'Products Mapping' of South Africa's Agri-food trade with the EU28 and Africa

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Abstract

This paper uses 'products mapping' tool based on the trade balance index (TBI) and Lafay index to investigate trade performance and competitiveness in food items between South Africa (SA) and the EU28 and Africa. The data for this analysis is obtained from the UNCTAD database. SA's agri-food trade balance climbed from $1.5 billion in 2005 to $3.1 billion in 2017. The results support the conclusion that in bilateral trade, certain products have comparative advantages in relation to African markets despite comparative disadvantages in relation to the EU28 market. Also, there is no or decreasing diversification towards more and new leading products despite the increased intra-regional openness. Leading products (especially fruit and nuts) are the dominant export generating segments in the product's structure of SA's agri-food trade. Also, leading products mostly contribute to the positive balance of SA's agri-food trade. The findings of this study may contribute to business strategies, trade policies, and regional and inter-regional integration.

Keywords

Introduction

Since 1994, the agricultural sector of South Africa (SA) has undergone substantial policy reforms. The country's economy has diversified, while the share of agricultural GDP declined from 11% to 2.3% between 1960 and 2017 (World Bank, 2019). Nevertheless, the agricultural sector's declining share of GDP did not mean that the sector was declining; it was more an indication that the services sectors grew faster (Vink and Rooyen, 2009). At the same time, the sector has been highly exposed to global markets as farmers do not receive any subsidies, and trade at the borders has been substantially liberalized (Sandrey et al., 2011).

Remarkably, SA's population grew from 41.4 million to 58.6 million between 1995 and 2019. Also, the country has achieved food security status, with 67.3/100 scores (the Global Food Security Index), and ranked 48/113 countries in 2019 (EIU, 2019). Nevertheless, the country still faced some challenges, such as climate shocks in rainfall (FSIN, 2019), market access and modern farm inputs (FAO, 2019; UNCTAD, 2019). Despite the challenges, SA has developed its food sector relative to the sub-region of Sub Saharan Africa (SSA).

The European Union (EU) is a traditional and important market for SA's agri-food exports. However, the EU food market has become saturated and SA faces competition from other southern hemisphere countries with similar seasonal differences in comparison to the northern hemisphere (Adriaen et al., 2004). After the end of apartheid, the EU was the first regional body that SA entered trade negotiations to re-integrate into the global trading system (Larsén, 2007; European Commission, 2016). In 1999, the EU and SA reached the Trade, Development and Co-operation Agreement (TDCA) that was signed in 2000 after four years of rigorous negotiations. The TDCA established a preferential trade arrangement and partially introduced a free trade area agreement (FTA), covering 90% of bilateral trade between SA and the EU. To protect the vulnerable sectors of SA and the EU, certain

products were excluded from the FTA, while some of the products partially liberalized. For the EU, these are mostly agricultural products, while for SA, there are industrial products and certain textile and clothing products. In general, the TDCA appeared asymmetrical in favour of SA, but the country felt that there was an unjustified imbalance against its agricultural sector. The country argued that some rules governing agricultural trade were too rigid and should be relaxed (Berends, 2016).

To further strengthen trade relations, establish close and sustain relations based on cooperation and partnership, SA signed the 'EU-Southern African Development Community Economic Partnership Agreement States' (SADC EPA states) together with five other southern African countries. The TDCA ought to be replaced by the EPA once ratified by the member states (European Commission, 2016). To boost market access, the EU recognizes SA as the leading trading partner in the region, and the significance of the agricultural sector in poverty alleviation strategies in the SADC EPA States (Berends, 2016). On food security measures, the Parties recognize that the removal of restrictions to trade between them, as envisaged in the Agreement, might pose major challenges to the SADC EPA States' producers in the food sectors. The Parties, therefore, agreed to consult with each other on these mentioned issues (European Commission, 2016).

In addition to developing Africa's relations with overseas countries and markets, the Pan-Africanism and regional cooperation have been seen as one of the most important instruments to promote economic growth and development in Africa since the period of decolonization (Blížkovský et al., 2018). The SA's is a member of the Southern African Customs Union (SACU). SACU was established already in 1910 making it the world's oldest Customs Union. In 2002, SACU Agreement highlighted, among others, the facilitation of cross-border movement of goods, the promotion of fair competition, and the equitable sharing of customs and excise revenue raised by all Member States within the Union (DTI, 2020).

Also, the regional trade, especially between South Africa and other SADC countries, has grown rapidly since the mid-2000s and has now reached levels that imply considerable macroeconomic significance. Africa, driven principally by SADC, has become the largest destination for diversified manufactured exports from SA (Arndt and Roberts, 2018).

Against this background, the article an attempt to contribute to the development of literature on trade policies and regional trade in the agricultural sector. The main aim of the study is to investigate agri-food trade performance and competitiveness in SA with the EU28, Africa and the world using "products mapping" technique. The study identifies the main agri-food products that positively or negatively contribute to the over-all agri-food trade of SA. The findings of this study may contribute to business strategies, national development and trade policies, and regional integration.

Literature review and some empirical evidence

Assessing the competitiveness of the agri-food industries in the context of global or regional competition, models following Ricardo and his theory suggest that the countries should focus on producing food products with comparative advantage. According to the Heckscher-Ohlin model, the trade specialization pattern is formed based on countries relative endowment in production factors (Nazarczuk et al., 2018). These findings are in line with current researches of productivity factors structure and effective usage (Bilan et al., 2020; Maris, 2019).

Other streams of theoretical literature emphasize the endogeneity of technological change (Krugman, 1987; Lucas, 1988; Brodzicky and Kwiatkowski, 2018; Cieślik, 2018) or economic geography that underlines the importance of agglomeration economies (Krugman, 1991; Fujita et al., 1999; Kostiukevych et al., 2020). Porter (1990) developed the diamond model, suggesting factors (input) conditions, demand conditions, supporting and related industries and corporate strategy, structure and competition as the driving forces of competitiveness of a nation or industry in the global competition. Moreover, it appears that attention should be directed from costs and production efficiencies towards promoting productivity growth over time and innovation (Yang et al., 2019). Removing tariffs on goods traded between countries and reducing nontariff barriers by harmonizing product standards and simplifying government formalities reduces the transaction costs of trade which should lead to an increase in the degree of specialization (Aiginger, 2001). Higher specialization can lead to higher productivity and competitiveness (and vice versa). Generally, the trade theories give dissimilar predictions regarding specialization dynamics of a country.

Some scholars have used comparative advantage approach to investigate the level of agri-food trade performance, comparative advantage and competitiveness (e.g., Fertő, 2008; Bojnec

and Fertő, 2015; Smutka et al, 2016; Benesova et al., 2017; Esquivias, 2017; Smutka et al. 2019). Empirical studies on international agri-food trade, comparative advantage and competitiveness suggest and support that changes in trade patterns and performance are due to both demand and supply sides, both at domestic and international markets, both in factor-intensities and productivity differentials. Liberalization, integration, and industrialization are also channels for improvements in productivity, scale, and export expansion and a way to improve comparative advantage.

In recent years, the level of agri-food trade performance, comparative advantage and competitiveness of SA agrarian trade have been investigated. DAFF (2011) measures the trade competitiveness of SA with the EU27 in some agri-food products for the period 2001 and 2009. Using RCA and comparative export performance (CEP) index, the results reveal that SA has been competitive in the EU27 in products, such as fish and crustaceans, fruits and beverages and vegetables. On the other hand, findings show SA with comparative disadvantages in cereals, tobacco, and sugar.

In the same direction, De Pablo Valenciano et al. (2017) investigate trade competitiveness in SA pear (fruit) with the EU28. Their findings show that SA has been highly competitive in pear exports to the EU28. They argue that South Africa's competitive advantage is driven by the trade agreements (TDCA) signed with the EU28.

There are also empirical studies in agri-food trade (Ishchukova and Smutka, 2014; Benesova et al., 2017; Esquivias, 2017; Smutka et. al., 2018; Ortikov et al., 2019, Zdráhal et al., 2019; Verter et al., 2020) that employ the Product mapping technique to analyze both comparative advantage and global competitiveness and its implications for domestic agri-food trade-balance creation. The composition of trade structure developed from Product Mapping and its trajectory give other important insights regarding the country's integration into the global or regional agribusiness.

The Product Mapping' method was designed by Widodo (2009) to analyze the catching-up countries' comparative advantage and its leading exported products. As pointed by Widodo (2009), leading exported products usually have a high comparative advantage. In the same manner, leading exported products spur export and contribute to the domestic trade-balance, are a source of output growth, and foreign exchange earnings.

Ishchukova and Smutka (2014) analysed the agri-food trade dynamic of Russia in relations to EU, Commonwealth of Independent States, Africa, Asia and the Americas. They found that in bilateral trade products of a specific group have comparative advantages in relation to a region or country despite comparative disadvantages in relation to the whole world. Also, Benesova et al. (2017) used product mapping to analysed Russian agri-food trade and concluded that there exists a general trend of strengthening comparative advantages of Russian agricultural exports, because the results of the product mapping method identified a growing share of class A in the total value of Russian agri-food exports and, at the same time, identify a reduction in the proportion of class D.

