A competitive analysis of the South African soybean industry

By

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Submitted in partial fulfilment of the requirements for the degree M Inst Agrar in Agricultural Economics

in the

Department of Agricultural, Economics, Extension & Rural Development

Faculty of Natural and Agricultural Sciences

at the

University of Pretoria

DECLARATION

I, Lehaiwa Stanford Manthata, hereby declare that the work contained in this dissertation to the University of Pretoria for the M Inst Agrar (Agricultural Economics) is my own original work and that I have not previously in its entirety or in part submitted it at any university for a degree.

Signature---------- **Date**----------

ACKNOWLEDGEMENTS

This dissertation is dedicated to those who contributed directly or indirectly towards its successful finalisation. A number of people made important contributions through advice, support and encouragement to this study.

First and foremost, I would like to express my sincere gratitude to my academic advisor, Dr Mmatlou Kalaba, for his continued encouragement, support and motivation, from the beginning to the end of this study. His advice and scholarly criticism has provided me with an opportunity to complete this study.

I am thankful to the Department of Agriculture, Forestry and Fisheries (DAFF) for their financial support. I am also grateful to my DAFF colleagues, especially Dr Madime Mokoena, for his support in difficult times during this study. This dissertation in fact would not have been completed without his massive assistance and encouragement. I am also grateful to ex-colleagues at the Food and Agriculture Organization (FAO) of the United Nations (Dr Jean-Joseph Cadilhon, Mr David Hitchcock and Ms Nancy Morgan) for their encouragement to begin with this journey.

I am also grateful to my late father, Masedi Theodor Manthata, and my mother, Matlhodi Maria Manthata, for their sacrifices towards my educational journey. They have devoted themselves completely to helping me to proceed in life.

To my beautiful and loving wife, Sinazo, and my daughters, Moleboheng and Lesedi, your support, patience and understanding during the course of this study is much acknowledged. Your presence in my life provided me with motivation to remain focused. I would not have done this without your moral support. Finally, I hope that this work would be a source of inspiration and motivation to my daughters.

ABSTRACT

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Degree: M Inst Agrar (Agricultural Economics)

Department: Department of Agricultural Economics and Rural Development

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ABSTRACT

Soybean is amongst the most crucial field crops in South Africa. Although the local soybean industry is still in its infancy, it is an important growing sector of South Africa's agricultural economy. The soybean industry's contribution in terms of gross value of production, at over R5 billion (in 2014/15) out of R225 billion (in 2014/15) for the entire agriculture industry, may seem insignificant but it is very important. This is not only in terms of the industry's contribution towards the gross value of the entire production in agriculture, but also in terms of its contribution towards value addition by soybean products. The key aspect of the importance of soybean relates to the fact that the majority of soybeans are consumed in the processed/value-added form, and very little is consumed in primary form. There are various sectors of the economy, such as agricultural inputs (paints, lubricants, animal feedstuffs, etc.), that benefit directly from the supply of the processed soybeans.

The increasing importance of soybeans in the domestic market is illustrated by the hectares (ha) set aside for the production of the crop over a period of time. Despite the steady increase in the production of soybeans in recent years, the South African soybean industry has not been able to meet the local soybean demand from the animal feed manufacturing, industrial and human consumption sectors.

By analysing the South African soybean industry, key weaknesses and threats in the value chain can be identified. Addressing these will further strengthen the competitiveness of the local soybean value chain.

This study gives an overview of the soybean industry, at both global and domestic levels. The overview of the industry is followed by a competitive advantage analysis of the South African, together with the Argentine and Brazilian, soybean value chains. The Relative Revealed Comparative Trade Advantage (RTA) index is applied to calculate the competitive advantages of the domestic soybean industry, together with those of its southern hemisphere competitors. The results reveal that the South African soybean in the primary form, has a marginal competitive advantage. Furthermore, the value-added soybean products display a competitive disadvantage. At the same time, both Argentinian and Brazilian soybean value chains have a competitive advantage.

The conclusion that the domestic soybean industry is slightly competitive only in the primary soybean sector, while both the Argentina and Brazil soybean industries are competitive through the entire value chain, was calculated from World Integrated Trade Solutions (WITS) trade data. The elements behind the competitiveness of the soybean industry were identified. These elements were identified to explain the underlying reasons behind the competitive disadvantage experienced by the South African soybean products. It was established in the analysis that utilisation rates have remained below average as a result of the technical challenges in a number of newly established factories, as well as a shortage in supply of soybeans by the local industry. All that is currently lacking is sufficient production to match the processing capacity. Although soybean production has grown tremendously over a period of time, it will take a while to match the crushing capacity.

In order to accelerate the South African soybean industry's competitiveness, there is a need to focus on increasing the area planted and enhance productivity, improve food quality and safety, strengthen Research and Development (R&D), increase market efficiency, and improve coordination of the value chain. There should also be emphasis placed on the soybean products, as this an area where the domestic industry has a competitive disadvantage. Furthermore, health

issues are becoming an integral part of both the domestic and global markets, and as a result, the production of healthier soy products has become a prerequisite for the industry.

In order to keep up with the rapidly evolving environment, investment towards innovation in the industry is necessary. The domestic soybean industry's competitiveness cannot be attained without the assistance of the public sector. Legislation and policy, as well strategies, must be put in place to enhance the production and crushing of soybeans. Furthermore, government should ensure, amongst other things that crucial gaps in grading standards used by the industry and the ones prescribed on the APS Act, 119 of 1990, are sorted out.

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LIST OF ABBREVIATIONS

ACET	African Centre for Economic Transformation
AFMA	Animal Feed Manufacturers Association
AIDS	Almost Ideal Demand System
APS	Agricultural Products Standards
BFAP	Bureau for Food and Agricultural Policy
CTS	Consolidated Tariff Schedule
CPI	Consumer Price Index
DAFF	Department of Agriculture, Forestry and Fisheries
DRC	Democratic Republic of Congo
DTI	Department of Trade and Industry
EC	Eastern Cape
EFTA	European Free Trade Association
EMBRAPA	Agency for Research on Agriculture and Animal Husbandry
EU	European Union
FAO	Food and Agriculture Organization
FDI	Foreign Direct Investment
FS	Free State
HS	Harmonized System
GP	Gauteng Province
GMO	Genetically Modified Organisms
GAP	Good Agricultural Practices
GMP	Good Manufacturing Practices
GSA	Grain South Africa
GSP	Generalised Systems of Preferences
IDB	Integrated Data Base
IPAP	Industrial Policy Action Plan
ISO	International Organization for Standardization
IT	Information Technology
ITC	International Trade Centre

KZN	Kwa-Zulu Natal
LP	Limpopo Province
MAP	Marketing of Agricultural Products
MERC	Markets and Economic Research Centre
MP	Mpumalanga Province
NAMC	National Agricultural Marketing Council
NC	Northern Cape
NDA	National Department of Agriculture
NW	North West
NXi	Net Export Index
PAMs	Policy Analysis Matrices
RCA	Revealed Comparative Advantage
R&D	Research and Development
RMP	Relative Import Penetration Index
RTA	Relative Trade Advantage
RXA	Relative Export Advantage Index
UK	United Kingdom
UNCTAD	United Nations Conference on Trade and Development
UNSD	United Nations Statistical Division
USDA-FAS	United States Department of Agriculture – Foreign Agricultural Service
USA	United States of America
SACU	Southern African Customs Union
SADC	Southern African Development Community
SAFEX	South African Futures Exchange
SAGIS	South African Grain Information Service
TRAINS	Trade Analysis and Information System
WC	Western Cape
WITS	World Integrated Trade Solution
WTO	World Trade Organization

CHAPTER 1
INTRODUCTION

1.1 Background

Soybean is counted amongst the key field crops in the global market. Among the oilseed crops, soybean occupies a leading role on the global scale. The crop's share in global oilseed output is currently estimated at approximately 60%, followed by rapeseed (at 13%) and cottonseed (at 7%). At the same time, soybean oilcake accounts for 71% of global protein meal production for vegetable and animal meals. At the same time, soybean meal/oilcake is amongst the key protein components utilised in the manufacturing of concentrates for animal feeds. After palm oil, soybean oil is rated as the second most crucial vegetable oil. Soybean oil accounts for 29% of consumption of vegetable/animal oils and fats in the world (USDA-FAS, 2016).

Global soybean production is primarily dominated by the United States of America (USA), Brazil and Argentina, with China dominating the demand. Soybean seed imports from China accounted for 58% of world trade in 2015/16, while exports of soybean by the USA, Brazil and Argentina accounted for approximately 78% of the world's trade (USDA-FAS, 2016). The economic feasibility of soybean production is primarily determined by the usage of both the soybean meal and oil at the commercial/industrial level. Both the soybean oil and oilcake are responsible for approximately two-thirds and one-third of soybean's economic value, respectively. Soybean oilcake and oil are utilised globally for human nourishment and as feed for animals. The global soybean market has shown a massive increase over the past couple of years, and this growth is expected to continue in line with the increasing demand from the food, feed and fuel sectors.

Soybean is counted amongst the key field crops in the domestic market, as it is on the global market. Although the local soybean industry is still small, it is an important growing sector of South Africa's agricultural economy. For example, the area planted with soybeans grew from 68 000 hectares in 1995/96 to 502 500 hectares in 2015/16; and production grew from 80 000 tons in 1995/96 to 741 000 tons in 2015/16 (SAGIS, 2016). Local soybean production has shown tremendous growth over a period of time as more producers in the summer rainfall areas are

exposed to the benefits of soybeans in a crop rotation program and to the lower input needs of soybeans, as compared with maize. According to DAFF (2016), the soybean industry's contribution in terms of gross value of production at over 5 billion (in 2014/15) out of 225 billion (in 2014/15) for the entire agriculture industry may seem small, but it is very important. Its contribution is not only in terms of gross value of the entire production of the agricultural sector, but also in terms of its contribution towards value addition by the soybean products. The key aspect on the importance of soybean relates to the fact that the majority of soybeans are consumed in the processed/value-added form, and very little is consumed in primary form. There are various sectors of the economy, mainly animal feedstuffs and others such paints and lubricants that benefit from the supply of processed soybeans.

Historically, the South African soybean, together with the entire oilseed industry, was regulated under the Marketing Acts of 1937 (Act 27 of 1937) and 1968 (Act 59 of 1968). The local oilseed industry operated under the auspices of the Oilseed Board. The Board was established primarily to operate a single pool scheme that controlled the marketing of oilseed products. The Oilseed Board would determine the prices for both production and selling of the entire oilseed production in the local market. Furthermore, the Oilseed Board would take into consideration the local supply and demand set-up, as well as prices for the export pool. Those prices would then be used throughout the marketing season. The Marketing Act of 1968 was replaced in 1996 by the Marketing of Agricultural Products (MAP) Act, No. 47 of 1996. The MAP Act of 1996 eventually introduced the deregulation of the South African agricultural sector. The MAP Act in 1996 led to the termination of the Oilseed Board and a move towards the establishment of the National Agricultural Marketing Council (NAMC) to manage and monitor government's involvement in the agricultural sector.

Currently, the South African soybean industry operates in a deregulated market environment where prices for both the soybean oilcake and oil are derived from international soybean oilcake and oil prices. This has resulted in the domestic soybean industry being fully exposed to the global markets. According to Esterhuizen (2006), the international "playing field" is all things except equal. Rivals extract organic resources and exploit labour pools that mainly differ with regard to superiority, skills and costs. Moreover, various nations are governed by different regulatory set-ups which affect their local agribusinesses in various ways. Furthermore, access to

finance, technology and knowledge varies a great deal between countries. The global playing field is harsh, but the South African soybean industry has no choice but compete in that environment. Ultimately, the issues related to competitiveness and comparative advantage become important for the agribusinesses and government policymakers, alike.

1.2 Problem statement

In terms of the above-mentioned background of local soybean industry, it is clear that the soybean industry is important to both the local and the global markets. The increasing importance of soybeans in the domestic market is illustrated by the hectares (ha) brought into production for soybeans over a period of time. The hectares used for soybean production increased from 183 000 ha in 2006/07 to 503 000 ha in 2015/16. Furthermore, increasing production supported by a positive agricultural policy environment[1] has accelerated the development of the industry, and the application of biotechnologies in agriculture has enabled a massive transformation of the commercial farming sector from traditional grain production(such as maize and sunflower) to soybean production. The South African government has also recognised the significance of soybeans for the economy. The Industrial Policy Action Plan (IPAP) of 2012/13 – 2014/15 identified soybeans as being one of the key crops with a massive capacity to create job opportunities and the establishment of new investments (the Department of Trade and Industry, 2010).

This positive agricultural policy environment has enabled the farmers of soybeans to increase the production of high-yielding soybeans in recent years. As a result, the Bureau for Food and Agricultural Policy (BFAP) (2014) projects that soybean plantings will continue to increase to reach approximately 900 000 hectares by 2023, as growing yields are projected to raise average gross income in real terms over the current period. BFAP (2014) further projected that national average yields will reach 2.3t/ha by 2023. This will boost domestic soybean production to approximately 2 million tons, from the 2013/14 production of 948 000 tons. This will increase profit margins and give producers the necessary incentive to further increase the area planted for soybean.

1 The GMO Act of 1997 provided a platform for the growth and application of GMO varieties domestically, despite powerful opposition to those technologies in the majority of the Southern African Development Community (SADC) countries and the entire African continent.

Despite the steady increase in the production of soybeans in recent years, the South African soybean industry has not been able to meet the local soybean demand emanating from the animal feed manufacturing, industrial and human consumption sectors. According to NAMC (2011), South Africa should ideally process its soybeans, given that the possibility of doing so does exist. This is extremely important, especially because soybean oilcake is currently one of the major agricultural import products in South Africa. In order for the domestic soybean industry to meet its demand for soybean meal/oilcake, soybean oil, full fat soybeans and soybeans for human consumption, domestic soybean production and value addition would need to increase significantly.

The animal feed industry, particularly the poultry industry, has been the key driver behind the demand for soybean and its products. According to the NAMC (2011), domestic soybean oilcake production, on average, only meets 10% of the local soybean oilcake demand. Approximately 90% of the soybean oilcake used domestically is imported from Argentina. At the same time, local supply and demand elements, as well as supply and demand requirements in the international market, are primary factors that drive the price determination of soybeans. The global soybean prices serve as a benchmark for South African soybeans and soybean products prices. Therefore, the Argentinian market has a major influence on the local market since both countries have a similar production season.

As explained earlier, it is clear that the deregulation of the oilseed industry and closure of the Oilseed Board in 1996 have drastically modified the concept of competitiveness in the domestic market. In a deregulated market, various forces possess a more massive influence on the local soybean industry than during a single pool scheme of pre-deregulation era. Under the deregulated set-up, continuous exposure to various factors in the local and global markets, as well as constant variations in the macro-economic variables, presents a massive risk to various participants within the soybean value chain. Role-players are forced by the deregulation and adjustments in the international markets of various agricultural products to position themselves as competent participants in an international free market environment.

By analysing the South African soybean industry, key issues in the value chain can be established. According to Van Rooyen, Esterhuizen and Doyer (1999), the factors that can yield

competitive advantage for the local industry are the challenge posed by global competition and the ability to satisfy the domestic demand.

1.3 Objectives

This study is primarily aimed at investigating the domestic soybean industry's competitiveness through a determination of relative competitiveness and a comprehensive analysis of the soybean value chain. The value chain analysis comprises all parts of the soybean value chain, from primary producers to the consumers of soybean products. In order to attain the key primary objective, various secondary objectives should be attained, and those are the following:

- Acquire an overview of key production and trade trends of soybean, for both the global and domestic markets.
- Estimate the domestic soybean industry's competitiveness in relation to the leaders in the global soybean markets (i.e. Argentina and Brazil).
- Develop key strategies that will increase the competitiveness of the South African soybean industry value chain.

1.4 Research methodology and data used

In line with the objectives specified above, this study will first and foremost benefit from both the domestic and international literature on the value chains in the soybean industry. The study will then apply various methods and techniques in the form of descriptive, theoretical, analytic and quantitative analysis.

The study is primarily aimed at assessing the domestic soybean industry's competitiveness in relation to those of Argentina and Brazil, by applying the quantitative approach of Balassa (1965). The Relative Trade Advantage (RTA) method developed by Balassa is to establish competitiveness indices of soybean and its products.

For the analysis, secondary data that has already been generated is used considerably, such as data from the World Integrated Trade Solution (WITS) of the World Bank, industry data from South African Grain Information Service (SAGIS), Grain South Africa (GSA), the Animal Feed

Manufacturers Association (AFMA) and the United States Department of Agriculture – Foreign Agricultural Service (USDA-FAS), as well as the abstract of agricultural statistics of DAFF. The primary reason to use the secondary information and data is mainly attributable to the following:

- Saving of costs and time during the process of collecting data.
- The exact requirements of the objectives of this research were not in sync with the primary data sources.
- Interviews and questionnaires cannot unearth some of the critical variables required.

1.5 Motivation

The outcome of the investigation into the South African soybean value chain will be used to determine the soybean industry's capacity to participate meaningfully in the international market. The analysis will further establish various participants within the soybean industry in South Africa. Several elements that are crucial in influencing the soybean industry are identified in order to establish the capacity of each segment within the value chain to deal with market adjustments and their ability to maintain and grow their market share. Conceptually, value chain analysis becomes an important and useful tool when measuring and evaluating the sustainability of the soybean industry. Furthermore, establishing the relative competitiveness of the soybean industry will also provide an indication of the success of, as well as challenges in, the value chain.

The findings from this research study could provide a strategic tool that might be used by several participants in the domestic soybean value chain. All the strengths and inefficiencies, as well as flaws, in the local soybean value chain can be determined through value chain analysis. According to Van Rooyen *et al*. (1999), factors that could bring competitive advantage for the local industry are the challenge posed by global competition and the ability to satisfy the domestic demand.

