Measuring the competitive performance of the South African stone fruit industry

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Measuring the competitive performance of the South African stone fruit industry value chain.

Abstract

The aim of the study is to enquire about the global competitive performance of the South African stone fruit industry for the period 1961 - 2012. A five-step analytical framework was applied, using approaches by Balassa (revealed comparative advantage, RCA), Vollrath (relative trade advantage, RTA) and the Porter Diamond Model, together with statistical methods such as cluster analyses, principle component analyses and Cronbach's alpha, to reflect differences in stakeholder opinions and views within the value chain. South African stone fruit was found to perform consistently at high, but fluctuating competitive levels in highly contested global markets (RTA values of between 0.41 and 5.61 since 1961); particularly since the economic deregulation of the industry in the mid 1990's. A strategic planning framework was drafted with participation from key industry role-players, identifying eleven industry level strategic focus areas. These included improved strategic communication within the value chain and improved industry intelligence systems.

Key words: competitive performance, RTA, Porter Diamond, industry value chain, executive survey, South African stone fruit industry

1. Introduction, research questions and objectives

The economic growth of the Republic of South Africa's agricultural sector is of considerable importance to the country's realisation of key economic and development objectives (National Planning Commission, 2011; Strauss, Meyer & Kirsten, 2010). For this reason, competitiveness must be viewed as an important feature and it was indeed identified as one of the cornerstones of South African agricultural policy – in the Agricultural Sector Plan (2001) and, more recently, in the National Development Plan (National Planning Commission, 2011). This point is also argued extensively by Esterhuizen (2006), Van Rooyen, Esterhuizen and Stroebel (2011), and Van Rooyen and Esterhuizen (2012). As the Republic of South Africa today functions as an integral part of the global market-orientated economy.

A higher level of global competitiveness is thus essential to operate successfully in this environment by trading more efficiently and effectively, with better quality products at strategically selected price points, produced through more productive practices (Smit, 2010).One of the major challenges that international agribusinesses are facing is the ability to remain, maintain, and enhance competitive performance.

Research questions: the major research questions that focussed this study are

- How should competitiveness be defined and measured of an industry that show high trade in highly competitive global markets; does the unequal playing fields in this environment influence competitive performance- government policies, trade barriers, differing supporting industries, etc.?
- How is long term trends determined and analysed?
- How do you enquire about views and opinions of industry decision makers along the value chain?
- How do you create a systemic set of determinants capturing the varying factors enhancing and constraining competitive performance?
- How can a strategic framework for industry level action be established

This paper is set to deal with these questions in order to inquire and pronounce about the global competitive performance of the South African stone fruit[1] industry, comparing different levels in the value chain, and aiming to set a framework to enhance the over-all competitive performance of the industry as a whole.

The objectives of this study are:

- Define the competitive performance of the South African stone fruit industry in the global context.
- Conduct a comprehensive empirical measurement for the competitive performance of the South African stone fruit industry over time.
- Determine the wider set of rudiments/factors that affect the competitiveness of the South African stone fruit industry.
- Analyse such factors and establish the major determinants affecting competitive performance.

[1] Refers to members of the genus *Prunus*, namely plums (*Prunus salicina* L., Japanese plum), peaches (*Prunus persica*), nectarines *(Prunus nucipersica*), apricots (*Prunus armeniaca*), prunes – often called sloes (*Prunus domestica* L, European plum), cherries (*Prunus avium*) and almonds (*Prunus amygdalus*)

- Propose industry-level strategies and institutional incentives to support and augment the level of competitiveness of the South African stone fruit industry.

This study used an enquiry system using both qualitative and quantitative methods through a step-wise analytical framework:

Step 1: Defining competitiveness as applicable to a highly traded commodity in a highly contested global market
Step 2: Measuring the competitive status and performance of the South African stone fruit industry over a long term time period
Step 3: Identify factors affecting – constraining and enhancing - the competitive performance of the South African stone fruit industry.
Step 4: Establish sets of the major determinants of industry competitiveness
Step 5: Propose strategies to enhance the competitiveness of the South African stone fruit industry

2. The SA stone fruit industry in a nutshell

The stone fruit industry in South Africa has come a long way since the establishment of the deciduous fruit industry in the 17th century. Due to the difference in chilling requirements[2] for stone fruit cultivars to perform under normal conditions, stone fruit are produced in all nine provinces, but mainly produced in the Western Cape. South African stone production roughly 1% of the global stone fruit produced and when compared within the southern hemisphere South Africa produces roughly 16%. According to HORTGRO (2014a) there are 330 402 ton of stone fruit produced on 18 098 ha cultivated by 1 058 production units. The value of the collective South African stone fruit industry's contribution to the South African economy indicated steady upsurges from the 2005/2006 season to a total value of $ 200.35 million[3] for the production season (2012/13).From a social/ethical point of view, the stone fruit industry employs, at the primary production farm level, roughly 24 000 labourers,[4] who have approximately 95 000 dependants HORTGRO (2014a). Most of the economic activities kick-started by the primary production of stone fruit, not only in the immediate production vicinities, but also right up the value chain and down the supply chain, give rise to employment opportunities and business ventures that are created, thereby adding stability to local economies.

The focus of this research was on the stone fruit export segment, which grew significantly post-deregulation in 1997 as this segment fundamentally affects the competitiveness in the milieu of key measurements applied to assess the competitiveness of this related area and industry of interest. During 2002/03 56 184 ton was exported and during 2012/13 76 462 ton were exported. South African stone fruit trades successfully in the highly traded global market, with a share of 2.23% of the world stone fruit volume and of 14.75% of Southern Hemisphere stone fruit value According to HORTGRO (2014a), the total stone fruit export value – collectively apricots, plums (including prunes), peaches, nectarines and cherries – amounted to a monetary value of $ 103.39 million[5] during the 2012/2013 production/export

[2] Measured in Infruitec units: Very low < 250; Low 250-400; Medium 400-800; High > 800 (HORTGRO, 2014b).

[3] ZAR 1 761.03 million (South African Rand) given an exchange rate to the US $ for January 2013.

[4] Permanent equivalent (seasonal labour converted to permanent equivalent)

[5] ZAR 908.79 million (South African Rand) given an exchange rate to the US $ for January 2013

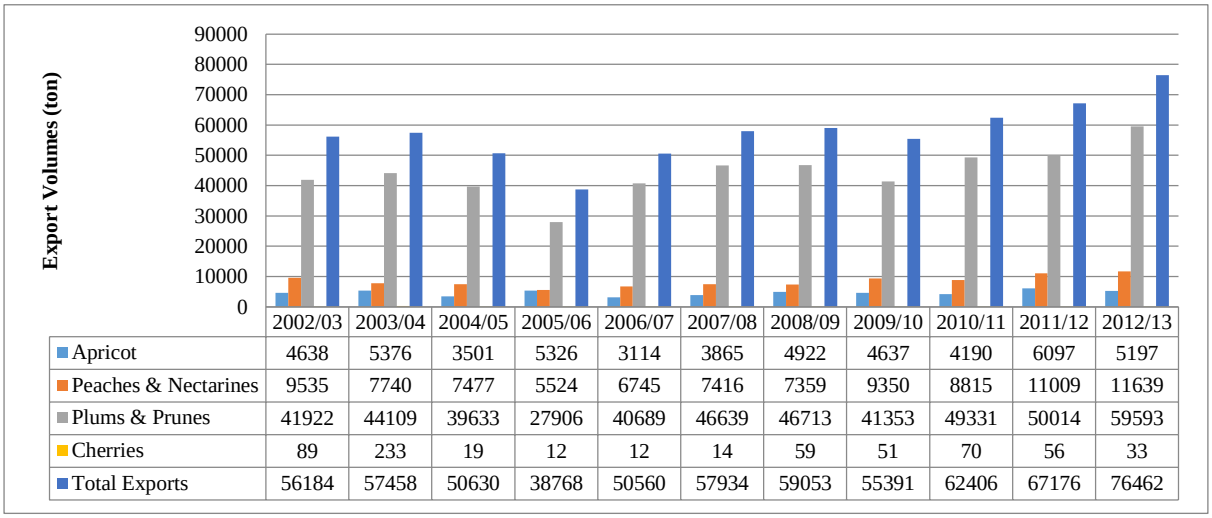
season, representing a contribution of 51.61% to the total value of South African stone fruit production, although 23.14% of this total volume produced was exported during the same period, which indicates a dynamic trading environment. The major stone fruit export destinations per type are shown in Table 1.

Table 1. Export destinations for the 2012/2013 production season.

Stone fruit type	Middle East	EU & Russia	United Kingdom	Far East & Asia	Indian Ocean Islands	Africa	USA & Canada
Apricots	31%	47%	21%	1%	< 1%	< 1%	< 1%
Peaches	43%	13%	36%	1%	5%	2%	< 1%
Nectarines	27%	19%	47%	2%	2%	2%	1%
Plums & prunes	16%	52%	25%	5%	1%	1%	< 1%
Cherries	54%	0%	35%	5%	0%	6%	0%

Source: Adapted from Boonzaaier (2015)

When it comes to the analysis of stone fruit exports, plums clearly dominate the local scene, with a share of 77.94% in the 2012/2013 season as shown in Figure 1. However, the joint attributed value of peaches, nectarines, apricots and cherries cannot be left unrecognised.