Esquivias (2017) used product mapping to analyse changes in agricultural trade patterns of East Java, Indonesia versus six main ASEAN exporting countries from 2007 to 2013 and found that gains appear to be larger than the losses; however, there is a little diversification towards new products despite the increased international openness. Also, he concludes, that opportunities within the region have not been exploited, because agri-food trade in the region still concentrates towards extra-ASEAN territories.

Smutka et al. (2018) studied agri-food trade of the Czech Republic from 2001 to 2015. The results derived from product mapping shows that the number of products located in classes B and C has significantly reduced and the whole commodity structure is divided into classes A and D. They point that the over-all product's classification is influenced by the bilateral trade relations and differences in trade regimes.

Ortikov et al. (2019) use the mapping to analyse Uzbek's trade in agricultural products and foodstuffs from 1995 to 2015. They found that agricultural exports of Uzbekistan are competitive especially in relation to the Asian countries and CIS countries. On the other hand, the comparative advantages in relation to other territories are limited.

Zdráhal et al. (2019) use products mapping to analyse agri-food trade between Nigeria and ECOWAS member countries. The findings suggest that Nigeria has performed better in trading with other ECOWAS countries than in trading with the overall world market and the product mapping revealed some of the promising product groups for expansion within the region and potential for Nigeria to diversify its agri-food export structure. In other studies, Verter et al. (2020) indicate that the share of total Nigerian food exports and imports

which the EU28 accounted for, declined from 72% and 40% to 37% and 27% between 1995 and 2017, respectively. Also, the food products that Nigeria has comparative disadvantages and negative trade balance in trading with the EU28 rose from 31/46 to 35/46.

Although scholars have used 'products mapping' approach to analyse agri-food competitiveness, to the of our knowledge, no study has used this tool to investigate trade competitiveness in SA. Thus, this study is an attempt to bridge the knowledge gap.

Materials and methods

This paper analyses the dynamics in the food trade of SA with the EU28 and African countries using time series for the period 2005-2017. The data for this analysis is obtained from the UN Conference on Trade and Development (UNCTAD) database. The classification of specific food products used in this paper is adapted from UNCTAD following the UN Standard International Trade Classification (SITC, Revision 3). The values are calculated (current prices, US$) at the three-digit level of the SITC for all the 46 food items (SITC 0 + 1 + 22 + 4) as presented in Table A1 (in appendix).

The Coefficient of concentration and Herfindahl-Hirschman Index (HHI) measures the concentration and competitiveness of countries or regions across the globe (Reis and Farole, 2012). The product concentration index shows how exports and imports of a nation or region concentrate on a few products or otherwise distributed in a more homogeneous manner among a broad range of products. In other words, the index measures the dispersion of export's or import's values across exporter's or importer's products (*n* products). The model is mathematically presented here as follows (Blažková and Chmelíková, 2016):

$$s_l = \frac{x_{ij}}{\sum_1^n x}, \text{ where } l = 3, 5, 10 \text{ most traded products} \quad (1)$$

The *HHI* is mathematically presented here as follows:

$$HHI = \sum s_{ij}{}^2 \quad (2)$$

Where: s is the share of exports (import) in the total food trade for the product i in the year j between SA and the World, EU28 or Africa. The value of the index ranges from 0 to 1. A value closer to 1 indicates that food trade is concentrated in few goods and/or sectors for trade. Thus, its

vulnerability to trade shocks, whereas a thoroughly diversified portfolio will have an index close to 0, suggesting a lesser vulnerability risk. The HHI can be classified as an indication of diversification in the exporter's profile.

To capture the degree of trade specialization of a country, it is also essential to assess the revealed comparative advantages of the relevant sectors included in the total agrarian trade. For this purpose, Lafay index (LFI) is selected (Lafay, 1992). Contrary to the traditional Balassa index that uses only export data to investigate comparative advantage in countries, the LFI uses both export and import data (Benešová et al., 2018). Another advantage of the LFI is its reliability when comparing its values in time series (Sanidas and Shin, 2010). The index is defined for a given country and a product as follows:

$$LFI_j^i = 100 \left(\frac{x_j^i - m_j^i}{x_j^i + m_j^i} - \frac{\sum_{j=1}^N (x_j^i - m_j^i)}{\sum_{j=1}^N (x_j^i + m_j^i)} \right) \frac{x_j^i + m_j^i}{\sum_{i=j}^N (x_j^i + m_j^i)} \quad (3)$$

Where: *x* and *m* are the export and import values of individual product group of agrarian trade of SA to/from EU28 countries as well as Africa as a whole. Zero represents a neutral value regarding reporting a comparative advantage. A positive value for the LFI indicates the existence of comparative advantage for a specific sector and a negative value of the LFI indicates the existence of a comparative disadvantage for a sector. This means that a higher index value suggests a higher degree of comparative advantage and specialisation (Zaghini, 2003). The values of LFI were calculated for 46 different products constituting agrarian foreign trade of SA with the different regions.

Empirically, a country might have a comparative advantage for a product, but the country is not a net exporter. Similarly, a country may have a comparative disadvantage but is not a net importer.

The Trade Balance Index (TBI) is employed to analyse whether a nation has achieved advanced levels of specialisation in export (as net-exporter) or import (as net-importer) for a specific group of products. TBI is mathematically formulated as follows:

$$TBI_j^i = \frac{x_j^i - m_j^i}{x_j^i + m_j^i} \quad (4)$$

Where: *TBI$_{ij}$* denotes trade balance index of country *i* for product *j*; x_{ij} and m_{ij} represent exports and imports of product products *j* by nation *i*, respectively. The values of the index range from -1 to +1. In extreme cases, the TBI will equal -1 if a nation

only imports. On the other hand, the TBI could equal +1 if a nation only exports. Understandably, the index is not defined when a nation neither exports nor imports. A nation is referred to as "net-importer" or consumer of particular product group if the value of TBI is negative. On the contrary, a nation is known as a "net-exporter" of a product if the value of TBI is positive.

Accordingly, the LFI and TBI are combined to create an analytical tool, called 'products mapping'. Similarly, the mapping classifies a product and a country into four categories (Widodo, 2008) as follows: Group A signifies that SA has a comparative advantage and is a net-exporter; Group B signifies that SA has a comparative advantage but is net-importer; Group C signifies that SA has a comparative disadvantage but is a net-exporter; Group D signifies that SA has a comparative disadvantage and is net-importer (Table 1). The technique has been used recently to study agrarian trade of countries in Europe and Asia, and Nigeria in Africa.

Results and discussion

The SA's agri-food trade gained its momentum in the early 2000s when the implementation of the Uruguay Round Agreement on Agriculture was completed. Together with the decrease in unilaterally applied tariffs levels and preferential applied tariffs levels, SA opened its markets as well as got market access and increased its integration in global agribusiness. The total food exports in SA rose from about $4 billion in 2005 to $9.6 billion in 2017 (Table 2).

The country trade balance also climbed from $1.5 billion to $3.1 billion within the same period under review. During the same period, SA recorded a positive balance of trade and TBI in the overall food products (Table 2). However, the value of exports and imports stagnated in the last decade. The following section presents South Africa's trade performance and products mapping with EU28 and with Africa in all 46 food items (No. of sectors) based on the calculated LFI, TBI and other descriptive approaches.

Agri-food trade between SA and the EU28

SA is the EU's largest trading partner in Africa, in total merchandise and food trade (UNCTAD, 2019). The EU's ranking of the global leading agri-food trade partners shows that SA was the number 19 top importing markets (with 1.2% share of extra-EU) for the agri-food exported by the EU28 in 2018. Also, SA was the number 11 top global supplying markets (with 2.5% share of extra-EU) for the agri-food imported by the EU28 in 2018 (European Commission, 2019).

The total value of food exports from SA

LFI > 0	Group B Comparative Advantage No Export-Specialization (net - importer) (LFI > 0) and (TBI < 0)	Group A Comparative Advantage Have Export-Specialization (net - exporter) (LFI > 0) and (TBI > 0)
LFI < 0	Group D Comparative Disadvantage No Export-Specialization (net - importer) (LFI < 0) and (TBI < 0)	Group C Comparative Disadvantage Have Export-Specialization (net - exporter) (LFI < 0) and (TBI > 0)
	TBI < 0	TBI > 0
	Trade Balance Index (TBI)	

Source: Widodo, 2008

Table 1: Product mapping scheme.

Indicator/year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Ex (Mill. US$)	3,990	3,734	4,214	5,429	5,469	8,231	9,017	8,743	9,293	9,463	8,547	8,426	9,612
Im (Mill. US$)	2,451	2,977	4,128	4,589	4,163	5,493	7,015	7,451	6,769	6,266	5,961	6,234	6,525
Bal (Mill. US$)	1,539	758	85	840	1,303	2,738	2,002	1,292	2,524	3,198	2,586	2,192	3,087
TBI	0.24	0.11	0.01	0.08	0.14	0.20	0.12	0.08	0.16	0.20	0.18	0.15	0.19

Notes: Ex = exports; Im = imports; Bal = trade balance
Source: Own composition based on UNCTAD (2019)

Table 2: Total agri-food trade of South Africa (SITC 0+1+22+4).

to the EU28 slightly rose from $1.8 billion in 2005 to $2.6 billion in 2017. Interestingly, SA recorded a positive balance of trade and TBI in food trade with the EU28 throughout the period under review, although the TBI has decreased (Table 3). It suggests that the country's overall competitiveness in agri-food trade with the EU28 has reduced. The share of SA's food exports (% of total food exports) to the EU28 declined from 44.1% to 26.6% between 2005 and 2017, while food imports (% of total food imports) from the union's markets rose 22.7% to 27.4% within the same period under study. This suggests that SA may have diversified its export markets beyond the EU28 while imports concentration from the union's markets accelerated.