1.6 Organisation of the Study

The rest of this study is split into various chapters. Chapter 2 provides in detail, an overview of the global and South African soybean industries. Chapter 3 provides literature survey and theoretical framework. Chapter 4 measures and analyses the competitiveness of the South African soybean value chain. Chapter 5 provide conclusions and recommendations.

CHAPTER 2
OVERVIEW OF THE GLOBAL AND SOUTH AFRICAN SOYBEAN INDUSTRIES

2.1 Introduction

Soybean is one of the most important crops, particularly when one takes into consideration the health benefits associated with its products (DAFF, 2010). Processed soybean provides a source of good quality protein for animal feed in the poultry and pork industries. Furthermore, it is a source of edible oil. At the same time, there is a growing market for processed soybean for human consumption. Soybean is manufactured into various products, such as soymilk, flour, protein, tofu, and several retail food products which provide a low cost source of protein. In this chapter, both the global and domestic soybean markets are scrutinised. The domestic key trends of the soybean industry are compared with the situation in the global environment.

2.2 Global and local production of soybeans

In this section, both global and local soybean production is scrutinised. The domestic key trends of the domestic soybean production are compared with the situation in the global environment.

2.2.1 Global production of soybean seed

As indicated in Figure 2.1, global soybean seed production cultivation is highly concentrated geographically, with only three countries, namely the USA, Argentina and Brazil, accounting for almost 83% of world output. They are followed, at considerable distance, by China, India, Paraguay and Canada, which together account for another 11% of world production. South Africa and countries such as Bolivia, Uruguay, Uganda, Romania, Ukraine, the Russian Federation and Vietnam, are regarded as smaller soybean seed producing countries (USDA–FAS, 2016).

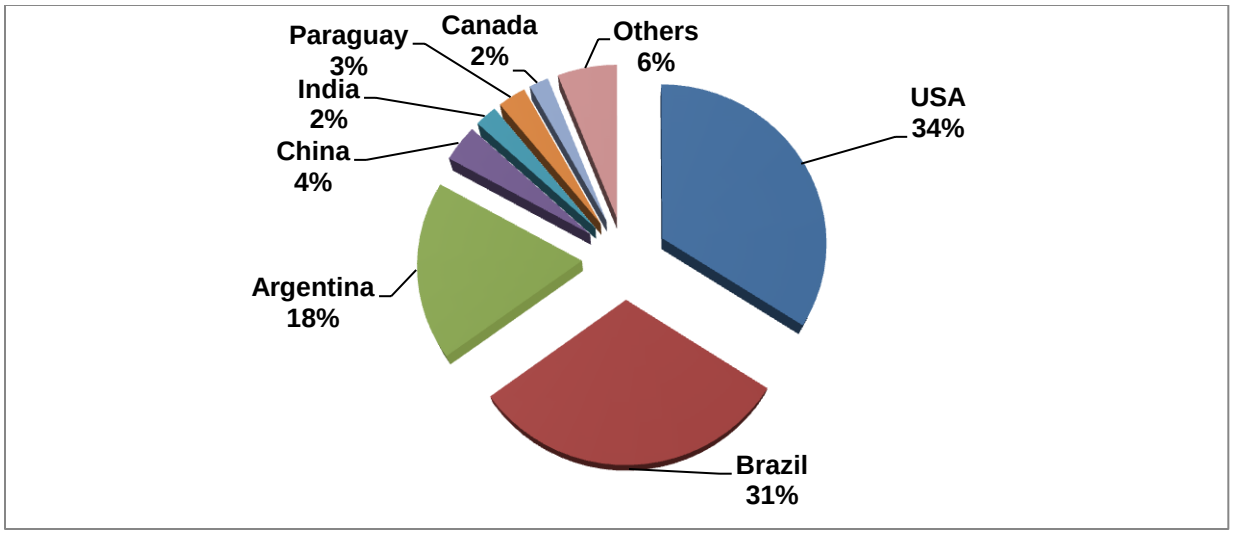

Figure 2-1: Leading global producers of soybeans

Source: USDA–FAS (2016)

The majority of the smaller producing countries are expanding their production, although they are generally operating from a negligible base and, as such, are not in a position to significantly influence the global soybean seed market. Global soybean seed production, as a result, is heavily influenced by the actions of the three main producing countries of the USA, Brazil and Argentina. This situation is likely to continue over a period of time, given their capacity to continue with massive investments in production technology and expand the cultivation areas.

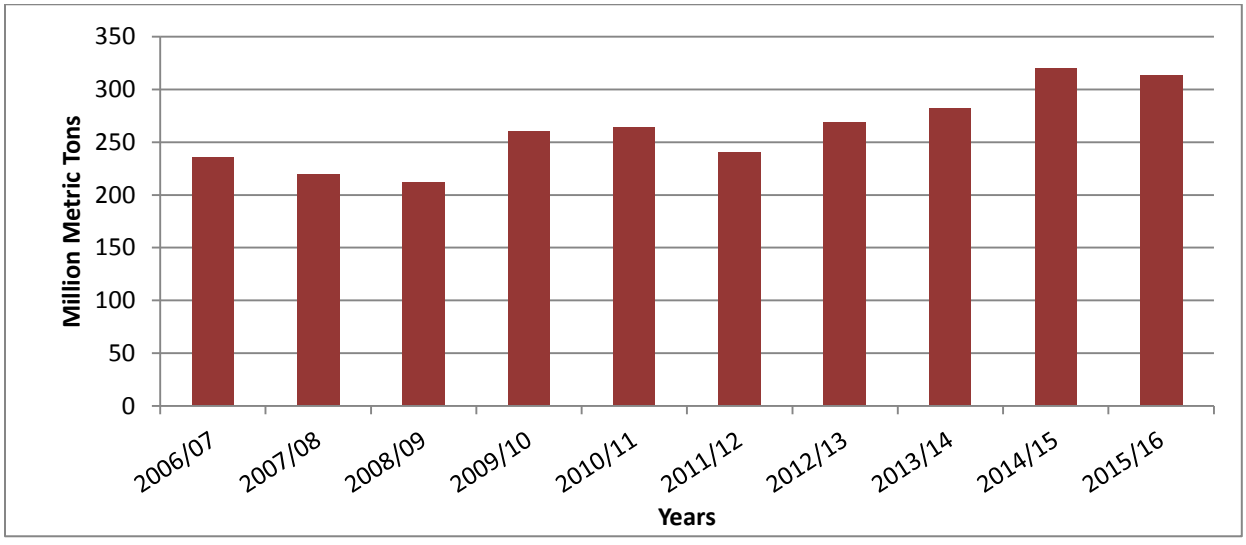

Figure 2-2: Global soybean seed production

Source: USDA–FAS (2016)

The global production of soybean seed increased from 235 million tons in 2006/07 to 313 million tons in 2015/16. As illustrated in Figure 2.2, there were some fluctuations for the period under review, with increases between 2008/09 and 2010/11, as well as 2011/12 and 2014/15. At the same time, there were declines between 2006/07 and 2008/09, and between 2010/11 and 2011/12. There have been fluctuations in production volumes due to changes in the area planted to soybean seed and as a result of demands for soybean seed by both the food and animal feed industries.

2.2.2 South African production of soybean seed

Soybeans are a becoming an integral part of the growing sector of the local agricultural economy. The increasing significance of the South African soybean seed is illustrated by the increase in the hectares that have been dedicated to the crop over a period of time. Increasing yields, accompanied by the application of agricultural biotechnologies, have facilitated an easy move to the production of soybean seed from the production of traditional grains by commercial farmers. Furthermore, this has enabled farmers to apply crop rotation for soybeans with other traditional grain crops, such as maize, to optimise profits. According to Van der Merwe *et al*. (2013), the soybean seed production growth can be attributed to an increased awareness of the benefits associated with rotation of crops between soybean and maize by commercial farmers. Furthermore, the increase in soybean seed production was the result of its strategic significance, firstly as a main source of protein in the production of animal feed, and as both a strategic product for both human and animal nutrition.

Soybean seeds are produced in varying magnitudes in all the provinces of South Africa, as illustrated by Table 2.1. At the same time, the provincial distribution has remained approximately the same for the period under review. In 2015/16, Mpumalanga was the main producer, with a share of 50% of the entire production, followed by the Free State, Kwa-Zulu Natal and Limpopo, with shares of 22%, 11%, 8.3% and 8.1%, respectively. The top four provinces accounted for 88% of the total production in 2015/16.

Table 2-1: Provincial production of soybeans

Production	WC	EC	NC	FS	KZN	LP	MP	GP	NW	Total
Production (1 000 Tons)										
2006/07	–	1.0	1.5	33.7	45.1	25.0	76.5	4.2	18.0	205.0
2007/08	–	0.8	1.7	64.5	44.0	22.5	128.0	5.5	15.0	282.0
2008/09	–	1.6	2.3	99.0	75.6	44.0	262.5	12.5	18.5	516.0
2009/10	–	1.2	2.0	151.9	73.5	50.4	239.6	20.4	27.0	566.0
2010/11	–	1.5	1.5	190.0	92.0	58.8	294.5	21.7	50.0	710.0
2011/12	–	0.8	1.5	192.5	81.6	50.6	263.0	28.5	31.5	650.0
2012/13	–	0.8	7.0	254.2	78.0	56.0	339.5	32.0	17.0	784.5
2013/14	–	3.0	13.6	281.4	91.0	66.0	304.5	44.0	28.8	832.3
2014/15	1.6	2.1	14.0	366.0	102.9	72.0	389.9	69.0	52.5	1 017.5
2015/16	1.2	2.1	12.4	156.6	60.0	58.8	363.0	52.5	18.0	724.6

Source: Abstract of Agricultural Statistics (2016)

According to Table 2.1, local soybean seed production showed tremendous growth for the period under review. Soybean seed plantings expanded from 183 000 hectares in 2006/07 to more than 502 000 hectares in 2015/16. The key underlying factor behind this growth was the demand from the crushing plants. The surge in increased investment in the local crushing sector was attributable to the South African government recognising the significance of soybeans in the economy. The Industrial Action Plan (IPAP) of 2012/13 – 2014/15 recognised soybeans as being one of the crops with the capacity to stimulate job opportunities and new investments (the DTI, 2010).

As a result of this favourable agricultural policy environment, farmers have been able to increase their production of high yielding soybeans over a period of time. The Bureau of Food and Agricultural Policy (BFAP) (2013) projected that the land prioritised for commercial production of soybeans in South Africa would increase in the next decade. According to Dlamini, Tshabalala and Mutengwa (2014), an increased emphasis on soybean as a crucial crop for both human nutrition and agro-processing has encouraged the production of soybeans by local farmers in recent years.

2.3 Global and South African soybean crushing

According to Hallatt (2005), oilseed crushing is generally considered a sector that is extremely capital intensive, as it goes hand in hand with transport economics, commodity trading, hedging, technical excellence, and large economies of scale. Soybean crushing at the global level is important to the industry. This is because very little of the primary soybeans produced are used in their raw and unprocessed form. Soybeans can be processed in different ways, depending on the product required by the end-user (oil and cake, full-fat cake, extracted for human consumption) and the capacity of the facility. Soybean processing starts as soon as the crop is ready for harvest. In this section, both global and local soybean crushing is discussed.

2.3.1 Global soybean crushing

China is not the main producer of raw soybean, but has emerged as the main crusher of the soybean. The country has been developing more quickly than any other of the main soybean crushing markets. According to USADA-FAS (2016), during the 2015/16 season, China was responsible for 81 million metric tons (29%) of total soybean crushed volumes, followed by the USA at 51 million metric tons (18%), Argentina at 43 million metric tons (16%), Brazil at 39 million metric tons (14%), and the EU at 14 million metric tons (5%). According to the ACET (2012), countries can be categorised into the following three groups when contemplating global processing capacity and demand:

- **Process to consume**: This strategy is commonly applied by both China and India. These countries each have a world-class crushing capacity, with a strong local focus. As a result, they undertake a minimal volume of trade in soybean meal and oil, as against their overall soybean processing.

- **Process to export**: The USA, Brazil and Argentina are the countries that epitomise this tactic. These countries have soybean production and processing capacity that is vertically integrated. As a result, they have a significant comparative advantage in terms of price competitiveness due to the extent of their raw soybean production, and the resulting economies of scale.

- **Import:** The EU provides a crucial market for the process-to-exporters. This is due to the lack of availability of agricultural land with a suitable climate. The EU does not play a significant role in soybean processing. This is the result of the fairly low margins that would accrue from that set-up.

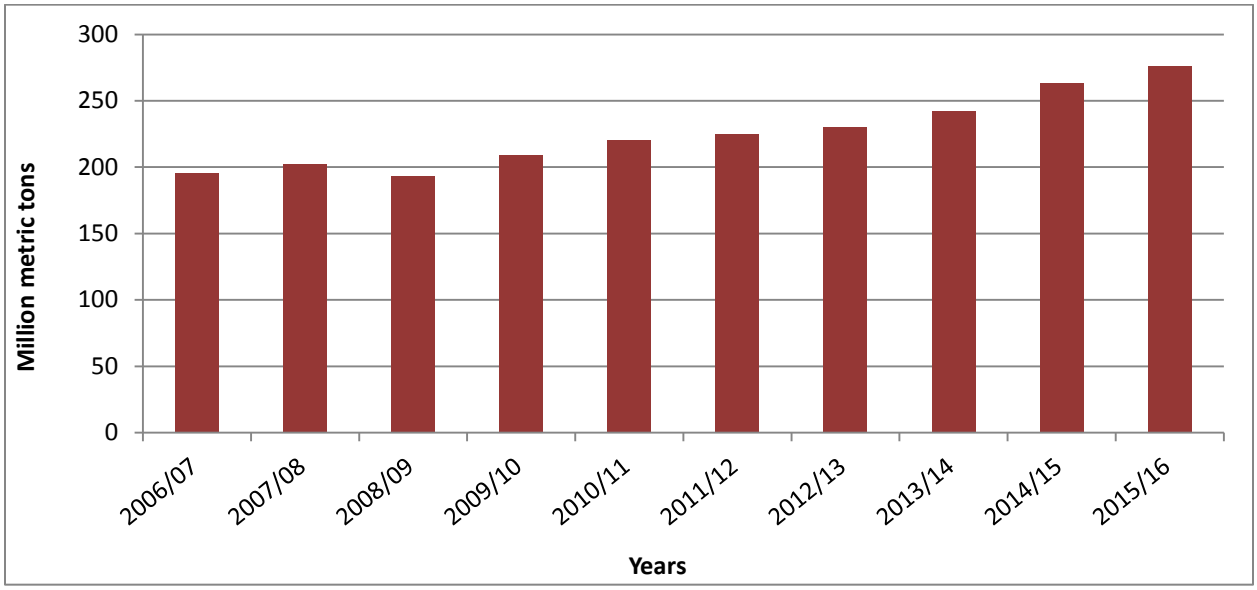

Figure 2-3: Global crushing of soybeans

Source: USDA–FAS (2014; 2016)

According to Figure 2.3, the global quantity of soybeans crushed has been on an increase for the period under review. Soybean crushing increased significantly from the 195 million tons crushed in 2006/07 to the 276 million tons in 2015/16. The total volume of soybeans crushed increased every year from 2008/09 to 2015/16, with the 276 million metric tons crushed in 2015/16 being the largest quantity to date. According to Figure 2.3, global soybean crushing is experiencing an increasing trend. The increase in demand can be attributed to amongst others an increased demand of soybean products by China.

2.3.2 South African soybean crushing

Soybeans in the local market, as in the global markets, are mainly used to satisfy the processing markets, namely those for animal feed, meal and oil, and human consumption. The first two (animal feed, meal and oil) are by far the most dominant, with human consumption being

insignificantly small. In terms of the animal feed, most of soybeans grown locally are used by the livestock industry as full fat soybeans. Full-fat soybeans constitute good quality protein. In South Africa, the animal feed industry is by far the main consumer of soybeans. Furthermore, due to their high oil content, they have the potential to provide significant amounts of energy (NAMC, 2011).

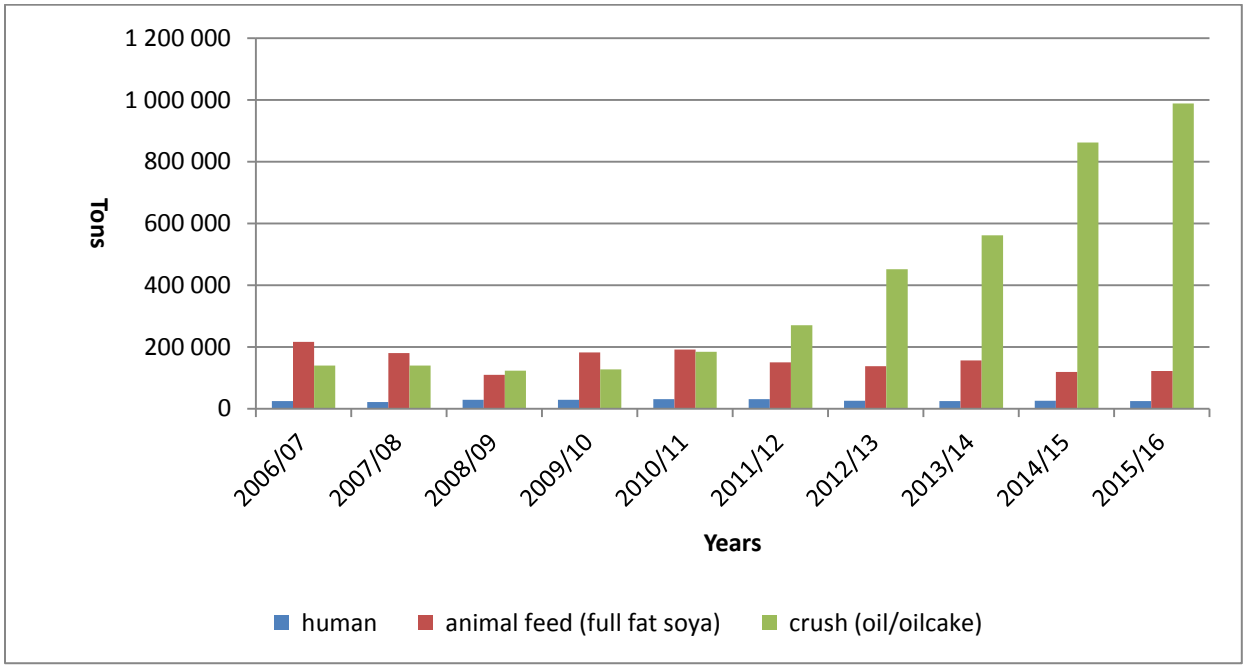

Figure 2-4: Domestic soybean processing

Source: SAGIS (2016)

Figure 2.4 indicates that since 2006/07, the greatest quantities of soybeans were used as oil and oil cake, as well as animal feed. It is also important to note how crushing increased from as little as 139 400 tons in 2006/07 to 988 024 tons in 2016/17. There was also a decline in the processing of animal feed between 2006/07 and 2008/09. The situation improved from 2009/10 to 2010/11, with a further decrease from 2011/12 to 2012/13. The soybean volumes absorbed for human consumption has remained relatively stable, at an average of 26 572 tons per annum for the period under review.

