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Competitiveness of the South African Citrus Fruit Industry Relative to Its Southern Hemisphere Competitors

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Abstract

This paper investigates the competitive performance of the South African citrus fruit industry relative to its southern hemisphere rivals, namely Argentina, Australia, Uruguay, Chile and Peru. Both local and international literature on the citrus fruit industries was used as part of the analysis. The method of analysis used included the Revealed Comparative Advantage (RCA#) index, the Net Export index (NX_i) and the Relative Revealed Comparative Trade Advantage (RTA) index. Time series data from the International Trade Centre (ITC) on South African and southern hemisphere major producing countries' citrus fruit imports and exports were used to calculate the competitiveness indexes. The results revealed that South Africa has competitive advantage in some citrus fruit products than its southern hemisphere counterparts. The RCA#, NX_i and RTA indexes analysis clearly showed that the domestic industry has a stronger and relatively higher revealed competitive advantage in three citrus fruit product categories, namely oranges, grapefruit and grapefruit juice than its southern hemisphere competitors. However, its orange competitiveness decreases when moving from primary orange to orange juice. This means that value adding opportunities are still lacking in the orange sub-sector. One possible reason for this could be the high rates of return recorded for farm-level applications of technology for most primary orange commodities.

Keywords: citrus fruit industry, competitiveness, revealed comparative advantage index, net export index, relative revealed comparative trade advantage index, South Africa

1. Introduction

The agricultural sector in South Africa, including the citrus fruit industry, has undergone enormous economic, social and political changes since the beginning of the democratisation process in 1994 (Vink et al., 2002; Sandrey et al., 2008). The combination of liberalisation and stricter labour laws, brought by the economic transformation, exposed the sector, including the citrus industry, to the adverse effects of globalisation (Chitiga et al., 2008). As a result, citrus fruit producers and processors are facing increasing competition in both the domestic and international markets. They are forced to position themselves as capable competitors in the global free market environment. This is even more important in the light of the fact that the South Africa's foreign competitors have high levels of government subsidies and protection measures (Madima, 2009), putting the domestic citrus fruit producers and processers at a definite disadvantage. In light of the above, this study intends to investigate the competitiveness of the domestic industry relative to that of its competitors in the southern hemisphere region.

The primary objective of the study is, therefore, to investigate and compare the competitiveness of the South African citrus fruit industry relative to that of its rivals in the southern hemisphere, namely Argentina, Australia, Uruguay, Chile and Peru. The competitive comparison of these countries is largely motivated by several reasons, including the fact that these countries enjoy the same counter-seasonal advantage to access markets in developed countries such as the EU, the US and the Far East markets. In addition, these countries constitute a major competitive force in South Africa's main traditional export destinations. Therefore, the research delimitation is on these southern hemisphere countries and excludes Southeast Asia and the Caribbean which are also often competitors. This delimitation will produce typical information that is capable of being used to create a framework that will assist the domestic industry to compete efficiently with other southern hemisphere producers. A comparison will present a realistic picture of South Africa's future prospects in these markets.

The rest of the paper is organised as follows: section 2 reviews literature on agricultural competitiveness in South Africa as this will help to put the analysis into perspective. It is followed by section 3 which discusses briefly the methodology used in the analysis. Section 4 presents the research results and conclusion and recommendations are provided in section 5.

1.1 Review of Agricultural Competitive Analysis

In recent years, competitive analysis has become a rapidly evolving area of interest for many agricultural researchers in South Africa. This is evident from the increasing number of studies that have been and are being conducted in this field. Competitive studies of agricultural products have gained commercial credence in the last ten to twenty years as many agricultural researchers started to realise their importance in the sector. Martinez (1996) argues that this is because of the significant changes that are currently affecting the agricultural sector, such as the shift in consumer demand, global competition, technological progress and the industrialisation of agriculture. Some of the studies conducted lately that analysed the revealed competitive advantage of several agricultural products on both the micro- and macro-levels include analyses by Esterhuizen and Van Rooyen (1999), Esterhuizen and Van Rooyen (2001), Van Rooyen (1998), Van Rooyen et al. (2000) and Van Rooyen and Esterhuizen (2001). The authors used the Balassa's (1989) RCA index method to analyse the competitiveness of several supply chains in the South African agricultural sector. Their findings were that most commodity chains are marginally competitive, and the competitive index generally decreased when moving from primary to processed products. They concluded that value-adding activities in the domestic agricultural sector were limited.

Mosoma (2004) examined the agricultural competitiveness and supply chain integration of South Africa, Argentina and Australia using the RTA index. His analysis established that South Africa's agricultural food chains are marginally competitive internationally, whereas Argentina's and Australia's agricultural food chains are generally more competitive worldwide than those of South Africa. His findings showed that South Africa has managed to move further up the value chain compared to Argentina and Australia. He concluded that in all three countries competitiveness decreased when moving from primary to processed products in the chain, which implied that value-adding opportunities were limited in these countries. Hallatt (2005) used three indexes, namely the RCA index, NX_i and RTA index to analyse the relative competitiveness of the South African oilseed industry by comparing it with that of Argentina. Her analysis showed that South African groundnuts and sunflower seeds have a competitive advantage in their primary form, but oilseed to which value is added has, in most cases, a competitive disadvantage, exactly the opposite of Argentina's oilseed products. Her study further revealed that the domestic oilseed industry was struggling with comparative and competitive disadvantage for value-added products.

Mashabela and Vink (2008) used the RTA index to measure the competitive performance of South African deciduous fruit supply chains relative to those of Chile. Their findings revealed that the South African industry enjoyed a relative marginal competitive advantage in several deciduous fruit products, such as dried apricots, whereas Chile is strongly competitive in almost all the deciduous fruit products. The findings further revealed that the competitiveness of South Africa's most deciduous fruit products decreased when moving further up the value chain, contrary to the case in Chile. The authors argued that the major possible explanation for this could be the high rates of return recorded for farm level applications of technology for most primary deciduous fruit commodities. Madima (2009) investigated the competitiveness of the domestic deciduous fruit canning industry. His findings clearly pointed out that the EU subsidies, not Sanitary and Phytosanitary (SPS) conditions, definitely disadvantaged the domestic industry and negatively affected its competitiveness in the EU market. However, he further found out that internationally the local industry was competitive with respect to area such as labour costs, product quality, efficient production technology and world class regulatory standards.