The 'products mapping' in Group A indicates that SA's comparative advantages in bilateral trade with the EU28 fluctuated but increased from 14/46 in 2005 to 17/46 in 2008, then, shrank to its lowest in 2014 with 10/46, before rising to 13/46 food products between 2016 and 2017 in bilateral trade with the EU28. These products accounted for about 80% and 7% of the total food exports and imports, respectively. This indicates that, although the country recorded a positive trade balance with the EU28, it has not marginally diversified in exporting food products. Similar studies (within the same period, using the same methodology) carried out by Verter et al. (2020) in Nigeria reveals that the country with 9/46 comparative advantages in agri-food trade with the EU28. This shows that SA performs slightly better than Nigeria in agri-food trade with the EU28.

On the other hand, the products mapping

Indicator/year		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Export (Mill. US$)		1,759	1,533	1,985	2,231	2,012	2,225	2,229	2,070	2,360	2,362	2,230	2,302	2,556
Import (Mill. US$)		557	706	909	990	1,073	1,322	1,732	1,825	1,780	1,934	1,725	1,673	1,785
Balance (Mill. US$)		1,203	827	1,076	1,241	939	902	498	245	580	429	505	629	770
TBI		0.52	0.37	0.37	0.39	0.30	0.25	0.13	0.06	0.14	0.10	0.13	0.16	0.18
Share on export (%)*		44.1	41.1	47.1	47.1	36.8	27.0	24.7	23.7	25.4	25.0	26.1	27.3	26.6
Share on import (%)*		22.7	23.7	22.0	21.6	25.8	24.1	24.7	24.5	26.3	30.9	28.9	26.8	27.4
EX	CR3	82.0	77.2	80.2	77.8	80.8	81.3	80.9	83.4	84.5	82.6	83.7	81.7	80.8
	CR5	90.9	87.0	88.9	85.7	88.4	88.8	88.0	89.9	90.3	88.2	89.4	87.9	87.2
	CR10	96.5	96.1	96.4	94.9	95.5	96.0	96.1	96.5	96.5	95.4	96.2	95.8	95.5
	HHI	0.29	0.26	0.29	0.26	0.29	0.31	0.31	0.34	0.35	0.34	0.38	0.37	0.37
IM	CR3	43.1	46.7	51.8	51.2	58.7	49.2	50.2	49.4	50.4	44.9	42.8	46.3	37.8
	CR5	52.2	57.1	62.1	62.4	68.7	63.4	64.3	63.3	65.2	58.8	58.6	60.4	55.5
	CR10	71.6	76.4	79.1	80.8	82.8	82.5	82.7	81.4	83.3	79.9	81.2	80.6	79.0
	HHI	0.10	0.11	0.15	0.14	0.15	0.11	0.11	0.10	0.11	0.09	0.09	0.09	0.08
A	No. of products	14	15	14	17	13	12	13	13	13	10	11	13	13
	Export (Mill. US$)	1,687	1,447	1,918	2,124	1,935	2,088	2,132	1,983	2,266	1,705	1,710	2,164	2,035
	Export share (%)	95.9	94.4	96.7	95.2	96.2	93.9	95.6	95.8	96.0	72.2	76.7	94.0	79.6
	Import (Mill. US$)	175	225	406	406	433	355	432	429	463	65	76	346	119
	Import share (%)	31.4	31.9	44.6	41.0	40.3	26.8	24.9	23.5	26.0	3.4	4.4	20.7	6.7
	Balance (Mill. US$)	1,513	1,222	1,513	1,718	1,502	1,733	1,700	1,554	1,804	1,640	1,634	1,818	1,916
C	No. of products	1	1	1	1	1	2	1	0	2	4	1	1	2
	Export (Mill. US$)	0.23	8	0.51	5	3	20	0.19	0	10	545	411	4	423
	Export share (%)	0.0	0.5	0.0	0.2	0.2	0.9	0.0	0.0	0.4	23.1	18.5	0.2	16.6
	Import (Mill. US$)	0.20	7	0.50	5	2	15	0.19	0	9	364	289	3	297
	Import share (%)	0.0	1.0	0.1	0.5	0.2%	1.1	0.0	0.0	0.5	18.8	16.7	0.2	16.6
	Balance (Mill. US$)	22	1	8	240	626	5	4	0	1	181	123	0.94	126
D	No. of products	31	30	31	28	32	32	32	33	31	31	34	32	31
	Export (Mill. US$)	72	78	66	102	74	117	97	88	84	113	108	134	98
	Export share (%)	4.1	5.1	3.3	4.6	3.7	5.2	4.4	4.2	3.6	4.8	4.9	5.8	3.8
	Import (Mill. US$)	382	474	503	580	638	953	1,300	1,397	1,309	1,505	1,360	1,324	1,370
	Import share (%)	68.6	67.1	55.3	58.6	59.4	72.0	75.0	76.5	73.5	77.8	78.8	79.1	76.7
	Balance (Mill. US$)	-310	-396	-437	-477	-564	-836	-1,202	-1,309	-1,225	-1,392	-1,251	-1,191	-1,272

Note: * share of bilateral food trade between SA and the EU28
Source: Own composition based on UNCTAD (2019)

Table 3: Dynamics of food trade between SA and the EU28.

in Group D reveals that SA recorded comparative disadvantages and adverse trade balance in 31/46 between 2005 and 2017 in trading with the EU28. The share of these product groups also fluctuated during the period under review and recorded about 77% and 4% of total imports and exports respectively in 2017. More detailed information on products in groups A and D are presented in Table A5. It suggests the performance of South Africa's exports to the EU28 has not improved significantly in many food products. Similar studies by Verter et al. (2020) in Nigeria reveals that the country with 35/46 comparative disadvantages in agri-food trade with the EU28. This shows that SA performs slightly better than Nigeria n agri-food trade with the EU28.

A critical look at the individual product groups (Table A2) in bilateral trade with the EU28 shows that throughout the period under review, SA has comparative advantages in products, such as SITC 001 (fish, aqua. invertebrates, prepared, preserved); SITC 016 (fish, aqua. invertebrates, prepared, preserved); SITC 034 (fish, fresh, chilled or frozen); SITC 036 (crustaceans); SITC 037 (fish, aqua. invertebrates, prepared, preserved); SITC 057 (fruits and nuts), SITC 058 (fruit, preserved, and fruit preparations); and SITC 059 (fruit and vegetable juices, unfermented, no spirit). Also, the country recorded comparative advantages in SITC 054 in all the years, except for 2014. The product highest with the highest comparative advantage is SITC 057.

Also, SITC 057 had the most significant weighting regarding its contribution to total food exports to the EU28 as it increased from 46% in 2005 to 58% in 2017. Trailing far behind with comparative advantages are product groups SITC 034, SITC 036, and SITC 058. These product groups ranked number third, fourth, and the fifth-largest food export products to the EU28 (Table A3). In the same direction, findings by DAFF (2011); De Pablo Valenciano et al. (2017) also show that SA has been highly competitive in pear (fruits) exports to the EU28 market. They argue that the country's competitive advantage has been driven by the TDCA signed with the EU28. Also, DAFF (2011) results reveal that SA has been competitive in products, such as fish (SITC 034) and crustaceans (SITC 036), fruits and vegetables.

The LFI findings further reveal that SA recorded high comparative disadvantages throughout the period under review in product grouping SITC 022, SITC 023, SITC 024, SITC 041, SITC 046, SITC 048, SITC 056, SITC 071, SITC 081, SITC

098 and SITC 421. This suggests that SA has not been competitive in trading with the EU28 in these product groups. The findings are partially in line with DAFF (2011) whose studies also show SA with comparative disadvantages in cereals, tobacco and sugar in trading with the EU27.

It is worth mentioning that, the country initially recorded high comparative advantage in alcoholic beverages (SITC 112), and then began to diminish, while recording comparative disadvantage between 2014 and 2015, and then 2017. Similarly, the contribution of the product grouping to exports to the EU28 also diminished from 27% in 2005 to 0.2% in 2017.

Even though the contribution of the top three (82%), top five (91%) and top ten (97%) food product groupings exported to the EU28 in 2005 merely decreased to 81%, 87%, 96% respectively in 2017, it is still substantial (Table A3). In the same direction, the HHI shows that SA's food exports to the EU28 have been concentrated in a few products. A careful analysis of the level of value-added of the top five traded products suggests that SA widely exported fresh food, such as SITC 057, SITC 034, SITC 036, SITC 054, SITC 075 to the EU28, and the country has comparative advantages in these products. Some of these products are (tropical) commodities which the EU28 hardly produce in large quantities owing to the natural conditions of the continent as postulated by traditional trade theories.

