (Diers and Scaboo 2019). However, the greatest increase in total production volumes has been in South Africa. Since 2010, total production among the six countries increased from 811 671 tonnes to over 2.1 million tonnes in 2019, notwithstanding the climate-related declines in 2016 and 2019. South Africa produced nearly 70% of the total in 2019. While the output of Zambia and Malawi is small in tonnage terms, both countries trebled their output from 2010 to 2017, although production fell back somewhat thereafter due to the costs of getting regional exports to market, which suppressed farmgate prices. Tanzania's production is very small, although it has grown strongly (the trade data suggests production is being substantially under-recorded).

Table 3: Soybean Production: Selected Countries in the SADC, Thousand Tonnes

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Malawi	73	76	107	112	132	121	132	209	175	170
Mozambique	-	-	-	-	-	-	-	-	-	-
South Africa	566	710	650	785	948	1 070	742	1 316	1 540	1 170
Tanzania	3	3	6	6	6	6	7	6	21	23
Zambia	112	117	203	261	214	226	267	351	303	281
Zimbabwe	57	54	77	67	71	42	48	36	70	40

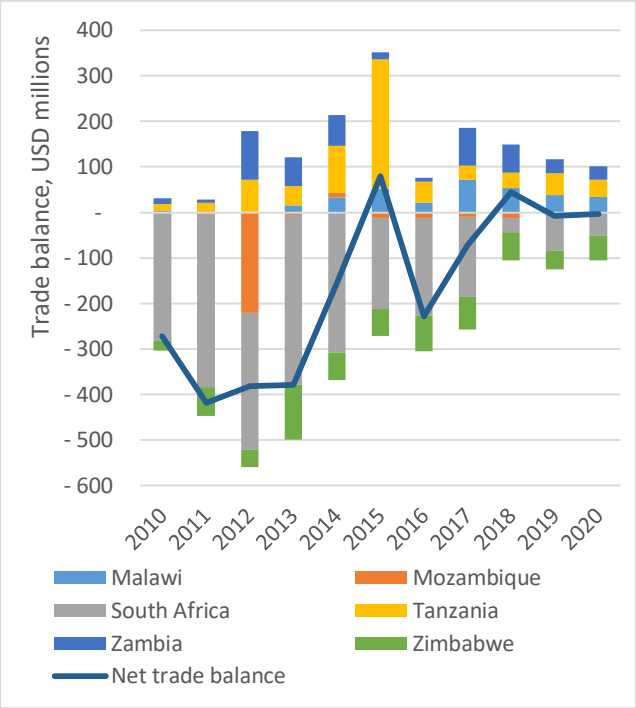
Source: https://www.fao.org/faostat/en/#data/QCL (**accessed October 2021**)

The growth in soybean production has seen the trade balance for oilcake, soybean and animal feed across the six countries improve substantially, mainly due to South Africa (Figure 9).[5] South Africa and Zambia have invested in expanding domestic crushing capacity in the last several years, which has supported the narrowing trade deficit (Ncube 2018; Paremoer 2021). Proper processing is important for poultry feed in order to reduce the oil content and other anti-nutritional factors. The lack of investment in processing in Tanzania has led to exports of beans and imports of soybean meal for poultry feed (Wilson et al. 2021). The growing demand for poultry continues to represent a huge derived demand for animal feed. In the selected countries, the poultry trade deficit remained substantial, at $283 million in 2020, due mainly to imports by South Africa from deep-sea sources.

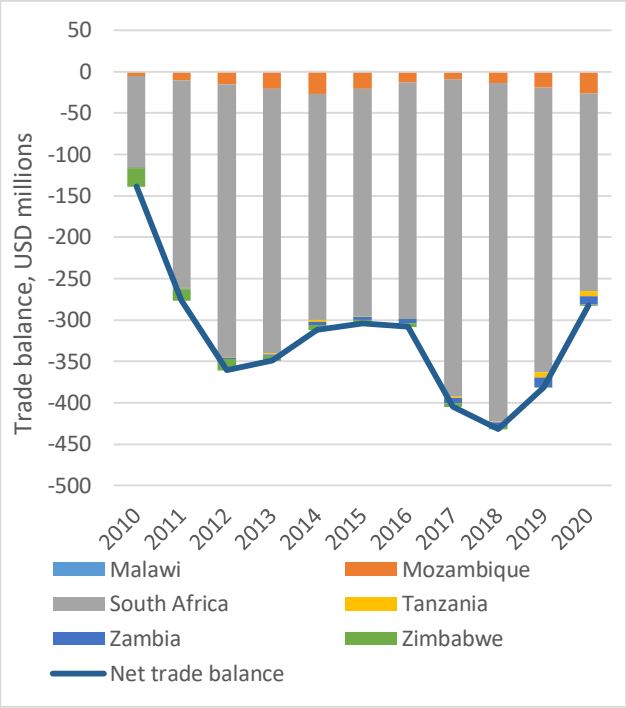
[5] Although it is not clear how Tanzania recorded substantial net exports in 2015 while production was minimal. The Tanzania Soybean Development Strategy aimed to increase production from six thousand tonnes in 2014 to two million tonnes in 2020 and, while this has not been achieved, production may be more than recorded.

Figure 9: Animal Feed-to-poultry Trade Balance: Selected SADC Countries

Oilcake and animal feed (HS23) & Soybean (HS1201)



Poultry (HS0207)



Source: Authors' analysis based on Trade Map

3.3.4 Power, Governance and Climate Change

Building the animal feed-to-poultry value chain to meet South African demand, along with the growing demand from urban consumers across the region, comprises one of the main development opportunities in the SADC. However, there is no regional strategy, as South Africa has largely pursued a go-it-alone path, viewing the region simply as an export market. Growing the poultry value chain requires the development of capabilities at various levels, including expanding soya and maize production and processing, while boosting poultry production through investments in productive breeds, production facilities and the technical capabilities required in commercial poultry production. Furthermore, there are competencies required in ancillary services such as cold-storage transportation and distribution.