Ndou and Obi (2011) analysed the business environment and international competitiveness of South African citrus fruit industry using the Constant Market Share (CMS) methodology. Their findings showed that South Africa's export growth of lemons and oranges was due to their competitiveness in all exports markets. Though competitive, the domestic industry however showed a downward trend in CMS over the years in both lemons and oranges. Recently, the Department of Agriculture, Forestry and Fisheries (DAFF, 2011) measured the competitiveness of selected agricultural exports in the EU between 2001 and 2009 using the RCA index and Comparative Export Performance (CEP) index approaches. The study revealed that South Africa had been competitive in the EU in terms of fish and crustaceans, vegetables, fruits and beverages, but not competitive with regard to cereals, sugar and tobacco. The study also revealed that Argentinean agricultural exports generally had a comparative advantage over South Africa in the EU market.

It is clear from the preceding discussion that a range of analysis has been conducted on the competitive advantage of South Africa's agricultural products. However, none of these studies had compared the competitiveness of citrus fruit products with those of its rivals in the southern hemisphere. Ndou and Obi (2011) only analysed the competitiveness of the domestic citrus fruit industry compared to the major rivals such as Spain, the USA, Turkey, China and Morocco. A study that compares the competitiveness of the domestic industry's citrus fruit products relative to those of southern hemisphere rivals is thus justified because such a study will enhance our knowledge of the ability of the industry to compete with these countries.

2. Methods

The measurement of the concept of competitiveness is a controversial issue due to its complexity. It means quite a lot of different aspects to different people with different interests. The complexity of the competitiveness concept has seen many measures thrown into the research field. As a result, there are many diverse methods and indexes that have been developed to measure the competitive advantage, such as the RCA index, the RTA index, the NX_i, the Domestic Resource Cost (DRC), the Policy Analysis Matrix (PAM), the Net Social Profitability (NSP), the Resource Cost Ratio (RCR) and the Trade Performance Index (TPI) (Esterhuizen & Van Rooyen, 1999).

No single comprehensive measure can be regarded as the appropriate indicator of the competitive advantage (Turner & Van't Dack, 1993; Ferto & Hubbard, 2002). This is witnessed by the failure of scholars to come to a conclusive definition of the concept, the basis of comparison and the number of dimensions included in the determination of competitiveness (Esterhuizen et al., 2001). Therefore, the choice of measurement is influenced by a particular question or facet of competitiveness that one wishes to deal with.

In the context of the objectives of this study, three internationally recognised indexes, namely, the Vollrath's (1991) improved original version of the Balassa's RCA index (denoted as the RCA# to differentiate it from the original RCA), the NX_i, and the RTA index were used to measure the competitiveness of the domestic citrus fruit industry relative to its southern hemisphere rivals. These indexes, discussed in details below, are common to determine the competitiveness at sector level where trends and countries are compared in the international market (Banterle & Carraresi, 2007). For the analysis and competitiveness calculations, use was made of the secondary data already generated from a reputable organisation, the International Trade Centre (ITC) trade map. The time series data on citrus fruit imports and exports from 2004 to 2012 was used to calculate the competitive indexes.

2.1 Revealed Comparative Advantage (RCA) Index

The RCA index is one of the most popular and potent measures of the industrial competitive performance (Galleto, 2003; Winkelman et al., 1995). It has a long history of practical use and has gained greater acceptance among the applied trade economists. Hinloopen and Marrewijk (2001) argue that the use of the RCA index for identifying a country's weak and strong sectors is widespread, both among the academic scholars and the policy makers. It is considered to be a more appropriate measure of competitiveness because a group of countries is expected to have a much greater impact at the world level than an individual economy (Bender & Li, 2002; Batha & Jooste, 2004).

Its advantage is that the only data required for analysis is trade statistics. The quality of the results is thus, to a considerable extent dependent on the quality of available data for analysis. However, the index has some measurement problems, as it is defined in terms of autarkic price relationships that are not observable (Bender & Li, 2002; Batha & Jooste, 2004). It assumes that the true pattern of competitive advantage can be observed from post-trade data, and trade statistics reflect only post-trade situations. Given that trade patterns may be distorted by government interventions (e.g. import restrictions, export subsidies), this may to an extent distort the RCA index, thus causing misrepresentation of underlying competitive advantage. Despite this, Bender and Li (2002) and Batha and Jooste (2004) are of the opinion that the RCA index is still acceptable since the impact of changes in trade policies can be deducted from movements of the RCA, even though it fails to distinguish between a region's factor endowments.

For a particular country, Balassa (1965) defines the RCA of a product as the ratio of the share of that product in world trade. It measures a nation's exports of a product or service relative to its overall exports and to the corresponding export performance of a set of countries (Ferto & Hubbard, 2002). The Vollrath's (1991) RCA# is expressed mathematically as:

$$RCA\#_i = \frac{\left\{\frac{X_{ij}}{\left(\sum_i X_{ij}\right) - X_{ij}}\right\}}{\left\{\frac{\left((\sum_j X_{ij}) - X_{ij}\right)}{\left((\sum_j \sum_i X_{ij}) - (\sum_j X_{ij})\right) - \left((\sum_i X_{ij}) - X_{ij}\right)}\right\}} \quad (1)$$

where X_{ij} are the exports of sector "*i*" of country "*j*"; $\sum_i X_{ij}$ are the total exports of country "*j*"; $\sum_j X_{ij}$ are the world exports of sector "*i*"; and $\sum_j \sum_i X_{ij}$ are total world exports.