On the contrary, SA mostly imported processed foods, such as SITC 112 (alcoholic beverages), SITC 421 (fixed vegetable fats and oils), SITC 098 (edible products and preparations), SITC 081, SITC 048 (cereal preparations, flour of fruits or vegetables), SITC 073 (chocolate, food preparations with cocoa), SITC 022 (milk and cream), and SITC 056 from the EU28, and the country has comparative disadvantages in these products (Table 2).

Additionally, it is possible that the EU's trade policies, regarding sanitary and phytosanitary measures (SPS), non-tariff measures (NTMs) and tariff escalation, especially in semi-processed and processed foods from SA (Gebrehiwe et al., 2017) may have partially distorted trade signals and nullified the country's efforts to boost food exports and add more value-added products with comparative advantages in trading with the EU28. Arndt and Roberts (2019) stress that there are still constrains that limits the exploitation of opportunities. Fruits and nuts are the most

important leading products when SA trades with EU28 and the share of the sector on the overall agri-food export increased. However, as pointed by Adriaen et al. (2004), the EU's food market has become saturated and SA faces competition from other southern hemisphere countries with similar seasonal differences in comparison to the northern hemisphere. Also, there is a slight structural shift in food trade of SSA. The economic globalization in commodity chains contributed to the structural changes in the composition of food trade as some SSA countries moved the composition of agri-food exports from traditional to non-traditional and high-value commodities.

Agri-food trade between SA and Africa

The total value of agri-food exports from SA to African countries increased from $923 million in 2005 to its peak in 2014, with about $4.4 billion, before decreasing to $3.6 billion in 2016, and then slightly increased to about $4 Billion in 2017. Also, SA recorded a substantially positive balance of trade and TBI in trade with Africa throughout the period under review, although the TBI has decreased (Table 4).

The share of intra-African trade in total food trade merely rose from 18.4% (exports) and 16.5% (imports) in 2005 to 25.4% (exports) and 17.3% (imports) in 2017. Also, the share of intra-SADC trade in total food items rose from 19.7% (exports) and 31.5% (imports) in 2005 to 31% (exports) and 32.1% (imports) in 2017 (UNCTAD, 2019). Similarly, the share of food trade from SA to African countries rose from 23.1% (exports) and 5.7% (imports) in 2005 to 41.5%

Indicator/year		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Export (Mill. US$)		923	867	841	1,684	1,806	3,857	4,166	4,218	4,343	4,370	3,925	3,748	3,985
Import (Mill. US$)		139	166	200	207	206	1,042	1,207	1,261	1,129	1,031	1,007	953	1,123
Balance (Mill. US$)		784	701	641	1,476	1,600	2,816	2,960	2,957	3,215	3,340	2,918	2,795	2,863
TBI		0.74	0.68	0.62	0.78	0.80	0.57	0.55	0.54	0.59	0.62	0.59	0.59	0.56
Share on export (%)*		23.14	23.21	19.96	31.01	33.04	46.86	46.21	48.24	46.74	46.18	45.92	44.48	41.46
Share on import (%)*		5.68	5.57	4.86	4.52	4.94	18.96	17.20	16.92	16.68	16.45	16.88	15.28	17.21
EX	CR3	44.9	40.1	39.7	43.7	40.9	26.2	26.0	24.9	25.9	24.7	26.1	26.1	26.7
	CR5	58.1	56.9	56.4	58.2	52.9	38.8	38.0	37.2	38.7	37.4	35.5	38.3	38.0
	CR10	76.7	76.0	75.4	77.0	71.7	61.9	60.6	61.0	62.0	59.8	57.9	59.9	60.3
	HHI	0.10	0.08	0.08	0.11	0.09	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
IM	CR3	45.1	43.8	40.2	49.0	52.9	39.9	41.8	37.9	37.6	36.9	45.5	42.0	48.1
	CR5	60.6	57.5	58.4	64.6	68.5	54.7	55.4	52.4	53.0	49.9	56.7	55.9	60.9
	CR10	82.3	78.0	81.2	82.7	87.2	79.2	79.2	74.2	76.0	73.2	78.3	77.4	81.9
	HHI	0.10	0.09	0.09	0.11	0.12	0.09	0.09	0.08	0.08	0.08	0.10	0.10	0.10
A	No. of products	36	36	38	40	40	34	35	34	34	34	34	36	37
	Export (Mill. US$)	876	820	808	1,643	1,758	3,646	3,941	3,973	4,044	3,845	3,532	3,452	3,674
	Export share (%)	94.9	94.7	96.1	97.6	97.3	94.5	94.6	94.2	93.1	88.0	90.0	92.1	92.2
	Import (Mill. US$)	33	52	70	75	60	617	740	772	614	400	336	378	425
	Import share (%)	23.4	31.1	35.1	36.0	29.1	59.2	61.3	61.2	54.4	38.8	33.4	39.7	37.9
	Balance (Mill. US$)	844	769	738	1,569	1,698	3,029	3,201	3,201	3,430	3,445	3,195	3,074	3,249
C	No. of products	3	2	1	1	0	2	1	0	1	2	1	2	0
	Export (Mill. US$)	23	16	6	6	0	34	31	0	72	347	56	28	0
	Export share (%)	2.5	1.8	0.7	0.3	0.0	0.9	0.7	0.0	1.7	7.9	1.4	0.8	0.0
	Import (Mill. US$)	18	15	6	5	0	31	27	0	59	266	40	25	0
	Import share (%)	13.3	9.1	2.9	2.6	0.0	3.0	2.3	0.0	5.2%	25.8	4.0	2.6	0.0
	Balance (Mill. US$)	4,667	751	57	63	0	3,351	3,530	0	13,139	80,332	15,853	3,662	0
D	No. of products	7	8	7	5	6	10	10	12	11	10	11	8	9
	Export (Mill. US$)	24	30	27	35	48	178	195	245	228	179	337	268	311
	Export share (%)	2.6	3.5	3.2	2.1	2.7	4.6	4.7	5.8	5.2	4.1	8.6	7.1	7.8
	Import (Mill. US$)	88	99	124	127	146	394	439	489	457	364	630	550	697
	Import share (%)	63.4	59.8	62.0	61.3	70.9	37.8	36.4	38.8	40.5	35.4	62.6	57.8	62.1
	Balance (Mill. US$)	-64	-69	-97	-92	-98	-217	-244	-244	-229	-186	-293	-283	-386

Note: * share of bilateral food trade between SA and the EU28
Source: Own composition based on UNCTAD (2019)

Table 4: Changes in food trade between SA and Africa.

(exports) and 17.2% (imports) in 2017. The SA's exports share in the region was substantially higher than the intra-Africa and intra-SADC averages, while imports were slightly below the intra-Africa and intra-SADC averages. Arguably, the increase in food trade between SA and the continent could be attributed to SA, and the African Union's efforts to stimulate local food production, value-added products, and intra-African trade. The measures may have started yielding positive results.

The 'products mapping' in Group A indicates that SA's comparative advantages in trading with African countries shifted, as it rose from 36/46 in 2005 to 40/46 in 2008, then, shrank to its lowest in 2014 with 34/46, before rising to 37/46 products in 2017. These products accounted for about 92% and 38% of the total food exports and imports respectively, between SA and all African countries (Table 4, Table A2). This indicates that the country's performance and competitiveness within the continent have been accelerated in many food products.

On the other hand, the results of the products mapping in Group D suggest that, on average, SA had comparative disadvantages in 9/46 products in trading with African countries. More detailed information on products in groups A and D are presented in Table A5. The share of these product groups also shifted during the years under study, recorded 62% and 7.8% of total imports and exports respectively in 2017 (Table 4, Table A2, Table A4). Nonetheless, the findings suggest that SA has fewer comparative disadvantages in agri-food products in trading with the African countries than the EU28 and the global markets.

A critical look at the individual product groups (Table A2) in trade with Africa shows that throughout the period under review, SA recorded comparative advantages in almost all the 46 food products (37/46) in 2017. The product groups with the highest comparative advantages in 2017 were SITC 098, SITC 112, SITC 044 (maize), SITC 022, and SITC 057 (Table A2). Interestingly, these 5 products were also among the top 5 exported products, although the share reduced from 58% in 2005 to 38% in 2017 (Table A4). Similarly, the HHI results show that food exports have been distributed more homogeneously among a broad range of products than imports (Table 3).

On the other hand, SA recorded comparative disadvantages in only a few products: SITC 001, SITC 016, SITC 034, SITC 036, SITC 061, SITC 072, SITC 057, SITC 121, and SITC 222. This suggests that SA has been competitive in trading

with African countries in these product groups. A careful look at the level of value-added products of the top ten traded products shows that SA primarily exported processed food products (SITC 098, SITC 112, SITC 022, SITC 048, SITC 122, SITC 081, SITC 059), that it had comparative advantages. On the other hand, the country mainly imported fresh food products (SITC 001, SITC 034, SITC 121, SITC 057, SITC 074, SITC 011, SITC 062) from African countries.