Expanding Animal Feed Production and Competing Interests

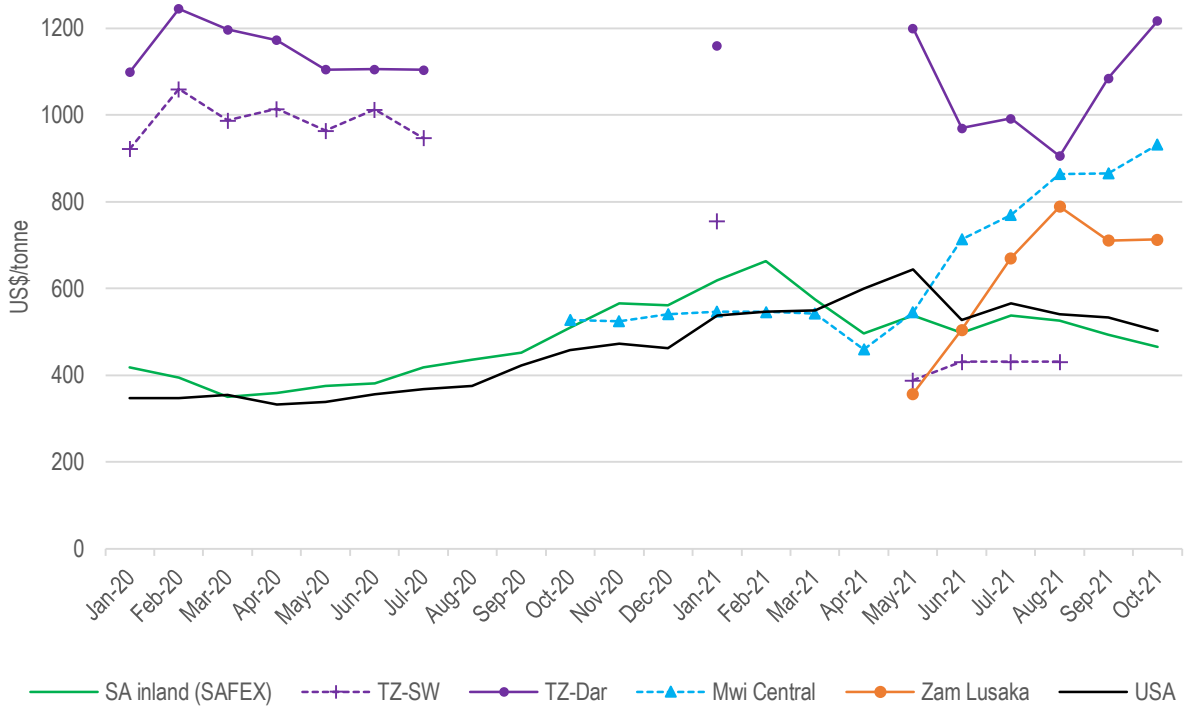
The main constraints to growing the value chain lie in ensuring sustained increases in the regional production of soya and oilcake, along with the regional cross-border linkages through animal feed to poultry markets. The rapid expansion of soybean production in the SADC has been driven by increases in area planted, supported by government intervention and, to some extent, enhanced productivity. South Africa's soybean production has increased thanks to an increase in area planted, supported by increased crushing capacity. Furthermore, the sector is protected by an 8% ad valorem tariff, except where South Africa has preferential trade agreements as with the EU and SADC (DAFF 2019).

In Zambia, government subsidies that are limited to maize production have disincentivised smallholder farmers from diversifying into soyabean production, despite the favourable agronomic conditions. Growth in soybean production in Zambia was initially driven by large-scale private investments, although the number of smallholder farmers has risen quite sharply since the 2010s, accounting for 45% of total production by 2019 (Mulenga et al. 2020). There is also a significant proportion of small-scale farmers in Malawi. In Tanzania, soybean production is undertaken predominantly by smallholder farmers, while there has also been growth in production by large-scale farmers in the last few years. However, poor market information, weak farmer organisation and weak linkages between buyers and producers has undermined output growth (Wilson et al. 2021). While smallholder farmers in Zambia have taken advantage of improved production technologies to boost production, there is still a tendency among most small-scale farmers to use traditional faming technologies which are not in line with developing climate-smart and industrialised soybean production (Paremoer 2021).

Increased production gave rise to somewhat more competitive soybean and animal feed prices in the region, although imports have still been required to clear the market (Ncube et al. 2017). In 2021, drought and extreme weather in North and South America saw international soybean prices increase by around 50% (Figure 10). These were also substantially higher than the prices prevailing in the preceding five years. Improved regional production meant lower prices in countries such as Zambia, Malawi and South Africa at the time of the main harvest in mid-2021. However, there are still extremely high prices in Dar es Salaam (as well as Nairobi; see Nsomba et al. 2021), which appear to have pulled prices up in Zambia and Malawi after the harvest.

Huge price differences across the region (within countries and across borders) point to obstacles related to transportation, logistics and borders. This is consistent with findings on the costs relating to the relative ‘remoteness’ of producers from demand (see, for example, Brenton et al. 2014; Aggarwal et al. 2018). These costs reduce the returns to farmers, especially those without storage facilities, who are forced to sell at harvest in April to May, and increase the prices paid by agribusinesses, including processors supplying urban areas. As such, it compounds regional food net imports by undermining local production and adds to high food prices for households.

Figure 10: Soybean Producer/Wholesale Prices



Source: Nsomba et al. (2021)

Large-scale Investments in Crushing Capacity by Vertically Integrated Firms

The soybean-processing industry in the SADC has grown rapidly in the last few years, largely linked to a South African strategy in the early-2010s (under the Department of Trade, Industry and Competition) to support large-scale processor investment. This resulted in the doubling of processing capacity to 2.1 million tonnes per annum. In response, processors increased soybean imports (from South America) to maximise processing operations and meet the growing national demand. However, the previously mentioned 8% ad valorem tariff on soybean imports was meant to counter this influx and support domestic production. Crushing capacity continues to exceed the domestic supply of soybean (from production and imports), with the industry operating around 60% of capacity (Paremoer 2021).

Similarly, Zambia's processing capacity for cottonseed, sunflower and soybean grew substantially, from 375 000 tonnes in 2013 to 550 000 tonnes by 2020 (Mulenga et al. 2020). There were investments by Cargill in the Zamanita plant it acquired from Zambeef in 2015, with was subsequently acquired by ETG in 2019, with capacity being expanded further. Indian-owned Global Industries invested in a major soybean-processing plant in Ndola, Zambia in 2018, mainly to support the aquafeed sector. Poor rainfall in 2019 resulted in the decline of soybean supply (Table 4) and increased competition among processors, with most processing plants operating at below capacity (Mulenga et al. 2020). This points to the importance of investment in water management and irrigation, linked to regional industrial processing capacity and through to poultry production.