In 2015/16, domestic processing of soybeans stood at 1 134 110 tons. This includes 24 323 tons processed for human consumption, 121 763 tons processed for animal feed (full fat) consumption, and 988 024 tons for crushing for oil and oilcake.

2.4 Global and South African prices of soybeans

The soybean industry can be considered as a commodity market, and as a result, price will have a considerable effect of the production, consumption and trade of soybean and its products. In this section, global and local price trends of soybeans and its products are discussed.

2.4.1 Global prices of soybeans and its products

The prices of soybeans and its products vary substantially from one season to the next, as is the case for all other field crops. This is due to the crop production's high level of dependence on climatic factors.

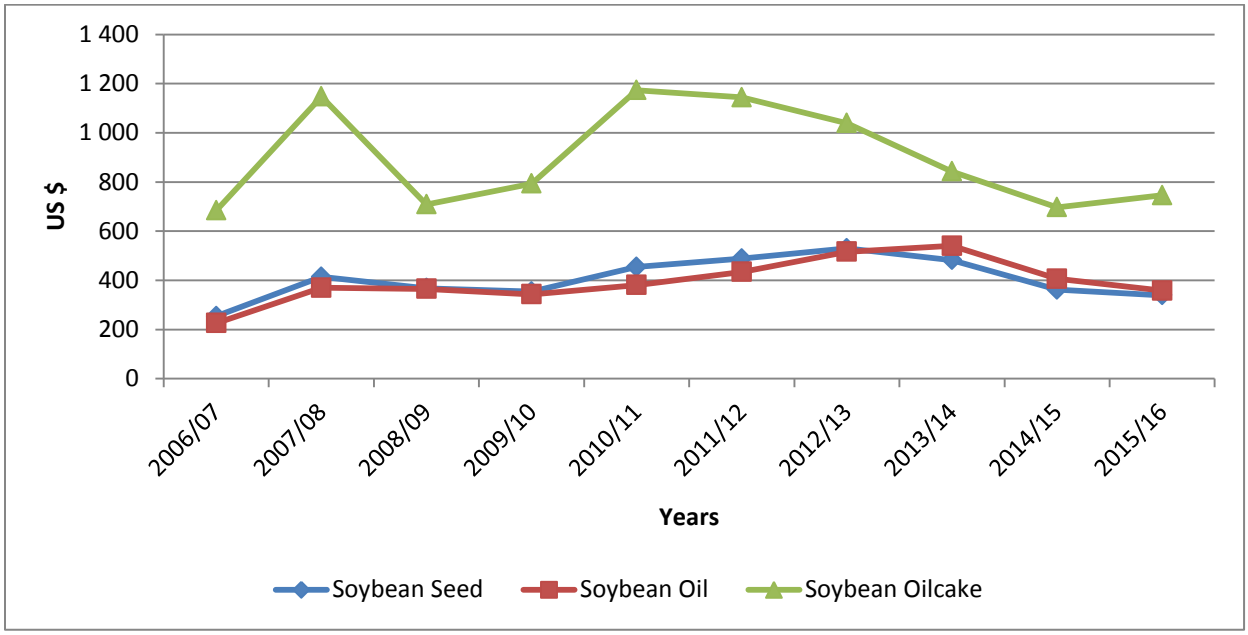

Figure 2-5: Global soybean prices

Source: USDA-FAS (2016)

Figure 2.5 represents the global prices of soybeans, soybean meal and soybean oilcake. Soybean prices were contextualised using the US farm price, and for the meal and oilcake, average wholesale 48% protein and US tank prices for crude oil were used. Soybean oilcake prices are considerably higher than the soybean seed. This means that the gap in price increases as more value is added to the commodity. As illustrated in Figure 2.5, it is clear that the soybean oilcake price increased massively from 2006/07 to 2007/08, and also from 2008/09 to 2011/12. The

prices also experienced a steady decline from 2011/12 to 2014/15, with a slight increase in 2015/16. Prices of both soybean seed and oil were on the same trajectory and were generally stable for the period under review.

2.4.2 South African prices of soybeans

International prices, as discussed above, have a direct bearing on local prices. According to Figure 2.6 below, soybean prices have been on an upward trajectory for the period under review. There was a steady increase in prices between 2006/07 and 2008/09, and also between 2010/11 and 2015/16. There was also a decline in prices between 2008/09 and 2010/11. The fact that the producer prices for soybean have been on an upward trajectory is expected to influence the planting and crushing of soybeans in the future.

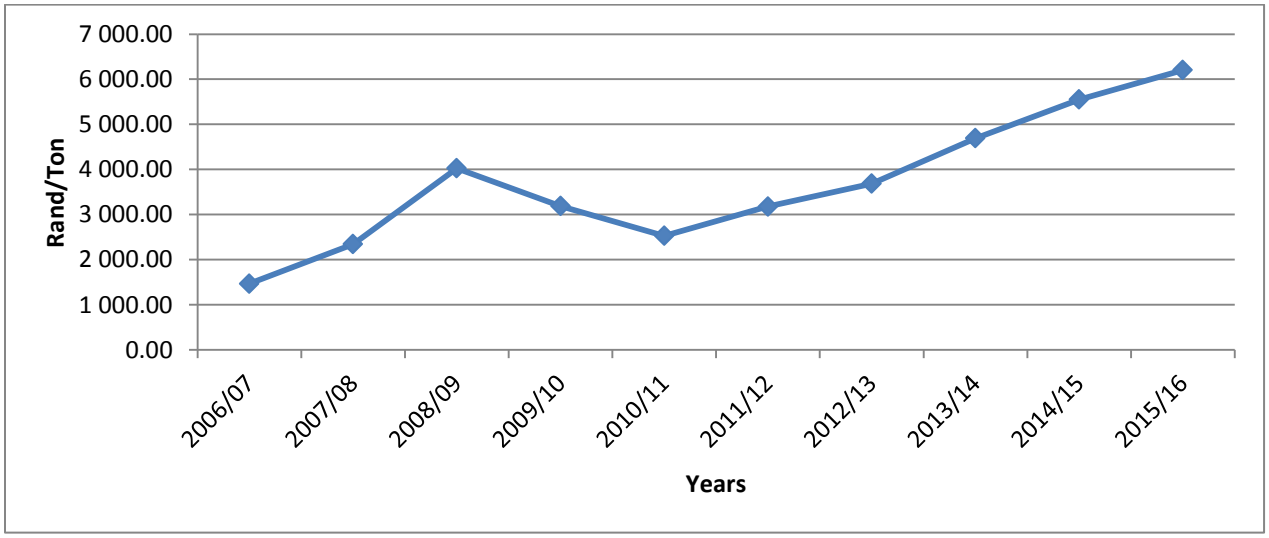

Figure 2-6: South African soybean producer prices

Source: Abstract of Agricultural Statistics (2016)

2.5 Global and South African trade of soybeans

In this section, the total amount of soybeans traded globally, as well as locally, is discussed.

2.5.1 Global trade of soybeans

The global trade of oilseed is made up of numerous closely substitutable crops, with sunflower, rape and cottonseed providing possible substitutes for soybeans. Various needs for protein meal, vegetable and biofuel oils determine the proportion of oilseeds products that nations trade (McFarlane, Ernesto and O'Connor, 2014).

According to Hallatt (2005), the global trade for oilseeds (including soybeans) during the 1970s and 1980s consisted of exports from the USA into the EU where oilseeds were crushed and consumed locally or shipped to the developing countries. During the 1990s, most of the growth in global trade involved the expansion of soybean production in South and North America to accommodate the Asian demand in the Pacific region. Trade with China grew significantly in the 2000s. The growth was more than the global trade, and more than in any other part of the world.

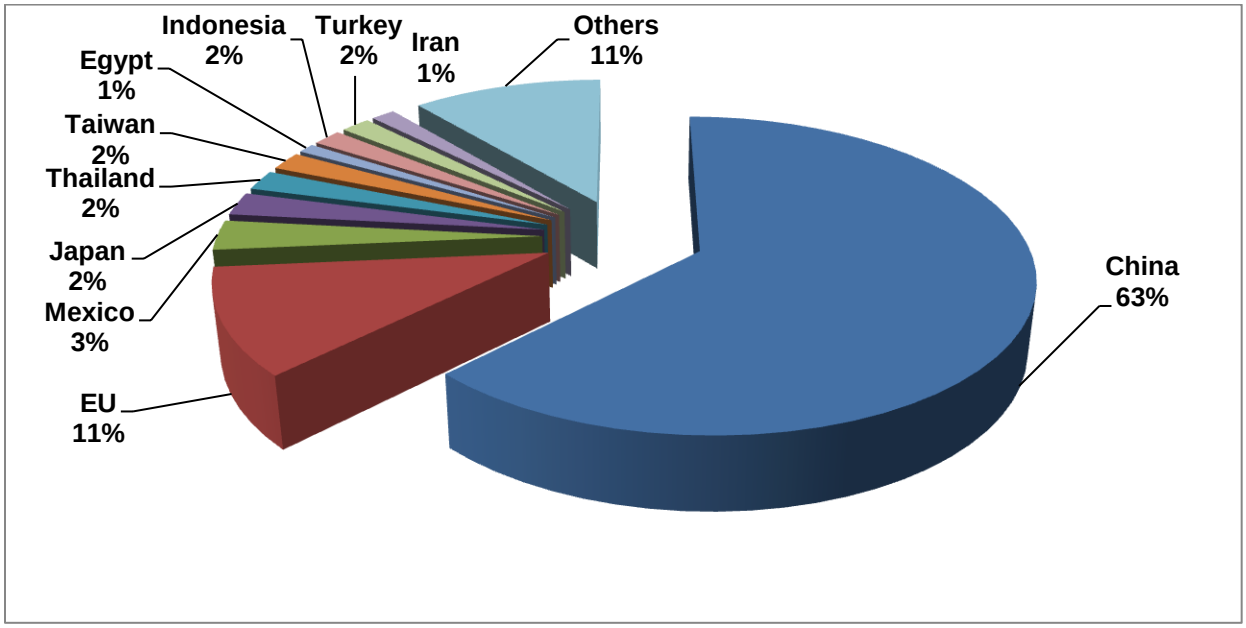

Figure 2-7: Leading global importers of soybean seed

Source: USDA–FAS (2016)

According to Figure 2.7, most trade in raw soybean involves only an insignificant quantity of inter-country flows. The majority of world trade in soybeans can be characterised by a massive movement from the USA, Brazil, and Argentina to China and the EU, where it is processed.

China is by far the largest importer of soybean seed, with a 63% of the global soybean seed imports, followed by the EU with 11% of the global soybean seed imports in 2015/16. The main feature of the global soybean trade is its high level of concentration, with a few countries accounting for the majority of global soybean trade.

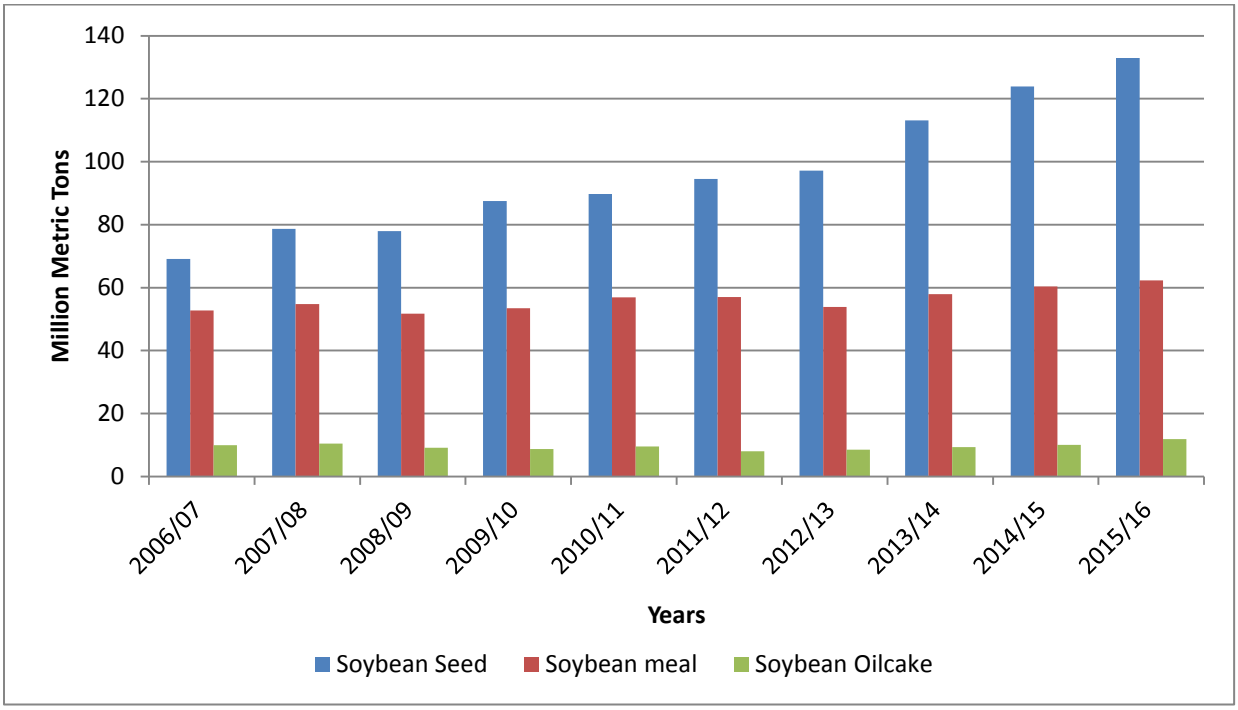

Figure 2-8: Global imports for soybeans and products

Source: USDA–FAS (2016)

Figure 2.8 depicts global imports of soybeans and its products. It can be seen that global imports are on an upward trajectory for the period under review. The global imports for soybean meal have been steady, while the global imports of soybean oilcake are insignificant. As indicated earlier, the increase in soybean imports is primarily driven by demand from China.

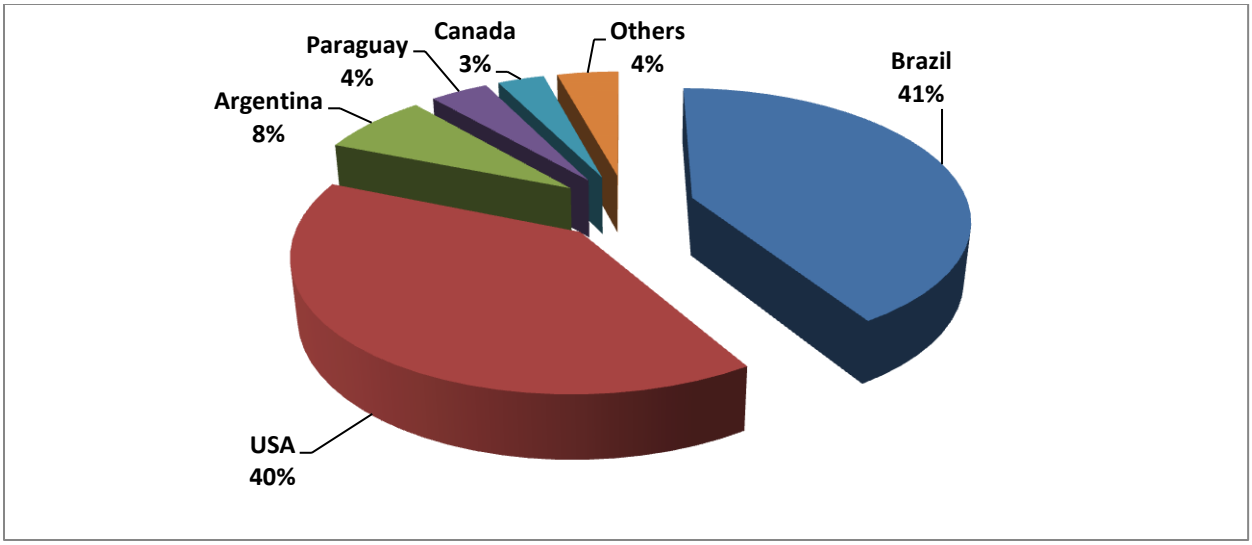

Figure 2-9: Leading global exporters for soybean seed

Source: USDA–FAS (2016)

According to figure 2.9, Brazil is biggest exporter of soybean seed, with a 41% of the global soybean exports, followed by the USA (at 40%) and Argentina (at 8%) of the global soybean seed exports in 2015/16. The top three exporters are responsible for almost 90% of the global soybean seed export market. As explained earlier, the main feature of the global soybean trade is its high level of concentration, with a few countries accounting for the majority of global soybean trade.