	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Apricot	4638	5376	3501	5326	3114	3865	4922	4637	4190	6097	5197
Peaches & Nectarines	9535	7740	7477	5524	6745	7416	7359	9350	8815	11009	11639
Plums & Prunes	41922	44109	39633	27906	40689	46639	46713	41353	49331	50014	59593
Cherries	89	233	19	12	12	14	59	51	70	56	33
Total Exports	56184	57458	50630	38768	50560	57934	59053	55391	62406	67176	76462

Figure 1. Stone fruit exported volume per stone fruit type

Source: Boonzaaier (2015)

The notion of South African agricultural value chains by Ortmann (2001) fundamentally affects and has effects on the competitiveness performance of industries. The supply and value chain is a complex linkage of various production and operational (and strategic) stakeholders[6] with consolidations on certain activities and internal competition/rivalry. (DAFF, 2012). To shape an improved understanding of the stone fruit industry's challenges

[6] Stakeholders include, among others, producer organisations, financial institutions, exporters/marketers, logistical service providers, cultivar developers/breeders, producers, input suppliers, consumers, etc.

and opportunities, the value chain guides the inclusion of key decision makers' perceptions across various disciplines of issues surrounding competitiveness to be included in the Stone Fruit Executive Survey (SFES).

3. Literature review, concepts and definitions

3.1 Defining competitiveness (Step 1 of the analytical framework)

The term "competitiveness" originated from the classical Latin word *petere*, meaning to seek, attack, aim at, and the Latin prefix *con-*, meaning together. Banterle (2005) characterises the competitiveness of a particular industry, such as the food sector, as meaningful by considering economic theory references and, subsequently, the sources of the competitiveness concept.

Competitiveness can be defined on various levels and from various points of view. Nevertheless, it was of the utmost importance that an appropriate and unequivocal definition of competitiveness be adopted within an agricultural trade framework to apply an applicable and valid measure to be utilised as a proxy for the evaluation of competitiveness. Esterhuizen (2006) highlights that competitiveness is a tool to exploit and investigate the local and/or global market reality for relative gains from trade compared to other competitors. Ideas were also drawn from Gittinger (1982), Freebairn (1987), Van Rooyen (2008) and Jafta (2014)

Competitiveness in this study is defined as the "sustained ability of the South African stone fruit industry to attract investment by trading its produce competitively within the global marketplace, whilst continuously striving to earn returns greater that the opportunity cost of scarce resources engaged". This definition gives effect to competing in a highly contested the global trade environment, focusing on "competitiveness advantage" rather than "comparative advantage" analytical viewpoints (Porter, 1998; Esterhuizen, 2006; Boonzaaier, 2015).

3.2 Measuring competitiveness

From the above definition with actual trade as a central component of competitive performance, the need to measure trade and trends over time empirically is apparent. Competitiveness as defined above emphasises the "ability to trade; and to sustain/enhance such performance"

Industry boundaries are defined and accepted and the competitive rules of the game are known in the 'market space', where entities try to outperform their rivals for a greater share of existing demand. Entities that understand the 'rules of engagement' and play the game of 'out-trading' the best will be frontrunners to compete for resources across nations and economic sectors. Thus it always will be important to navigate successfully in this market space by outcompeting the rivals, as an entity's ability to trade is viewed as the foundation of competitive performance (Freebairn, 1987; Kirsten, 1999; Kim & Mauborgne, 2005a; Farole, Reis & Wagle, 2010).

3.2.1 Revealed comparative advantage and derived indicators

The concepts of competitive advantage as the basis for the measurement of competitiveness were advanced by Balassa (1965; 1977) in terms of the revealed comparative advantage (RCA), reflecting the "ability to trade" despite various nation based government interventions and other market distortions often contravening comparative advantage positions. The Balassa view thus deals with "real" world trade and not "what ought to be traded". In the literature on the RCA it is often referred to as the Balassa index.

Vollrath (1991) offered an extended specification of RCA, avoiding potential "double counting" viz the relative trade advantage (RTA[7]), which takes both imports and exports into account as a more comprehensive indicator of revealed comparative advantage, is calculated as the difference between relative export advantage (RXA), which is equal to the Balassa index, and its counterpart, the relative import advantage (RMA). RTA is formulated accordingly. See footnote 7.

The RXA measure, which is grounded in exports, calculates the ratio of a nation's export share of a commodity in the international market to the nation's export share of all other commodities. A RCA index greater than 1 indicates that the country has a comparative advantage in the commodity under consideration. Hence it reveals a higher state of competitiveness, since it has a strong export sector. Vollrath (1991) proposed the RMA index, which is similar to the above-mentioned RXA, but relates to imports (*M*), rather than exports. By considering both imports and exports, the RTA indicator implicitly weighs the revealed competitive advantage by calculating relative export and relative import competitive advantages. Therefore it is not dominated by extremely small export or import values for the commodity "measured", which means that this RTA is a more wide-ranging (all-inclusive) and superior measure of competitiveness (Esterhuizen, 2006).

3.1.1 Export- and import-related measures of competitiveness

Comparative advantage proposes that trade flows are the result of differences in production factors/endowments among countries and that a country will specialise in the production of a good in which it has a cost advantage (Latruffe, 2010; Pugel, 2012).

In addition to the RCA and RTA, other trade-based measures are also applied in the assessment of competitiveness as presented in Table 2. However, it must be noted that these measures/indicators have a very direct/restricted focus, taking only specific factors into consideration, and may be viewed as somewhat limited and less-encompassing in the context of the global analysis in this study.

Table 2. Summary of additional trade-based measures of competitiveness

Measuring techniques	**Description**	**Author(s) applicable**
Real exchange rate (RER)	The ratio of the price index of tradeable commodities to that of non-tradeable inputs. Where the demand for the currency of a competitive nation is high, the nation's exchange rate is strengthened – so for the inverse too.	Brinkman (1987) and Frohberg and Hartmann (1997)

[7] $\boldsymbol{RTA_{ij} = RXA_{ij} - RMA_{ij}}$

for the *i*-th nation and *j*-th commodity, where a positive value of RTA reflects a status of competitive advantage.

$$\boldsymbol{RCA_{ij} = RXA_{ij}} = \left[\frac{X_{ij}}{X_{ik}}\right] / \left[\frac{X_{nj}}{X_{nk}}\right]$$

where *X* are exports, *k* denotes all commodities other than *j*, and *n* denotes all other countries than *i*.

$$\boldsymbol{RMA_{ij}} = \left[\frac{M_{ij}}{M_{ik}}\right] / \left[\frac{M_{nj}}{M_{nk}}\right]$$

In this case, a RMA index of less than 1 indicates revealed comparative advantage and thus higher competitiveness.

Purchasing power parities (PPP)	A measure for comparing different countries' relative prices. The number of units[8] in the domestic currency that would be required to purchase the amount of the domestic industry's good for one unit of the second country's currency.	Ball *et al*. (2010)
Export market share (EMS)	EMS can be measured in terms quantity or in terms of value.	Dosi, Grazzi & Moschella (2013)
Net export index (NEI)	An entity's (nation, sector, industry or agribusiness) exports minus its imports, divided by the total value of trade.	Banterle and Carraresi (2007)
Grubel-Lloyd measure (GLM)	Assesses the health of exports, by taking into account that a product is often imported and exported simultaneously (known as intra-industry trade).	Banterle and Carraresi (2007)

Source: Adapted from Latruffe (2010) and based on Boonzaaier (2015)

3.1.2 Cost vs. benefit measures

Within this context, competitiveness is shown by way of performance indicators (Zairi, 1994), such as benchmarking (BFAP, 2012), cost superiority, profitability, productivity and efficiency – which are often cited as measures or indicators of competitiveness (Spies, 1999; Latruffe, 2010). The notion of opportunity costs is also attended to within these indicators or measures (Gittinger, 1982:489; Freebairn, 1987:79). However, the most intuitive concept of competitiveness is that of price competitiveness (Ball *et al*., 2010), which forms an integral part of the reflexion on measures for competitiveness shown in Table 3.

Table 3. Summary of various cost vs. benefit measures for competitiveness

Measured Factor	Measuring Technique	Description	Author(s) applicable
Cost	Domestic resource cost (DRC) ratio	Compares the opportunity costs[9] of domestic production with the value added it generates.	Gorton *et al*. (2001) and Liefert (2002)
	Social cost-benefit (SCB) ratio	The ratio of the sum of domestic (non-tradeable) input cost to the price of the considered product.	Masters and Winter-Nelson (1995)
	Agricultural costs of production (ACP)	Itemised costs for various agricultural activities.	Cesaro *et al*. (2008), Brunke *et al*. (2009) and Omela and Värnika (2009)
Profitability	Gross margin	The difference or ratio between incomes and costs.	Thorne (2004)
Productivity, Efficiency and Technological	Total factor productivity (TFP)[10]	Ratio relating to the aggregation of input to the aggregation of outputs.	Coelli *et al*. (2005)
	Mathematical	The measurement of the potential input reduction, or output increase, relative to a	Farrel (1957), Aiger, Lovell and

[8] Inputs and outputs

[9] Gittinger (1982:489) describes opportunity cost as follows: "the benefit forgone by using a scarce resource for one purpose instead of, for its next best alternative use".

[10] Also referred to as, and sometimes called, multi-factor productivity (MFP).

change	representation of efficiency	reference with the construction of efficiency frontier.[11]	Schmidt (1977); Charnes, Cooper and Rhodes (1978) and Coelli *et al*. (2005)
	Index number approach	Proposes explicit methods for the aggregation[12] of various inputs and outputs to measure efficiency and technological change.	Coelli *et al*. (2005)
	Production function estimation	Econometric estimation of a production function.	Heady, Johnson and Hardin (1956)
	Malmquist indices	Provides a decomposition of the productivity change into efficiency change and technological change.	Caves, Christensen and Diewert (1982)

Source: Adapted from Latruffe (2010) and based on Boonzaaier (2015)

3.1.3 Concluding remarks on measurements of competitiveness

Some of the measures and/or indicators for competitiveness may be viewed as somewhat "restricted", as not all of them are relevant to the definition proposed for competitiveness relating to the highly contested international environment in which the South African stone fruit industry operates, which depends highly on exports. Recent international and local studies were reviewed to assess the applied measurements and competitive frameworks in an agricultural context, taking forward the stepwise framework to evaluate competiveness for this study.