Poultry Production and Market Power

Large-scale poultry producers dominate the regional value chain by governing production and becoming involved in breeding stock, animal feed mixes and large-scale slaughtering. In the

SADC, South Africa is the largest broiler producer by far (with around two million tonnes per annum), while countries such as Zambia, Botswana and Malawi each produce less than 150 000 tonnes per annum (Ncube 2018). The lead South Africa-based firms are Rainbow Chicken (a subsidiary of Remgro-controlled RCL Foods), Astral Foods, CBH Holdings and Quantum Foods. These companies have associated businesses across the region. Irvine's Africa has operations in Mozambique, Tanzania and Zimbabwe, which are vertically integrated – from animal feed production through to poultry production and packaging.

Only a handful of poultry producers have breeding licences from the two global transnationals corporations (Tyson and Aviagen/EW Group), which control more than 90% of the world market.[6] Broiler breeders are imported into South Africa at great grandparent or grandparent level, as regulations prohibit growers from importing commercial day-old chicks and limit the importation of parent stock. The licensing arrangements and regulations reinforce the important governance position of a few large businesses, and their arrangements determine the extent to which smaller players can participate meaningfully in the poultry sector (Ncube et al. 2017; Ncube 2018). There have been competition cases in South Africa and in Zambia relating to exclusionary conduct and collusion at various levels (Ncube et al. 2017).[7]

South Africa's poultry producers are organised through the South African Poultry Association (SAPA). Through this organisation, the poultry producers have successfully lobbied government for import tariff protection from other regions, except through the USA's African Growth and Opportunity Act (AGOA) and the EU-SADC Economic Partnership Agreement (EPA), which includes 27 EU member states. Both trade agreements provide American and EU-based firms preferential access to the South African market. For frozen bone-in chicken cuts, South Africa has not paid any tariff duty on imports through the EU-SADC since 2016. Similarly, American firms have had a quota of 65 000 tonnes per annum through AGOA since September 2016. While EU and American firms can access the domestic market through these trade deals, South African firms are unable to meet the sanitary and phytosanitary requirements to export to these markets, and thereby are unable to capitalise on their market access (De Klerk 2019).

South Africa's poultry master plan, published in 2019, aims to develop the domestic capacity of poultry production by addressing various structural challenges (DTIC & DALRRD 2019). These challenges include the high cost of feed, limited export capacity (especially to the region and deep-sea markets), relatively small production capacity (compared to global producers) and the limited progress towards incorporating black poultry producers into the value chain. While the master plan correctly identifies the challenges faced by poultry producers, it fails to recognise the importance of a regional value chain, especially in the context of climate change. The growing regional demand under urbanisation, and the attractive growing conditions for animal feed constituents, mean a regional approach is essential. In addition, the lead South African firms are expanding across the region.

The route to market for SADC's poultry industry is predominantly through supermarkets (about 50% of all produce), followed by quick-service restaurants (QSRs). These actors have bargaining power over poultry producers, as they determine the terms of business with suppliers. Both retailers and QSRs impose requirements on poultry producers, including

[6] See the Heinrich Boll Foundation (2021), and Scaturro (2020), quoting Tony Barnes, former Cobb CEO.

[7] Zambia fined the four main producers, Ross Breeders Zambia, Hybrid Poultry, Tiger Chicks and Quantum Foods Zambia, in March 2018 for collusion. https://globalcompetitionreview.com/zambia-fines-chick-hatchery-cartel

quality and listing requirements. Quality standards are quite strict and relate to the rearing conditions of the chickens, packaging denominations (such as whether the chickens are individually quick frozen (IQF) or fresh), weight and/or size of chicken, and types of cuts. In this way, retailers and QSRs can exert pressure on chicken suppliers before they are able to enter the market. However, poultry producers do have some leverage, given that poultry is a key product line for retailers and QSRs given the growing demand (Ncube 2018; Goga and Bosiu 2019).

3.4 Sugar to Confectionery

3.4.1 An Overview of the Regional Value Chain

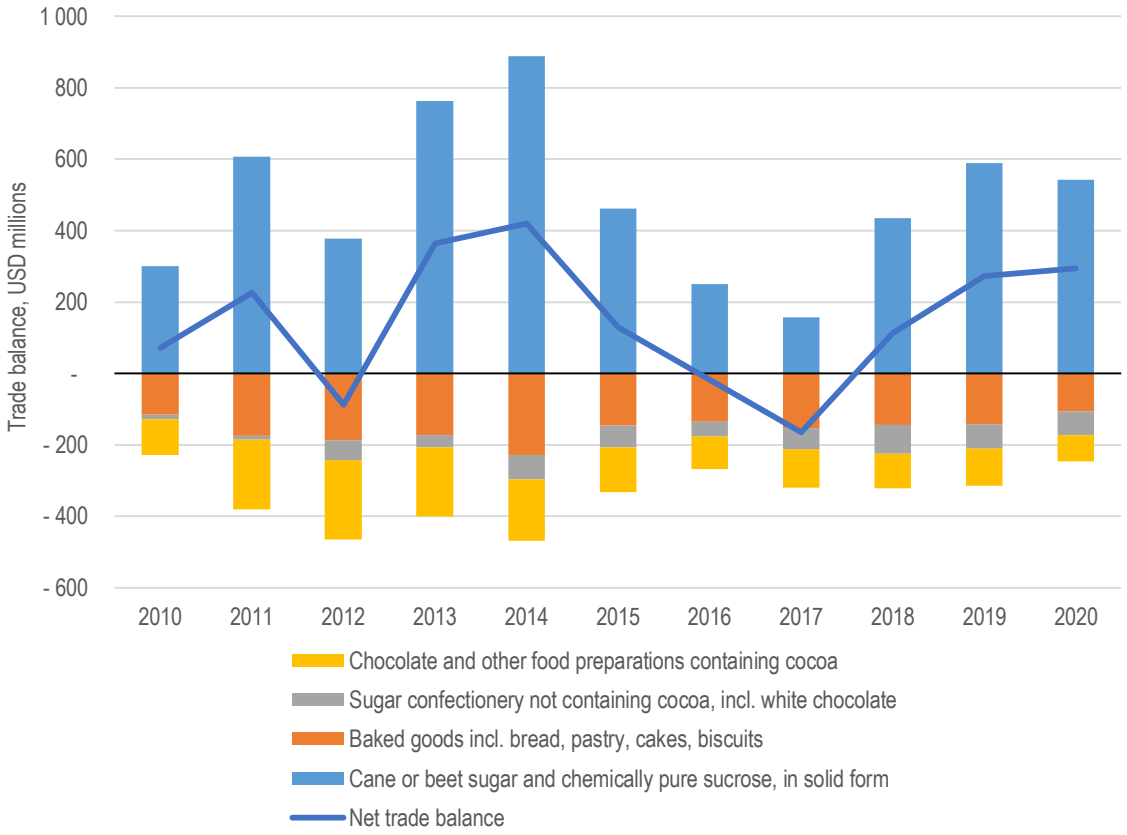
The SADC includes low-cost producers and substantial net exporters of sugar (Figures 11 and 12; Ellis et al. 2010; Das Nair et al. 2017). Globally, sugar industries receive substantial government support, which means that world market prices are often viewed as 'dumped' prices below the cost of production, and this is also the rationale for the SADC protection of sugar growers and millers (Das Nair et al. 2017). Protection and high levels of concentration have the consequence that domestic prices for retail or industrial sugar have been relatively high, even in major net exporters such as Zambia (Chisanga et al. 2015). This raises the costs of downstream confectionary producers.