Conclusion

This paper uses 'products mapping' tool based on TBI and Lafay index and other descriptive approaches to investigate SA's trade performance and competitiveness in agri-food with the EU28, Africa and the world. SA's agri-food trade performance products have improved since 2000. Despite SA as the EU's traditional and largest trading partner in Africa and the establishment of a preferential trade arrangement, the proportion of the EU in the total agri-food trade with the country has decreased.

The findings suggest that SA recorded more comparative advantages and leading agri-food product groups (group A) in trading with African countries (37/46) than in trading with the EU28 (13/46) in 2017. On the level of total agri-food trade, the SA reveals 19/46 leading products when trading globally. The results support the conclusion that in bilateral trade, certain products have comparative advantages in relation to African markets despite recording comparative disadvantages in relation to the EU28 market.

The number of leading product groups has remained the same in the case of trade with Africa and slightly declined in the case of trade with the EU28. The leading products mostly contribute to the positive balance of SA's agri-food trade. Contrary, the losing products (group D) are dominantly the import generating segments in the product's structure of SA's agri-food trade, negatively contributing to SA's agri-food trade balance. The groups B and C are very few in numbers and do not significantly contribute to either export or import and thus the SA's agri-food trade balance. The only exception is SA's production and trade in alcoholic beverages. This industry has shifted from A to C group when SA trades with EU28.

The comparison of SA's agri-food trade with EU28 and Africa indicated a difference in the number of leading products. Besides that, the product mapping indicates structural differences and shifts

among the leading products. The product's structure within the group of leading products shows that SA has been diversified in trading with Africa while remains concentrated in export products to the EU markets. This again supports the conclusion, that emerging markets in Africa are generating opportunities for many SA agri-food industries that would otherwise not successfully compete in the EU's markets.

Recently, SA exports more processed food to Africa than it imports from the continent. The issue of reciprocal intra-regional trade and the lack of specialized trade agreements have received attention although the impact of these agreements in SA's in the region (the SADC) has not come to fruition. On the other hand, the country imports more processed products from the EU than exports, while trade with the Union has shrunk. The country should focus on producing and exporting higher value-added food products based on local raw materials.

The variability in the nature and structure of trade between the EU28 and the SA suggests that there is no apparent congruence in the growth and development of policies to improve the comparative advantages of the SA agricultural exports in the mentioned products.

Thus, policymakers in SA should continue to assess the opportunities, threats, strengths and weaknesses of the food sector to drive the effective integration of SA's agri-food industries. Also, should evaluate the existing policies regarding the exploitation of production and processing activities. For SA to realize more comparative advantages, it is imperative to improve production and trade with value-added products.

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References

[1]   Adriaen, D., Kleynhans T. E. and Tollens, E. (2004) "A Comparison Between South African Agricultural Exports to the European Union and those of other selected southern hemisphere countries", *Agrekon*, Vol. 43, No. 2, pp. 184-201. ISSN 2078-0400. DOI 10.1080/03031853.2004.9523644.

[2]   Aiginger, K. (2000) "Specialization of European manufacturing", *Austrian Economic Quarterly*, Vol. 5, No. 2, pp. 81-92. ISSN 1098-3708.

[3]   Arndt C. and Roberts, S. J. (2018) "Key issues in regional growth and integration in Southern Africa", *Development Southern Africa*, Vol. 35, No. 3, pp. 297-314, ISSN 1470-3637. DOI 10.1080/0376835X.2018.1469970.

[4]   Benesova, I., Maitah, M., Smutka, L., Tomsik, K. and Ishchukova, N. (2017) "Perspectives of the Russian agricultural exports in terms of comparative advantage", *Agric. Econ. – Czech*, Vol. 63, No. 7, pp. 318-330. ISSN 1805-9295. DOI 10.17221/344/2015-AGRICECON.

[5]   Benešová, I., Smutka, L. and Laputková, A. (2018) "Specifics of the Mutual Trade of the Post-Soviet Countries", *Entrepreneurial Business and Economics Review*, Vol. 7, No. 1. E-ISSN 2353-8821, ISSN 2353-883X. DOI 10.15678/EBER.2019.070102.

[6]   Berends, G. (2016) "What does the EU-SADC EPA really say? An analysis of the economic partnership agreement between the European Union and Southern Africa", *South African Journal of International Affairs*, Vol. 23, No. 4, pp. 457-474. ISSN 1022-0461. DOI 10.1080/10220461.2016.1275763.

[7]   Bilan Y., Mishchuk, H., Roshchyk, I. and Kmecova I. (2020) "Analysis of Intellectual Potential and its Impact on the Social and Economic Development of European Countries", *Journal of Competitiveness*, Vol.1, pp. 22-38. E-ISSN 1804-1728. ISSN 1804-171X. DOI 10.7441/joc.2020.01.02

[8]   Blažková, I. and Chmelíková, G. (2016) "The Influence of Market Concentration on the Development of Newly Born Business in the Czech Republic", *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, Vol. 64, No. 3, pp. 929-938. ISSN 1211-8516. DOI 10.11118/actaun201664030929.

[9]   Blížkovský, P., Grega, L. and Verter, N. (2018) "Towards a common agricultural policy in Africa?", *Agric. Econ. – Czech*, Vol. 64, No. 7, pp. 301-315. ISSN 0139-570X. DOI 10.17221/310/2016-AGRICECON.

[10]   Bojnec, Š. and Fertő, I. (2015) "Agri-food export competitiveness in European Union countries", *JCMS: Journal of Common Market Studies*, Vol. 53, No. 3, pp. 476-492. E-ISSN 1468-5965. DOI *10.1111/jcms.12215.*

[11]   Brodzicki, T. and Kwiatkowski, J. (2018) "An Empirical Investigation into the Role of Technology Gap in the Trade Relations of the EU Member States", *Entrepreneurial Business and Economics Review*, Vol. 6, No. 2, pp. 111-135. E-ISSN 2353-8821, ISSN 2353-883X. DOI 10.15678/EBER.2018.060206

[12]   Cieślik, A., Qu, Y. and Qu, T. (2018) "Innovations and Export Performance: Firm Level Evidence from China", E*ntrepreneurial Business and Economics Review*, Vol. 6, No. 4, pp. 27-47. E-ISSN 2353-8821, ISSN 2353-883X. DOI 10.15678/EBER.2018.060402

[13]   Department of Agriculture, Forestry and Fisheries of South Africa (DAFF) (2011) "*Competitiveness of selected South African agricultural product exports in the EU-27"*, Economic Services and Directorate, International Trade, South Africa. [Online]. Available: https://1url.cz/6MgC8 [Accessed: 14 May 2019].

[14]   De Pablo Valenciano, J., Uriarte, M. M. C. and Battistuzzi, M. A. G. (2017) "South Africa's competitiveness against its main competitors in the market of pears imported by the EU28", *Agrekon*, Vol. 56, No. 2, pp. 191-204. ISSN 2078-0400. DOI 10.1080/03031853.2017.1297723.

[15]   DTI – Department of Trade and Industry Republic of South Africa (2020) "*African Regional Integration*". [Online]. Available: https://bit.ly/33fYsYX [Accessed: 15 Feb 2020].

[16]   Economist Intelligence Unit (EIU) (2019) *"Global food security index 2019: Exploring challenges & developing solutions"*, EIU. [Online]. Available at: https://bit.ly/2THEbs8 [Accessed: 11 March 2020].

[17]   Esquivias, M. A. (2017) "The Change of Comparative Advantage of Agricultural Activities in East Java Within the Context of Asean Economic Integration", *AGRIS on-line Papers in Economics and Informatics*, Vol. 9, No. 1, pp. 33-47. ISSN 1804-1930. DOI 10.7160/aol.2017.090103.

[18]   European Commission (2016) "Economic Partnership Agreement between the European Union and its Member States, of the one part, and the SADC EPA States, of the other part", *Official Journal of the European Union*, L 250/2108.

[19]   European Commission (2019) "*Agri-food trade factsheet: European Union and South Africa*". [Online]. Available: https://bit.ly/2McDx4j [Accessed: 27 May 2019].

[20]   Fertő, I. (2008) "The evolution of agri-food trade patterns in Central European countries", *Post-Communist Economies*, Vol. 20, No. 1, pp. 1-10. ISSN 1463-1377. DOI 10.1080/14631370701865680.

[21]   Food and Agriculture Organization of the United Nations (FAO) (2011) "*Why has Africa become a net food importer? Explaining Africa agricultural and food trade deficits*". [Online]. Available: https://bit.ly/2IzRtAy [Accessed: 20 Jan 2019].

[22]   Food and Agriculture Organization of the United Nations (FAO) (2019) "F*AOSTAT database*", [Online]. Available: http://bit.ly/NmQzZf [Accessed: 17 June 2019].

[23]   Food Security Information Network (FSIN) (2019) "*Global report on food crises 2019*", FSIN. [Online]. Available: http://fsinplatform.org/ [Accessed: 27 July 2019].

[24]   Fujita, M., Krugman, P. and Venables, A. (1999) "*The Spatial Economy: Cities, Regions, and International Trade*", Cambridge, MA: MIT Press, 382 p. ISBN 9780262561471. DOI 10.7551/mitpress/6389.001.0001.