The abovementioned measurement techniques and measures were taken into account and considered to best fit the analyses of this research. The RTA measure was identified as the most comprehensive measure in the context of this study, as

- RTA calculations have the ability to compare the actual trade values of export industries with each other within the same country; more importantly to
- compare the same export industries of different countries across the board; and also to
- include all relevant industries that would potentially attract the particular and relevant scarce resources.

RTA measurement thus allow for "opportunity cost" (se definition above) to be factored into the reason that the RTA measurement applies the concept of comprehensiveness and relativity to all relevant factors.

3.3 Competitiveness analysis models

3.1.1 Porter's diamond model of competitiveness

The Competitive Advantage Analysis, as described by Porter (1990), consists of examining case studies of successful industries to identify why they are located in particular countries. Porter, (2013:144) stated that: "We need a new perspective and new tools – an approach to competitiveness that grows directly out of an analysis of international successful industries, without regard to traditional ideology or current intellectual fashion. We need to know, very

[11] The function that describes this frontier is unknown. Techniques for defining the frontier can be categorised as non-parametric measures (data envelopment analysis – DEA), and parametric measures (stochastic frontier model – SFM).

[12] Several methods of aggregation lead to different TFP indices, e.g. Laspeyre, Paacshe, Fisher, Tornqvist and Eltetö-Köves-Szulc (Latruffe, 2010).

simply, what works and why." Porter (1990) studied 100 firms in ten developed nations to learn if a nation's prominence in an industry can be explained more adequately by variables other than only the factors of production on which the theories of comparative advantage and Heckscher-Ohlin model (Ohlin, 1933) are based (Cho & Moon, 2002).

According to Porter (1990: 1998), national prosperity is created, not inherited. It does not grow from a country's natural endowments (labour pool, interest rate or currency value), as classical economics insists. A nation's competitiveness depends on the capacity of its industry to innovate and upgrade. Companies gain advantage against the world's best competitors because of pressure and challenge. Porter argues further that countries benefit from having strong domestic rivals, aggressive home-based suppliers and demanding local customers.

Companies achieve competitive advantage through acts of innovation that revolutionise the business. Companies approach innovation in its broadest sense, including both new technologies and new ways of doing business. They perceive a new basis for competing or find better means for competing in old customs. Innovation can be manifested in a new product design, a new production process, a new marketing approach or a new way of doing business.

Esterhuizen (2006) asks three questions with regard to the competitiveness of a business:

- Why are certain companies, based in certain nations, capable of consistent innovation?
- Why do they ruthlessly pursue improvements, seeking an ever more sophisticated source of competitive advantage?
- Why are they able to overcome the substantial barriers to change and innovation that so often accompany success?

According to Porter (1990), the answer to the questions by Esterhuizen (2006) lies in four broad attributes/determinants of a nation, attributes/determinants that individually and as a system constitute the diamond of national advantage, the playing field that each nation establishes and operates for its industries, namely *factor conditions*, d*emand conditions*, r*elated and supporting industries*, and *firm strategy/structure and rivalry*. These attributes/determinants are illustrated in Figure 2. However, there are two added criteria or attributes/determinants that also shape the environment in which firms compete and promote the creation of a competitive advantage, namely *government* and *chance*.

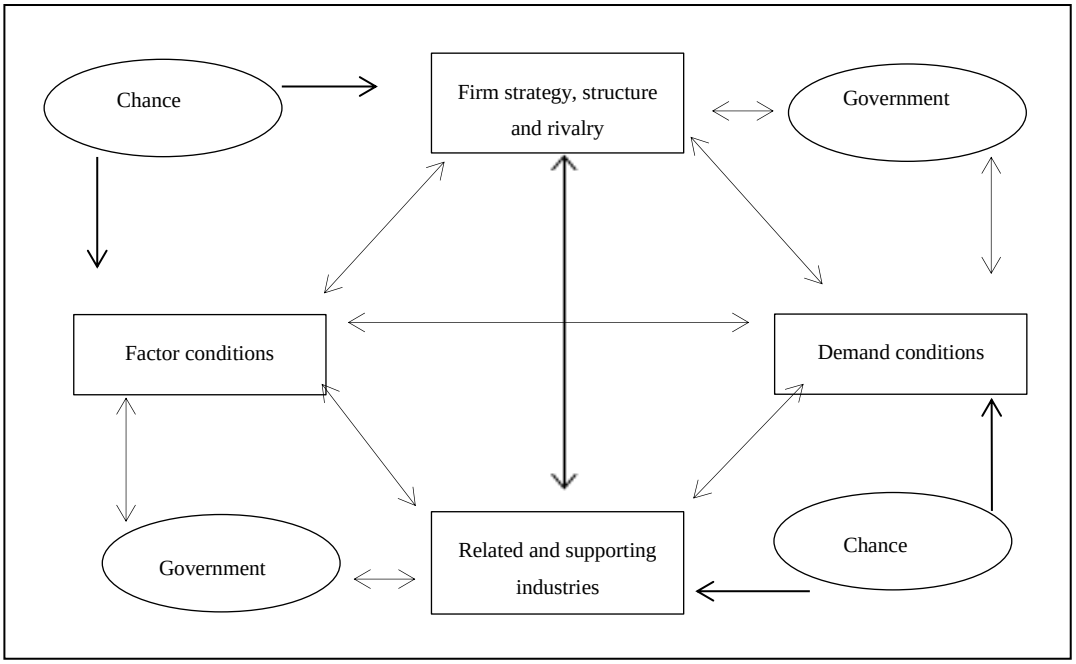


Figure 2. Porter's diamond model of competitiveness

Source: Porter (1990; 1998)

The four attributes/determinants or criteria of the Porter diamond (Porter, 1990) can be explained and described as follows:

- ***Factor conditions.*** The nation's position in the factors of production, such as skilled labour or infrastructure, that are necessary to compete in a given industry.
- ***Demand conditions*.** The nature of home-market demand for the industry's products or service.
- ***Relating and supporting industries*.** The presence or absence in the nation of supplier industries and other related industries that are internationally competitive.
- ***Firm strategy, structure and rivalry*.** The way companies are created, organised and managed, as well as the nature of domestic rivalry.

Each point on the diamond, and the diamond as a system, affect essential ingredients for achieving international competitive success. The availability of the resources and skills necessary for competitive advantage in an industry is critical. The information that shapes the opportunities that companies perceive and the directions in which they arrange their resources and skills is of the utmost importance (Fagerberg, Srholec & Knell, 2007). Porter (1990) add these and also includes two outside variables (additional attributes or criteria - determinants) in the model, which were mentioned above and circled in Figure 1, namely the role of chance and the role of government.

Chance events are sporadic occurrences that have little to do with the circumstances in a nation, and often are outside the power of firms and (sometimes) the national government to influence. Examples include new inventions, major new technologies such as biotechnology, and discontinuities in input costs such as the energy crisis, financial market shifts, foreign government decisions, wars and changing weather patterns/conditions (Kandulu *et al*., 2012).

***The role of governmen**t* is best viewed in terms of its influence on the four determinants of competitiveness, rather than as a separate determinant per se. Porter explicitly rejects trade intervention, arguing that it only guarantees markets for inefficient businesses (Porter, 1990). Government has an indirect, rather than direct, role. Government plays a pivotal and enabling role in the competitiveness of nations and industries alike, as argued extensively by Acemoglu and Robinson (2013).

3.1.2 Institute for Management Development (IMD) - World Competitiveness Yearbook

The Institute for Management Development's World Competitiveness Centre (WCC) has been a forerunner in the field of the competitiveness of nations and enterprises since 1989 (WCC, 2011). The World Competitiveness Yearbook analyses and ranks how nations and enterprises manage the totality of their competencies to achieve increased prosperity (WCC, 2011). It features 59 industrialised and developing countries, which are compared on 331 criteria which are grouped into four competitiveness factors in Figure 3. The hard data are taken from international, national and regional organisations and private institutes, and survey data are drawn from the annual Executive Opinion Survey of 4 935 respondents. A fair measure of accuracy is achieved and maintained through its collaboration with 54 partner institutes worldwide, and data are aggregated over a five-year period (WCC, 2011).