Sugar milling is highly concentrated, with sugar production in the region dominated by a very few large transnationals led by Illovo Sugar (part of Associated British Foods), Tongaat Hulett Sugar and TSB Sugar. These companies have their own farms and source from smaller growers with whom they have long-term relationships. Raw and refined sugar produced from milling and refining processes are distributed to wholesale, retail and industrial channels for final consumption or use in products such as confectionery, baked goods and beverages. Capacity to produce downstream goods such as confectionary is concentrated in a few countries, and the region is an overall net importer of sugar confectionery products. This points to a break in the value chain, where capabilities upstream in sugar are not translating into competitive downstream production.

3.4.2 Overall Performance of the SADC

The SADC's net trade balance for the sugar-to-confectionery regional value chain was mostly positive during the period under analysis, driven by sugar's strong export position outweighing imports of confectionary and baked goods (Figure 11). The SADC's trade balance for sugar, however, has been affected adversely by the dry conditions, given how sensitive water-intensive sugar production is to climatic conditions (Gerbens-Leenes & Hoekstra, 2009). From 2014 to 2017, the SADC sugar trade surplus declined by 82%, as production fell sharply in South Africa, Mozambique and Zimbabwe with the 2015/2016 drought. Imports of sugar confectionery and baked goods represent a derived demand for sugar, pointing to the opportunities for expanding processing capacity and capabilities in the SADC. There are firms investing in downstream capabilities outside of South Africa, notably the expanding regional production capacity on the part of companies such as Trade Kings in Zambia (Bosiu and Vilakazi 2020).

Figure 11: Trade Balance for the Sugar-to-confectionery and Baked Goods Regional Value Chains in the SADC



Source: Authors' analysis based on Trade Map

The countries with the strongest trade balance in sugar include Eswatini, Mauritius, Zambia, Malawi and Mozambique. By comparison, the SADC trade deficit for baked goods, chocolate and other cocoa-related preparations, together with sugar confectionery, averaged around -R113 million between 2010 and 2020. Thisis driven by all the countries except for Zambia and South Africa, which have positive trade balances. Most of the countries import baked products from South Africa, along with deep-sea imports from India, Malaysia and the EU.

3.4.3 Analysis of Selected Countries

In the last decade, total sugar production has increased for the selected countries, from 30 million tonnes in 2010 to 39 million tonnes in 2019, despite consecutive declines in 2014 and 2015 and volatile production in countries (Table 5). South Africa is by far the largest producer, although conditions for future growth are more favourable in other countries due to their water-intensity. South Africa and Mozambique also are vulnerable to periods of drought, evidenced by the sharp decline in production in 2016, relative to Malawi, Zambia and Tanzania, which experienced better rains during that period. The adverse influence of the extreme weather conditions witnessed in the southern parts of SADC is even more apparent in the trade patterns for sugar, especially for South Africa (Figure 12). This implies anticipating the climate effects and the likely shifts in the location of production, as well as the investments required in climate adaptation. Sugar production in South Africa is already

irrigated; however, the country is water scarce overall and will see further drying under climate change.

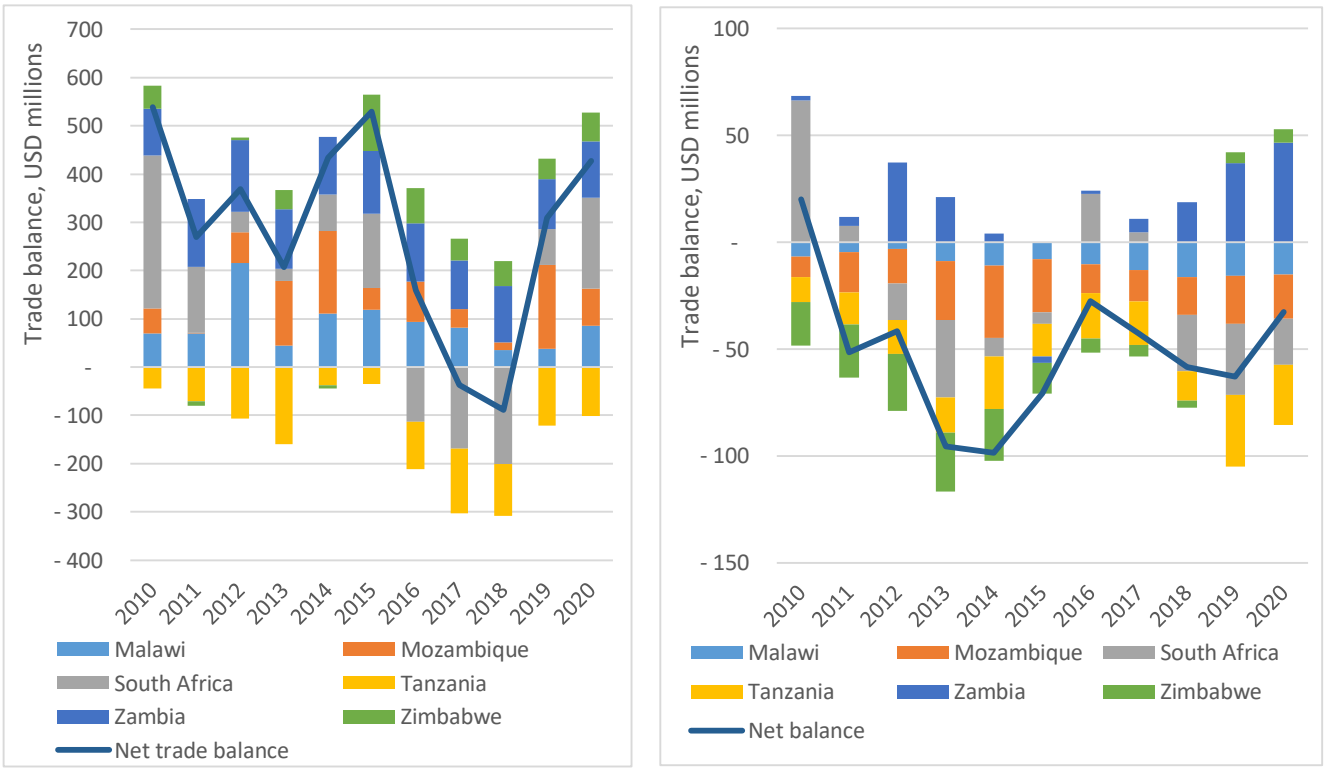
Table 4: Sugar Production: Selected Countries in the SADC, in '000 Tonnes