[25] Gebrehiwet, Y., Ngqangweni, S. and Kirsten, J. F. (2007) "Quantifying the trade effect of sanitary and phytosanitary regulations of OECD countries on South African food exports", *Agrekon*, Vol. 46, No. 1, pp. 1-17. ISSN 2078-0400. DOI 10.1080/03031853.2007.9523759

[26] Ishchukova, N. and Smutka, L. (2014) "Revealed" comparative advantage: products mapping of the Russian agricultural exports in relation to individual regions", *Acta Scientiarum Polonorum. Oeconomia*, Vol. 13, No. 1, pp. 45-61. ISSN 1644-0757.

[27] Kostiukevych, R., Mishchuk, H., Zhidebekkyzy, A., Nakonieczny, J. and Akimov, O. (2020) "The impact of European integration processes on the investment potential and institutional maturity of rural communities", *Economics and Sociology*, Vol. 13, No. 3, pp. 46-63. E-ISSN 2306-3459, ISSN 2071-789X. DOI 10.14254/2071-789X.2020/13-3/3.

[28] Krugman, P. (1987) "The narrow mowing band, the Dutch disease, and the competitive consequences of Mrs. Thatcher: notes on trade in the presence of dynamic scale economies", *Journal of Development Economics*, Vol. 27, No. 1, pp. 41-54. ISSN 0304-3878. DOI 10.1016/0304-3878(87)90005-8.

[29] Krugman, P. (1991) "*Geography and Trade*", Cambridge, MA: MIT Press, p. 156. ISBN 9780262610865.

[30] Lafay, G. (1992) "The measurement of revealed comparative advantages", In: DAGENAIS, M. G. & MUET, P.-A. (eds.), "*International Trade Modelling*". London: Chapman & Hall. ISBN 978-0412450006.

[31] Larsén, M. F. (2007) "Trade Negotiations between the EU and South Africa: A Three-Level Game", *JCMS: Journal of Common Market Studies*, Vol. 45, No. 4, pp. 857-881. ISSN 1468-5965. DOI 10.1111/j.1468-5965.2007.00751.x.

[32] Lucas, R. (1988) "On the mechanics of economic development", *Journal of Monetary Economics*, Vol. 22, No. 1, pp. 3-22. ISSN 0304-3932. DOI 10.1016/0304-3932(88)90168-7.

[33] Maris, M. (2019) "Structural and productivity shift of industries in Slovakia and Czech Republic: A comparative study", *Journal of International Studies*, Vol. 12, No. 1, pp. 313-323. E-ISSN 2306-3483, ISSN 2071-8330. DOI 10.14254/2071-8330.2019/12-1/21.

[34] Nazarczuk, J., Umiński, S. and Gawlikowska-Hueckel, K. (2018) "The Role of Specialisation in the Export Success of Polish Counties in 2004-2015", *Entrepreneurial Business and Economics Review*, Vol. 6 No. 2, pp. 91-109. E-ISSN 2353-8821, ISSN 2353-883X. DOI 10.15678/EBER.2018.060205

[35] Ortikov, A., Smutka, L. and Benešová, I. (2019) "Competitiveness of Uzbek agrarian foreign trade – different regional trade blocs and the most significant trade partners", *Journal of International Studies*, Vol. 12, No. 4, pp. 177-194. ISSN 2306-3483. DOI 10.14254/2071-8330.2019/12-4/12.

[36] Porter, M. E. (1990) "Competitive advantage of nations", *Harvard Business Review,* Vol. 68, No. 2, pp. 73-93. ISSN 0017-8012.

[37] Reis, J. G. and Farole, T. (2012) "*Trade Competitiveness Diagnostic Toolkit*", Washington, DC, World Bank Group. DOI 10.1596/978-0-8213-8937-9.

[38] Sandrey, R., Punt, C., Jensen, H. G. and Vink, N. (2011) "Agricultural Trade and Employment in South Africa", *OECD Trade Policy Papers*, No. 130, OECD Publishing, Paris. [Online]. Available: https://bit.ly/2TExdEa [Accessed: 01 Dec 2019]. E-ISSN 18166873. DOI 10.1787/5kg3nh58nvq1-en.

[39] Sanidas, E. and Shin, Y. (2010) "*Comparison of Revealed Comparative Advantage Indices with Application to Trade Tendencies of East Asian Countries*", Seoul National University. [Online]. Available: https://bit.ly/39LOzVe [Accessed: 20 April 2019].

[40] Smutka, L., Rovný, P., Pulkrábek, J. and Horská, E. (2016) "Foreign Trade in Sugar (HS 1701) and Sugar Containing Products (HS17) – Comparison of the Czech and Slovak Republic During the Last Two Decades", *Listy Cukrovarnicke a Reparske*, Vol. 132, No. 7-8, pp. 234-240. ISSN 1805-9708.

[41] Smutka, L., Maitah, M. and Svatoš, M. (2018) "Changes in the Czech agrarian foreign trade competitiveness – different groups of partners' specifics", *Agric. Econ. – Czech*, Vol. 64, No. 9, pp. 399-411. ISSN 1805-9295. DOI 10.17221/399/2016-AGRICECON.

[42] Smutka, L., Maitah, M. and Svatoš, M. (2019) "The Czech Agrarian Trade Comparative Advantages Distribution Based on Value and Volume Approach", *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, Vol. 67, No. 6, pp. 1613-1625. ISSN 2464-8310. DOI 10.11118/actaun201967061613.

[43] UNCTAD (2019) "*World statistical database*" [Online]. Available: https://bit.ly/21GbfKX. [Accessed: 25 Feb 2019].

[44] Vink, N. and van Rooyen, J. (2009) "Perspectives on the Performance of Agriculture in South Africa since 1994 and implications for its Role in Achieving Sustainable Food Security", Working Papers 108005, University of Pretoria, Department of Agricultural Economics, Extension and Rural Development. [Online]. Available: https://bit.ly/2IFAo8g [Accessed: 10 Dec 2019]. DOI 10.22004/ag.econ.108005

[45] Verter, N., Zdráhal, I., Bečvářová, V. and Grega, L. (2020) "'Products mapping' and trade in agri-food products between Nigeria and the EU28", *Agric. Econ. – Czech*, Vol. 66, No. 1, pp. 34-45. ISSN 0139-570X. DOI 10.17221/145/2019-AGRICECON

[46] Widodo, T. (2008) "Product mapping and dynamic shift in the patterns of comparative advantage: Could India Catch Up China?", *Journal of Chinese Economic and Foreign Trade Studies*, Vol. 1, No. 3, pp. 200-213. ISSN 1754-4408. DOI 10.1108/17544400810912365.

[47] Widodo, T. (2009) "Comparative Advantage: Theory, Empirical Measures and Case Studies", *Review of Economic and Business Studies*, Vol. 2, No. 2, pp. 57-81. ISSN 1843-763X.

[48] World Bank (2019) "*World development indicators*", [Online]. Available at: http://bit.ly/1Cd8EkQ. [Accessed: 28 June 2019].

[49] Zaghini, A. (2003) "Trade advantages and specialization dynamics in acceding countries", Working paper No. 249, Frankfurt am Main, Germany: European Central Bank, pp. 4-15.

[50] Zdráhal, I., Verter, N., Daňková, B. and Kuchtík, J. (2019) "'Products mapping' and agri-food trade between Nigeria and ECOWAS member countries", *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, Vol. 67, No. 5, pp. 1379-1392. ISSN 1211-8516. DOI 10.11118/actaun201967051379.

[51] Yang, J., Černevičiūtė, J., Strazdas, R. and Tvaronavičienė, M. (2019) "Stimulation of cultural and creative industries clusters development: A case study from China", *Terra Economicus*, Vol. 17, No. 3, pp. 169-184. ISSN 24104531.

Appendix

SITC code	Food product	SITC code	Food product
001	Live animals	057	Fruit, nuts excl. oil nuts
011	Bovine Meat	058	Fruit, preserved, prepared
012	Other meat, other offal	059	Fruit, vegetable juices
016	Meat, ed. offl., dry, slt, smk	061	Sugars, molasses, honey
017	Meat, offl. Prdd, nes	062	Sugar, confectionery
022	Milk and cream	071	Coffee, coffee substitutes
023	Butter, other fat of milk	072	Cocoa
024	Cheese and curd	073	Chocolate, oth. cocoa prep.
025	Eggs, birds, yolks, albumin	074	Tea and mate
034	Fish, fresh, chilled, frozn	075	Spices
035	Fish, dried, salted, smoked	081	Animal feed stuff
036	Crustaceans, Molluscs	091	Margarine and shorten
037	Fish etc. prepd, prsvd. nes	098	Edible prod. prepetns, nes
041	Wheat, Meslin, Unmilled	111	Non-alcohol. beverage
042	Rice	112	Alcoholic Beverages
043	Barley, unmilled	121	Tobacco, unmanufactured
044	Maize unmilled	122	Tobacco, manufactured
045	Other cereals, unmilled	222	Oil seeds and oleaginous fruits (excl. flour)
046	Meal, Flour of wheat, msln	223	Oil seeds, oleaginous fruits (incl. flour, n.e.s.)
047	Other cereal meal, flours	411	Animal oils and fats
048	Cereal preparations	421	Fixed veg. fat, oils, soft
054	Vegetables	422	Fixed veg. fat, oils, other
056	Vegetables, prpd, prsvd, nes	431	Animal, veg. Fats, oils, nes.