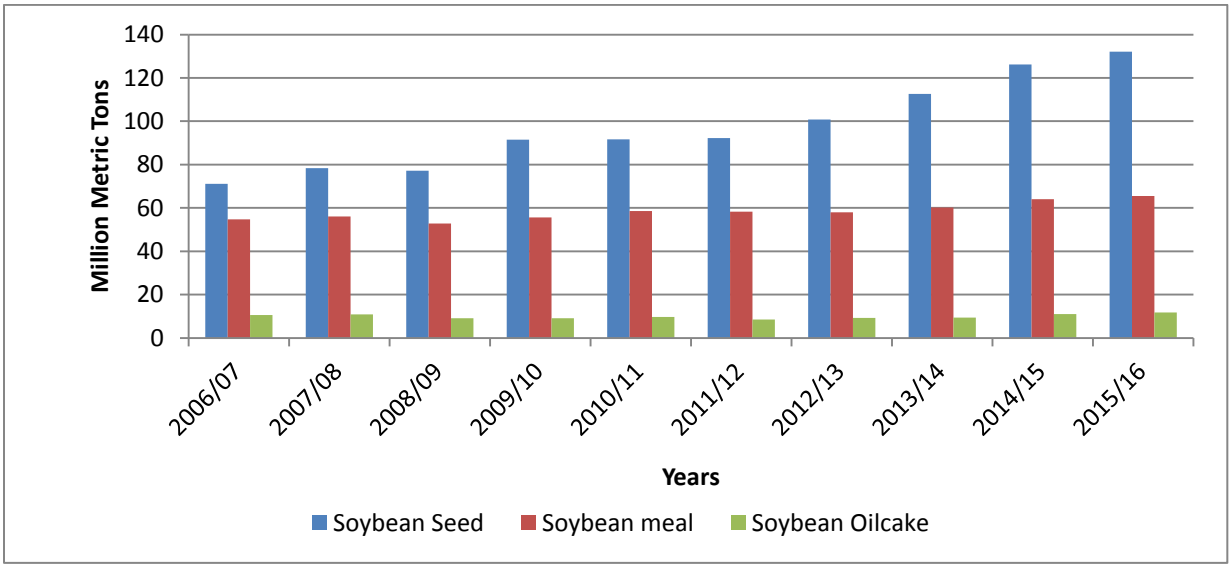

Figure 2-10: Global exports for soybean seed

Source: USDA–FAS (2016)

Figure 2.10 depicts global exports of soybeans and its products. It can be seen that global exports have been on an upward trajectory for the period under review. The global exports for soybean meal have been steady, while the global exports of soybean oilcake are insignificant.

2.5.2 South African trade of soybeans

The domestic supply of soybean is one of the crucial factors for the South African soybean industry. South Africa is a net importer of soybean products, particularly soybean oilcake. South Africa mainly imports soybean oilcake from Argentina.

The domestic supply of soybean is one of the crucial factors for the South African soybean industry. South Africa is a net importer of soybean products, particularly soybean oilcake. South Africa mainly imports soybean oilcake from Argentina.

2.5.2.1 Trade balance of soybean and products

According to Figure 2.11, the South African soybean industry (at the primary level) recorded a negative trade balance between 2006 and 2008. The situation was reversed between 2009 and 2012, where the industry recorded a positive trade balance. The increase in exports is the result of South Africa increasing its soybean exports to other African states, such as Sudan, Zimbabwe, Mozambique, Kenya, Tanzania, the Democratic Republic of Congo (DRC), Malawi, Senegal, Zambia, and Angola; and to Asia (Pakistan and Turkey), South America (Argentina and Uruguay) and Europe (France). Furthermore, South Africa experienced a decline in exports volumes, with a negative trade balance recorded between 2013 and 2015.

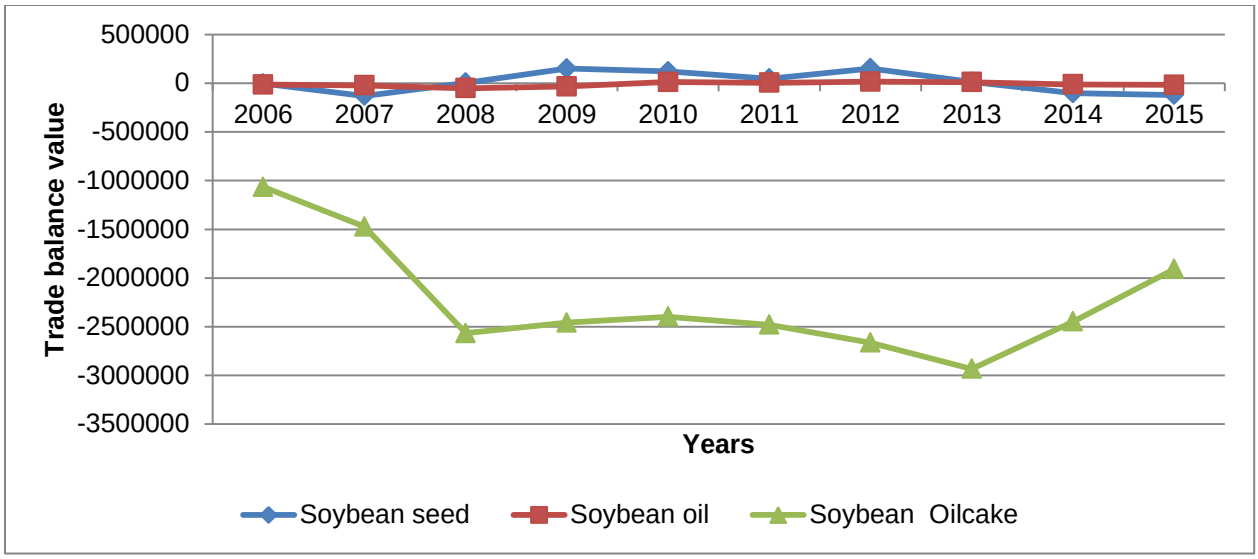

Figure 2-11: Soybean and products trade balance

Source: Calculated from the Quantec Easy Data (2016) and SAGIS (2016)

South African soybean meal also had a trade balance that was negative for the period under review. This implies that the country imported soybean meal to supplement domestic production. The increased demand of soybean meal is mainly driven by the processing sector.

Furthermore, the local soybean oilcake industry had a negative trade balance, which implies that the country imported soybean oilcake to supplement domestic production. As mentioned earlier, there is a growing demand for soybean oilcake by the animal feed sector (particularly poultry) in South Africa. Due to its affordability, soybean oilcake is being used increasingly as a substitute for fishmeal in feed rations. It is also important to note that there has been a continuous decrease in the trade balance of soybean oilcake from 2013 to 2015. The continuous decrease represents a significant sign of a structural adjustment currently taking place in the domestic soybean value chain. With the increased crushing capacity in the local soybean industry, more local soybeans are channelled to crushing for animal feed, thus substituting the historically significant volumes of soybean oilcake imports. This trend is obvious and it can be expected that soybean oilcake imports can be substituted over a period of time by the locally produced product.

2.5.2.2 Tariff and non-tariff barriers

Tariff and non-tariff barriers play a significant role in influencing trade patterns. Countries utilise tariffs barriers and non-tariffs barriers to offer domestic producers protection from imported products. Tariffs increase the price of imported products, compared with domestic products. This will result in domestic products gaining a relative price advantage. Non-tariff barriers are mainly applied in the form of strict sanitary and phytosanitary measures or the adherence to certification measures, such as Good Agricultural Standards (GAP), Good Manufacturing Standards (GMP), and International Organization for Standards (ISO). Non-tariff barriers increase the producer's costs throughout the value chain due to the complexity of the processes that must adhered to and the administrative cost of ensuring that all procedures are well documented**.** Table 3.2 below sets out the import tariffs applied by South Africa to imports of soybeans from various regions of the world**.**

Table 2-2: Soybean import tariffs applied by South Africa

Trade Regime	**Aggregated Ad Valorem Applied Tariffs (2015)**
Intra-SACU rate	0%
SADC	0%
General	8%
European Union (EU)	0%
European Free Trade Association (EFTA)	8%

Source: ITC Market Access Map (2016)

It is clear from Table 2.2 that the tariff rate that is normally applied in the domestic market to soybean imports from other parts of the world is 8%, unless in an event where there is a specific trade deal between South Africa and those countries. A 0% preferential tariff is applied by South Africa on soybeans imports from the EU, SADC and SACU. Imports of soybeans from outside the three regions (EU, SADC and SACU) into South Africa are exposed to an import duty of 8%.

2.6 Key global and South African trends

2.6.1 Key global soybean industry trends

The global soybean value chain (production, processing and marketing) is characterised by a high level of concentration, with only three countries – the USA, Argentina and Brazil – accounting for almost 83% of world output. Soybean contributes massively to the entire value added by the agricultural industry in the major producing countries, and particularly so in the USA, Argentina and Brazil. In these countries, soybean and its value-added products (oil and oilcake) generate significant export earnings. A few other countries, notably China and the EU, are also involved in imports (mainly oilcake). The current structure of the global soybean industry may mean that small producers, especially in developing countries, might find it extremely difficult to compete, in particular when confronted with fast expanding and highly efficient trade.

2.6.2 Key South African soybean industry trends

From the local soybean industry's perspective, the following major trends emerge from the above assessment.

2.6.2.1 Soybean producers

There is an important relationship between the production of maize and soybean in South Africa. This relationship is the result of their substitutability. Soybeans are normally planted between November and January, and that is almost concurrent with the planting timeframe for maize plantings.

The area dedicated to soybean production in South Africa has increased substantially from 134 000 hectares cultivated in 2000/01 to 520 000 hectares cultivated in 2015/16 (Figure 2.12). There was a downward pressure on maize prices in 2010/11 as a result of an oversupply of maize on the domestic market in 2010/11. At the same time, the 2011 soybean prices had great support and that encouraged producers to increase their soybean production. It is also apparent from Figure 3.12 that the yield per hectare ranged between 1.1 and 2.1 tons per hectare, which has

varied to a great extent over a period of time. This may suggest a growth in the usage of GMO seed, although the usage of farm-saved seed is still significant.

Figure 2-12: South African soybean production, area harvested and yield

Source: Abstract of Agricultural Statistics (2016)

Figure 2.13 illustrates the inverse relationship between maize and soybean production. As discussed in the previous section, this inverse relationship was experienced in 2010/11 where there was an oversupply of maize in the domestic market, and that created pressure on maize prices. As further illustrated by Figure 3.13, maize prices increased as the surplus of maize decreased where farmers reallocated land from maize to soybean. It is also clear from Figure 3.13 that there was an increase in the reprioritisation from maize to soybean from 2010 to 2011. When the prices of maize increased in 2012, the inverse relationship had an impact on producers as they switched back to maize production from soybeans.

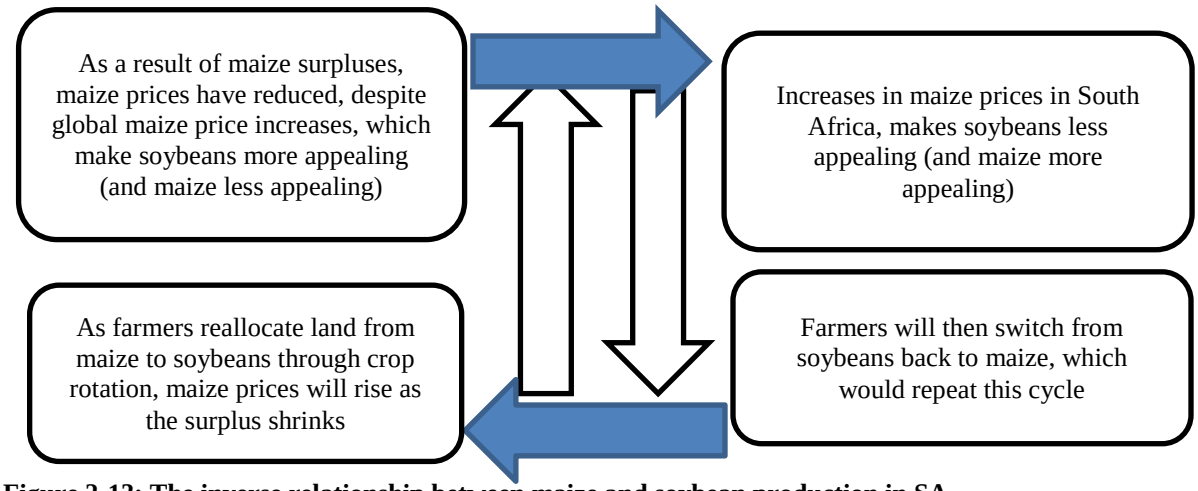

Figure 2-13: The inverse relationship between maize and soybean production in SA

Source: NAMC (2011)

Over the past fifteen years, soybean crops have shown significant growth when compared with maize, wheat, groundnuts and sunflower (Table 2.3). Majority of these crops, especially groundnuts recorded significant decreases, due to decreases in yields and domestic demand, particularly in the edible peanut market.

Table 2-3: Summer grain production in South Africa

	Maize (1 000 tons)	**Grain Sorghum (1 000 tons)**	**Groundnuts (1 000 tons)**	**Sunflower (1 000 tons)**	**Soybean (1 000 tons)**
2001/02	10 076	258	134	967	223
2002/03	9 705	260	67	682	137
2003/04	9 737	449	128	674	220
2004/05	11 749	313	72	645	273
2005/06	6 947	110	84	541	424
2006/07	7 339	202	66	312	205
2007/08	13 164	293	100	907	282
2008/09	12 567	318	113	833	516
2009/10	13 421	226	100	509	566
2010/11	10 924	178	73	894	710
2011/12	12 759	156	67	543	650
2012/13	12 486	169	47	579	785
2013/14	14 925	305	84	865	948
2014/15	10 629	139	70	689	1 070
2015/16	7 740	20	20	785	742

Source: Abstract of Agricultural Statistics (2016)

The farmers' ultimate decision to cultivate soybeans will primarily be influenced by profitability and price relations with other competing commodities. Other aspects that will sway the farmers' decisions will primarily comprise the advantages derived from crop rotation practices which include low input costs and better yields for the crop and diversification plans (NAMC, 2011).

2.6.2.2 Soybean crushing

As illustrated in the previous section, soybean production grew by 60% between the 2011/12 and 2014/15 production seasons. At the same time, the area planted increased by 68%. The key underlying factor behind this growth was the demand from the crushing plants. According to BFAP (2015), the entire crushing capacity acquired from specialist soybean crushers in South Africa is estimated at 1.788 million tons.

Taking into consideration the fact that most plants have the capacity to alternate between soybeans and sunflower crushing, this capacity can be increased to over 2.5 million tons, if all plants with dual capacity were to crush only soybeans. As illustrated by global comparisons, crushing capacity shows that utilisation tends to remain under at 85%, with 80% being accepted over a period of time. Those international norms are being accepted as a benchmark for modern crushing facilities (AFMA, 2015). Table 2.4 illustrates the crushing capacity of the South African oilseed industry

According to Table 2.4, the largest of the plants for soybean crushing is that of Noble in Standerton, Mpumalanga. The plant has a crushing capacity of 336 000 tons. That is followed by Willowton Oil Mills in Pietermaritzburg, Kwa-Zulu Natal, with a crushing capacity of 276 000 tons. The third largest plant is Russell Stone Protein's plant in Bronkhorstspruit, Mpumalanga, with a crushing capacity of 240 000 tons. The other prominent plants are Nedan Oil (228 000 tons), Majesty (192 000 tons), and Continental Oil Mills (180 000 tons). In all, the total crushing capacity for South African oilseeds (soybeans and sunflower) is estimated to be approximately 3.5 million tons. There are four crushers (Elangeni Oil & Cake Mills, Willowton Oil Mills, Noble, and Majesty) with dual crushing capabilities. There are also five plants (Nedan, Drak, VKB, Russell Stone and Gauteng Oil) that primarily focus on soybeans.

Table 2-4: South African oilseed crushing capacity

Name	Location	Status	Total Soybean crushing (1000 t/year)	Total Sunflower crushing (1000 t/year)
Historical				
Capital Oil Mills	Pietermaritzburg	Closed	–	–
Continental Oil Mills	Viljoenskroon	Running	120	
Continental Oil Mills	Randfontein	Running	192	180
Elangeni Oil & Cake Mills	Isithebe	No more sunflower	–	–
Epic Foods	Southdale/Soweto/ Nasrec	No plant	–	–
Epko Oilseed Crushing	Lichtenburg	Running	120	–
Nola Industries	Randfontein	Running	120	–
Gauteng Oil	Gauteng	Running	120	–
Sealake Industries	Pietermaritzburg	Closed	–	–
Sun Oil Refineries	Durban	Refinery only	–	–
Sunola Oil Mills	Port Shepstone	Refinery only	–	–
Hentiq 1320	Cumberwood	Closed	–	–
Willowton Oil Mills	Cape Town	Used to be ground nuts	168	
Willowton Oil Mills	Pietermaritzburg	Running	240	276
Willowton Oil Mills	Isando	Running	–	–
UBR		Closed	–	–
CEOCO	Boksburg	Running	192	–
Nedan Oil	Mokopane	Running	96	96
More Recent				
Nedan Oil	Mokopane	Running	–	228
Drak	Winterton	Running	–	48
VKB	Villiers Coop	Running	–	96
Russell Stone	Bronkhorstspruit	Running	–	240
Noble	Standerton	Running	269	336
Gauteng Oil	Nasrec	Running	–	96
Majesty	Mogale City	Running	154	192
Russel Stone	Bethlehem	Start-up	–	–
Total Individual Crushing Capacity (1000t)			**1 790**	**1 788**

Source: BFAP (2015)

Processors will normally have to make decisions on whether to process soybean or sunflower (NAMC, 2011). The following illustrates the key considerations that guide the final decisions for both commodities.