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Eswatini	5 110	5 288	5 363	5 438	5 442	5 516	5 524	5 571	5 619	5 666
Malawi	2 500	2 500	2 800	2 900	3 000	3 000	3 000	3 058	3 127	3 137
Mozambique	2 720	3 396	3 394	3 166	3 620	3 084	2 762	2 900	3 650	4 107
South Africa	16 016	16 800	17 278	20 033	17 756	14 861	15 075	17 388	19 302	19 482
Tanzania	2 801	3 021	2 717	2 992	2 800	2 944	3 016	3 061	3 118	3 589
Zambia	3 500	3 500	3 900	4 000	4 600	4 400	4 478	4 628	4 630	4 994
Zimbabwe	2 692	3 058	3 929	3 960	3 856	3 348	3 483	3 101	3 583	3 562

Source: https://www.fao.org/faostat/en/#data/QCL accessed in October 2021

Note: Production data on sugar cane relates to the harvested crop, free of soil, plant tops and leaves. Sugar cane has a high water content, accounting for about 75% of the total weight of the plants, with sugar content ranging from 10% to 15% of the total weight.

Figure 12: Sugar-to confectionery and Baked Goods Trade Balance: Selected SADC Countries



Source: Authors' analysis based on Trade Map

It is notable that Zambia has developed strong processing capabilities through coordinated investments along the value chain by the sugar processors and manufacturers of baked goods and sugar confectionery (Das Nair et al. 2017). In 2020, Zambia's confectionary exports had grown to be equivalent to around half the size of its sugar exports. By comparison,

Mozambique, Malawi and Tanzania have not leveraged growing sugarcane production to support the growing regional demand for confectionary, which is mostly met by imports through multinational companies such as Nestlé and Mondelēz International (Das Nair et al. 2017; Reardon et al. 2021).

3.4.4 Power, Governance, and Climate Change

Sugar is one of the most heavily subsidised products, reflecting the lobbying power of the concentrated producers around the world (Wood 2013; Das Nair et al. 2017; Paremoer 2021). The effect of subsidy-induced overproduction in several major sugar-producing countries on international prices has resulted in imposing tariff and non-tariff barriers against the free importation of sugar to protect domestic industries in many sugar-producing countries, including South Africa (Chisoro-Dube et al. 2018).

Sugar Production and Institutional Power

The sugar regulatory systems in the SADC favour the upstream segment, which consists of sugarcane growers and millers. The majority of sugarcane is produced by large-scale growers (nearly 83% of production in South Africa, and 90% in Zambia), while there is a fragmented constituency of small-scale farmers – nearly 22 000 in South Africa). South Africa's sugarcane output is processed by six millers with 14 milling operations. The three largest mills are operated by Illovo Sugar (Ltd), Tongaat Hulett Sugar (Ltd), and TSB Sugar (Ltd), which have vertically integrated operations across the SADC. For instance, the Illovo Group holds 75% of the shares in Zambia Sugar and 76% of those Illovo Sugar (Malawi), and itself is part of the transnational corporation Associated British Foods.

In the SADC, the sugar industry's position is protected by the overarching SADC Trade Protocol Annex VII, also known as the Sugar Cooperation Agreement. This Agreement was established with the intention of increasing cooperation between and support for sugar producers in the SADC region. In addition, it provides for two additional elements – market access and areas of cooperation. SADC countries that are not members of the Southern African Customs Union (SACU) are allocated market access to SACU on an annual basis in the form of duty-free quotas. An SADC Technical Committee on Sugar (TCS) was also established to support the development of efficient and competitive sugar industries in the SADC. In this way, the Sugar Cooperation Agreement offers non-SACU producers (Malawi, Mauritius, Mozambique, Tanzania, Zambia and Zimbabwe) market access to the higher-priced SACU market for restricted volumes compared to the low-cost global markets.

At the country level, SADC countries have further instituted policies to safeguard their domestic market and, in doing so, protect the interests of large-scale millers (Das Nair et al. 2017; Paremoer 2021). In South Africa, sugarcane growers and millers are organised through the South African Sugar Association (SASA), which consists of the Cane Growers' Association and the Millers' Association, thereby representing the interests of growers and millers. The industry association is governed by the Sugar Act (1978) and the Sugar Industry Agreement (2000), which were revised in June 2020 to promote job stability, transformation, and the growth of the sugar industry in line with the South African Sugarcane Value Chain Masterplan to 2030 (Department of Trade, Industry and Competition [DTIC] 2020). The ability of the cane growers and millers to organise themselves into a collective group gives them the leverage to negotiate with government and influence the direction of policy, illustrating the institutional power held by SASA.

South African tariff protection through the dollar-based reference price (DBRP) is based on the long-term average world price for sugar. It is adjusted for distortions and delivers protection when the world price drops below the long-term average level. This is combined with an equitable export obligation for millers to allocate exports to the lower-priced world market amongst millers. The DBRP was last increased in August 2018 and was due for another review in August 2021. The higher local prices under protection are obviously at the expense of downstream processing industries.

Along with the 2020 Sugar Act amendments, the South African Sugarcane Value Chain Masterplan to 2030 was developed and approved. The masterplan is designed to support the sugarcane value chain by diversifying sugar applications (e.g. in bioenergy, packaging and low-calorie sweeteners) and upgrading the competitiveness of the value chain in ways that support inclusive growth. An important component of the sugar masterplan is the exemption from Section 10 of the Competition Act, 1998 (Act No. 89 of 1998), which permits competing growers and millers to collaborate (and coordinate) towards meeting the objectives of the masterplan. The exemption was in place for 12 months, starting on 1 July 2020, with the possibility of extension (DTIC 2020). Such an exemption further illustrates how organised industrial associations can influence government policy.