An RCA# index greater than 1 indicates that the country i has a comparative advantage in the commodity j, and therefore it reveals competitiveness. An RCA# index lower than 1, on the other hand, indicates that the country i does not have a comparative advantage in the commodity.

2.2 Net Export Index (NX_i)

The RCA index has been widely criticised largely due to the fact that it only takes into account exports, ignoring the level of imports. According to Vollrath (1991), with differentiated products, intra-industry trade, and flows of exports and imports, the net trade effects should be taken into account when analysing the competitiveness of the industry or commodity. Balassa (1965) proposed an alternative measure of competitiveness called the Net Export index (NX_i), where net exports are exports minus imports. In order to calculate the index, the net exports are divided by the total value of trade (exports plus imports) of the commodity in question. Another alternative way to calculate the NX_i is to divide the numerator ($X_i - M_i$) by domestic production (Y_i), instead of total trade (Traill & Gomes da Silva, 1996). The NX_i index formula is expressed arithmetically as:

$$NX_i = [(X_i - M_i) / (X_i + M_i)] \times 100 \quad (2)$$

Where X_i is exports and M_i is imports. An index with an upper limit of 100 indicates that there are no imports, and a lower limit of negative 100 indicates that there are no exports.

The NX_i has a problem of not taking into account the overall level of trade in a specific commodity (Galetto, 2003). This implies that a country that is relatively self-sufficient, with a small exportable surplus and no imports, would have an index of 100 and, therefore, appear to be very competitive, even though it hardly trades at all. For these reasons, Galetto (2003) recommends that both the RCA and NX_i should be used together in assessing and analysing the competitiveness of a specific industry or commodity.

2.3 Relative Revealed Comparative Trade Advantage (RTA) Index

Vollrath (1991) offers an alternative specification of the RCA index that can be used to measure the competitiveness, namely the Relative Revealed Comparative Trade Advantage (RTA) index. The RTA index describes the country's share of the world market pertaining to one commodity relative to its share of all traded goods, and it accounts for imports as well as exports. It is calculated as the difference between the relative export advantage (RXA) and its counterpart, the relative import advantage (RMA). The model is arithmetically stated as follows:

$$RTA_{ij} = RXA_{ij} - RMP_{ij} \quad (3)$$

Where $RXA_{ij} = (X_{ij}/\Sigma_{l,\, l\neq j} X_{il}) / (\Sigma_{k,\, k\neq j} X_{kj} / \Sigma_{k,\, k\neq i} \Sigma_{l,l\neq j} X_{kl})$;

While $RMP_{ij} = (M_{ij} / \Sigma_{l,\, l\neq j} M_{il}) / (\Sigma_{k,\, k\neq i} M_{kj} / \Sigma_{k,\, k\neq i} \Sigma_{l,\, l\neq j} M_{kl})$.

The *X* and *M* refer to exports and imports respectively, with the subscripts *i* and *k* denoting product categories, while *j* and *l* denote country categories. The numerator in RXA and RMP equations is equal to a country's exports (imports) of a specific product category relative to the exports (imports) of this product from all countries, except for the country in consideration. The denominator reveals the exports (imports) of all products, except for the commodity in consideration from the respective country as a percentage of all other countries' exports (imports) of all other products. The level of these indicators represents the degree of revealed export competitiveness and import penetration. Values above zero point to a competitive trade advantage and values below zero point to a competitive trade disadvantage.

While the calculations of indexes RXA and RMP are exclusively based on either the export or import values,

only the RTA considers both export and import activities. The RMP index can be very misleading since it can be heavily distorted due to the protection of domestic markets (Frohberg & Hartmann, 1997). For example, in the extreme case of an import ban or a prohibitively high import tariff, the RMP measure indicates a high level of competitive advantage, and the reverse might be the case. Another factor that can lead to a distortion of all indicators considering exclusively either exports or imports is the existence of the intra-industry trade. For example, in case where the country acts only as a transit country; the RXA might indicate a high level of competitiveness that would be purely superficial (Pitts et al., 1995). Therefore, given that the RTA index includes both exports and imports it is more comprehensive and superior measure of competitiveness, and it eliminates double counting (Mashabela & Vink, 2008). However, there are several challenges with the use of the RTA index. The index may misrepresent the underlying competitive advantage (Ferto & Hubbard, 2002). It does not explain how a country or region acquires its international market share and competitiveness status (Mosoma, 2004). Given this, care should be exercised when interpreting RTA indexes because when comparing a cross-section of RTA indicators, different aspects of the formula can change and with them the interpretation of the RTA indicators.

3. Results and Discussion

In this section the results of applying the RCA#, the NX_i and the RTA index simultaneously to the citrus fruit industry are discussed. It should be noted at this point that any measure of the revealed comparative advantage can be distorted by aggregation and policy effects. In addition, the reliability of trade data is far from perfect and readers need to be aware of these shortcomings. Some sceptics consider trade data so unreliable that they simply disregard it as a source of information. Trade data is never complete. Smuggling and non-reporting represent a serious problem in a number of countries. In addition, trade data, as any source of information, is not free of mistakes and omissions. Exchange rates fluctuations are not always properly recorded in international trade data. Despite above shortcomings, the International Trade Centre's (ITC) experience suggests that trade statistics represent a very useful source of information and a valid point of departure for strategic market research, if analysed with a healthy mix of scepticism and pragmatism vis-à-vis their strength and shortcomings. It is, therefore, advisable to interpret the indexes results with caution.

3.1 Orange and Orange Juice RCA#, NX_i and RTA Indices

Table 1 depicts the orange RCA# index values of South Africa and its southern hemisphere competitors. Galetto (2003) argues that the RCA# index value higher than 10 for a specific product of a country shows a strong comparative advantage for this product. For the whole period depicted in Table 1, Uruguay oranges had all their RCA# values remaining at more than 40 except in 2012. Its RCA# index values are higher than all its competitors in the southern hemisphere region, an indication that it has the strongest revealed comparative advantage in this product category. South Africa, on the other hand, has the second highest RCA# values which remain at above 20, meaning it also shows a strong revealed comparative advantage for this product category. For the most period depicted in the table, Peru oranges have RCA# index values of less than 1, indicating a revealed comparative disadvantage.