Soybeans:

- The demand from the feed industry, particularly poultry and pork, for soybean cake is normally high.
- The demand for soybean cake is normally higher than that for sunflower cake, despite being more expensive.
- Soybean seed yields almost twice more than sunflower seed does. Furthermore, soybean cake is traded at prices higher than sunflower cake is.
- There are challenges with the soybean quality of soybean cake due to inconsistencies of the protein content.

Sunflower:

- The majority of consumers prefer sunflower oil for cooking, and as a result, its demand is generally higher.
- The prices for sunflower oil normally fetch a premium, in comparison with the prices for soybean oil.
- As a result of its fibrous nature and protein content that is low in comparison with soybean, sunflower cake is generally viewed as inferior as compared with soybean cake.
- The dairy and beef sectors, together with those of other ruminants such as goats and sheep, primarily utilise sunflower cake.
- Sunflower seed provides twice the quantity of oil, as compared with soybean seed.

There are some efforts being made by the South African soybean industry to expand and build new soybean processing facilities. The expansion will enable the South African soybean industry to unlock value for farmers and processors. However, utilisation rates have remained relatively low as a result of the technical challenges experienced in some of the newly established plants, as well as a shortage of soybeans produced locally (AFMA, 2015). All that is currently lacking is

sufficient production to match the processing capacity. Although soybean production has grown tremendously as illustrated earlier, it will take a while to match capacity.

Investment in soybean processing plants is quite substantial. South Africa imports huge volumes of soybean products, and with recent developments, improvements in genetically modified seeds and investments in crushing plants, the prospects for the industry remain positive. Local production is already expanding, as illustrated in the previous section. As local production grows, local crushers can replace imports with domestic products. Should all the processing plants operate efficiently as planned, it will be possible to replace import volumes in the near future.

2.6.2.3 Utilisation of soybeans

Soybean is mainly used in the production of soybean oil, oilcake (full-fat cake and low-fat cake) and to a lesser extent, products for human consumption. According to Dlamini *et al*. (2014), soybean constitutes an insignificant amount of the average South African household's diet, despite its remarkable nutritional qualities. In South Africa, the livestock feed industry remains the key driving force for soybean oilcake, with the poultry industry being the major user of proteins derived from soybeans by far (Joubert and Jooste, 2013). Table 2.5 illustrates the soybean oilcake usage by the livestock feed industry.

Table 2-5: Soybean oilcake usage by the livestock feed industry

Volume in Tons	**2011/12**	**2012/13**	**2013/14**	**2014/15**	**2015/16**
Soybean oilcake (Including soy oilcake & full-fat soy	1 008 760	892 480	896 937	968 782	1 008 698

Source: AFMA (2015)

Soybean oilcake and full-fat soya consumption reflected a 14.6% increase, from 968 782 to 1 008 698 tons in 2015/16. The increase, according to AFMA (2016), can mainly be attributed to an increase in the inclusion rate in poultry and other feed diets, as well as greater oilcake sales to non-AFMA members.

2.6.2.4 Price formulation in the South African soybean industry

The prices for soybeans, like other oilseeds, vary substantially from one season to the next. Although soybean is traded on SAFEX like other grains such as maize and wheat, the local price of soybean is not only influenced by the local demand and supply factors of soybean, but also by the supply and demand factors of the international soybean markets. The international soybean prices act as a guideline for domestic soybean prices. Domestic soybean producers trade their soybean produce with local processors at import parity prices (particularly the Argentina import parity prices). The situation regarding the Argentinian market is significant for the local market because the Argentinian soybean market has a similar marketing period as the South African soybean producers have.

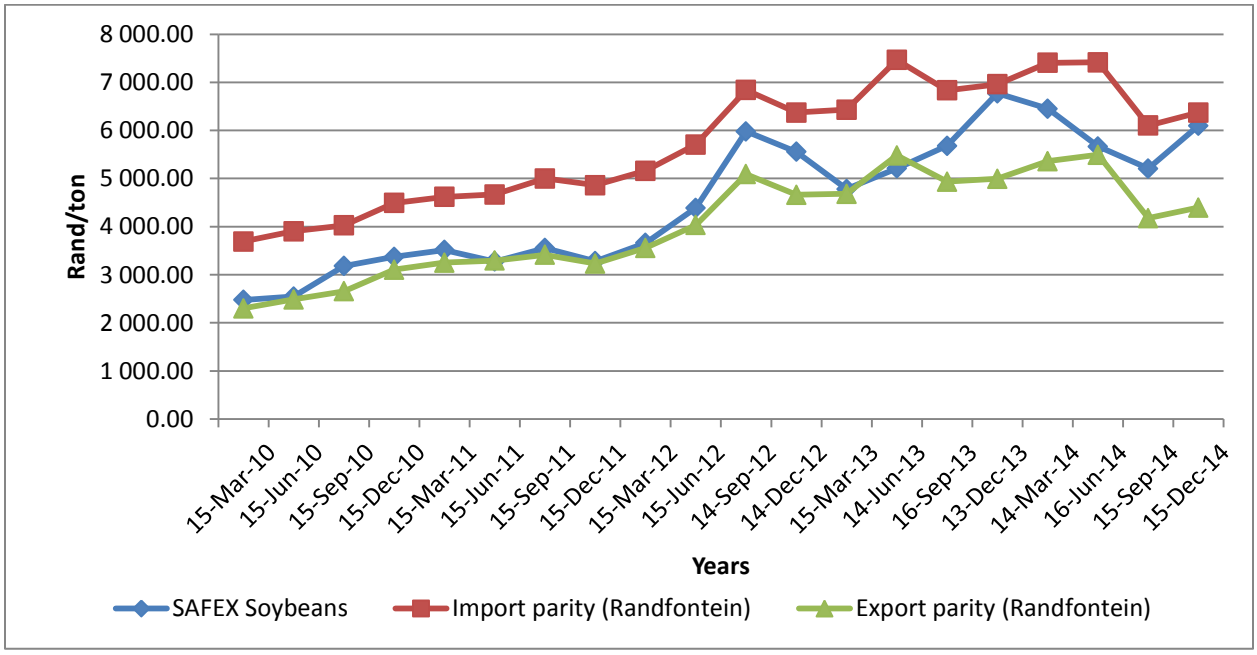

Figure 2-14: Domestic soybean prices

Source: Grain SA (2014)

Figure 2.14 illustrates the relationship between the import parity and export parity prices at Randfontein, and the soybean price traded on SAFEX. As previously mentioned, South Africa is a net importer of soybean, which implies that the local price is normally traded closer to import parity levels. The local prices were well below the import parity price before 2012. The major investments in the processing facilities may have been behind the shift closer to the import parity

prices. Local industry shifts between export and import parity prices depending on the availability of local soybeans.

According to AFMA (2015), the domestic soybean prices are generally below import parity levels, since they are obtained from the oil and oilcake prices. Consequently, the crushing margins are subjected to enormous pressure, as soybean costs increase to import parity levels. However, the utilisation rates are projected to improve over the course of the next decade, and with local soybean production still growing, only small volumes of soybeans will occasionally be imported. This, in the short term, means that if a local company could import soybean or soybean products from Argentina at a lower price than that of the locally produced products supplied by the crushers, the company would simply import soybeans from Argentina. South Africa is not a significant role player in international soybean production and trade, and as such, the country is regarded as a price taker.

2.6.2.5 Oil content analysis

Protein extraction is, in most cases, the main objective of processing because of the high protein content found in soybeans. Most soybean seed is sold in the form of soybean oilcake, with an average of 47% protein. This process is where quality of seed plays a major role. The fact that one cannot create protein, and only extract it, indicates that low-protein soybeans will result in low-protein meal. Although there are other factors affecting this, it is crucial to understand the relationship that these factors have in the process of effectively extracting oil and protein out of soybeans.

South Africa has no official specification in terms of a "norm" oil content that should be delivered. According to The APS Act, No 119 of 1990, there are two grades of soybeans in South Africa, namely class 'SB' and class 'other'. In this grading, there is no reference made to protein or oil content in the seed, only to impurities and moisture content.

2.7 Conclusion

This chapter provided an overview of the South African soybean industry in relation to the global industry. The chapter provided an overview of the soybean industry with a particular

emphasis on the value chain structure (production, crushing, pricing and trade) at both local and global levels.

In global terms, soybean is highly traded and is the most important oilseed in the world. It provides a source of high-quality protein in animal feed, especially for the poultry and pork industries, as well as a source of edible oil for humans. Soybean production is highly concentrated geographically, with only three countries, the USA, Brazil and Argentina, accounting for over 80% of world output. At the same time, South Africa is an insignificant player, being responsible for less than 1% of global production. China is the largest importer and processor of soybeans, by far.

Both local and global crushing capacities have been on an increase over a period of time. The increase in local crushing capacity is primarily attributable to the increased investment in local crushing facilities, led by the government through the IPAP. The outcome of this favourable agricultural policy environment has enabled soybean farmers to produce increasingly high-yielding soybeans over a period of time. The increased crushing capacity in the local soybean industry means that more local soybeans will be channelled to crushing for animal feed, and so replacing the historically high volumes of soybean oilcake imports. Local imports of soybean oilcakes can be substituted by the domestic product, as this trend becomes obvious. Furthermore, the producer prices for soybean have been on the increase. This is expected to influence both the planting and crushing of soybeans in the future.

South Africa is primarily a net importer of soybean products, particularly soybean oilcake. South Africa mainly imports soybean oilcake from Argentina. The large volumes of soybean oilcake imported by South Africa are indicative of a problem. The reason for this reliance on imports has been the lower prices of imports. Although the soybean oilcake imports have decreased slightly over a period of time, this can still be detrimental to the South African soybean oilcake processors.

CHAPTER 3
LITERATURE SURVEY AND THEORETICAL FRAMEWORK

3.1 Introduction

According to Esterhuizen (2006), the volume of literature on competitiveness is growing in economics and business studies but there is little agreement on what the term means. The American former-Secretary of Labour, Robert Reich, expressed his frustration with the term "competitiveness" by saying, "rarely has a term in public discourse gone so directly from obscurity to meaninglessness without an intervening period of coherence". The lack of coherence in terms of defining and measuring competitiveness renders the process of comparing results from various studies, as they increase around the globe, extremely difficult. Competitiveness is therefore conceptualised in this paper through the definition by Esterhuizen (2006) which regards competitiveness as being the ability to successfully compete by the sector, industry or firm. This is done so as to obtain development that is sustainable within the international set-up, while accumulating, at least, the opportunity cost of returns on resources.

The definition of competitiveness as explained above illustrates two key types of competition. The first being competition in both local and global product markets and the capacity to acquire and keep market share. The second aspect is competition in terms of factor markets, where factors deployed in developing products have to justify at least their opportunity cost. Both types of competition, though pointing to various aspects, are illustrative of the fact that competitiveness is a relative measure.

According to Pitts and Lagnevik (1997), the dissection of competitiveness is concerned with answering key economic questions in terms of the factors that determine investment, company success, and policies developed by the government. By scrutinising competitiveness, emphasis is placed on addressing issues regarding trade policy within the distorted global environment by substituting comparative advantage, and downgrading it to the level of a theoretical concept of insignificant practical value (Abbott and Bredahl, 1994).

The purpose of this chapter is, therefore, to define competitiveness. The foundation of this study in terms of principles and theoretical basis is built on both the Diamond Model by Porter and the

Revealed Comparative Methods by Balassa. Furthermore, value analysis from Porter's (1990) point of view is also discussed.

3.2 Defining the concept of competitiveness

Although several papers have investigated competitiveness empirically, or discussed its merit for social welfare such as living standards improvement, there is no agreement on its definition or on the exact methods to measure it (Latruffe, 2010). According to Porter (1990), the capacity of an industry to innovate and upgrade will ultimately influence the nation's competitiveness. Pressure and challenges enable companies to obtain advantage against the world's finest competitors. They benefit massively from their fierce home-based rivals, hostile local suppliers and demanding customers in the local market. Karacsony (2008) included the following groups as the factors that define competitiveness:

- Comparative advantages (in terms of technology, differences in productivity and natural makings);
- Competitive abilities (in terms of abilities by leadership and organisation, as well as cost-yield-income indicators); and
- The function of the public sector (in terms of the education system, research, macro-environment, infrastructure and regulations).

According to Lall (2001), the factors that greatly influence competitiveness are economic factors (such as required payment, cost, earnings, conditions in the market, and support in the form of subsidies) on the one side; and natural factors (such as climatic conditions, water and soil) as well factory factors (type of factory structure and provision of resources) on the other side. Competitiveness is generally associated with comparative advantage that is related to the theory of Heckscher-Ohlin and to competitive advantage connected to the Diamond Model by Porter.

3.3 Key indicators of competitive advantage

Researchers have, in general, applied two scientific approaches, namely models and indicators to measure and analyse competitiveness. According to Esterhuizen (2006), models are by their nature complicated and are normally custom-built to address particular challenges. Furthermore, models need a relatively huge investment in the gathering of statistics and analysis. They are therefore suitable for research in academia or in considering decisions regarding high-risk investments and choices of policies. It is also suitable to generally recruit specialist personnel, as modern developments in modelling methods are being introduced constantly. It is for this reason that this study focuses rather on indicators to analyse performance in terms of competitiveness.

The main alternative to model is the index number indicators. According to Masters (1995), the indicators are developed to calculate certain adjustments over a period of time or differentiation across various industries. It is the same principle applied in the determination of the Consumer Price Index (CPI) of inflation. Such indicators serve as thermometers or barometers, not weather forecasts, since they do not pretend to imitate the economy itself.

There are various indicators that can be applied in analysing competitiveness. The most frequently used are the internationally published competitive reports, real exchange rates and Foreign Direct Investment (FDI), export performance, and Unit Labour Cost. The methods differ extensively in terms of methodologies and data requirements.

3.4 Related studies on competitiveness

It is important to note that there had been few studies published on the significance of the items that address the economics and development of agricultural produce, from first point of production (farm level) to the final users (consumers) in the domestic industry. However, this has recently changed. The analysis of value chains has attained commercial importance in the last decade or two, as numerous researchers in agriculture began to notice its significance to the agricultural sector. Its popularity for research can be observed through the growth in the research that has been, and is currently being, handled. The significant changes, such as the change in demand by consumers, international competition, progress in technological advancement, and

the industrialisation of the agricultural sector, are the key drivers of this continued interest in value chain analysis of agricultural commodities.

Esterhuizen and Van Rooyen (1999); Esterhuizen and Van Rooyen (2001); Van Rooyen *et al*. (2000); and Van Rooyen and Esterhuizen (2001) have analysed the competitiveness of various value chains in the local agricultural sector by using the Revealed Comparative Advantage (RCA) index method developed by Balassa (1989). Their conclusions suggest that the majority of the local commodity value chains are only slightly competitive. At the same time, the competitive index reduces normally when proceeding from primary to value-added products. They argued in conclusion that the activities in value adding are limited in the South African agricultural sector.

Kalaba and Henneberry (2001) used the Almost Ideal Demand System (AIDS) to assess South Africa's competitiveness in apples, pears and grapes in the EU. Their analysis shows that fruit exports from South Africawere the least competitive when compared with a selected number of countries (Chile, the USA, New Zealand, Argentina and Turkey). They argued that the lack of competitiveness of domestic products could be the result of, amongst other things, apartheid-era South Africa having been numerous years 'in the wilderness' and producing products of poor quality in comparison with products from other countries.

Krabbe and Vink (2000), as well as Jooste and Van Schalkwyk (2001), conducted comparative advantage analyses of the domestic sugar industry and primary soybean production on dry land, respectively, by applying Policy Analysis Matrices (PAMs) developed by Monke and Pearson (1989). Grönum, van Schalkwyk and du Plessis (2000) also used the PAMs to investigate the comparative advantage of the production of soybeans under dry land in Brits, North West Province. It can be concluded generally from these analyses that there is only a marginal comparative advantage in terms of the production of these commodities in South Africa.

Mosoma (2004) analysed the competitiveness of the agricultural sector and the integration of the supply chain of South Africa, Argentina and Australia by applying the RTA index. The results illustrate the fact that agricultural value chains in South Africa are slightly competitive, internationally. At the same time, the agricultural value chains of both Argentina and Australia

are primarily more internationally competitive, when compared with the domestic market. The findings illustrate the fact that the local agricultural sector has succeeded in rising further up the value chain when compared with both Argentina and Australia. The conclusion was that competitiveness declines when shifting from primary to value-added products in all three countries. This suggests that opportunities for value adding in these three countries are generally limited.

Hallatt (2005) analysed the relative competitiveness of the local oilseed industry, in comparison with Argentina, by using the RCA, NXi and RTA indices. The results from the study illustrate the fact that domestic groundnuts and sunflower in their primary form have a competitive advantage. At the same time, the oilseed products in most cases have a competitive disadvantage. This is in contrast to Argentina's oilseed products.

Chogo (2009) analysed the relative competitiveness of the local potato industry through a comparison with some selected countries within the Southern Africa Development Community (SADC) by using the RTA index. The findings revealed that South African potato exports are the most competitive within the SADC region. At the same time, the South African potato supply chain's competitiveness was found to be marginal in relation to the regional performance. The South African potato value chain, when shifting from the production of raw potatoes to potato products, displayed a negative trend in competitiveness.

Dennis (2011) used RCA and RTA indices to analyse the comparative and competitive advantages of the local sunflower seed industry in relation to Argentina's sunflower seed industry. The results demonstrated that the local sunflower seed, in its primary form, is competitive. At the same time, South African products from sunflower seed exhibit a competitive disadvantage that is in contrast to the value-added sunflower seed products of Argentina.