In other SADC countries, the sugar growers and millers are protected through additional instruments (Das Nair et al. 2017). Zambia, Malawi and Mozambique all have sugar-fortification requirements that protect local producers. For instance, Zambia's Vitamin A-fortification programme was implemented by the Ministry of Health and with assistance from the U.S. Agency for International Development (Das Nair et al. 2017; Paremoer 2021). While the fortification programme was initially targeted at maize meal, the high concentration of sugar production (Zambia Sugar produces 99% of sugar consumed by households, with a market share of 90%) relative to the highly dispersed maize millers made it relatively easier to coordinate the programme (Das Nair et al. 2017; Paremoer 2021). While the fortification programme protected the Zambian industry, it has in fact entrenched Zambia Sugar's position in the market (Chisanga et al. 2014). This indicates that the fortification programme was shaped by the institutional and bargaining power of Zambian Sugar.

Sugar Processing and Limited Bargaining Power

The high cost of industrial sugar directly affects the competitiveness of sugar confectionery and baked goods producers in the region, despite the comparative advantage in sugar production. The government's regulation of imports reflects the institutional power of the large sugar millers and undermines diversified manufacturing.

In addition to the high costs of industrial sugar, downstream processors are also required to meet the quality, packaging and labelling requirements imposed by supermarkets. The changing retail landscape in the SADC region implies that formal retailers are the key route to market for the producers of sugar confectionery and baked goods. In Zambia, for instance, the quality and food safety standards set by the Zambian Bureau of Standards (ZBS) are often less demanding than those set by South Africa-based retailers. In doing so, the retailers can exercise bargaining power and exclude small processors (including those that may be certified by the ZBS).

Zambia also points to the benefits of steps to tackle the market power of the large sugar millers and the potential for local business groupings to drive industrialisation. The Competition and Consumer Protection Commission of Zambia investigated Zambia Sugar's

pricing from 2013 and, in 2017, imposed a financial penalty of 5% of 2013 turnover and an order for competitive pricing.[8] At the same time, the Zambian company Trade Kings has taken advantage of better pricing to build a substantial confectionary business, which is reflected in regional exports (Bosiu and Vilakazi 2020).

3.5 Comparative Summary

A comparison of the three value chains points to clear aspects of similarity and important differences that need to be appreciated, given that each is important in its own right as well as collectively pointing to challenges for a regional industrial policy for food (see Table 5 for a high-level summary).

South Africa is the largest and most industrialised producer in each of the value chains and the largest source of demand. However, South Africa, as for the region as a whole, is a net importer of the higher value-added products, in the form of poultry and confectionary and baked goods. As demand continues to shift towards urban consumers, these represent the strongest growth areas. The strategy needs to focus on building capabilities to meet this growing demand. It can leverage off the capabilities base of South Africa, but it must be a shared industrialisation strategy for at least four reasons.

First, there will be no commitment to the strategy without concrete actions, in line with a shared regional vision, to escape the trap of the SADC being seen as an export market for South Africa and an investment location for dominant South African multinationals.

Second, a precondition for growing regional value chains for the structural transformation of economies to more sophisticated economic activities is effective transport, logistics and storage infrastructure, without which there will continue to be gaps in value chains instead of strong linkages. Addressing this issue is contingent on tackling the first challenge, otherwise countries will use transport costs and non-tariff obstacles to protect local interests. Despite the spread of large traders across the region, the big price wedges in the region remain.

Third, institutions of industrial development, such as for skills, technology and standards, are critical for capabilities, and especially for the participation of smaller and medium producers. There are great potential savings in avoiding duplication in building regional institutions, at least across the subset of SADC countries.

Fourth, cost competitiveness in each value chain depends on strategies to support agricultural production, taking urgent account of the adaptations required by climate change. The projections on the basis of and evidence from recent years points to the potential for expanded regional production and the need for effective support to farmers, including to get produce to market. South Africa is among the most vulnerable countries, which, given the importance of its agricultural production in the region, increases the urgency of expanding the production base.

The value chains point to important improvements in production in various countries, indicating the potential for a major transformation in regional food systems. Growth in Zambia in terms of soybean, animal feed to poultry, and confectionary stands out. In each of

[8] Zambia Sugar was reported to be appealing the decision to the Competition Tribunal, although it is not clear what the outcome was (see https://www.lusakatimes.com/2017/10/12/zambia-sugar-fined-penalty-fee-k-76-7-million-competition-consumer-protection-commission/).

these there has been a combination of measures to incentivise investments, support expanded production and assess and discipline market power, including through competition cases.

A critical aspect that cuts across the value chains is the governing role of supermarkets. These are the routes to market for producers supplying urban consumers and help shape consumer preferences. The main supermarket chains set their own standards for packaging, quality and product specifications for producers, and collect data. A diversity of retail channels is important, for example for enabling less-refined and more nutritious maize meal brands to have shelf space. The spread across the region of the major chains is also effectively integrating the region, as the companies build their own distribution infrastructure. A regional green industrial policy must engage with the position of supermarkets as key actors.

Table 5: Structural Transformation Through Green Regional Industrial Policy: A Comparison of Three Selected RVCs

	Key characteristics	Power dynamics and policies	Traps and gaps, including for climate change
Maize to maize meal	South Africa is lead regional maize producer, **with** large-scale farmers**;** smallholders important in other countries Supermarket expansion, branding and specifications driving greater refining in context of urbanisation Expansion of larger traders Regional markets not working well Small-scale millers service remote areas	Supermarkets and large traders appear to be governing the value chain Supermarkets control the route to market, setting standards, labelling and packaging High levels of concentration in trading and ownership of silos enables rent extraction Ad hoc policies blocking exports from time to time, increasing price volatility Farmer support programmes performing poorly	Failure to develop linkages Invest in storage and logistics for smaller participants Policies captured by national interests, no regional approach to logistics, storage, and food security threat Fortification consistent with capabilities of SME processors Climate change – invest in water management, irrigation Regional competition enforcement addressing market power of traders, supermarkets Regional supermarket code
Animal feed to poultry	Strong growth in poultry demand linked to urbanisation and rising incomes SADC is a substantial net importer of poultry, and of soybean and animal feed Strong backward linkages to agriculture Suitable for soyabean production, with very large demand in China Poultry production mainly by large-scale, vertically integrated SA-based firms	Large SA-based poultry groups, vertically integrated into breeding and feed Policy support for soybean crushing in South Africa and Zambia Protection in South Africa, but not linked to lowering costs through regional integration SA Masterplan: focus on domestic productive capabilities for poultry; SADC identified for market access opportunities, not RVCs	Lack of coordination across region for linkages to meet growing demand Bottlenecks in access to breeds Scale economies in crushing facilities Competition concerns in large price differences Supermarket and cold chain integration to realise regional trade
Sugar to confectionery	SADC is net exporter of sugar, but net importer of sugar confectionery and baked goods Sugar production is concentrated and highly water-intensive; powerful position of large-scale SA-based multinationals Downstream processors are unable to benefit from low-cost production	Major multinational sugar mills have maintained favourable trade and industrial policies as a sensitive product with special treatment. Dual pricing with higher local prices, undermining downstream competitiveness, to support low export prices Fortification of sugar acts as NTB Maintained the SASA SA Sugar Masterplan focused on sugar, not on value chain or regional industrialisation	Earnings, support and linkages extend to sugar, not to downstream food product manufacturers Regional oligopoly, and some national quasi-monopolies, with exemption from competition law in SA Water intensity of sugar, in context of climate change and need to consider water use Zambia has tackled market power through competition enforcement and developed downstream lead firm