Table 1. Oranges (fresh or dried) RCA# index (HS code '080510)

Country	RCA# 2004	RCA# 2005	RCA# 2006	RCA# 2007	RCA# 2008	RCA# 2009	RCA# 2010	RCA# 2011	RCA# 2012	Average 2004/12
Uruguay	79.3	80.7	75.1	75.5	42.8	44.3	44.1	40.7	22.7	56.1
SA	24	23.7	26.9	28	26.3	25	32	27.4	30	27
Chile	3	2.2	2.9	1.8	2.6	4.4	5.6	6.5	6.8	4
Argentina	3.9	4.3	5.3	6	4.1	3	3.1	2.5	1.4	3.7
Australia	3.2	3.5	3.4	3.7	2.2	2.2	1.5	1.5	4.9	2.9
Peru	0.03	0.1	0.1	0.2	1	1.7	0.6	1	1	0.6

Source: Own calculations based on data from International Trade Centre (2014).

The NX_i values for oranges are given in Table 2. South Africa, Uruguay and Argentina NX_i values for oranges indicate a strong net export for the whole period with values mostly above 95. Peru, on the other hand, showed a negative NX_i value in 2004 before recording a positive value, an indication that this country was a net importer of oranges in 2004.

Table 2. Oranges (fresh or dried) NX_i index (HS code '080510)

Country	NX_i 2004	NX_i 2005	NX_i 2006	NX_i 2007	NX_i 2008	NX_i 2009	NX_i 2010	NX_i 2011	NX_i 2012	Average 2004/12
SA	99.9	99.8	99.5	99.7	99.1	99.7	99.9	99.9	99.9	99.7
Uruguay	100	100	99.4	98.7	99.9	98.7	99.5	99.5	99.4	99.4
Argentina	99.4	100	98.8	98.8	96	98.6	98.1	97.7	100	98.6
Chile	98.6	99.1	98.3	97.8	96.2	98.7	91.3	96.9	94.7	96.8
Australia	79.2	79.1	76.4	80.7	72.8	72.3	62.6	58.9	72.1	72.7
Peru	-48.9	36.7	32.8	76.8	97.5	99	97.3	98.5	95.6	65

Source: Own calculations based on data from International Trade Centre (2014).

Table 3 shows the RTA index values calculated for the last nine years until 2012. Oranges RTA index values for South Africa are higher than all other countries, with values hovering around the 20s and above for the whole period. This indicates that South African oranges experience a stronger relative competitive advantage compared to other countries. It is followed by the Uruguay, which has a negative trend for the whole period. The RTA calculations agree with the analysis of the RCA# index, which identifies South Africa and Uruguay as having stronger and higher revealed competitive advantage in the oranges product category. However, Uruguay (as well as Argentina) recorded a negative RTA index trend throughout the whole period, an indication that it could be losing its competitiveness.

Table 3. Oranges (fresh or dried) RTA index (HS code '080510)

Country	RTA 2004	RTA 2005	RTA 2006	RTA 2007	RTA 2008	RTA 2009	RTA 2010	RTA 2011	RTA 2012	Average 2004/12	Trend 2004/12
SA	23.8	23.5	26.7	27.8	26	24.8	31.7	27.3	29.8	26.8	+
Uruguay	30	33.8	30	33.5	22.6	18.1	18.8	17.2	9.9	23.8	-
Argentina	3.9	4.3	5.2	6	4	3	3.1	2.4	1.4	4	-
Australia	2.9	3.2	3	3.4	1.9	1.9	1.2	1.1	6.4	2.8	+
Chile	1.1	0.9	1.2	0.8	1.3	1.8	2.3	2.7	2.9	1.7	+
Peru	-0.02	0.02	0.01	0.1	0.5	0.7	0.3	0.4	0.4	0.3	+

Source: Own calculations based on data from International Trade Centre (2014).

Notes: RTA>0⇒Global competitive advantage; RTA<0⇒Global competitive disadvantage, "+"⇒ positive trend; "-"⇒ negative trend; and "="⇒ constant trend.

For oranges to which value has been added (i.e. orange juice), Uruguay has a much better revealed comparative advantage than its southern hemisphere rivals. This country's orange juice RCA# index values are higher than 2, while the RCA# values of other countries remain at just over 1 with some even less than 1. South Africa, which has a strong revealed comparative advantage in primary oranges, has RCA# index values of less than 1 in most periods depicted in Table 4. This clearly shows that its competitiveness decreases when moving from primary to processed products. This is in line with findings by other researchers such as Esterhuizen and Van Rooyen (1999), Esterhuizen and Van Rooyen (2001), Van Rooyen et al. (2000), Van Rooyen and Esterhuizen (2001), Mosoma (2004), Hallatt (2005), and Mashabela and Vink (2008) who found out that several of the agricultural products they investigated revealed that their competitiveness generally decreased when moving from primary to processed products. One possible explanation for this could be the high rates of return recorded for farm-level applications of technology for most primary citrus fruit commodities. Value added activities higher up in the value chain are somewhat ignored. According to Esterhuizen et al. (2001), historically agricultural R&D focused on farm-level innovation and this led to high rates of return at this level. This phenomenon can, to some extent, explain why there is a decline in competitiveness when moving from the primary oranges to processed orange juice.

Table 4. Oranges juice RCA# index (HS code '200911)

Country	RCA# 2004	RCA# 2005	RCA# 2006	RCA# 2007	RCA# 2008	RCA# 2009	RCA# 2010	RCA# 2011	RCA# 2012	Average 2004/12
Uruguay	2.4	4.5	6.1	4.4	3.6	2.3	5.4	2.6	3.3	3.8
Argentina	0.7	1.4	1.6	1.1	1.4	1.6	1.6	1.3	1.3	1.3
SA	0.3	0.5	1.7	0.7	0.4	1	1.3	0.6	0.7	0.8
Australia	0.1	0.01	0.03	0.04	0.07	0.04	0.1	0.02	0.05	0.04
Chile	0.01	0.05	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.02
Peru	0	0	0	0	0	0	0	0	0	0

Source: Own calculations based on data from International Trade Centre (2014).