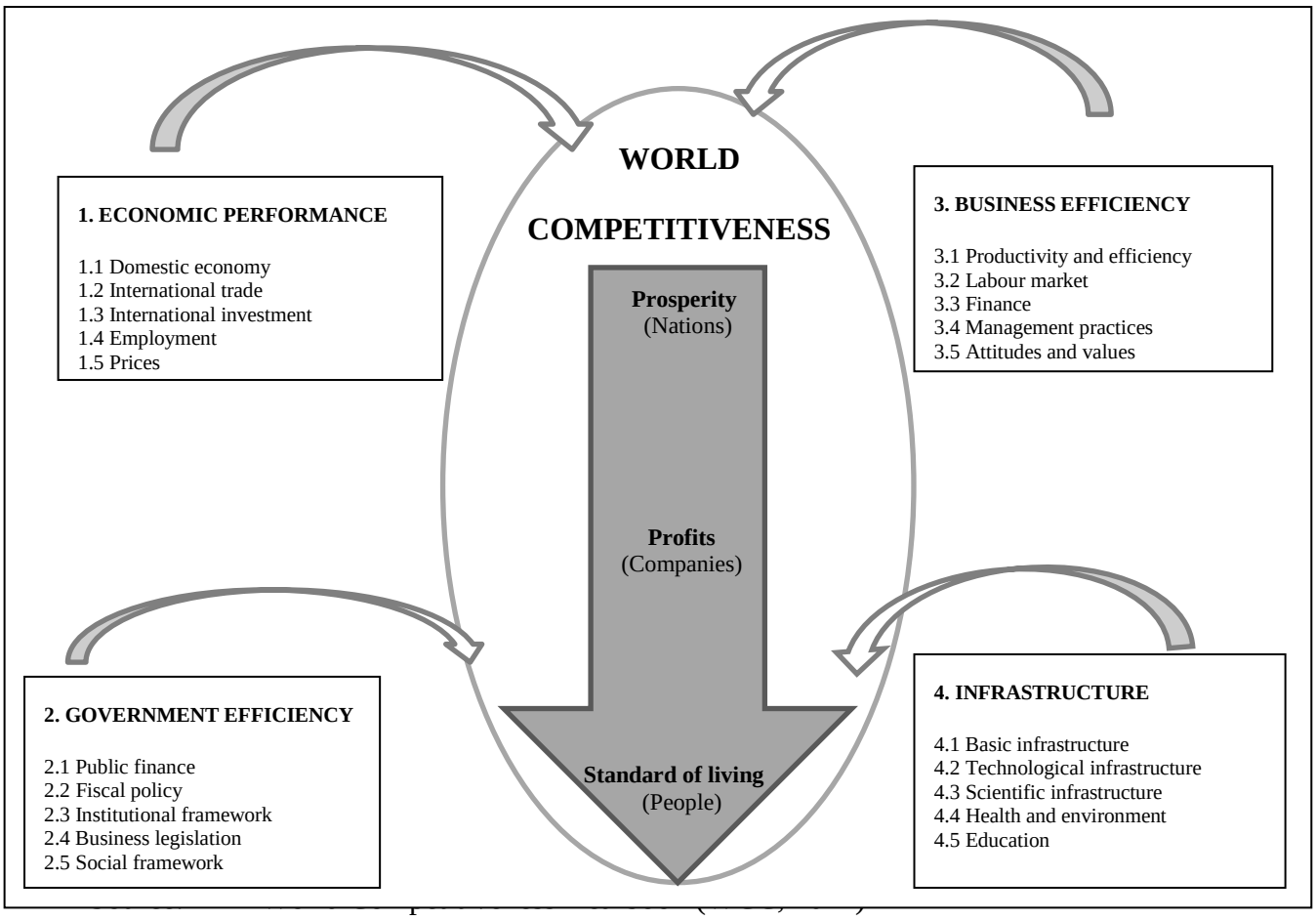


Figure 3. World competitiveness – Four factor grouping

Source: IMD World Competitiveness Yearbook (WCC, 2011)

Regarding national competitiveness ratings, South Africa was ranked 52nd for the year 2014, a drop from 50th position in 2012 (IMD, 2014).

3.1.3 World Economic Forum: Global Competitiveness Index

For the past three decades, the World Economic Forum's annual Global Competitiveness Reports have studied and benchmarked the many factors supporting national competitiveness. From the start, the aim has been to provide insight into and stimulate discussion among stakeholders on the best strategies and policies to assist nations to the overcome the impediments to improving competitiveness (WEF, 2013). The GCI is a comprehensive tool that measures the microeconomic and macroeconomic fundamentals of national competitiveness.(WEF, 2013).The degree to which the factors, indirectly and directly, affect the functioning and cohesion of one another has been captured within the GCI by including a weighted average of many different components, each measuring a different aspect of competitiveness. These components are accordingly grouped into 12 pillars of competitiveness as shown in Figure 4. Within this assessment framework of national competitiveness, South Africa was rated 56th in 2014, dropping four places from the 2012 rating (WEF, 2014).

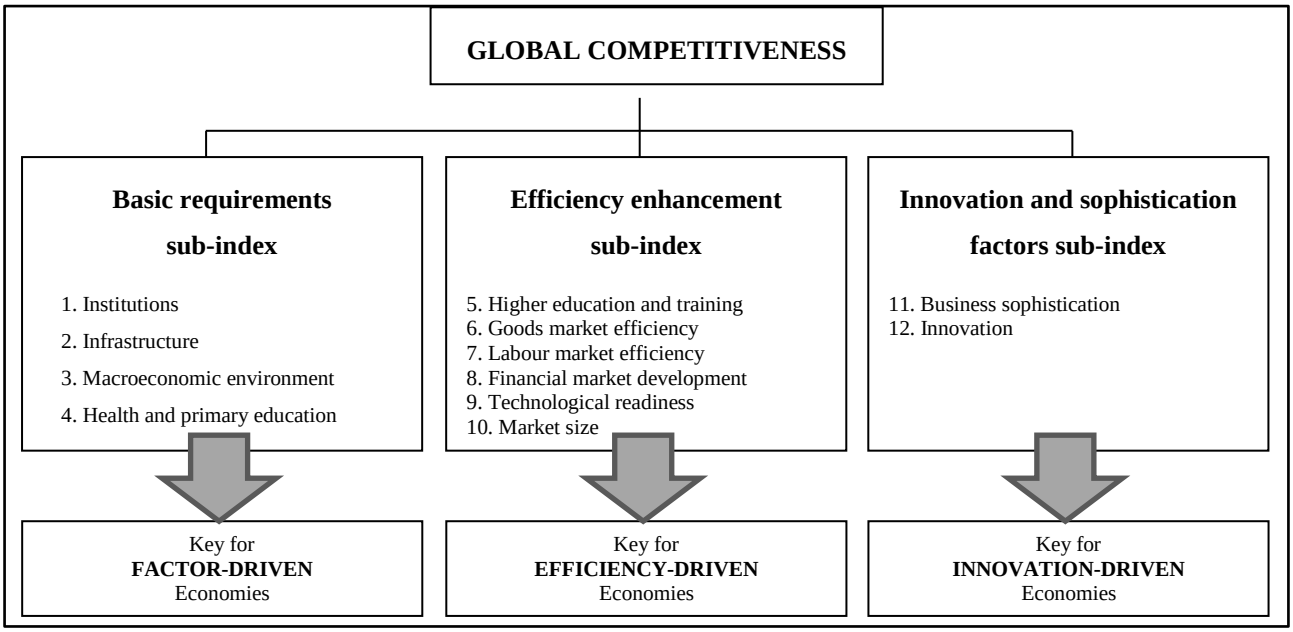


Figure 4. The 12 pillars of competitiveness

Source: WEF (2013)

The Porter diamond model of competitiveness is complemented by frameworks focusing on the wider socio-economic and welfare rating of competitive performance, i.e. the frameworks of the IMD World Competitiveness Yearbook (WCC, 2011) and the WEF annual Global Competitiveness Report (WEF, 2013).

3.4 Some applications on competitiveness analysis in agriculture

There is a significant volume of recent studies focused on the competitiveness of the agricultural industries or sectors. The important benchmark study by ISMEA (1999), which piloted the approach of RTA and Porter's diamond model to analyse competitive

performance of countries and industries in the expanding European Economic Union (EEC) of the mid-nineties, must be viewed as the benchmark. In this study, two methods, namely Porter's diamond model (1990) and competitiveness indicators as originally developed by Balassa (1977), were prioritised to determine the competitiveness of the European Union food chain in a global environment.

In Table 4, some other important international studies are listed. If notions can be singled out, what is apparent throughout are the emphasis on trade; whether trade productivity is enhanced, to trade better quality goods more efficiently; and the important role of agricultural related policies, to improve trading and innovation in the depicted international industries/sectors.

Table 4. Recent international agricultural competitiveness studies

National industry or sector researched	Authors or researchers	Proxies for measurements and/or models/frameworks applied	Verdicts or conclusions
Hungarian agricultural-food sectors	Fertő and Hubbard (2002)	RCA and RTA	Hungary has a comparative advantage for 11 of the 22 aggregated product groups.
Agricultural enterprises in Slovakia	Bielik and Rajèániová (2004)	Resource cost ratio (RCR)	Businesses and companies are more competitive than co-operatives. The better the soil quality, the more competitive these businesses.
Namibian table grape production	Thomas (2007)	Porter diamond model	The Namibian table grape chain is relatively competitive in the international arena. Primary production in becoming more competitive.
Milk production in Ireland	Hopps and Maher (2007)	Profitability and costs of production (benchmarking)	Irish cash costs per litre are competitive in Europe. Charges for owned land, capital and family labour led to a lesser competitive advantage.
Estonian milk production	Omela and Värnika (2009)	Opportunity cost approach; domestic resource cost	Declining competitiveness of both small-scale and large-scale producers.
Livestock product exports from India	Kumar (2010)	Export and import analysis – nominal protection coefficient (NPC)	India is competitive in the export of meat products, except poultry.
China's agricultural products	Qiang, Yong-Sheng and Xiao-Yuan (2011)	RCA and trade coefficient specialisation (TCS)	Ability of direct factors is strong in terms of transformation from cost advantage and price advantage into competition advantage.
Poultry production in the Czech Republic	Belová *et al*. (2012)	Trade-related comparisons – Lafay Index (LFI)	The comparative disadvantage deepens in relation to European Union countries.
Global Pear Market	Valenciano, Giancinti and Uribe (2012)	RCA	Geography plays a main role in competitiveness with nearby markets, as happens in markets with free trade.
Tobacco sub-sector in the Republic of Macedonia	Tuna, Georgiev and Nacka (2013)	RCA and Porter diamond model	The republic of Macedonia has favourable conditions and a competitive advantage for producing tobacco.
Orange juice chain in Brazil	Neves, Trombin and Kalaki (2013)	In-depth analysis of qualitative fieldwork observations	The orange juice sector will probably not realise the same future growth as other important sectors of Brazilian agribusiness if a few drastic steps are not taken.

Canadian wheat, beef and pork sectors	Sarker and Ratnasena (2014)	RCA and normalised revealed comparative advantage (NRCA)	Canada has enjoyed international competitiveness in the wheat sector, but not in the pork sector, whilst the beef sector has grown rapidly since 1992.