It is evident from the above studies that much work has been done on the competitiveness of the domestic agricultural value chains in relation to other countries. At the same time, none of these studies assessed the competitive performance of the local soybean value chain, relative to those

of the Argentinian and Brazilian value chains. Hallatt (2005) analysed only the competitive performance of the domestic oilseed industry in relation to the competitiveness of Argentina's oilseed industry. A study that analyses the domestic soybeans industry's competitiveness in relation to those of Argentina and Brazil is indeed justified. This is because a study of that nature will generally increase our understanding of the capacity of the domestic soybean industry to compete globally with Argentina and Brazil.

3.5 Choosing a methodology

The selection and adoption of a methodology is not necessarily a straightforward process. According to the World Trade Organization (2012), the choice of methodology data includes the process of choosing between modelling approaches and descriptive statistics. At the same time, one has to select between simulation and econometric estimation, and choose between ex-ante and ex post approaches, as well as picking between general and partial equilibrium. Ex ante simulation has to do with estimating the impact of a policy adjustment on a set of chosen economic variables. Ex post approaches perform an analysis on the effects of previous trade policy by using historical data. The ex-ante approach is more useful in answering "what if" questions. However, ex post approaches can also address the "what if" questions under the presumption that previous relations remains relevant. This assumption provides the basis for approaches that apply approximated parameters for simulation. Ultimately, simulation/mathematical models are able to provide the most comprehensive insight. An ex-ante approach will demand considerable human resource capacity and data. It is for this reason that this study will only focus on an ex post approach (through the use of historical data).

3.6 Measuring competitiveness

The previous section described methods which only illustrate the initial steps applied in any competitive analysis. They further illustrate the point that the choice of a method for analysis is primarily influenced by the specific question or feature that needs to be addressed in relation to competitiveness.

As explained earlier in this chapter, competitiveness is a relative measure, and as a result, the indicators of competitiveness that compare one sector or industry within the economy relative to others are key for providing information regarding the competitiveness of a commodity or industry in the economy. On the other hand, indicators found on the complete production and market share will provide minimal information on competitiveness. The more advanced and all-inclusive measures of global competitiveness to be applied in this study take into consideration this aspect. These measures are the following:

- Relative Export Advantage Index (RXA);
- Relative Import Penetration Index (RMP); and
- Relative Trade Advantage Index (RTA).

The first two indices were originally developed by Balassa (1977; 1989) in what was referred to as the "Revealed Comparative Advantage" (RCA) model. This model is generally applied to identify the strong and weak sectors in a country. Liesner (1958) became the first to use the Revealed Comparative Advantage index, although it is widely known as the "Balassa index" after it was improved and popularised by Balassa (1965; 1989). The creation of the Revealed Comparative Advantage by Balassa (1965), and its succeeding extension (Balassa, 1977) to include a "stage" approach to industrialisation was a vital innovation. The RCA is expressed as:

$$\mathrm{RCA_{aj}} = \frac{\frac{\mathrm{X_{aj}}}{\mathrm{X_a}}}{\frac{\mathrm{X_{refj}}}{\mathrm{X_{ref}}}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

where Xaj represents the export value of industry j in country a, Xrefj is the value of exports by industry j in relation to a set of reference countries.

Mashabela (2007), Bender and Li (2002), and later, Batha and Jooste (2004) pointed out the measurement problems in Balassa's RCA index. These arise in relation to its definition, which is in autarkic price terms where relationships are not noticeable. Statistics from trade only reflect post-trade situations. Bender and Li (2002) further stated that the approach, as championed by Balassa (1965, 1977, 1979), presumes that a real system of comparative advantage may be

distinguished from post-trade data. Data availability at various levels of aggregation and the data bias as a result of public sector policy distortions, such as export subsidies and non-trade barriers, have been detrimental in determining a "proper" comparative advantage pattern.

In order to conduct an analysis of agricultural competitiveness, globally (Vollrath, 1987; 1989), and in terms of a deregulated global economy, Vollrath (1991) introduced the RTA index to analyse competitiveness. RTA is an alternative specification of revealed comparative advantage. The RTA index outlines a nation's share, in relation to the global market, in terms of a single commodity relative to its contribution towards all products that were traded. This method is applicable for both imports and exports. It weights revealed competitive advantage implicitly by determining the significance of the competitive advantages of both relative exports and relative imports. It is worked out as the balance between relative export advantage (RXA) that is equivalent to Balassa index, and the relative import advantage (RMP).

3.6.1 Relative Export Advantage Index (RXA)

The RXA index represents the relationship between the export ratio of a particular product of a specified nation on the global market, and the export ratio of the entire products of that particular nation on the global market. According to Chogo (2009), the special attribute of this measure is that the global "total" is captured as a total across all nations, except the one that is being analysed. This assists in avoiding the counting of both the numerator and denominator for countries and commodities. The product and the nation under consideration are removed when exports are added up, instead of the entire exports being included in the summations of Equation 1. This feature is crucial, particularly when a country is a significant role-player in the international markets. In cases like that, double counting would produce misleading and inaccurate index values.

According to Fertő and Hubbard (2001), the RXA by Vollrath varies from the RCA by Balassa in the sense that the RXA removes the double-counting of the commodity and country caused by the latter, and it considers the entire traded products and all nations, instead of sub-sets, and it is indeed international in nature. The RXA index is formulated mathematically as follows:

$$RXA_{ij} = \frac{\frac{X_{ij}}{\sum_{l,\ l\neq j} X_{ij}}}{\frac{\sum_{k,\ k\neq j} X_{kj}}{\sum_{k,\ k\neq i} \sum_{l,\ l\neq j} X_{kl}}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

where X represents the exports, and subscripts *i* and *k* represent the product, while *j* and *l* represent country categories. The numerator is equal to the exports by a nation of a particular product category in relation to these product exports from the entire nations of the world, excepting the nation being analysed. The denominator exposes exports of the entire products, except the commodity being analysed. The degree of these indicators illustrates the extent of the revealed export competitiveness and is thus interpreted in the following manner: a country with values above unity illustrates competitive advantage in a specified product, whereas competitive disadvantage is represented by values below one point.

3.6.2 Relative Import Penetration Index (RMP)

The RMP index is similar to the RXA index. The difference with the RMP index is that the foundation is based on imports (M), not exports as in the case of the RXA index. The RMP interpretation is opposite from the RXA (Hambalková, 2006). The RMP index is therefore mathematically formulated as follows:

$$RMP_{ij} = \frac{\frac{M_{ij}}{\sum_{l,\ l\neq j} M_{ij}}}{\frac{\sum_{k,\ k\neq j} M_{kj}}{\sum_{k,\ k\neq i} \sum_{l,\ l\neq j} M_{kl}}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

where M represents imports, and subscripts *i* and *k* represent products, while *j* and *l* represent country categories. The numerator is equal to the imports by the nation of a particular product in relation to these products imported from the entire nations of the world, excepting the nation being analysed. The denominator exposes imports of the entire products, except the product being analysed, to the specific nation by means of a percentage of imports of the entire products from the entire nations. The degree of these indicators represents the extent of import penetration

and is interpreted in the follow manner: competitive disadvantage is signalled by a value of unity, whereas values below unity illustrate competitive advantage.

3.6.3 Relative Trade Advantage Index (RTA)

The RTA index is generally regarded as an appropriate and more suitable method of analysis of competitiveness. It has been demonstrated by numerous researchers such as Vollrath (1991) that the RTA method permits for the calculation of competitiveness under a genuine global set-up, and is therefore the most suitable method for measuring the status of competitiveness. The RTA index provides the difference between the RXA and RMP. The RTA index is mathematically formulated as follows:

$$RTA_{ij} = RXA_{ij} - jRMP_{ij} \quad \text{.....(4)}$$

The competitive edge established by the indicator is completely weighted by the significance of relative export and relative import advantages. It is for that reason that it is not heavily influenced by acutely insignificant values of both exports or imports of the product under consideration. A competitive advantage is signalled by a positive value, whereas a competitive disadvantage is signalled by a negative value.

While calculations of both RXA and RMP indices are entirely based on values of either exports or imports, RTA considers the activities of both exports and imports (Mashabela, 2007). In terms of trade theory's position, this appears to be an advantage.

According to Frohberg and Hartmann (1997), the use of an RMP index alone can be extremely misleading because it can be distorted heavily as a result of the protection offered to local markets. In the severe case of banning imports or the introduction of a high import tariff that is prohibitive by nature, the RMP calculation will illustrate a positive competitive advantage, whereas the opposite might be the case. The other element that may create a misrepresentation for the entire indicators is the availability of intra-industry trade.

Pitts, Vianene, Trail, and Gellynk (1995) argued that if a country, for example acts only as a transit country, the RXA may demonstrate an artificially high level of competitiveness. It is therefore crucial in terms of what can be included as exports by any given nation. This is due to the fact that there are differences between various nations' databases. When taking into consideration both exports and imports, the RTA index offers a complete and better form of measurement. It establishes an explicit difference between a particular product and the rest of the other products, and also between a particular nation and the entire world. This helps in removing double counting for both the country and product.

According to Mashabela (2007), when one compares a cross-section of RTA indicators, various features of the formula may be altered, and that may, in a way, influence the interpretation of the RTA indicators. As a result, it becomes important to exercise care when interpreting an RTA index. It is also crucial to take into consideration the fact that when calculating RTA indicators, there are three features of the formula that may change. Firstly, it will be important to note that there is a commodity or commodity group. Furthermore, there is a nation or national groups for which one is calculating competitive advantage. Lastly, there are reference countries in a group.

Frohberg and Hartmann (1997) noted some numerical challenges in terms of all three indices (RTA, RXA and RMP). They argued that RXA and RMP are bound by zero from below, but unbound from above. RTA is also unbound from below, but a change in signal illustrates an alteration in the level of competitiveness. Where these indexes are bounded completely by explanation of any value, they would be uncomplicated since one would be in a desirable position to evaluate the magnitude of a nation's competitiveness or the lack of it. They further argued that it is also challenging to explain the results of these three indexes, particularly in an event where they reflect massive annual fluctuations, which are as a result of structural variations. This is the situation with the majority of nations that are in transition. This is because their economies (agricultural and food industries) are then under massive adjustment pressure. Furthermore, their annual variations in trade structure are significant. It therefore becomes a challenge to reach a conclusion regarding competitiveness under those conditions.

According to Ferto and Hubbard (2001), a major challenge with these indices is that government policies and interventions are likely to distort observed trade patterns, and by implication, this may misrepresent underlying comparative advantages. Furthermore, there is no explanation in terms of how a market share was acquired by a country. After all, market share can be maintained through costly government incentives.

Despite criticisms levelled at the RTA index, it has been widely applied by numerous scientists to analyse the competitive performance of agricultural industries. Mashabela (2007) employed RTA to analyse competitive performance of the domestic supply chains of the local deciduous fruit industry in relation to that of Chile. Hallatt (2005) also applied the same RTA to measure the relative competitiveness of the local oilseed industry. Furthermore, Esterhuizen and Van Rooyen (1999) applied the same index to analyse the competitiveness of local agribusiness in the food commodity chain and in agro-food and fibre industries. Based on the success of these earlier studies, this research will employ the RTA method to conduct a competitive analysis of the South African soybean industry

3.7 Data used

In measuring the South African soybean industry's competitiveness, it is important to establish the success that the soybean industry has experienced in trading its products, relative to its rivals over a period of time in both the domestic and global markets. It is for this purpose that the data for both imports and exports is required in order to compare the local performance in relation to the international competition.

The process of collecting data for this purpose can be a challenge. This is due to the fact that data is not necessarily accessible in an obtainable, or issued, in the format required. In order to address this challenge, trade statistics (values of both imports and exports) were retrieved from World Integrated Trade Solutions (WITS). WITS is a software tool established by the World Bank in partnership and assistance with several global agencies, including UNSD, ITC, UNCTAD and WTO. WITS provides one with access to key global trade, tariffs and non-tariff data collections through the following:

- **The UN COMTRADE** – the database includes yearly imports and exports statistics for more than 160 reporting countries or areas, which account for almost all trade, worldwide. The trade statistics are detailed, providing values and quantities for each commodity, broken down by trading partner.

- **The UNCTAD-TRAINS (Trade Analysis and Information System)** – the trade and market access information system is contained in the database drawn from the UN TARMAC. This is a joint primary data collection compiled from ITC, UNCTAD/WTO and WITS software. TRAINS comprises HS-based statistics for over 1 000 country/years, including tariff and non-tariff measures, as well as import flows by origin, for more than 160 countries, and dating from 1988. For tariffs, TRAINS contains generalised applied tariff data and information on applied preferential tariff, including the Generalised Systems of Preferences (GSP) and various regional and bilateral preferences.

- **The Integrated Data Base (IDB) and Consolidated Tariff Schedule (CTS) databases by WTO** – the databases include applied customs duties at the tariff line level and commitments on goods (bound tariffs and specific commitments in agriculture) by WTO members, respectively. Applied customs duties are supplied to the WTO secretariat by WTO member governments on an annual basis. The information is standardised and verified by the WTO secretariat. The commitments on products are developed either by WTO members themselves or by the WTO secretariat, and are approved by WTO members.

As explained in Chapter 1, this study relies primarily on secondary information and data. The primary reason for reliance on secondary information and data was mainly to save costs and time involved in the data collection. The specific requirements of the objectives of this study were not coordinated with the primary sources of data. At the same time, some of the variables that are crucial could not be brought out through the questionnaires and interviews, and those sources of primary data can sometimes be subjective.

In order to establish the extent of the competitiveness of the local soybean industry, it therefore becomes important to measure the success at which the sector has traded its products, in relation

to its rivals (Argentina and Brazil), over a period of time on both domestic and global markets. It is for this reason that both imports and exports are required to measure South African performance against international competition. Although questions regarding data quality are always to be asked, it is by far one of the best trade databases available. The database is readily obtainable on the Internet (http://wits.worldbank.org). Trade data figures between 2001 and 2015 were applied in order to establish the status of global competitiveness.

3.8 Porter's Diamond Model

Michael Porter (1990) introduced a competitiveness theory, called Porter's Diamond Model, after having observed the erosion of the USA's industry competitiveness by Japanese and European competitors in the early 1980s. Porter (1990) concluded that nations obtain a competitive advantage in a particular industry by using classical international trade theories. The theories are focused primarily on changing, over a period of time, the "inherited" variables in the form of natural resources, climate and profile of the working population.

Porter (1990) created a structure of competitive advantage, "A Diamond of National Advantage", using comprehensive examples of companies from a hundred industries in ten highly industrialised countries (Germany, Japan, Sweden, the United Kingdom (UK), Switzerland, the USA, Denmark, Italy, the Korean Republic and Singapore). Those countries contributed half of global exports by the mid-1980s. Competitive advantage, according to Porter (1990), implies having little costs, differentiation advantage, or a focus strategy that is successful. Porter maintained that productivity growth can improve the standard of living of a nation's citizenry. Productivity, as a result, is regarded as the key element for international competitiveness.

As illustrated by Figure 3.1, Porter's Diamond Model outlines four determinants that are country-specific and two variables that are external in order to illustrate the determinants of national advantage. Porter's four determinants and two exterior elements act together in the "diamond" of competitive advantage. The basic feature of a nation's competitiveness in a global environment will primarily depend on the nature and make-up of the interactions.

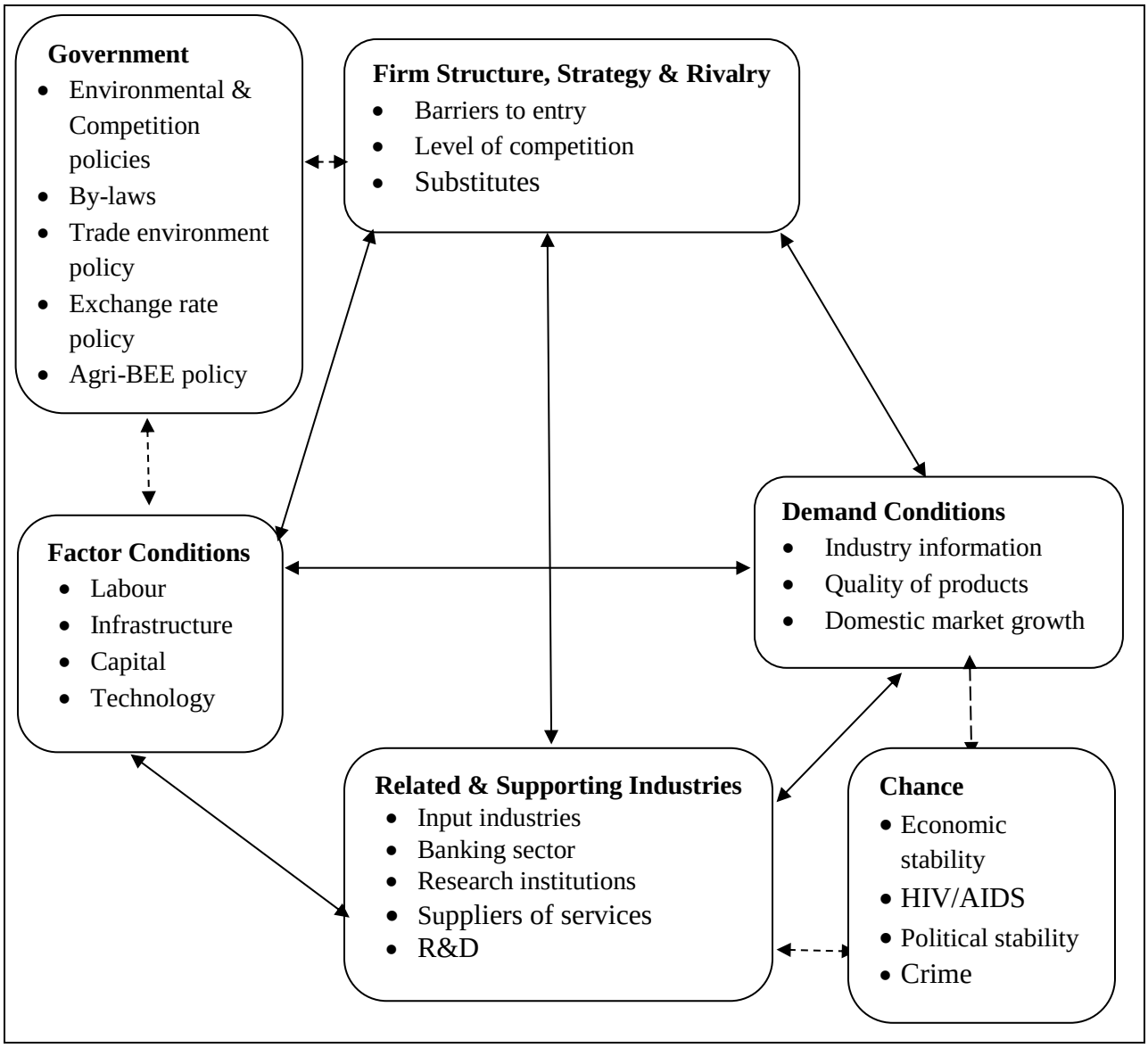

Figure 3-1: Determinants of national competitive advantage

Source: Porter (1990)

Figure 3.1illustrates the four main features of the Porter's Diamond Competitive Advantage Model that influence the domestic environment within which local companies compete.