4. A Green Industrial Policy for Regional Food Value Chains in the SADC

The growing and urbanising population in the SADC is continuing to shift preferences towards processed food products and meat and poultry. This presents an opportunity for industrialisation to meet the growing demand. The reduced SADC food trade deficit over the past decade demonstrates that this challenge can be met; however, it requires confronting the implications of climate change for agriculture head on, and taking into account the regional cross-border nature of the value chains – from primary agriculture to the different levels of processing – in order to meet urban demand. In each of these interrelated areas, actions are urgently required for a Green Deal for food in the SADC.

To develop competitive regional value chains, the SADC requires a regional industrialisation agenda that promotes coordination, the development of capabilities and the balancing of skewed power relations along regional value chains. We address these challenges in terms of: (i) linkages, power and governance, (ii) the need for an SADC approach to industrialisation, and (iii) moving towards a green industrial policy in the SADC.

4.1 Linkages, Power and Governance

The three value chains represent a large component of processed food demand and were selected to explore the challenges to and opportunities for deepening linkages in SADC. Coordination along the regional value chain requires close cooperation from farming to processing, steered by an agenda for inclusive and sustainable regional industrialisation. It is important to emphasise that, in any event, urgent investments are required to support agricultural production through improved water management and irrigation as part of climate-smart agriculture. These investments involve supplying infrastructure, equipment and know-how, and are themselves part of the necessary Green Deal for the region.

The analysis of the value chains highlights critical points across three dimensions: value chain coordination; power and governance; and routes to market. Among the three value chains, the animal feed-to-poultry value chain offers the largest benefits from improved regional coordination, particularly for linkages to animal feed. Soybean is a key input for animal feed, and the region needs to be competitive in it relative to South America. Production in Zambia and Malawi has more than doubled from a relatively low base, thanks to conducive agronomic conditions and large-scale investments. For the SADC to meet the growing demand for poultry, as well as other meat and fish, it will be necessary to plan for continued high levels of growth in soybean in these and other countries by boosting productivity in climate-friendly ways to ensure cost-competitive animal feed.

Realising the opportunities in the value chain depends on bridging the gaps to link areas with the greatest potential to expand soybean production, given available water and land, with industrial capabilities in poultry production. For this value chain, it is essential to manage the bargaining power exercised by large-scale vertically integrated poultry producers, along with appropriate institutional arrangements at the regional level to ensure increased participation and inclusive growth. It is already happening to an important degree with investments in crushing plants and animal feed mills in countries such as Zambia and Malawi. This platform needs to be built on, and the gaps in regional value chain linkages must be addressed. In addition, Chinese demand for animal feed continues to grow, while there are major constraints on supplies from South America, given the deforestation and changing land use

associated with this production (Voora et al. 2020). There are thus substantial export opportunities, in addition to meeting the growing regional demand.

By comparison, in the maize-to-maize meal value chain, which supplies the single most important staple across the region, the ability to meet people's needs is skewed towards South Africa's large-scale commercial maize farmers, and a rebalancing is required. This is urgent when we consider that the El Niño drought in 2015/2016 demonstrated what can be expected to occur with greater frequency and depth under global warming, along with long-term drying in the southern parts of the region. In El Niño years, there are good rains further north, such as in Tanzania, parts of Zambia, the DRC and northern Mozambique, meaning that production and trade can meet the region's needs. However, high transport costs and poor storage and logistics mean that the integrated regional markets that can meet needs in times of supply shocks simply are not present, and countries compound this with short-term trade restrictions. The evidence suggests that large traders are able to profit from shocks by cornering markets, with speculation exacerbating price spikes. A completely foreseeable situation could be addressed through an SADC food security strategy, coupled with a geographic diversification of maize production, investment in infrastructure, along with securing buffer stocks.

In the sugar-to-confectionary value chain, there is a highly structured regime to support upstream sugar production across the region through extensive import protection from non-SADC imports. This is justified by the international support given to sugar in other major sugar-producing countries around the world (Das Nair et al. 2018a). However, the effect of protection for the sugarcane millers is to raise the cost of industrial sugar, making downstream industries less competitive. The region remains a net exporter of sugar and a net importer of diversified and higher value-added confectionary and baked products. In the context of climate change, there are also important questions to consider regarding the sustainability of sugar production, given its high water usage and the rationale for affording it the level of support, specifically if we consider what other production the water could be used for (such as high-value fresh fruit, which generates substantial employment and exports (Chisoro-Dube and Roberts 2021).

In each value chain there are very high degrees of concentration at some levels, with market power being reinforced by lobbying to influence policies and institutional arrangements. The incumbents also shape the way in which value chains are organised in more subtle ways, such as through consumer preferences, fortification of products and how standards are decided on and monitored. The major supermarket chains play an important role here. In a fast-urbanising SADC region, retailers provide the key route to market between the producers and consumers. Retailers typically have strict quality, packaging and labelling requirements, and exert bargaining power on small and medium-sized new entrants (Das Nair et al. 2018 a and b). These requirements can have a significant effect on supplier participation and exclude firms from RVCs.

4.2 The Imperative of an SADC Approach to Industrialisation

A regional approach is crucial, given the geography of production and consumption and the nature of key value chains (Arndt and Roberts 2018; Kozul-Wright and Fortunato 2020; Ncube and Tregenna 2021; Paremoer 2021; Levin and Makgetla 2021). The implications of climate change make this even more imperative. The SADC Industrialization Strategy and Roadmap

(2015-2063) is tasked with the complex agenda of promoting regional industrialisation and structural change. The forthcoming African Industrialisation Agenda, steered by the African Continental Free Trade Area (AfCFTA), adds another layer of complexity to this agenda.