Source: SITC rev.3

Table A1: Sectors and their numeric designations (SITC rev.3, 3-digit code).

SITC	2005	2010	2015	2017	2005	2010	2015	2017	2005	2010	2015	2017
					South Africa's Agri-food trade with							
	World				**EU28**				**Africa**			
001	-0.15	-1.20	-1.38	-2.10	-0.16	-0.10	-0.08	-0.07	0.11	-0.56	-0.70	-1.17
011	-0.74	-0.71	0.74	0.69	0.00	0.00	0.00	0.00	0.05	-0.35	-0.01	0.01
012	-6.83	-3.74	-5.54	-6.51	-0.28	-0.27	-2.21	-1.19	0.07	0.43	0.53	0.54
016	-0.02	-0.05	-0.05	-0.04	-0.01	-0.01	-0.01	-0.02	0.01	-0.02	-0.02	-0.01
017	0.12	0.19	0.45	0.40	-0.03	-0.01	0.02	0.00	-0.02	0.14	0.23	0.21
022	-0.96	0.94	0.71	0.67	-0.39	-0.21	-0.50	-0.47	0.24	1.00	1.02	0.99
023	-0.16	0.00	-0.11	-0.26	-0.12	-0.04	-0.05	-0.12	0.02	0.08	0.06	0.05
024	-0.45	-0.21	-0.43	-0.37	-0.18	-0.17	-0.35	-0.34	0.02	0.15	0.18	0.19
025	-0.02	0.25	0.33	0.16	0.00	-0.01	-0.02	-0.02	-0.01	0.16	0.21	0.12
034	3.89	0.60	0.18	-0.48	1.94	0.92	0.80	0.76	0.07	-0.51	-0.52	-0.65
035	0.05	0.06	0.00	0.03	0.00	0.00	0.00	0.00	0.04	0.00	-0.02	0.00
036	1.15	1.08	0.72	0.23	0.74	0.39	0.28	0.42	-0.14	-0.05	-0.02	-0.04
037	-0.91	-1.76	-1.88	-0.69	0.03	0.07	0.05	0.08	0.04	-0.07	-0.14	0.03
041	-5.52	-3.54	-5.64	-3.81	-0.50	-1.06	-1.00	-1.22	0.07	0.31	0.51	0.15
042	-7.00	-5.38	-5.33	-5.81	-0.03	0.00	0.00	-0.01	0.06	0.40	0.39	0.30
043	-0.58	-0.22	-0.30	-0.14	-0.08	-0.02	0.00	0.00	0.00	0.00	0.00	0.00
044	4.69	4.01	-0.09	2.31	0.01	0.11	0.02	-0.02	2.62	1.42	0.96	1.37
045	-0.26	0.04	-0.23	-0.14	0.00	-0.02	-0.09	0.00	0.02	0.09	0.06	0.04
046	0.04	0.42	0.24	0.01	-0.04	-0.02	-0.04	-0.02	0.07	0.28	0.19	0.03
047	2.02	0.66	0.96	0.89	-0.01	0.00	0.00	0.00	1.24	0.39	0.57	0.53
048	-1.64	-0.18	-0.18	-0.24	-0.49	-0.57	-0.69	-0.73	0.17	0.89	0.94	0.90
054	0.06	0.30	0.83	1.40	0.29	0.09	0.04	0.13	0.22	0.76	0.73	0.74
056	-0.79	-0.53	-0.22	-0.33	-0.21	-0.36	-0.20	-0.28	0.03	0.34	0.37	0.36
057	22.13	20.14	25.97	26.52	9.31	6.16	7.24	7.25	0.35	1.00	1.16	0.79
058	2.96	1.84	1.45	1.25	0.90	0.48	0.34	0.31	0.04	0.11	0.03	0.04
059	1.75	2.00	1.73	1.15	0.37	0.20	0.26	0.11	0.27	0.90	0.95	0.76
061	4.51	-0.54	-3.20	-4.44	-0.10	-0.10	-0.10	0.15	0.93	0.25	-1.01	-0.84
062	-1.25	-0.44	-0.02	-0.02	-0.09	-0.04	-0.06	-0.05	0.04	0.02	0.17	0.15
071	-1.38	-1.21	-2.02	-1.79	-0.24	-0.22	-0.51	-0.46	-0.03	0.11	0.03	0.05
072	-1.07	-1.02	-0.88	-0.63	-0.07	-0.04	-0.04	-0.05	-0.29	-0.23	-0.15	-0.09
073	-0.51	0.03	-0.82	-0.65	-0.40	-0.27	-0.60	-0.60	0.18	0.15	0.24	0.23
074	-0.64	-0.49	-0.49	-0.47	0.01	-0.02	-0.05	-0.03	-0.35	-0.22	-0.14	-0.16
075	-0.35	-0.22	-0.39	-0.25	0.03	0.00	0.00	0.00	-0.03	0.21	0.25	0.24
081	-5.11	-5.80	-2.85	-2.84	-0.46	-0.65	-0.73	-0.73	-0.03	0.21	0.61	0.34
091	-0.33	0.06	0.13	0.17	-0.12	-0.02	-0.04	-0.03	0.08	0.24	0.22	0.20
098	-2.42	0.60	0.59	0.90	-1.18	-0.88	-1.08	-1.02	0.71	1.94	2.14	2.08
111	-0.17	0.13	0.45	0.32	-0.41	-0.29	-0.36	-0.30	0.33	0.43	0.79	0.68
112	6.22	3.71	4.21	3.48	2.85	0.65	-0.01	-0.07	0.70	0.80	1.55	1.33
121	-1.71	-2.34	-1.75	-1.52	-0.15	-0.05	-0.05	-0.02	-0.42	-0.39	-0.44	-0.55
122	1.76	2.45	1.50	0.60	-0.22	-0.17	-0.06	-0.06	0.60	1.30	1.00	0.82
222	-0.15	0.37	-1.14	-0.75	0.09	-0.01	-0.09	-0.15	-0.18	-0.08	-0.04	-0.08
223	0.11	0.24	0.09	0.10	0.00	0.00	0.00	0.00	0.09	0.15	0.08	0.09
411	-0.45	-0.25	0.05	-0.03	-0.01	-0.01	-0.01	0.01	0.02	-0.01	0.01	0.02
421	-4.40	-4.13	-1.94	-2.74	-0.36	-1.94	-1.37	-1.60	0.18	1.14	0.93	0.72
422	-4.17	-5.04	-3.88	-4.56	-0.07	-0.02	-0.03	-0.02	0.01	0.03	0.07	0.09
431	-1.31	-1.14	-0.55	0.29	-0.07	-0.03	0.01	0.10	0.03	0.05	0.11	0.09
Total	**0.00**	**0.00**	**0.00**	**0.00**	**10.08**	**1.42**	**-1.38**	**-0.37**	**8.23**	**13.39**	**14.06**	**11.68**

Source: Own composition based on UNCTAD (2019)

Table A2: South Africa's comparative advantage (LFI) in agri-food products with World, EU28 and Africa.