3.9.1 Factor conditions

According to Smit (2010), factor conditions such as land, labour and capital are generally defined by traditional trade theories. Porter (1990) differentiates across various groups, namely

resources (capital, physical, knowledge and human) and infrastructure. Factor conditions may further be divided into primary and advanced factors. Primary factors may be distinguished as raw materials, climatic conditions, unskilled labour, and water resources. These factors are by nature inherited. Advanced factors are mainly in the form of skilled labour capital and infrastructure. These factors are established and advanced by reinvestment, as well as innovation, that build a foundation for a competitive advantage of a nation that is sustainable.

NAMC (2011) rated factor conditions as key drivers of the South African soybean industry's competitiveness in terms of having a constraining, enhancing or neutral impact on competitiveness. The factor conditions that mainly constrain the competitiveness of the South African soybean industry are the cost and productivity of labour, labour laws and quality of natural resources. Furthermore, factor conditions that drive the competitiveness of the South African soybean industry are availability and quality of operational infrastructure, availability and quality of technology and cost of capital. Technology is regarded as one of the key factors that determine the competitive position of the industry (Van Rooyen, Esterhuizen and Doyer (2000). Kirsten (1999) concurs that technology plays an integral part in enhancing competitiveness.

3.9.2 Demand conditions

According to Porter (1990), demand conditions in a country are perceived as being a source of competitive advantage for a country. Porter focused on demand differences, and not on similarities, to explain the international competitiveness of countries. The composition of home demand shapes how firms perceive, interpret and respond to the needs of the buyers. This impels firms to continually innovate and upgrade their competitive positions to meet the high standards in terms of product quality, features and service demands.

According to the NAMC (2011), demand condition with a major constraining impact on the competitiveness of the local soybean industry is industry information. Inadequate information regarding market prices and supply levels can render the industry uncompetitive. The availability, cost and of quality market information has an impact on the competitiveness of the South African agricultural and agro-processing sector (NDA, 2001). On the other hand, the

quality of locally produced inputs products has an enhancing impact on the competitiveness of the local soybean industry. The quality of the local inputs, impacts on the final products that the industry produces and that will enhance the competitiveness of the local industry.

3.9.3 Related and supporting industries

International competitive supplier industries are industries that create advantages in downstream industries through efficient, early or rapid access to cost-effective inputs. According to Liu and Hsu (2006), internationally competitive related industries are industries that can coordinate and share activities in the value chain when competing, or those which involve products that are complementary. The introduction of related and support industries as a separate determinant of national competitive advantage has been viewed as being one of the most important contributions of Porter's Diamond Theory (Teece, 1996). According to Porter (1998), the external economies of related and support industry clusters, such as networks of specialised input providers, intuitional and the effects of local rivalry become the true source of competitive advantage.

According to Mashabela (2007), a set of strong, related and supporting industries is crucial to the Industry's competitiveness. The presence of supplier industries that are globally competitive, in the form of input industries; banking sector; research institutions and suppliers of services, in the form of electricity, telecommunication and internet services, have a massive impact on the competitiveness of the soybean industry. According to the NAMC (2011), the related and supporting industries condition with a major constraining impact on the competitiveness of the local soybean industry is the cost and supply of electricity. At the same time, related and supporting industries condition with a major enhancing impact on the competitiveness of the local soybean industry is Research and Development (R&D). Majority of the role players in the local soybean industry are collaborating with scientific research institutions in their R&D activities is intensive and ongoing. These efforts have resulted in reduction in the cost of research and enhanced their competitiveness.

3.9.4 Firm strategy, structure and rivalry

The national conditions would determine how companies are created, organised and managed (Porter, 1990). The focus in this determinant is the point that the strategies and structures of firms depend on the national environment. There are systematic differences in the business sectors in different countries that determine the way in which firms compete in each country and, ultimately, their competitive advantage (Smit, 2010). Porter (1990) identified rivalry between local firms as the most critical driver of competitive advantage of a country's firms. Domestic rivalry forces firms to be cost competitive, to improve quality, launch new products, to invest in new and more advanced technologies, and to be innovative. According to Porter (1990), the global competitive advantage of companies is shaped by the international competitiveness of a country.

In terms of firm strategy, structure and rivalry, barriers to entry seem to have a constraining impact on the competitiveness of the local soybean industry. On the other hand, level of competition by domestic rival firms enhances the competitiveness of the local soybean industry (NAMC, 2011). The level of competition by domestic rivals in the soybean industry is extremely intense. This enhances competitive advantage of the industry since intense local rivalry creates pressure on them to improve and innovate. It pushes the firms to improve quality and services and to create new products and processes that are required for competitiveness.

3.9.5 Chance

Chance is mainly attributable to various developments in the form of new creations; political factors by foreign governments; conflicts; notable moves in global financial markets; changes in global or regional demands; and vital technological discoveries (Liu & Hsu, 2006). The events caused by chance can be disruptive in nature and are outside the control of firms and governments. All these factors can enable new competition that fully utilises opportunities that emerge from a realignment of the industry's structure.

HIV/AIDS, cost of crime and political climate are chance factors that have a constraining impact on the competitiveness of the local soybean industry. Unstable political climate undermines the

firms' capacity to plan and this will negatively influence their competitiveness. High levels of crime also impose costs to the firms and this constrains the competitiveness of the industry (NAMC, 2011). Crime and HIV/AIDS are externally manipulated factors over which the industry has relatively little control (Mashabela, 2007). Government therefore has to play a crucial role in ensuring that these issues are managed.

3.9.6 Government

All determinants of Porter's Diamond Model can be influenced by government policies. Government policies that are successful are applied in industries where key factors of the country's advantage are available and supported by public sector interventions. Several roles of the public sector are mainly in in the form of incentives; subsidies; policies and strategies aimed at education; improving capital markets; creation of national regulations and standards for products; acquiring of products and services; laws that governs tax; and regulations for antitrust (Porter, 1990).

Government plays a crucial role, if not the most influential role in international competitiveness. It can positively or negatively influence the competitiveness of the industry, depending on its policies, strategies and operational system. The role of the government in enhancing the competitiveness of the industry is to ensure the proper functioning of the market by its policies. Its role should be to create a friendly environment for the industry to prosper in. However, it is important to realise that government cannot make each and every farm or organisation in the industry competitive. Thus, while individual farmers or organisations are responsible for their own production and marketing decisions and the efficiency and cost-effectiveness of their own operations, government is primarily responsible for creating proper environment within which they can operate effectively. Government can, therefore, enhance the competitiveness of the industry by ensuring the proper working of the market. A stable and predictable macro-economic environment, particularly a stable exchange rate policy, is seen as a necessary condition in order to facilitate the development of a sustainable competitive industry. (Mashabela, 2007).

Both environmental and competition policies have an enhancing impact on the competitiveness of the soybean industry. On the other hand, by-laws, trade environment policy, exchange rate

policy and Agri-BEE policy have been pointed out as having a negative impact on the competitiveness of the local soybean industry (NAMC, 2011).

3.10 Advantages and disadvantages of the Porter Diamond Model

Grant (1991) identified the advantages and disadvantages of Porter's model as follows:

Advantages:

- Porter's Diamond Model outlines how corporates from certain countries have managed to successfully penetrate global markets. The model can also be used to evaluate national competitive advantage, according to which individual organisations or industries function.
- This model can assist in understanding the strong link that connects the corporate strategy of a company with the country's competitive advantage.
- The model supplements the five forces model of Porter by addressing the structure of the industry. According to the diamond model, a firm should only participate in the global markets once it has established a formidable advantage in its domestic market.
- This model describes the importance and relevancy of industry clusters.
- The public sector can play a crucial function in the establishment of clusters.
- This model illustrates the point that besides inter-company competition, collaboration is an integral element of corporate strategy. Firms should establish essential alliances, particularly with firms in similar and supporting industries.

Disadvantages:

- A set-up where all major features are perfectly lined up to improve the growth of a particular industry only provides significant prospects that an industry will develop. Its growth will be informed by individual action in order for the favourable environment to be exploited commercially in its entirety.

- The non-existence of some of the four conditions from the diamond model in the domestic market may not necessarily prevent firms and industries from being competitive, globally. For example, materials and components can be easily imported if associated and supporting industries are not available in the local market. This will be made simple by improvements in transportation logistics and the easing of import restrictions.
- Capacity is established through proper resource allocation as a result of the pressure created by competition. The model does not in any way emphasise the role of building competence.
- The significance of chance as the most important part for change is not clearly explained. The model is not clear on the level of change required to transform into an internationally competitive economic cluster.
- A direct cooperation amongst competitors is considered non-advantageous since it is considered to decrease the strength of rivalry.
- The model overlooks the significant role played by exchange rates and wage rates in the establishment of competitiveness. Porter's 1990 volume did not list comparative data on various factors such as salaries or price levels from manufacturing in the fact files of various countries.
- The model did not determine the role played by virtual clusters where companies located across various countries cooperate through the internet.
- It is assumed by the model that free market in the national set-up exits where companies engage head-to-head. This has not happened in numerous countries around the world.
- According to Daniels, Lee and Daniels (2006), Porter probably over-emphasised the role played by local companies when the multinational companies are the driving force.
- Moon, Rugman and Verbeke (1998) maintained that the Diamond Framework by Porter is applicable in a context of one country, whereas the majority of a nation's activities are informed by regional, continental or global contexts. It is therefore crucial to gauge trade relationships amongst nations in order to gain a full comprehension at the national level.

According to Dennis (2011), the method by Porter assesses the competitiveness of the entirety of the role-players in a value chain. The method permits for the identification and analysis of a formation within a sector in order to establish the strengths and weaknesses of that sector. Crucial elements of success can be distinguished, which role-players in a value chain have to particularly focus on in order to establish and maintain competitive advantage over a period of time.

3.11 Value chain analysis

According to Porter (1985), an analysis of value chains outlines the activities throughout and around the company and how those activities relate to an overall performance in connection with the competitive advantage of the company. Value chain analysis evaluates the characteristics that each and every specific activity contributes to the company's products or services. Porter (1990) describes a company as being more than a random set-up of machines, equipment, human resources and finance. It will only be feasible to manufacture something for which consumers will be willing to pay a price if these elements are organised into a structure and structural activities. Porter argues that a competitive advantage for the company is attained when there is the capacity to execute specific activities and to control the connections between those activities. According to Van Rooyen *et al.* (2000), value chain analysis is important since the analysis will illustrate the competitiveness of all the elements or activities in a specific value chain.

Porter (1985) provided the differences that distinguish support activities from primary activities. Primary activities have to do with the formation of a good or service. All of these primary activities are linked to several support activities that assist in improving their productivity or effectiveness. These can be categorised into the following:

- **Inbound Logistics** – these involve all the activities required to be accepted, stored and disseminated, and this also involves the links with the suppliers.
- **Operations** – the entire range of activities is needed to convert inputs into outputs (products and services).

- **Outbound Logistics** – involves entire activities necessary to enable collection, storage, and distribution of output.
- **Marketing and Sales** – activities which notify consumers in terms products and services, encourage buyers to acquire them, and ease their acquisition.
- **Service** – the entire range of activities that are needed to maintain a product or service operating successfully after being sold to the buyer.

Support activities of the value chain are:

- **Procurement** – the action of acquiring inputs, or resources, for the company.
- **Human Resource Management** – consists of all steps that are followed during recruitment, training, maintaining health and wellness, paying and (where required) dismissals or retrenchments.
- **Technological Development** – involves the company's transformation of inputs into outputs, using the appropriate equipment, hardware, software, procedures and technical knowhow.
- **Infrastructure** – serves the firm's requirements and ties its several segments jointly; it is made up of functions or directorates such as human resources, legal services, finance, planning with monitoring and evaluation, stakeholder relations, marketing and communications, quality assurance, and general management.

Figure 3.2 illustrates the value chain by Porter. According to Porter (1985), the source of competitive advantage for the company is characterised by its ability to deliver on specific activities and to ensure that there are linkages between those activities.

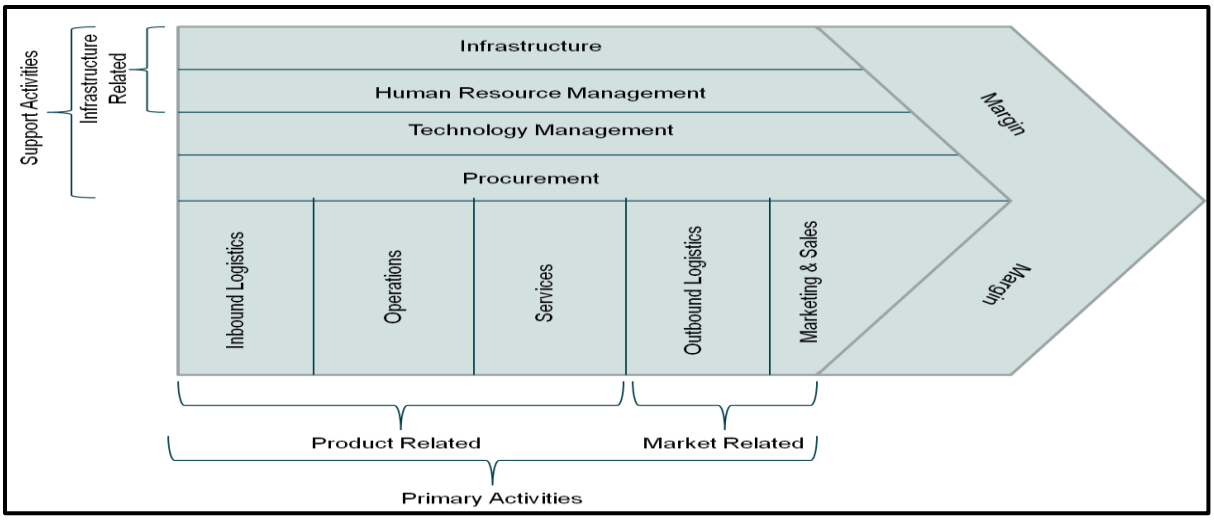

Figure 3-2: Porter's value chain

Source: Porter (1985)

The value chain in this study is conceptualised on the premise that it incorporates business dealings amongst the entire value chain processes, i.e. from input suppliers, to production at farm level, from farm to storage, trading, processing and retailing, and up to the final buyers, with transport being involved at various stages along the value chain.

3.11.1 Advantages and disadvantages of value chain analysis

Simister (2011) identified the following as advantages and disadvantages of value chain analysis:

Advantages:

- It is a highly adaptable strategy instrument for assessing the organisations, rivals and the specific areas within the value system of the industry.
- The analysis may be applied to determine and initiate competitive advantages for both cost and differentiation.
- Its adaptability means that in may be used for all types of businesses.
- It illustrates the significance of (re)grouping tasks into activities to production, manufacturing, marketing, delivering and supporting products, in terms of connections between activities and to relate the value chain to the competitive position of a firm.

- Since an organisation is multi-dimensional, it therefore becomes necessary to analyse its underlying activities, as this will assist in understanding its general competitive position. An organisation's effectiveness and deficiencies can only be established through the profiles of its rivals.

Disadvantages:

- Its primary strength in terms of adaptability means that it has to be flexible to suit a specific business set-up and that may act as a disadvantage.
- Unpacking the extent and range of analysis of a value chain can be discouraging.
- It is necessary to recalibrate the accounting system in order to assign costs to individual activities, and as such, the quantitative analysis becomes time consuming.
- A customer segmentation analysis must be part of the value chain analysis to combine both the internal and external views.

3.12 South African soybean market value chain

According to NAMC (2011), the South African soybean value chain is made up of several key role-players. These key role-players include soybean seed producers, soybean crushers, farmers, crude oil refineries, retailers, and consumers. All the role-players highlight the key stages of the soybean value chain. It is also crucial to pinpoint the various situations within the soybean value chain in order to distinguish and determine various environments within soybean value chain. These will assist in identifying and measuring the various determining elements that influence the competitiveness of the soybean industry. NAMC (2011) identified the three environments as meso-, micro- and macro-environments.