Table 5 shows the orange juice NX_i values for the past nine years to 2012. Australia, Chile and Peru show a negative NX_i values throughout the entire period, an indication that these countries were net importers of orange juice from 2004 to 2012. South Africa's NX_i values indicate a strong net export for the whole period with an average value of 84.4.

Table 5. Orange juice NX_i index (HS code '200911)

Country	NX_i 2004	NX_i 2005	NX_i 2006	NX_i 2007	NX_i 2008	NX_i 2009	NX_i 2010	NX_i 2011	NX_i 2012	Average 2004/12
SA	83.8	89.5	99.2	92.9	58	97.8	97.1	63.7	77.4	84.4
Uruguay	74.2	94.4	98.1	95.1	96.7	65.6	68.9	35.4	44.2	74.7
Argentina	20.5	68.3	72.4	-7.5	26.5	58.9	24.3	53.2	48.5	40.6
Australia	-95.3	-98.9	-97.7	-97.3	-94.1	-97.1	-94.6	-98.1	-95.4	-96.5
Chile	-98.1	-86.4	-97.4	-97.4	-97.9	-97.9	-98	-97.7	-98.6	-96.6
Peru	-100	-100	-100	-100	-100	-100	-100	-100	-100	-100

Source: Own calculations based on data from International Trade Centre (2014).

The RTA index values of the orange juice show that Uruguay exhibits a better revealed competitive advantage and a constant trend. South Africa, on the other hand, experienced a marginal relative revealed competitive advantage also with a constant trend for the whole period depicted in Table 6. The reason for this could be the deregulation of the industry which increased the vulnerability of citrus fruit producers to the external commercial risks. Deregulation led to a short-term shortage of essential services formerly provided by the boards, such as storage, value adding and processing. As is the case with the RCA# index values, the RTA index values clearly show that the competitiveness of the South African oranges decreases when moving from primary to processed products. Therefore, an important observation made from this analysis is that value-adding opportunities are still limited or constrained in the orange subsector, since the competitiveness of this product category decreases from primary to processed products.

Table 6. Oranges juice RTA index (HS code '200911)

Country	RTA 2004	RTA 2005	RTA 2006	RTA 2007	RTA 2008	RTA 2009	RTA 2010	RTA 2011	RTA 2012	Average 2004/12	Trend 2004/12
Uruguay	2	4.4	6.1	4.3	3.6	1.9	4.7	1.7	2.4	3.5	=
SA	0.3	0.5	1.7	0.7	0.3	1	1.2	0.5	0.6	0.8	=
Argentina	-0.05	1	1.2	-0.5	0.4	1	0.5	0.9	0.8	0.6	+
Peru	-0.3	-0.3	-0.2	-0.2	-0.3	-0.1	-0.3	-0.1	-0.3	-0.2	-
Chile	-0.9	-0.8	-0.9	-1.2	-1.2	-1.1	-1.6	-1.6	-1.8	-1.2	-
Australia	-3.1	-2.2	-2.3	-2.6	-2.3	-2.4	-2	-2.5	-2	-2.4	+

Source: Own calculations based on data from International Trade Centre (2014).

Notes: RTA>0⇒Global competitive advantage; RTA<0⇒Global competitive disadvantage, "+"⇒ positive trend; "-"⇒ negative trend; and "="⇒ constant trend.

3.2 Grapefruit and Grapefruit Juice RCA#, NX_i and RTA Indices

South Africa has a higher and stronger revealed comparative advantage for grapefruits in their primary form than its southern hemisphere competitors. Table 7 clearly shows that its RCA# index values are higher than those of its southern hemisphere rivals throughout the whole period. Its RCA# index values are higher than 20, an indication that it has a strong revealed comparative advantage. Uruguay, on the other hand, started with a marginal revealed comparative advantage in the period 2004 until 2007, before recording a revealed comparative disadvantage from 2006 onwards. Argentina only recorded a revealed comparative disadvantage in 2012 with the RCA# index value of 0.3.

Table 7. Grapefruit (fresh or dried) RCA# index (HS code '080540)

Country	**RCA# 2004**	**RCA# 2005**	**RCA# 2006**	**RCA# 2007**	**RCA# 2008**	**RCA# 2009**	**RCA# 2010**	**RCA# 2011**	**RCA# 2012**	**Average 2004/12**
SA	36	42.5	27.1	28.8	24.3	26.2	25.6	30.3	26	29.7
Argentina	5.2	5.6	3.2	3.8	5.7	2.6	1.8	1.3	0.3	3.3
Uruguay	3.1	2.5	3.8	1.6	0.5	0.4	0.2	0.3	0.1	1.4
Chile	1.2	0.3	0.7	0.2	0.2	0.2	0.3	0.2	0.3	0.4
Australia	0.1	0.05	0.1	0.04	0.04	0.1	0.1	0.04	0.1	0.06
Peru	0.002	0.02	0.02	0.01	0.1	0.01	0.1	0.1	0.1	0.06

Source: Own calculations based on data from International Trade Centre (2014).

It is apparent from Table 8 that Argentina and South Africa have a higher net export index values. These two countries were net exporters of grapefruits for the whole period depicted. Australia, on the other hand, was a net importer for the whole period, except in 2009 when it recorded positive trade balance.