Indicator/year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Exports to the EU28 (%)													
[057] Fruits and nuts	45.5	41.8	45.3	42.3	45.6	48.4	49.2	52.7	53.4	54.0	58.5	57.9	58.1
[112] Alcoholic beverages	27.0	26.4	26.1	25.3	27.5	25.7	23.8	23.3	24.8	21.0	18.5	16.8	16.3
[034] Fish, fresh (live or dead)	9.5	9.0	8.7	10.2	7.8	7.3	7.9	7.4	6.3	7.6	6.7	7.1	6.5
[036] Crustaceans, mollusks, etc	3.9	4.5	4.4	3.8	3.0	3.3	3.2	2.6	1.6	2.0	2.4	3.2	3.4
[058] Fruit, preserved, and fruit	5.1	5.3	4.3	4.1	4.5	4.3	3.9	4.0	3.4	3.2	3.2	3.0	2.9
[061] Sugar, molasses/oney	0.3	0.1	0.9	0.1	0.1	0.0	0.1	0.0	0.1	0.2	0.1	0.1	2.4
[054] Vegetables	1.8	1.8	1.6	1.9	1.3	1.2	1.5	1.5	1.5	1.4	1.5	2.2	2.3
[059] Fruit and vegetable juices	1.9	3.4	1.5	1.5	1.6	2.0	2.0	1.9	2.4	2.4	2.5	2.1	1.6
[431] Animal or veg. oils & fats	0.2	0.2	0.2	0.2	0.2	0.1	0.3	0.3	0.3	0.4	0.4	0.4	1.1
[056] Vegetables, roots, tubers, etc	0.6	0.6	0.6	0.8	0.9	0.9	1.1	0.9	0.9	1.1	1.0	0.9	1.0
Total top 10 products	95.5	93.1	93.8	90.3	92.4	93.0	93.0	94.5	94.6	93.2	94.8	93.5	95.5
Imports from the EU28 (%)													
[112] Alcoholic beverages	25.8	27.1	34.7	32.9	33.0	23.2	20.4	19.2	22.1	17.1	16.7	15.4	16.3
[421] Fixed vegetable fats & oils,	3.5	2.6	3.5	4.4	2.5	16.8	19.7	16.4	14.3	13.2	9.9	13.0	12.2
[012] Other meat and edible meat	3.8	5.2	4.1	3.3	2.9	4.9	10.1	13.8	14.0	14.7	16.3	17.9	9.4
[041] Wheat (incl. spelt) & meslin	4.6	7.8	1.3	7.1	15.2	9.2	4.3	1.5	1.8	5.5	7.2	5.2	9.2
[098] Edible products and prep.	12.6	11.9	11.5	11.2	10.6	8.5	8.4	8.5	9.3	8.4	8.7	8.6	8.4
[081] Feeding stuff for animals	4.6	4.7	5.1	5.8	5.5	5.7	5.7	5.4	5.4	5.3	6.0	5.1	6.1
[048] Cereal preparations	4.8	5.2	5.6	5.5	4.5	5.0	5.7	5.1	5.1	5.5	5.0	5.6	5.7
[073] Chocolate, food prep.	4.1	4.5	2.7	2.4	2.2	2.4	2.8	3.6	4.1	3.9	4.3	3.7	4.6
[071] Coffee and coffee	2.4	2.8	2.0	2.4	1.9	2.0	2.2	3.0	3.4	3.3	3.7	3.3	3.6
[022] Milk and cream	3.7	2.3	3.2	2.8	1.7	1.8	2.5	3.1	2.7	3.2	3.6	2.5	3.5
Total top 10 products	69.8	74.0	73.7	77.7	79.8	79.6	81.8	79.7	82.2	79.9	81.2	80.2	79.0

Source: Own composition based on UNCTAD (2019)

Table A3: Share of top 10 food products (% of total food trade) between SA and the EU28.

Indicator/year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Exports within Africa (%)													
[098] Edible products and prep.	6.8	10.3	12.3	7.5	7.9	8.9	9.4	9.1	8.9	9.4	10.0	9.8	10.8
[112] Alcoholic beverages	6.4	6.5	9.2	7.0	7.0	8.3	9.3	8.6	8.6	8.8	9.1	7.9	8.9
[044] Maize	24.0	13.9	2.3	27.7	23.5	6.4	4.4	4.6	6.5	6.3	4.5	8.4	6.9
[057] Fruits and nuts	4.4	6.5	9.1	5.4	4.9	5.3	5.2	5.7	6.4	6.4	7.1	6.5	6.4
[022] Milk and cream	2.2	2.9	3.3	2.5	3.1	4.5	4.5	4.9	5.2	5.1	4.6	4.1	5.0
[048] Cereal preparations	1.8	2.3	2.9	2.3	2.8	4.1	4.5	4.5	4.5	4.5	4.4	4.5	4.8
[061] Sugar, molasses/honey	9.6	15.9	18.2	8.5	9.5	9.1	7.4	7.2	8.5	6.5	4.4	3.9	4.7
[054] Vegetables	2.5	3.2	3.4	2.1	1.8	4.0	4.0	3.9	3.8	3.9	3.8	4.4	4.4
[122] Tobacco, manufactured	6.1	10.3	7.6	3.3	4.7	6.2	5.5	5.7	4.9	4.2	4.7	4.1	4.3
[081] Feeding stuff for animals	1.4	1.4	1.8	1.5	1.3	3.2	3.2	3.7	4.1	3.9	4.8	5.7	4.2
Total top 10 products	65.2	73.1	70.1	67.8	66.5	59.8	57.3	57.9	61.2	58.9	57.3	59.3	60.3
Imports within Africa (%)													
[061] Sugar, molasses/honey	4.2	3.0	4.6	3.0	4.0	19.7	19.3	17.6	17.2	20.1	24.4	24.0	21.4
[001] Live animals	0.6	0.6	0.3	0.4	0.2	8.4	9.6	6.5	9.0	5.4	11.7	7.4	16.6
[034] Fish, fresh (live or dead)	1.3	1.8	1.6	1.4	2.3	8.6	7.2	8.0	8.8	8.8	9.4	10.6	10.1
[121] Tobacco, unmanufactured	19.2	20.3	18.1	23.8	23.2	4.8	5.5	3.8	3.2	6.6	5.5	7.5	6.8
[057] Fruits and nuts	4.8	7.0	6.8	6.6	5.9	2.1	2.2	3.1	3.9	3.8	5.0	5.5	5.9
[074] Tea and mate	14.9	15.4	10.5	11.4	16.9	3.9	3.0	3.2	3.9	3.9	3.5	4.1	3.7
[081] Feeding stuff for animals	6.8	6.7	11.6	13.8	12.8	5.5	5.6	7.3	6.3	6.4	5.5	6.5	6.0
[011] Meat of bovine animals	0.0	0.1	0.0	0.1	0.1	6.5	6.4	7.1	6.5	5.7	4.0	3.8	3.3
[062] Sugar confectionery	1.1	2.9	3.1	1.9	1.4	4.6	4.1	3.7	5.2	4.3	3.0	2.8	2.8
Total top 10 products	52.9	58.7	57.0	63.3	67.0	75.6	75.8	72.6	75.4	73.0	77.8	77.4	81.9
Total top 10 products	69.8	74.0	73.7	77.7	79.8	79.6	81.8	79.7	82.2	79.9	81.2	80.2	79.0

Source: Own composition based on UNCTAD (2019)

Table A4: Share of top 10 food products (% of total food trade) between SA and Africa.

	Group A (leading products)					Group D (losing products)			
SITC	Export	SonEX	Import	SonIM	SITC	Export	SonEX	Import	SonIM
	1000 USD	%	1000 USD	%		1000 USD	%	1000 USD	%
Trade in Food Products between South Africa and the EU28									
2005									
[057]	800,677	45.51	7,636	1.37	[098]	13,745	0.78	69,845	12.55
[112]	474,160	26.95	143,305	25.75	[048]	1,410	0.08	26,522	4.77
[034]	167,428	9.52	1,774	0.32	[041]	0	0.00	25,765	4.63
[058]	89,291	5.08	7,977	1.43	[081]	1,971	0.11	25,327	4.55
[036]	67,650	3.85	3,091	0.56	[111]	4,344	0.25	24,010	4.31
others	88,183	5.01	10,943	1.97	others	50,256	2.86	210,117	37.76
Sum	*1,687,389*	*95.91*	*174,725*	*31.40*	*Sum*	*71,725*	*4.08*	*381,585*	*68.57*
2017									
[057]	1,484,329	58.10	25,241	1.40	[421]	727	0.00	217,140	12.20
[034]	164,890	6.50	9,563	0.50	[012]	8,434	0.30	167,094	9.40
[036]	87,914	3.40	2,543	0.10	[041]	0	0.00	164,856	9.20
[058]	74,758	2.90	8,995	0.50	[098]	18,709	0.70	150,576	8.40
[061]	60,423	2.40	21,147	1.20	[081]	14,742	0.60	108,495	6.10
others	1,872,315	73.26	67,490	3.78	others	54,917	2.15	561,519	31.45
Sum	*2,035,060*	*79.63*	*118,777*	*6.65*	*Sum*	*97,530*	*3.82*	*1,369,679*	*76.71*
Trade in Food Products between South Africa and Africa									
2005									
[044]	221,604	24.00	92	0.07	[121]	8,433	0.91	26,781	19.24
[047]	104,832	11.35	8	0.01	[074]	4,042	0.44	20,742	14.90
[061]	88,185	9.55	5,796	4.16	[072]	752	0.08	15,321	11.00
[098]	62,738	6.79	1,850	1.33	[222]	4,759	0.52	12,119	8.70
[112]	59,166	6.41	196	0.14	[036]	2,239	0.24	8,772	6.30
others	339,892	36.81	24,591	17.66	others	3,561	0.39	4,497	3.23
Sum	*876,418*	*94.92*	*32,533*	*23.37*	*Sum*	*23,786*	*2.58*	*88,233*	*63.37*
2017									
[098]	432,156	10.84	11,616	1.03	[061]	185,665	4.70	240,348	21.40
[112]	355,749	8.93	61,097	5.44	[001]	41,399	1.00	186,006	16.60
[044]	275,213	6.91	1,844	0.16	[034]	37,325	0.90	113,736	10.10
[057]	253,445	6.36	65,692	5.85	[121]	2,227	0.10	75,905	6.80
[022]	198,215	4.97	853	0.08	[074]	28,952	0.70	40,978	3.70
others	2,159,229	54.18	284,070	25.30	others	15,577	0.39	40,507	3.61
Sum	*3,674,006*	*92.19*	*425,172*	*37.87*	*Sum*	*311,145*	*7.81*	*697,480*	*62.13*

Notes: SonEX – share on exports, SonIM – share on imports
Source: Own composition based on UNCTAD (2019)

Table A5: Results of Product Mapping for South Africa's agri-food trade with EU28 and Africa (2005, 2017).