Source: Adapted from Boonzaaier (2015)

The agricultural industries in South Africa were analysed with the application of various measurement and different frameworks. There evidently is no absence of recent research focused on the concept of competitiveness in the milieu of a deregulated South African agricultural sector since the mid-1990s. Relevant publications in selected journals are shown in Table 5. The research is listed chronologically, stating the authors, sector or industry, alongside the proxies employed for measurements of competitiveness, as discussed above with a brief conclusion.

Table 5. Summary of agricultural competitiveness studies related to South Africa

Authors and Researchers	**Industry (sector)**	**Proxies for measurements**	**Frameworks applied**	**Verdicts or Conclusions**
Vink *et al*. (1998)	Western Cape wheat industry	Agricultural costs of production	International and RSA cost comparisons	Declining value of Rand provides short-term relief and production practices need to be adapted.
Venter and Horsthemke, (1999)	Southern African sheep meat industry	Profitability and costs of production	Porter's diamond model framework	Industry/value chain is less competitive than that of Australia.
Blignaut (1999)	RSA dairy industry	RCA Low cost and differentiation comparisons	Porter five competitive factors[13]	Not internationally competitive, but primary milk producers are relatively effective.
Esterhuizen and Van Rooyen (1999)	RSA food commodity chain	RTA	Porter diamond model framework	16 selected food commodity chains. Majority of chains are marginally competitive, except for the maize, pineapple and apple chains. Index decreases when moving from primary to processed products.
Du Toit (2000)	RSA apple industry	Comparative analysis: Production and related costs	Porter's diamond model framework	RSA less competitive than Chile.
Jooste and Van Schalkwyk (2001)	RSA primary oilseeds industry	DRC ratio	Comparisons of economic advantages (CEA)	Where agro-ecological conditions are poor – improved-yield cultivars will determine comparative advantage. Distortionary policies on input side are a main factor influencing comparative advantage.
Van Rooyen *et al*. (2001)	RSA flower industry	RCA, DRC and private cost ratio (PCR)[14]	Porter diamond model framework and PAM	Overall, RSA has a competitive advantage over Australia, except when using the Porter analysis, where certain determinants are stronger, i.e. government support

[13] Five competitive forces: 1 – The entry of new competitors, 2 – Bargaining power of suppliers, 3– Bargaining power of buyers, 4 – Threat of substitutes, 5– Rivalry among the existing competitors (Porter, 1985).

Authors and Researchers	Industry (sector)	Proxies for measurements	Frameworks applied	Verdicts or Conclusions
				and the role of chance determinant.
Kalaba and Henneberry (2001)	Fruits (grapes and pome fruit) in the EU market	Trade-based models: Import demand model [Restricted source-differentiated almost ideal demand system (RSDAIDS)]	Trade-related comparisons	RSA fruit exports are least competitive among Chile, the United States, Argentina and Turkey.
Esterhuizen, Van Rooyen and Van Zyl (2001)	RSA agricultural input industry	RTA	Trade-related comparisons	RSA manufacturing of farming requisites is relatively marginally competitive. Competitiveness of machinery industry is improving. Fertiliser industry is becoming more competitive. Pesticide industry is decreasing in its competitiveness.
Mahlanza *et al*. (2003)	Organic wheat production in Western Cape	SCB and DRC ratios	PAM	Weak comparative advantage for conventional wheat in WC, except for certain areas of Swartland. Would be an improvement if wheat could be produced under organic practices.
Mosoma (2004)	RSA agricultural exports	RTA	Trade-related comparisons	Marginally competitive internationally.
Hallatt (2005)	RSA oilseed industry	RCA, NXI and RTA	Trade-related comparisons	RSA secondary oilseed industry is struggling with a competitive disadvantage against Argentina, whilst primary industry is more competitive than Argentina.
Esterhuizen and Van Rooyen (2006)	RSA wine industry	RTA	GCR (WEF)	Industry enjoys a sustained improvement in competitiveness.
Mashabela and Vink (2008)	RSA deciduous fruit supply chains	RTA	Trade-related comparisons	RSA enjoys a relative global competitive advantage. Increased competitiveness further up the chain.
Van Rooyen (2008)	RSA agribusiness sector	RTA	Porter diamond model framework	Can be classified as generally marginal in terms of global competitiveness.
Madima (2009)	RSA deciduous fruit canning industry	RTA	Porter diamond model framework	Industry is internationally competitive in the following areas: labour costs, product quality, efficient production technology and regulatory standards.
Beukes (2009)	RSA apple industry	Production efficiency, industry and infrastructure inputs, financial and market factors	O'Rourke framework	RSA less competitive than Chile and New Zealand. Production is area of best competitive performance for RSA.
Ndou and Obi (2011)	RSA citrus industry	Constant market share (CMS)	Porter diamond model framework	Industry is competitive

[14] Private cost ratio (PCR) is a measure to compare the competitiveness of different systems with one another (Van Rooyen *et al*., 2001).

Authors and Researchers	Industry (sector)	Proxies for measurements	Frameworks applied	Verdicts or Conclusions
Dennis (2011)	RSA sunflower industry	RCA and RTA	Porter diamond model framework	Value-added sunflower products struggle with a competitive disadvantage.
Van Rooyen *et al*., (2011)	RSA wine industry	RTA	Porter diamond model framework	RSA wines are increasingly internationally competitive, with a positive trend since 1990s.
Van Rooyen and Esterhuizen, (2012)	RSA agribusiness sector	RTA	Porter diamond model framework	The sector is marginally competitive, but constrained by an increasingly negative trend since 2004.
Jafta (2014)	RSA apple Industry	RCA and RTA	Porter diamond model framework	RSA apple industry is marginally competitive in the international market.
Boonzaaier (2015)	RSA stone fruit industry	RTA	Porter Diamond model, WEF – Global Competitiveness Index and IMD – World Competitiveness Yearbook	The industry clearly is highly competitive in the global trading arena and performed so on a sustainable basis, especially since the period of deregulation in the mid 1990's with Plums was the most competitive stone fruit type, followed by apricots, peaches and nectarines, and lastly cherries.
Angala (2015)	Namibian date industry	RTA	Porter Diamond model	Namibian date industry is competitive in the international market.

Source: Adapted from Boonzaaier (2015)

The application of trade-based measures as proxies for competitiveness is clearly evident, where the RTA measure, noticeably in conjunction with the Porter diamond model of competitiveness, dominates as analytical framework and also to mobilise expert views and opinions to assess the competitive performances.

4. Results and major findings:

4.1 Measuring the competitive status and performance (Step 2 of the analytical framework)

The competitiveness performance of the South African stone fruit industry was firstly calculated using the FAOSTAT[15] data base (Figure 5). Here it must be noted the FAOSTAT only include agricultural commodities and the RTA formula therefore provides a less comprehensive view of "opportunity costs" as non-agricultural trade is not included. The advantage of FAOSTAT however is that it is available from 1961 and covers the deregulation period, the nineties, of SA agriculture.

[15] Food and Agricultural Organisation Statistical Database (FAO, 2014)

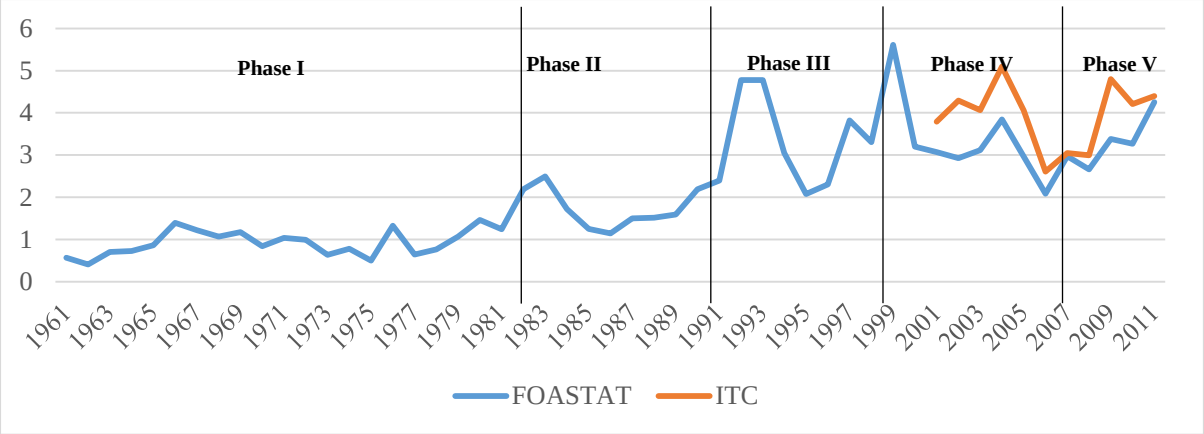


Figure 5. Phases of competitive performance of SA stone fruit industry

Source: Based on Boonzaaier (2015)

Secondly, the ITC[16] data, available from 2001, provide a more comprehensive view as non-agricultural commodities are also captured in the calculation based on the database provided by International Trade Centre (in Figure 5).

RTA values above 1 calculated from 1961 to 2012, indicate that this industry is competitive.

When the two respective datasets of the FAO (2014) and ITC (2014) are depicted for the period from 2001 to 2011, the period for which corresponding RTA calculations from both datasets would be available, both trends follow the same movement, but with varying magnitude as shown in Figure 5. This also indicates that the SA stone fruit industry measures as being marginally more competitive within the multi-economic sector index, viz. agriculture-based competitiveness.

It can be concluded that there is a 'relatively' more intense competition between agricultural products/commodities. These products/commodities compete for a common set of resources in a more 'sticky resource mobility' environment, i.e. the major competing internationally traded alternatives are found within the direct agricultural production alternatives to stone fruit, such as other deciduous fruit – apples, pears and grapes, citrus, exotic fruits and vegetable groups. Within an only 'agricultural environment', stone fruit thus are considered somewhat less competitive, while this industry outcompetes many more industries when non-agricultural alternatives are considered in the measuring process. Difference between the respective RTA dataset calculations were not analysed in depth, however, and further research is needed to express a broader statement on these results, i.e. varying measurements.