Table 8. Grapefruit (fresh or dried) NX_i index (HS code '080540)

Country	**NX_i 2004**	**NX_i 2005**	**NX_i 2006**	**NX_i 2007**	**NX_i 2008**	**NX_i 2009**	**NX_i 2010**	**NX_i 2011**	**NX_i 2012**	**Average 2004/12**
Argentina	100	100	100	100	100	100	100	100	100	100
SA	99	99.4	98.4	98.8	99.1	99.1	99.3	99.5	99.1	99.1
Chile	98.7	99.2	100	99.4	100	100	82.9	77.2	92.2	94.4
Uruguay	93.1	88.5	93.2	83.4	18.1	33.9	-7.5	9.8	-24.8	43.1
Peru	-97.7	-43.3	-51.7	-2.4	58.8	53.8	89.8	100	100	23
Australia	-15.1	-30.3	-20.1	-33.7	-30.3	0.5	-15.7	-34.6	-5.7	-20.6

Source: Own calculations based on data from International Trade Centre (2014).

As is the case with the RCA# index values, the RTA index values (Table 9) of grapefruits in their primary form shows that South Africa has a relatively stronger competitive advantage than its southern hemisphere rivals. Its RTA index values are higher than those of its competitors, with values averaging 29.5 for the whole period. It is interesting to note that all countries recorded a negative RTA index trend throughout the entire period, with the exception of Peru which recorded a positive trend.

Table 9. Grapefruit (fresh or dried) RTA index (HS code '080540)

Country	RTA 2004	RTA 2005	RTA 2006	RTA 2007	RTA 2008	RTA 2009	RTA 2010	RTA 2011	RTA 2012	Average 2004/12	Trend 2004/12
SA	35.8	42.4	27	28.7	24.2	26.1	25.5	30.2	25.9	29.5	-
Argentina	5.2	5.6	3.2	3.8	5.7	2.6	1.8	1.3	0.3	3.3	-
Uruguay	3.1	2.4	3.7	1.5	0.3	0.3	0.04	0.1	-0.01	1.3	-
Chile	1.2	0.3	0.7	0.2	0.2	0.2	0.2	0.2	0.3	0.4	-
Peru	-0.1	-0.03	-0.04	-0.01	0.1	0.01	0.1	0.1	0.1	0.02	+
Australia	0.01	-0.02	-0.01	-0.03	-0.02	0.01	-0.02	-0.05	0.003	-0.01	-

Source: Own calculations based on data from International Trade Centre (2014).

Notes: RTA>0⇒Global competitive advantage; RTA<0⇒Global competitive disadvantage, "+"⇒ positive trend; "-"⇒ negative trend; and "="⇒ constant trend.

Table 10 shows that only one country, namely South Africa displayed a strong revealed comparative advantage in grapefruit juice. Its RCA# index values are mostly above 20, while those of others countries are less than 10. Argentina has marginal comparative advantage, with its RCA# index values averaging 7.5 for the whole period.

Table 10. Grapefruit juice RCA# index (HS code '200929)

Country	RCA# 2004	RCA# 2005	RCA# 2006	RCA# 2007	RCA# 2008	RCA# 2009	RCA# 2010	RCA# 2011	RCA# 2012	Average 2004/12
SA	19.9	45.4	69.5	39.5	29.2	31.4	32.5	34.1	25.7	36.4
Argentina	6.2	19.3	14.7	6.9	5	4.6	4.9	3.2	2.4	7.5
Uruguay	5.2	5.9	6.8	2.8	0.4	1.9	1.1	0.5	0	2.7
Australia	0.5	1.2	0.7	0.2	0.1	0	0	0.1	0.2	0.3
Chile	0	0.01	0	0.02	0.02	0.05	0.04	0.03	0	0.02
Peru	0	0	0	0	0	0	0	0	0	0

Source: Own calculations based on data from International Trade Centre (2014).

The NX_i values for the grapefruit juice are given in Table 11. South Africa shows stronger positive net export index values throughout the period, an indication that it was a net exporter of grapefruit juice from 2004 to 2012. Chile, on the other hand, shows negative net export index values throughout the period, while other countries such as Argentina, Australia and Uruguay showed some negative values in certain periods.

Table 11. Grapefruit juice NX_i index (HS code '200929)

Country	NX_i 2004	NX_i 2005	NX_i 2006	NX_i 2007	NX_i 2008	NX_i 2009	NX_i 2010	NX_i 2011	NX_i 2012	Average 2004/12
SA	99.70	99.30	99.50	99.80	98.40	99.10	99.90	99.30	100.00	99.40
Argentina	98.30	100.00	99.90	95.40	99.40	97.60	99.90	74.30	-2.60	84.70
Uruguay	98.00	79.80	97.60	97.00	70.40	100.00	-3.00	92.00	-100.0	59.10
Australia	0.40	9.80	-8.90	-63.10	-38.80	-75.00	-87.40	-30.90	-20.50	-34.90
Chile	-100.0	-68.40	-100.0	-66.70	-68.00	-60.50	-71.00	-51.30	-100.0	-76.20
Peru	-100.0	-100.0	*	-100.0	-100.0	-100.0	-100.0	-100.0	-100.0	*

Source: Own calculations based on data from International Trade Centre (2014).

Note: *⇒ data not available.

As is the case with the RCA# index values, the grapefruit juice RTA index values (Table 12) show that South Africa has a stronger competitive advantage than its southern hemisphere rivals. Its RTA index values are higher than those of its southern hemisphere competitors, with values averaging 36.3 for the whole period. Argentina is experiencing a marginal competitive advantage for most periods, and exhibits negative trend. All countries

recorded negative trends throughout the whole period.

Table 12. Grapefruit juice RTA index (HS code '200929)

Country	RTA 2004	RTA 2005	RTA 2006	RTA 2007	RTA 2008	RTA 2009	RTA 2010	RTA 2011	RTA 2012	Average 2004/12	Trend 2004/12
SA	19.9	45.3	69.4	39.4	29	31.3	32.5	34	25.7	36.3	-
Argentina	6.2	19.3	14.7	6.8	5	4.5	4.9	2.8	-0.2	7.1	-
Uruguay	5.2	5.6	6.7	2.8	0.3	1.9	0.4	0.5	-1.6	2.4	-
Australia	0.3	0.7	0.2	-0.3	-0.1	-0.2	-0.1	-0.1	-0.1	0.04	-
Peru	-0.01	-0.01	0	-0.01	-0.03	-0.03	-0.1	-0.1	-0.03	-0.03	-
Chile	-0.02	-0.02	-0.1	-0.1	-0.1	-0.1	-0.2	-0.1	-0.2	-0.09	-

Source: Own calculations based on data from International Trade Centre (2014).