The SADC's regional industrialisation brings together 16 states. In the current industrial policy discourse, the government and its agencies are meant to develop new markets while unlocking coordination challenges such as through investment in productive assets. Furthermore, the government can leverage regulatory policies and address issues of competition and concentration in markets (Andreoni et al. 2021a). However, the SADC's industrialisation seems to have been undermined by national interests. This is a natural tension. The key test is in whether the recognition of countries' necessary interdependence is part of national strategies and flows through into practical, shared initiatives at the industry level. South Africa's leadership in regional integration and industrial policy is critical; however, the South African industry master plans, such as for poultry and sugar, have thus far not incorporated regional industrial policy objectives and initiatives. This needs to change.

The SADC's industrialisation agenda and the costed Action Plan provide a generalised and high-level approach to achieving regional industrialisation. Notably, the SADC recognises the need to ensure that regional industrial cooperation should add value to national industrial policies (SADC 2017). With that said, neither the strategy and roadmap nor the action plan provide the specific supply-side and demand-side interventions that are required to direct regional industrialisation. Apart from the Sugar Cooperation Agreement, which focuses on the upstream level only, there is no unified approach to developing regional value chains for maize to maize meal, nor animal feed to poultry. Ultimately, the current approach to industrialisation places national interests in contention with regional interests.

It makes no sense to view trade and integration as a zero-sum game – as if what one country gains another loses. Instead, institutions to build skills and technological capabilities can be much more effective if developed at a regional level as part of upgrading value chains. Moreover, the lead companies that govern value chains already operate regionally. For example, supermarkets are planning how to meet demand across countries using networks of distribution centres and logistics capabilities. The critical issue is to ensure investment in broad-based and diversified industrial capabilities, as opposed to the narrow commodity-oriented path, which protects the margins of concentrated incumbents and continues to characterise most economies. An example is given by the Citrus Growers Association of Southern Africa, which has invested in sophisticated export capabilities for growers across Botswana, Eswatini, South Africa and Zimbabwe. These include skills, a digital platform for monitoring standards, research facilities for analysing crops to support access to export markets, and support for cultivars and plant treatment chemicals (Chisoro-Dube and Roberts 2021).

An obvious area for immediate regional action, given the importance to all three value chains, is to establish a common code of conduct for supermarkets for the treatment of smaller suppliers and supplier development. There are a range of country experiences to draw on, including the UK's Groceries Code Adjudicator and Namibia and Kenya's retail codes, as well as the findings from South Africa's Grocery Retail Market Inquiry (see Bonakele et al. 2022). Such a code will set out expectations for the fair treatment of suppliers and rules to prevent the supermarkets exerting buyer power. It is part of ensuring that smaller suppliers have a fair opportunity to access shelf space. The same supermarket chains operate across countries

in the region, and so having different codes in each country will add to the regulatory burden. A code does not have to be adopted by all SADC countries, but can instead start with a core group that are already considering such a step. A core set of rules can be agreed on, to which individual countries can add appropriate policies that address country-specific factors.

4.3 Moving Towards a Green Industrial Policy for Food in the SADC

The impending climate emergency means the costs of failure to act on an SADC green industrialisation agenda will be very high, and the opportunities for transforming to higher value and more sophisticated activities will be lost. The SADC is a global hotspot in terms of climate change. However, the SADC region will be affected by climate change to differing degrees, which can now be anticipated. Some parts of the region will continue to have good conditions for agriculture to meet the growing demand for food. Regional trade, alongside climate adaptation interventions, therefore can ensure food security across the region. More frequent extreme weather means it is essential to invest in better water management, storage facilities, logistics and support for farmers to ensure greater resilience. In other words, an industrialisation plan for agriculture is required. Conversely, following narrow national agendas will exacerbate the shocks from greater weather variability and undermine food security, such as the impact of the devasting cyclones in Mozambique and Malawi in 2019.

Yet the SADC still does not have an effective policy that tackles industrialisation together with climate change. The existing policies – the SADC Climate Change Strategy and Action Plan (2015) and the Industrial Development Policy Framework (IDPF) – speak to each other tangentially and have not been implemented actively in the region. Moreover, the SADC Climate Change Strategy and Action Plan has not been reviewed since 2015 to recognise the latest approach to climate change embodied in the nationally determined contributions of countries. Here, we propose several green policy interventions that should be considered.

Agricultural commodities, such as maize, soybean and sugar, require climate-smart and precision-farming interventions. Specifically, maize and soybean (along with other cereals) require government-led investments in smart water-saving technologies, irrigation equipment, research and development to develop new varieties that are climate proof, as well as storage silos and credit facilities. Furthermore, improved data analytics, combined with analyses of soil and weather conditions, can improve the management of water and the application of nutrients and agrochemicals (Das Nair and Landani 2020). SADC countries such as Malawi, Zambia, Mozambique and Tanzania are better suited to become the main sources of agricultural production, but are mostly characterised by small-scale farmers who rely on traditional farming methods that cannot cope with climate change. In supporting these farmers, the SADC will be better placed to safeguard food security and ensure access to food at a reasonable cost.

Digitalising supply chains can improve market access and coordination between suppliers and producers (Das Nair and Landani 2020). At the farming level, small-scale farmers often lack the data and information related to demand and pricing, which can lessen their bargaining power and place them on the back foot in markets. However, with digital technologies, smaller players can access market platforms, market and pricing data, as well as forecasts on weather conditions and crop production levels. Likewise, processors such as maize millers can

employ ICT technologies to track maize supply, which will allow them to determine the most opportune time to purchase maize.

At the processing level, investments in cloud computing and integrated reporting systems can improve the traceability and monitoring of quality and food safety requirements to meet the standards instituted by retailers and national bureaus of standards. This is important for export markets to meet the expectations of traceability and to prove that sustainable production requirements have been met. In local markets, for example, maize millers can use cloud computing to monitor and track elements such as maize grading records that contain moisture and protein contents (Das Nair and Landani 2020). These technologies tend to be relatively basic and can be implemented by millers of varying sizes. Apart from large processing firms, small- and medium-scale processors will need to invest in facilities that can endure the potential effects of climate change, such as extreme weather events and pest infestations.

A Green Deal for industry is naturally much wider than a green industrial policy for food production. It will include the development of alternative energy sources for industry and transport, such as green hydrogen, for which Southern Africa is one of the best locations in the world. Namibia is already showing the way here, with plans for a green hydrogen complex already under way. This is important for fertiliser for agriculture, transport, and energy for processing as part of structurally transforming the region's economies.

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