Trends and phases: Five phases were identified (in collaboration with industry experts) in the competitive performance of the South African stone fruit industry since 1961, showing the generally competitive but fluctuating nature of the performance of this industry:

- Phase I (1961-1982): Increasingly regulated competitiveness(RTA values from 0.41 to 2.19)
- Phase II (1983-1990): Politically constrained competitiveness (RTA values from 2.50 to 2.19)
- Phase III (1991-1999): Economic deregulation and internal rivalry(RTA values from 2.39 to 5.61)

[16] International Trade Centre (Trademap) database (ITC, 2014)

- Phase IV (1999-2007): Towards international competitiveness (RTA values from 5.61 to 2.97)
- Phase V (2007 – present): Increasingly sustained competitiveness (RTA values > 2.66)

Comparisons with other fruit types: When stone fruit is compared to other South African (SA) horticultural crops, plums consistently claim the top position as shown in Figure 6.

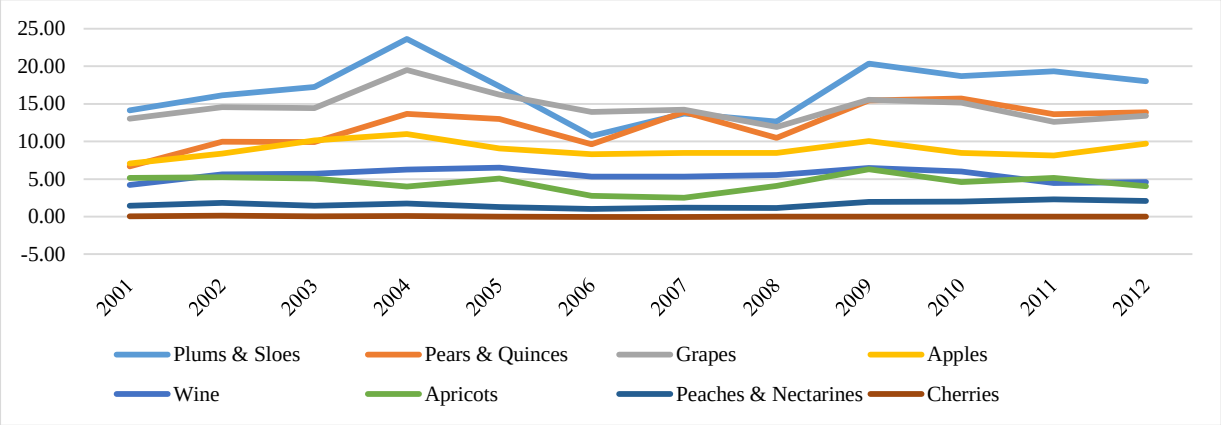


Figure 6. RTA comparisons of South African deciduous fruits
Source: Boonzaaier (2015)

The South African plum industry outranks all competitors in the RSA deciduous fruit basket. As of 1997 (post-deregulation), the performance of plums has been on a par with that of pears, but since 2008 plums outrank all other deciduous fruit types in both the agricultural index (FAOSTAT data) and the multi-sector index (ITC data).

The RSA stone fruit industry furthermore competes on a lower level than the pome fruit and table grape industry, but still outranks fruit industries such as the tropical fruit, exotic fruit and nut industries, and operates on par with the SA wine industry.

International comparisons: In the international field of stone fruit competitiveness, the SA industry is the runner-up in the first league behind Chile – the clear leader in this environment. As stone fruit form part of the deciduous fruit grouping within the larger fruit and nut grouping, SA can be considered as a major competitor in this broad set of industries, not only in the SH, but also in NH countries as shown in Figure 7.

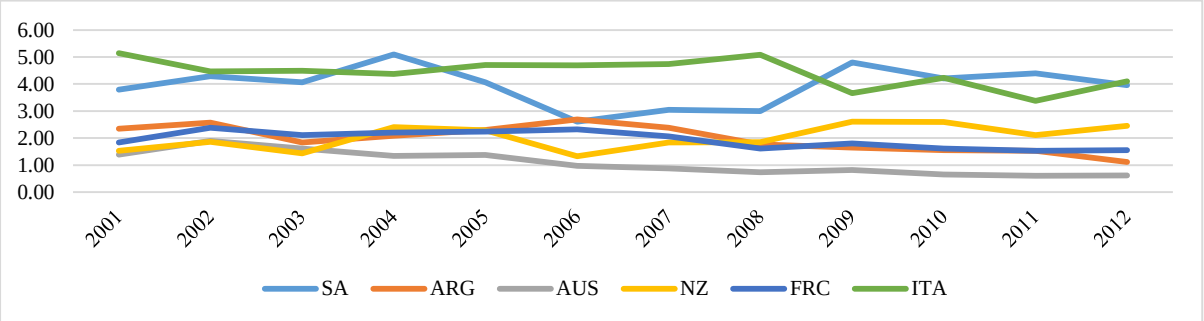


Figure 7. International stone fruit RTA comparisons
Source: Boonzaaier (2015)

4.2 Identifying the competitiveness factors (Step 3of the analytical framework)

Through an industry wide survey - the Stone Fruit Executive Survey (SFES) - views and opinions of prominent industry role-players were mobilised through the SFES (53 questionnaires) and also through focused group sessions, organised by relevant industry bodies. Trends and phases, described in the section above were firstly considered. The current performance trends were secondly attended to. A total of 84 factors affecting the competitiveness of the industry were identified, and these were rated on a five-point Likert scale (where 5 were most enhancing and 1 was most constraining). Average based analysis are explored and elaborated by the following statistical methods to differentiate between the functional positions in the value chain.

Value chain analysis: In order to consider possible differences in views on factors affecting competitiveness between the functional role players in the value chain, representative groupings or opinion clusters were identified. This will allow the identification of the respective scores of the most agreed-to statements and enable clustering of opinions in terms of significance, i.e. to sketch a more realistic/accurate picture of the competitiveness and address issues and opportunities at hand to complement the empirical measurement.

Cluster analysis was carried out to determine whether significant opinion groupings exist and whether these correlate with different functions in the value chain, i.e. functional opinion cluster analysis. As discussed in the findings by Boonzaaier (2015) where the percentages for Cluster 1, Cluster 2 and the General industry refers to the corresponding share(%) for each item/activity/type/form in the row. To test whether the average rating scores or statements differed significantly for different role players in the value chain and also in relation to the size of the business, ANOVA (analyses of variance) was employed (Keller & Warrack, 2000).

Principle component analysis (PCA) was applied to identify redundant (highly correlated) variables, i.e. factor ratings in the data set for which individual responses were very similar/ concentrated – to be viewed as consensus factors, as well as uncorrelated variables, i.e. factors to which respondents gave a more variable range of rating values – to be viewed as variation factors (Wold *et al*., 1987). The objective of this analysis was to yield a dataset containing information to ease strategic planning processes, i.e. to differentiate between variation and consensus factors as basis for industry level discussions and actions (Boonzaaier, 2015).

A statistically significant difference ($p < 0.05$) is expressed in terms of the following;

- Cluster 1 (Agribusiness orientated) contains a larger share of role players who are ‘input suppliers only’, ‘exporter/marketer only’, as well as ‘producer and pack house/processor’ and ‘exporter/marketer’.
- Cluster 2 (Producer orientated) contains a larger share of role players who are ‘producers only’, as well as ‘producers and pack house/processors combined’.

The top 10 enhancing and top 10 constraining factors for both cluster and the average industry score are shown in Table 7.

Table 7. Most enhancing and most constraining factors for the two clusters

CLUSTER 1: Agribusiness orientated			
Top 10 enhancing factors	**Average score cluster 1**	**Top 10 constraining factors**	**Average score cluster 1**
International market competition	4.32	Politicians' trustworthiness	1.54
Technology services	4.25	Political system credibility	1.68
Reinvestment	4.18	Entry-level labour: Quality	1.76
Exchange rate	4.14	Labour policy	2.04
Local input suppliers: Availability	4.12	Land reform policy	1.96
General infrastructure	4.11	Political system	2.07
Economies of scale	4.11	Social unrest	2.12
Location suitability	4.08	Establishment and production cost	2.15
Storage/product handling: Facility availability	4.08	Skilled labour: Obtaining	2.22
Relation	4.07	Crime	2.30
CLUSTER 2: Primary producer orientated			
Top 10 enhancing factors	**Average score cluster 2**	**Top 10 constraining factors**	**Average score cluster 2**
International market competition	4.10	Politicians' trustworthiness	1.35
Economies of scale	4.00	Political system credibility	1.30
General infrastructure	3.85	Entry-level labour: Quality	1.35
Location suitability	3.79	Labour policy	1.40
Exchange rate	3.70	Land reform policy	1.71
Entry-level labour: Obtaining	3.65	Political system	1.65
Technology services	3.55	Social unrest	1.79
Storage/product handling: Facility availability	3.45	Establishment and production cost	1.75
Local market competition	3.35	Skilled labour: Obtaining	1.70
Technology quality	3.25	Crime	1.65

Source: Boonzaaier (2015)