Notes: RTA>0⇒Global competitive advantage; RTA<0⇒Global competitive disadvantage, "+"⇒ positive trend; "-"⇒ negative trend; and "="⇒ constant trend.

The results in Table 12 contradict some of the studies already conducted by several researchers such as, among others, Mosoma (2004), Hallatt (2005), and Mashabela & Vink (2008), who found out that the competitiveness of the South African agricultural products generally decreases when moving from primary to processed products. In this case, the grapefruit juice revealed the strongest competitive advantage with an average RTA value of 36.3 than the primary grapefruit with an average RTA index value 29.5.

3.3 Lemons and Limes RCA#, RTA and NXi Indices

For the whole period depicted in Table 13, both Australia's and Peru's lemons and limes have the RCA# index values of less than 1, indicating a revealed comparative disadvantage. Argentina's lemons and limes RCA# index values remained at more than 20, averaging 30.3 for the entire period, and are higher than all other countries. This indicates that Argentina has the strongest revealed comparative advantage than all other countries in this product category. South Africa's lemons and limes RCA# index values, on the other hand, averaged 10.7 and are the third highest after Argentina and Uruguay, an indication that it also has strong revealed comparative advantage.

Table 13. Lemons and Limes (fresh or dried) RCA# index (HS code '080550)

Country	RCA# 2004	RCA# 2005	RCA# 2006	RCA# 2007	RCA# 2008	RCA# 2009	RCA# 2010	RCA# 2011	RCA# 2012	Average 2004/12
Argentina	34.3	37.2	28.6	30.4	50.7	22.1	25.3	19.7	24.1	30.3
Uruguay	15.1	15	13.2	11.6	15.7	10.6	14.7	10.7	10.1	13
SA	11.9	10.9	10.1	7.8	8.1	10.2	12.3	13.5	11.8	10.7
Chile	5.9	4.8	4.7	5.9	4.8	4.7	5.1	5.6	4.4	5.1
Peru	0.1	0.2	0.2	0.2	0.2	0.3	0.5	0.5	0.5	0.3
Australia	0.1	0.05	0.01	0.06	0.04	0.06	0.03	0.02	0.03	0.04

Source: Own calculations based on data from International Trade Centre (2014).

Peru, South Africa and Argentina NX_i values (Table 14) indicate a stronger net export for the whole period with values above 95. Australia, on the other hand, shows negative net export index values, an indication that this country is a net importer of lemons and limes products.

Table 14. Lemons and Limes (fresh or dried) NX_i index (HS code '080550)

Country	NX_i 2004	NX_i 2005	NX_i 2006	NX_i 2007	NX_i 2008	NX_i 2009	NX_i 2010	NX_i 2011	NX_i 2012	Average 2004/12
Peru	100	100	100	100	100	100	100	100	100	100
SA	100	100	99.9	100	99.8	99.7	99.9	99.9	99.8	99.9
Argentina	99.9	100	99.9	99.9	99.9	96.4	95.5	98.2	99.7	98.9
Uruguay	99.4	97.3	98.1	97.9	97.7	94.9	96.6	89.3	91	95.8
Chile	98.8	98	98	98.2	95	94.3	85.7	72	78.5	91
Australia	-62.6	-80.9	-92.6	-80.5	-72.5	-67.8	-85.6	-81.9	-80	-78.3

Source: Own calculations based on data from International Trade Centre (2014).

The RTA index values (Table 15) for Argentina are higher than all other countries, with average RTA index value of 30. This indicates that Argentina's lemons and limes experience a stronger and higher relative revealed competitive advantage compared to the other countries. The RTA index calculations agree with the analysis based upon the combination of the RCA# and NX_i indexes, which identify Argentina as having stronger and higher revealed competitive advantage in the lemons and limes product category. Uruguay's and South Africa's lemons and limes also reveal strong competitive advantage, both with a negative trend. Only one country, namely Peru, recorded a positive trend for the period 2004 to 2012.

Table 15. Lemons and Limes (fresh or dried) RTA index (HS code '080550)

Country	RTA 2004	RTA 2005	RTA 2006	RTA 2007	RTA 2008	RTA 2009	RTA 2010	RTA 2011	RTA 2012	Average 2004/12	Trend 2004/12
Argentina	34.1	37.1	28.6	30.3	50.4	21.6	24.6	19.5	24.1	30	-
Uruguay	15.1	14.8	13.1	11.5	15.6	10.4	14.5	10.2	9.8	12.8	-
SA	11.9	10.9	10.1	7.8	8	10.2	12.2	13.5	11.7	10.7	-
Chile	5.9	4.7	4.7	5.9	4.7	4.6	4.6	4.6	4	4.9	-
Peru	0.1	0.2	0.2	0.2	0.2	0.3	0.5	0.5	0.5	0.3	+
Australia	-0.2	-0.3	-0.3	-0.4	-0.2	-0.2	-0.4	-0.2	-0.2	-0.3	-

Source: Own calculations based on data from International Trade Centre (2014).

Notes: RTA>0⇒Global competitive advantage; RTA<0⇒Global competitive disadvantage, "+"⇒ positive trend; "-"⇒ negative trend; and "="⇒ constant trend.

3.4 Mandarins, Tangerines and Clementines RCA#, NX_i and RTA Indices

The Uruguay's mandarins, tangerines and clementines exhibited higher positive average RCA# index value of 25 over the past nine years to 2012 (Table 16). This is an indication that this country has a stronger revealed comparative advantage in this product category. Other countries had their RCA# values remaining below 10, showing a marginal revealed comparative advantage. South Africa revealed the third highest average RCA# index value of 5, after Uruguay and Peru. This average indicates that South Africa experiences marginal revealed comparative advantage in mandarins, tangerines and clementines product category. Only Australia experienced a revealed comparative disadvantage throughout the entire period, except in 2004, 2005 and 2012 when it recorded a marginal comparative advantaged.