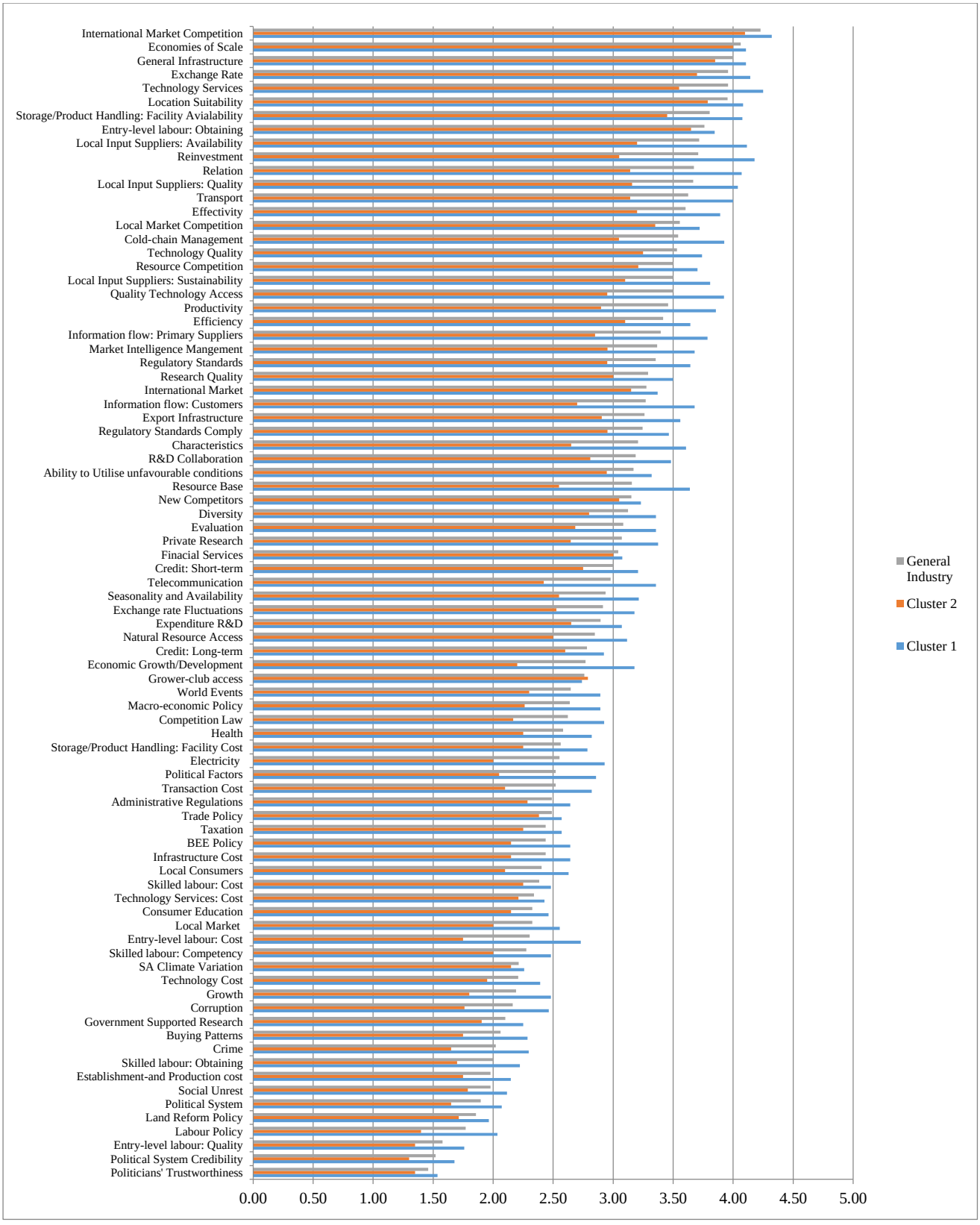


Figure 8. Rating of factors influencing the stone fruit industry's competitive performance

Source: Boonzaaier (2015)

Notes: Cluster 1 =Agribusiness orientated; Cluster 2 =Producer orientated; General industry =Industry average

Scores/ratings: 0 = most constraining, 3 = neutral rating, and 5 = most enhancing

4.3 Identifying and analysing the Porter diamond determinants (Step 4 of the analytical framework)

Step 4 follows Step 3, as it encapsulates and categorises sets of factors identified by the industry stakeholders into constellations or clusters of determinants for competitiveness. The model developed by Porter (1990) was applied and the captured information from the SFES was interpreted within the six broad competitiveness determinants or attributes within which an industry operates (Porter, 1990; 1998).

Analysing the 84 factors of competitiveness within the framework of the Porter diamond model of competitiveness first required the grouping of these factors as sets into production factor conditions; demand/market factors; relating and supporting industries; firm-level business strategy structure and rivalry; government support and policy; and chance of opportunity factors.

The respective SFES scores for the factor sets grouped into each determinant (aggregated out of five for each determinant) were calculated. A Likert-scale (Likert, 1932) was applied and a score closer to 5 represents more enhancing impact on competitive performance, whereas a score closer to 1 represents a more constraining impact on competitive performance for the purpose of the study. With this method, each Porter determinant carries an equal weight – out of five ratings for each determinant. The determining of realistic weightings was not possible from the SFES. Step 5 however dealt with this aspect to some degree.

The rated factors were grouped into Porter's six determinants and the general industry (see Figure 9) scored ratings yielded the two most enhancing determinants, being business strategy, structure and rivalry (3.55 out of 5) and related and supporting industries (3.14 out of 5). Production factor conditions (2.81 out of 5) and demand/market factors (2.76 out of 5) were identified as being less enhancing determinants. Chance factors (2.66 out of 5) and government support and policy (2.35 out of 5) were identified as the two most constraining determinants.

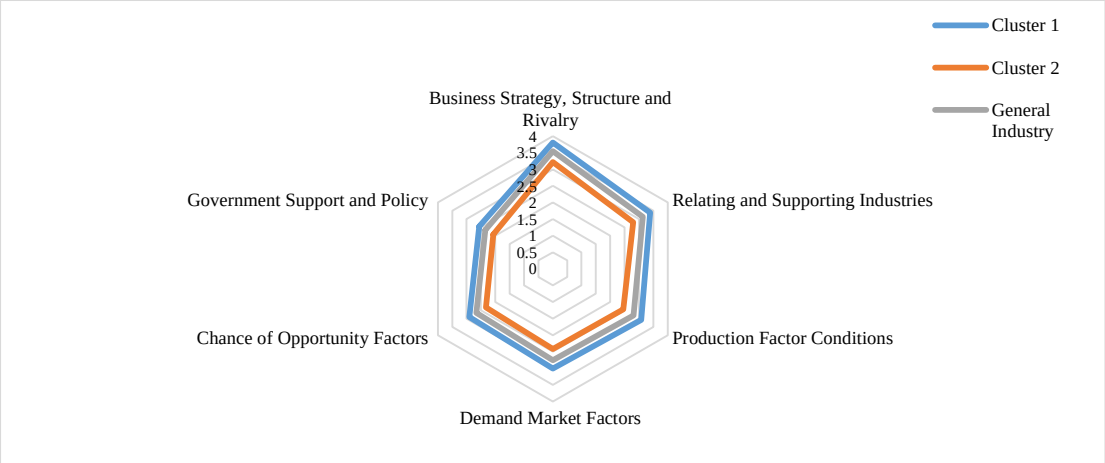


Figure 9. Porter determinants of competitiveness: Comparing clusters

Source: Boonzaaier (2015)

Differences in the views of role players were again considered through a cluster analysis, dealing with role players who are 'input suppliers the agribusiness orientated cluster (cluster

1) and a producer orientated cluster (cluster 2) General industry refers to the combined (entire) stone fruit responses irrespective of the functional value chain position claimed.

4.4 Value chain differences

As different cluster groupings based on functional value chain positions were analysed, it became clear that there were significant differences between the respondents involved in the primary production and packing of stone fruit and the respondents involved in activities lower down the value chain, such as in pack houses/processors and exporters/marketers. Further down the value chain (processing, trading), the respondents (relating to Cluster 1) expressed more "bullish" or optimistic views and positive statements on competitiveness than those directly exposed to primary production (relating to Cluster 2) risks and uncertainties. This confirms the importance to ensure alignment re competitive performance to all related functions in the value chain i.e. to expand competitive analysis to cover different points in the value chain in order to create better strategic alignment.

4.5 Analysing the individual Porter diamond determinants

A next phase in a comprehensive analysis of factors affecting competitive performance entails the analysis of separate determinants with their related factors. In this paper only the factors within the "firm strategy, structure and rivalry" determinant is shown, as it deals with value chain considerations (Fig 10). This analysis is the result of focus group discussions with relevant industry players for each determinant set.

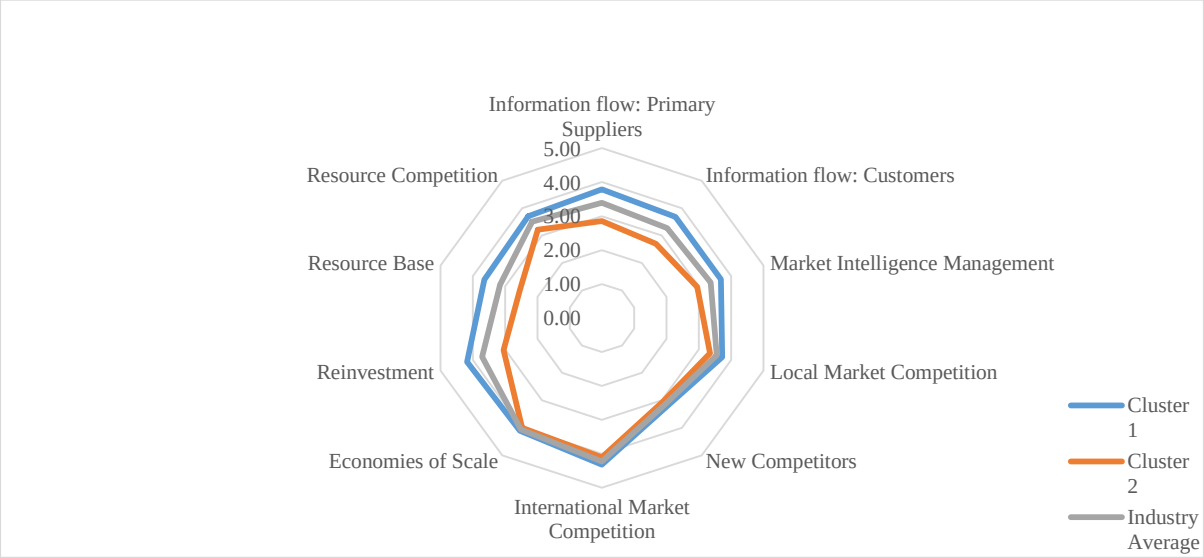


Figure 10. Firm strategy, structure and rivalry determinant of competitiveness

Source: Boonzaaier (2015)

A high degree of consensus was found through PCA of the factor, resource base for projected stone fruit operations is sufficient, as expressed by the respondents, but Cluster 1 (agribusiness role players) was keener to reinvest in stone fruit operations as their resource base was even more aligned to facilitate projected stone fruit operations. Additionally, Cluster 1 expressed more positive views on the factors and synergies regarding the flow of

information and market intelligence. New competition is viewed as less enhancing to the competitive performance of the industry – in contrast to the view of Porter that the more competitors the better. This is understandable as 'own views', because firms, industries and nations are constantly competing for resources and "uncontended market space" on the perception that market share will decrease when new competitors enter the 'game'.

For this determinant to enhance the competitive performance of this industry, it is necessary that the flow of information and the management thereof are adequate and available in the desired format for all stakeholders, whilst not neglecting other enhancing factors.

As the relative position and involvement in the value chain presents significant statistical differences, it is expected that conglomerations between smaller role players to integrate vertically into the value chain possibly would yield competitive performance enhancements. Consolidations, or perhaps improved value chain management functions, between industry role players and other stakeholder will be essential to improve not only the competitiveness of individual firms in this regard, but also of the industry as a whole. Evidence of such consolidations can indeed be found in the industry.

4.5 Validating the Porter diamond model

This study applied the SFES to additional two frameworks to ensure that the required re-grouping of factors (from the Porter diamond determinant groupings) is meaningful. This was done through the Cronbach's alpha test (Cronbach, 1951). Cronbach's alpha was firstly employed to test the consistency of responses regarding the SFES statements/factors that were restructured to fit the frameworks of the IMD (World Competitiveness Yearbook - WCY) and the WEF (Global Competitiveness Report - GCR). The responses in their own right provide a high level of consistency – proving that the 84 questions in the SFES are validated as highly relevant and the application of the Porter diamond model is substantiated. Boonzaaier (2015) portrayed the findings expressively.

For the IMD WCY the factor referring to government attributes is viewed as less enhancing, whilst the factors of infrastructure and business efficiency are perceived as more enhancing. The factor economic performance is perceived as most enhancing to the competitive performance of the SA stone fruit industry. In context of WEF results, the pillar, institutions, is viewed as most constraining, whilst labour efficiency, market size, macroeconomic environment, goods and market efficiency, innovation and financial market development are viewed as more enhancing pillars. Business sophistication, technological readiness and infrastructure are viewed as the most enhancing pillars within this framework for the competitive performance analysis of the South African stone fruit industry (Boonzaaier, 2015)

Furthermore, if the SA stone fruit industry was analysed according to the WEF GCR in terms of what drives an economy,[17] it can be best described as "innovation driven", as it calculated a score of 3.32 within the respective model. A "factor-driven" economy yielded a lower score of 2.49, and an "efficiency-driven" economy a score of 2.84. This also correlates with the high-scoring determinants of the Porter diamond, viz. business strategy, structure and rivalry; relating and supporting industries; and production factor conditions (Boonzaaier, 2015).

[17] In the terms of this study, an industry instead of an "economy" (Boonzaaier, 2015)

4.6 Strategies to enhance the competitive performance (Step 5 of the analytical framework)

The above results and major findings were interrogated through industry wide work sessions and focus group discussions eleven major industry level strategies were agreed upon. In doing this the notion of "equal weighting" in the Porter diamond determinants were somewhat countered. These priority actions are shown in Table 8 and are related to the Porter diamond model.

Table 8. Priority industry level strategies to improve competitive performance.

Porter determinants	**Relevant and constraining competitive factors**	**Strategic proposals**
Production factors conditions	Technology cost	**1. Technological innovation through value chain collaboration:** Upgrade and expansion of stone fruit technological innovation platforms to focus attention on aspects impacting on competitiveness in global markets; to encourage a long term vision; to foster investments in technological innovations through public-private initiatives; to broaden the scope and extent of technology affordability; collaborative information management sharing between stakeholders and clients along the value chain network; focus on "smart fresh" (new cooling technology), climate and moisture management tools, fruit-handling systems, fruit thinning and harvesting platforms, chemicals/fertilisers application equipment, etc. **2.** "**Anticipating climate change"**: The tracking and projection of possible climate variation conditions and possible impacts, like; heat waves prior to harvesting of fruit, frost damage during the flowering period of fruit, projected chilling unit (Richardson units and ARC units) accumulation measurement, shifting periods of full-bloom to harvesting, role of insects (pests and bees/natural predators of pests), virus infections and diseases, etc.
Demand/ market factors	Inconsistent quality and availability of SA stone fruit varieties in markets	**3. Improved consistency in supply to exports markets:** Market access are constrained by the inconsistency of fruit/cultivar types/tastes availability. The grouping of varieties with similar attributes and qualities as "homogenous products" must be considered to maintain/ensure product continuity. Quality control will also minimise "product confusion". **4. Extended supply in export markets:** Market access will also be improved by breeding and evaluation (on a continuous and sustainable basis) of cultivars/varieties for specific production regions to lengthen and "even out the spikes" of fruit supplied in the global market(refer to strategic proposal 1) **5. Market intelligence to achieve preferred supplier status:** Create market intelligence by linking consumer profiling in international markets to innovations in storage and ripening of fruit and to national cultivar breeding and evaluation programmes; and as such to claim the status of preferred suppliers in international markets.
Chance factors	The influence of adverse weather conditions on buying patterns of consumers (export markets)	**6. Redirecting market supply:** Buying patterns are often negatively impacted on by ad hoc and unexpected adverse weather conditions, such as heavy snow falls negatively affecting infrastructure network and logistics in export markets. Therefore contingency plans to proactively anticipate such conditions through "early warning systems" together with collective action from producers, exporters, overseas clients related to alternative destinations and inventories.
Related and supporting industries	Electricity supply (including renewable energy and fossil fuels)	**7. Consistency of power supply:** As stone fruit are extremely susceptible to "break-ups/stoppages" in the cold-chain, inconsistent electricity supply in the will have to be addressed in a much improved manner through area/time targeting and "early warning systems" with government departments; (Energy; Trade and Industry; Science and Technology) and agencies such as ESCOM (Electricity Supply Commission of South Africa). Investment in the provision of additional/supplementary electricity supply initiatives,

		especially during periods of critical demand also need to be considered, inter alia through renewable and fossil fuels options.
	Industry's expenditure on Research &Development and innovation	**8. Institutional arrangements to create innovation through collaborative partnerships:** Well-structured public-private Research & Development partnerships (for example between ARC – Agricultural Research Council, CSIR – Council for Scientific and Industrial Research and selected industries) to collaborate on the development of innovation through: • Goal driven research objectives and outputs; impact and cost-benefit analyses; effective management of budgets and resource allocation to priority projects. • Industry levies refocussed to improve the systems impacting on competitive performance.
Government support and policy	Trade policy	**9. Trade promotion support:** Trade promotion negotiations and industry lobbying with relevant government departments to achieve/gain market access and realise international trade agreements into potential lucrative markets such as China and India; and inclusion in trade missions and trade agreements.
	Dealing with the political economy	**10. A "Stone Fruit Industry Plan (SFIP) and compact:** The establishment of a compact between industry and government to restore mutual trust and to create a "Shared-mission, joint-vision and strategic plan" (a Stone Fruit Industry Plan) for the industry by all role players and affected stakeholders. The SFIP should aim to establish an agreed to and transparent framework of agreement and co-operation with checks and balances to create conjoint engagement and governance to align major stakeholders and combat negatives such as corruption, discrimination, favouritism, racism, etc. at all levels. Private: public partnership, referred to above, will be an important component of this SFIP, including such collaboration on transformation and land redistribution matters. **11. Improved industry intelligence systems:** High quality and improved industry intelligence will enable improved co-operation, lobby and negotiation at all levels, dealing with matters related to: • Human capital factors (including labour) and societal issues. • Education, capacity and training programmes. • Investment environment that the industry faces – improving the "climate" for South African agriculture and more specifically stone fruit. • Articulate the role and impact of the stone fruit industry in the broader economy, relating to the stimulation of employment opportunities and income generation.

Source: Boonzaaier (2015)

The table above does not relate to the Firm Level determinant, as this was not discussed at industry level. However some of the priority statements above clearly impacts on such firm level approaches required to enhance competitive performance.

The major strategic improvements to enhance competitive performance argued for focus on improved industry-based lobby discussions, i.e. to build and strengthen the necessary communication between industry role players and government agencies through an improved strategic intelligence database, centred on aspects such as trade agreements, international market development and policy development.

5. Conclusions

The major findings of this study established that the South African stone fruit industry performs highly competitive, albeit somewhat fluctuating, in the global trading arena on a sustainable basis; especially since the period of deregulation in the mid 1990's. Plums was the most competitive stone fruit type, followed by apricots, peaches and nectarines, and lastly cherries. The competitive performance of these individual stone fruit types increased significantly from the late 1990s onwards, showing gradual decreases in the early 2000s, but recovered from 2007 onwards. From the analysis 84 factors impacting on competitive

performance were identified and analysed in collaboration with industry role players. From this eleven priority industry-based strategic actions were, reflecting aspects for improved strategic intelligence, value chain coordination, government interaction and policy development were formulated for consideration in a comprehensive stone fruit industry strategy plan.

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