Table 16. Mandarins, tangerines and clementines RCA# index (HS code '080520)

Country	RCA# 2004	RCA# 2005	RCA# 2006	RCA# 2007	RCA# 2008	RCA# 2009	RCA# 2010	RCA# 2011	RCA# 2012	Average 2004/12
Uruguay	33.4	32.3	32.3	31.9	24.5	20.3	20.4	15.8	13.8	25
Peru	3.8	4.3	5.2	4.4	5.1	4.7	5.8	6.3	6.1	5.1
SA	4.9	4.9	5.7	4.4	4.6	4.7	5.1	4.8	5.7	5
Argentina	4	3.8	4.9	5.2	5.1	5.5	5.4	5	4.4	4.8
Chile	1.6	1.9	2	1.8	2.2	2.6	2.8	3.4	4.1	2.5
Australia	1.6	1	0.8	0.9	0.7	0.8	0.7	0.8	1	0.9

Source: Own calculations based on data from International Trade Centre (2014).

It is apparent that all countries were net exporters over the past nine years to 2012. Peru recorded the highest average net export index value, followed closely by Argentina, Uruguay and Chile. South Africa's average net export index of 98.1 puts it as the second last in the list depicted in Table 17, just ahead of Australia.

Table 17. Mandarins, tangerines and clementines NX_i index (HS code '080520)

Country	NX_i 2004	NX_i 2005	NX_i 2006	NX_i 2007	NX_i 2008	NX_i 2009	NX_i 2010	NX_i 2011	NX_i 2012	Average 2004-2012
Peru	100	100	100	100	100	100	100	100	99.9	100
Argentina	99.8	100	100	99.9	100	99.8	99.9	99.9	100	99.9
Uruguay	100	100	99.8	99.9	99.8	99.6	99.6	99.2	100	99.8
Chile	98.8	99.8	100	100	100	99.8	98.9	98.8	99.6	99.5
SA	98.8	98	98.1	97.7	97.9	97.9	98	98	98.3	98.1
Australia	91.7	97.2	77.6	87.6	84.9	84.8	81.6	76.8	82.1	84.9

Source: Own calculations based on data from International Trade Centre (2014).

Uruguay recorded the highest positive RTA index values throughout the whole period depicted in Table 18, an indication that this country has a stronger competitive advantage in mandarins, tangerines and clementines product category than its southern hemisphere rivals. However, it has demonstrated negative trends over the past nine years to 2012, implying that its competitiveness is decreasing. Other countries recorded moderate RTA index values, indicating marginal relative competitive advantage. As is the case with the RCA# index analysis, South Africa revealed the third highest average RTA index value of 4.9 with positive trend, after Uruguay and Peru which also recorded a positive trend. This indicates that it has a marginal competitive advantage in mandarins, tangerines and clementines product category.

Table 18. Mandarins, tangerines and clementines RTA index (HS code '080520)

Country	RTA 2004	RTA 2005	RTA 2006	RTA 2007	RTA 2008	RTA 2009	RTA 2010	RTA 2011	RTA 2012	Average 2004/12	Trend 2004/12
Uruguay	33.2	32.1	32.1	31.7	24.4	20.1	20.3	15.7	13.7	24.8	-
Peru	3.8	4.3	5.2	4.4	5.1	4.7	5.8	6.3	6.1	5.1	+
SA	4.9	4.8	5.6	4.4	4.5	4.6	5.1	4.7	5.7	4.9	+
Argentina	4	3.8	4.9	5.2	5.1	5.5	5.4	5	4.4	4.8	=
Chile	1.6	1.9	2	1.8	2.2	2.6	2.7	3.3	4.1	2.5	+
Australia	1.5	1	0.8	0.8	0.6	0.7	0.6	0.6	0.9	0.8	-

Source: Own calculations based on data from International Trade Centre (2014).

Notes: RTA>0⇒Global competitive advantage; RTA<0⇒Global competitive disadvantage, "+"⇒ positive trend; "-"⇒ negative trend; and "="⇒ constant trend.

4. Conclusions and Recommendations

This paper reveals that the South African citrus fruit industry enjoys a better global competitive advantage in several citrus fruit products than its southern hemisphere rivals. The results of the RCA#, NX_i and RTA indexes show that the domestic industry has a stronger and relatively higher revealed competitive advantage than its southern hemisphere competitors in three citrus fruit product categories, namely oranges, grapefruit and grapefruit juice. However, its competitiveness of oranges decreases when moving from primary oranges to orange juice. This means that value adding opportunities are still lacking in the orange sub-sector. One possible reason for this could be the high rates of return recorded for farm-level applications of technology for most primary orange commodities. Considering the above results summary, a conclusion can be drawn that all is not lost. The industry still has a good chance of maintaining and improving competitive position of its citrus fruit products that it does not reveal competitiveness, such as orange juice, lemons and limes, mandarins, tangerines and clementines. Whilst the industry forms partnerships with government and other relevant stakeholders and focuses on strengthening the areas where it is less competitive, efforts must still be made to ensure that the industry maintains, or even betters its position in areas where it is competitive. The industry should strive to improve its competitiveness by putting enough resources in value adding activities. It is no longer good enough for farmers to compete at farm-gate level, while value-adding activities (processes) are not globally competitive. Value adding should, therefore, become a focal area for investment. However, this does not mean the primary practices should be ignored. Innovation in the form of new technology development, new cultivar development, new products attributes, improved and cost effective citrus fruit production processes, as well as new and diverse marketing approaches should be encouraged in the industry. Though the industry may not afford a major technological breakthrough like totally new products, small insights like improvements in fruit attributes nearby the trend in consumer preferences can generate a competitive advantage.

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