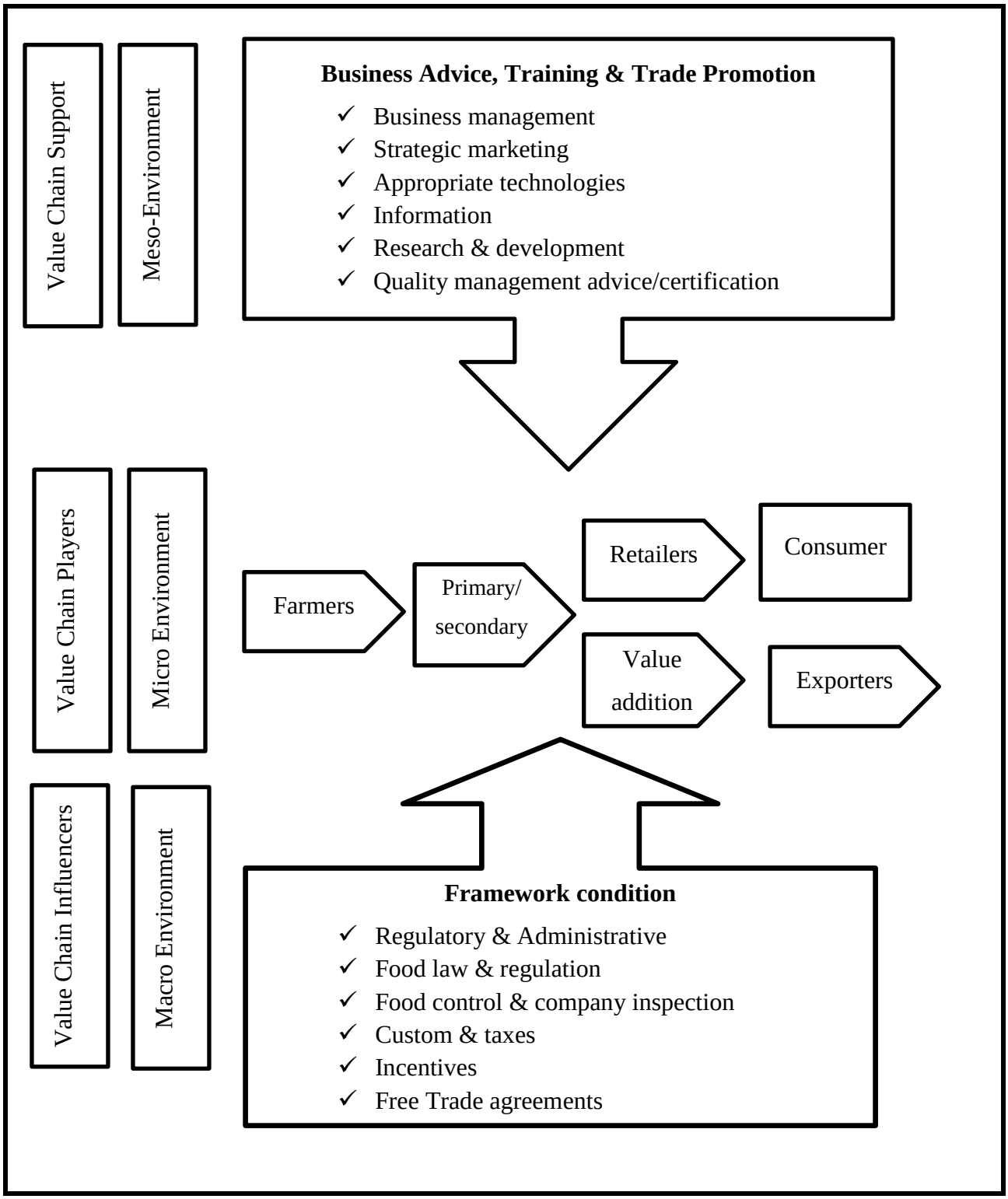

Figure 3-3: The various business environments for the South Africa soybean value chain

Source: NAMC (2011)

The meso-environment, as illustrated in figure 3.3, refers to the institutions that provide support to the actual soybean value chain. The institutions primarily provide support in the form of business consultancy, food safety and quality assurance programmes, transfer of expertise and provision of information. The micro-environment refers to factors that can be controlled by each participant in the day-to-day business set-up within the industry. Furthermore, it refers to competition levels between various role-players. The effect of administrative and regulatory factors, international and domestic trends in the economy, together with chance factors in the form of exchange rates of the currency and political events are regarded as factors within the macro-environment (NAMC, 2011).

Soybean seed producers supply their produce to oil seed crushers who crush the raw soybean into crude oil and oilcake. The soybean crude oil has various functions, and refineries manufacture several products from the crude oil. The soybean oilcake is primarily used by animal feed manufacturers who produce concentrates through soybean oilcake. Domestic refineries also import crude oil from the global markets to supplement the local production. Their products, together with those from the manufactures of animal feed, are prepared, packed, labelled and dispatched to wholesalers and retailers to sell eventually to the final consumers.

3.13 Conclusion

The primary objective of this chapter was to outline the techniques and indices applied in the study. Three indices, namely RXA, RMP and RTA will be used for analysing the global competitiveness of local soybean industry in relation to those of Argentina and Brazil. Trade statistics (values of imports and exports) were obtained from WITS. WITS provided one with access to key global trade, tariffs and non-tariff data collections.

From the literature reviewed it is clear that Porter's diamond model analyse the country-specific sources of advantage that enhance the international competitive advantage of firms. The Revealed Comparative Advantage and revealed competitive advantage indices are useful in examining trade performance.

The trade data obtained from WITS will be applied in the next chapter in order to determine the competitiveness of the local soybean value chains. These indices are suitable for this study due to their precise results, despite some shortfalls, as illustrated earlier.

CHAPTER 4
MEASURING AND ANALYSING THE COMPETITIVENESS OF THE SOUTH AFRICAN SOYBEAN VALUE CHAIN

4.1 Introduction

The previous chapter described in detail the methodology to be applied in this chapter for measuring the competitiveness of the local soybean value chain. The next phase will be focused on measuring, analysing and comparing the competitive status of the value chain of the local soybean industry, in comparison with those of Argentina and Brazil.

An industry's competitiveness will primarily be driven by the operational performance of its value chains in that particular industry. The notion of competitiveness has drastically evolved over a period of time in South Africa. According to Hallatt (2005), the changes that have occurred in the South African trading set-up, and those elements that drive agricultural global markets have forced role-players in the industry to position themselves as efficient rivals in a deregulated international market environment.

4.2 Measuring competitiveness of South Africa, Argentina and Brazil's soybean

The South African soybean industry's competitiveness, together with those of Argentina and Brazil, is determined and analysed using Balassa's Revealed Comparative Trade Advantage methodology in this chapter. According to Van Rooyen et al. (2000), the RXA and RMP indices are based exclusively on either export or import values. Thus, when brought together in the determination of RTA, the latter considers the activities of both exports and imports. Given the significance and developments of intra-industry and/or intra-port trade, it is noteworthy that the RTA index completely considers revealed comparative advantage by measuring the significance of competitive advantages for both relative exports and imports.

4.2.1 RTA results for South African, Argentinian and Brazilian soybean seed

Table 4.1 below illustrates the competitive advantages of soybean seed in South Africa, Argentina and Brazil between 2001 and 2015, according to the RTA index. It is clear from the table that the domestic soybean seed is generally uncompetitive, while those of Argentina and Brazil are internationally competitive.

Table 4-1: Competitive advantage of soybean seed in South Africa, Argentina and Brazil, based on the RTA index

Country	RTA 2001	RTA 2002	RTA 2003	RTA 2004	RTA 2005	RTA 2006	RTA 2007	RTA 2008	RTA 2009	RTA 2010	RTA 2011	RTA 2012	RTA 2013	RTA 2014	RTA 2015
[2]RSA	-0.06	-0.09	-0.05	-0.04	-0.01	-0.02	-0.24	0.01	0.42	0.22	0.08	0.25	0.03	-0.15	-0.26
[3]Arg	23.88	21.27	25.65	24.29	32.42	23.82	26.41	19.11	7.59	25.54	23.27	12.10	16.23	16.28	21.55
[4] Bra	24.32	26.01	24.32	29.79	27.50	28.99	23.25	23.29	25.43	19.11	22.79	21.60	28.29	30.03	31.69

Source: Own calculations, based on data from WITS (2016).
Notes: RTA>0⇒Global competitive advantage; RTA<0⇒Global competitive disadvantage

It is evident from Table 4.1 that the RTA values for South African soybean seed are mostly negative, meaning that South African soybean production generally experienced a relative competitive disadvantage. The soybean production has been marginally competitive, particularly between 2008 and 2013. This represents a slight improvement from the negative figures experienced by the South African soybean production chain between 2001 and 2007. Furthermore, South Africa experienced negative growth from 2014 – 2015. The decrease in competitiveness was as result of draught conditions which have led to a decrease in area planted as well as lower yields. At the same time, it is clear that both Argentina and Brazil have internationally competitive soybean seed production.

2 South Africa
3 Argentina
4 Brazil

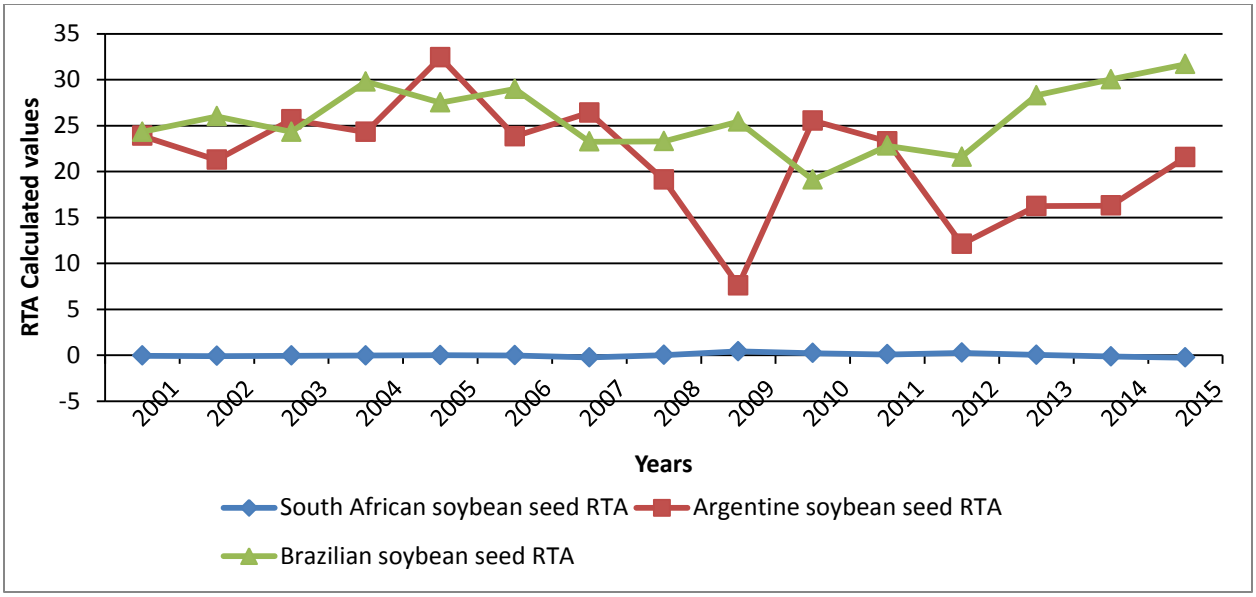

Figure 4-1: RTA index of soybeans for South Africa, Argentina and Brazil

Source: Own calculations, based on the WITS of the World Bank (2016)

It is clear from Figure 4.1 that the South African soybean value chain, at primary level, is marginally competitive, while the Argentinian and Brazilian soybean value chains are internationally competitive at the primary level. The massive volumes of crude, refined oils and oilcake that are imported into the domestic market reduce the global competitiveness of South African soybean oil and soybean oilcake products. The crude, refined oils and oilcake are primarily imported into the local market because of their competitive prices and the fact that South Africa is generally a net importer of soybean oil and oilcakes.

4.2.2 RTA results for South Africa, Argentina and Brazil's soybean oil

In Table 4.2 below, the South African, and the Argentinian and Brazilian, RTA indices for soybean oil industries between 2001 and 2015 are summarised. The aim is to highlight the trends of the various value chains. The table clearly shows that the domestic soybean oil is internationally uncompetitive, while both the Argentinian and Brazilian soybean oils are internationally competitive.

Table 4-2: Competitive advantage of soybean oil for South Africa, Argentina and Brazil, based on the RTA index

Country	RTA 2001	RTA 2002	RTA 2003	RTA 2004	RTA 2005	RTA 2006	RTA 2007	RTA 2008	RTA 2009	RTA 2010	RTA 2011	RTA 2012	RTA 2013	RTA 2014	RTA 2015
RSA	-2.43	-2.69	-2.89	-3.55	-4.13	-4.15	-4.41	-4.21	-2.53	-5.29	-4.2	-3.00	-3.63	-1.61	-1.36
Arg	77.23	79.46	92.66	104.54	105.32	116.27	113.0	82.43	85.28	86.46	80.69	74.29	67.56	96.95	105.79
Bra	16.06	17.95	21.75	21.67	20.89	17.07	14.84	15.76	11.49	9.42	10.83	11.90	7.28	9.58	9.34

Source: Own calculations, based on data from WITS (2016).
Notes: RTA>0⇒Global competitive advantage; RTA<0⇒Global competitive disadvantage

It is evident from Table 4.2 that the RTA values for South African soybean oil are generally negative, meaning that South African soybean oil experienced a competitive disadvantage for the entire period under review. At the same time, it is clear that both Argentina and Brazil, especially Argentina, have soybean oil that are internationally competitive for the period under review.

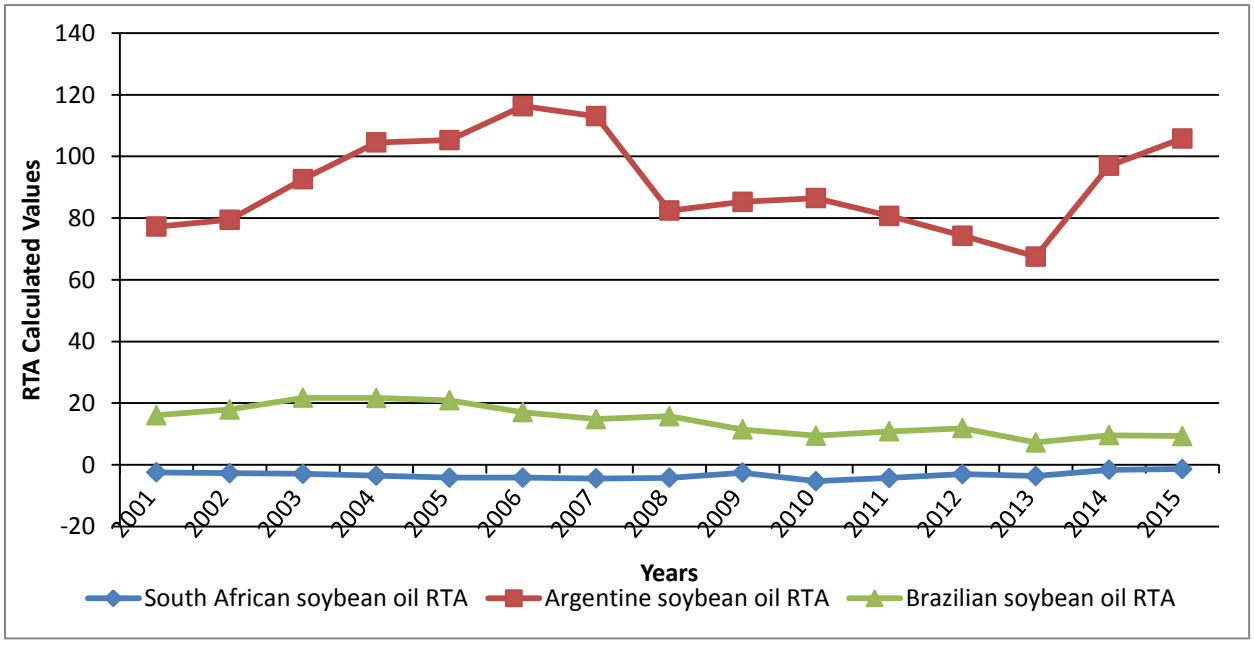

Figure 4-2: RTA index of soybean oil for South Africa, Argentina and Brazil

Source: Own calculations, based on the WITS of the World Bank (2016)

As seen in Figure 4.2, when the RTA indices for both Argentina and Brazil are compared with the local RTA index, it is evident that domestic soybean oil is internationally uncompetitive, while the Argentinian and Brazilian soybean supply chains are internationally competitive.

4.2.3 RTA results for South African, Argentinian and Brazilian soybean oilcake

Table 5.3 below illustrates the competitive advantages of soybean oilcake held by South Africa, Argentina and Brazil between 2001 and 2015, as derived from the RTA index. The table clearly illustrates the fact that domestic soybean oilcake is mainly uncompetitive, while both Argentina's and Brazil's soybean oil cake are internationally competitive.

Table 4-3: Competitive advantage of soybean oilcake for South Africa, Argentina and Brazil based on the RTA index

Country	RTA 2001	RTA 2002	RTA 2003	RTA 2004	RTA 2005	RTA 2006	RTA 2007	RTA 2008	RTA 2009	RTA 2010	RTA 2011	RTA 2012	RTA 2013	RTA 2014	RTA 2015
RSA	-2.57	-2.61	-2.01	-2.60	-1.96	-2.27	-2.27	-2.36	-2.48	-2.45	-1.94	-1.40	-1.49	-0.92	-0.63
Arg	64.27	71.11	81.05	79.33	85.54	93.22	88.73	71.66	76.13	74.44	75.96	75.87	79.04	93.44	94.69
Bra	25.00	25.38	25.48	25.33	21.53	17.24	15.87	15.45	15.78	14.48	14.28	15.79	15.79	16.69	16.91

Source: Own calculations, based on data from WITS (2016).
Notes: RTA>0⇒Global competitive advantage; RTA<0⇒Global competitive disadvantage

According to Table 4.3, the South African RTA values for soybean oilcake are generally negative, meaning that South African soybean oilcake experienced a competitive disadvantage for the entire period under review. At the same time, it is clear that both Argentina and Brazil, especially Argentina, produced internationally competitive soybean oilcake for the period under review.

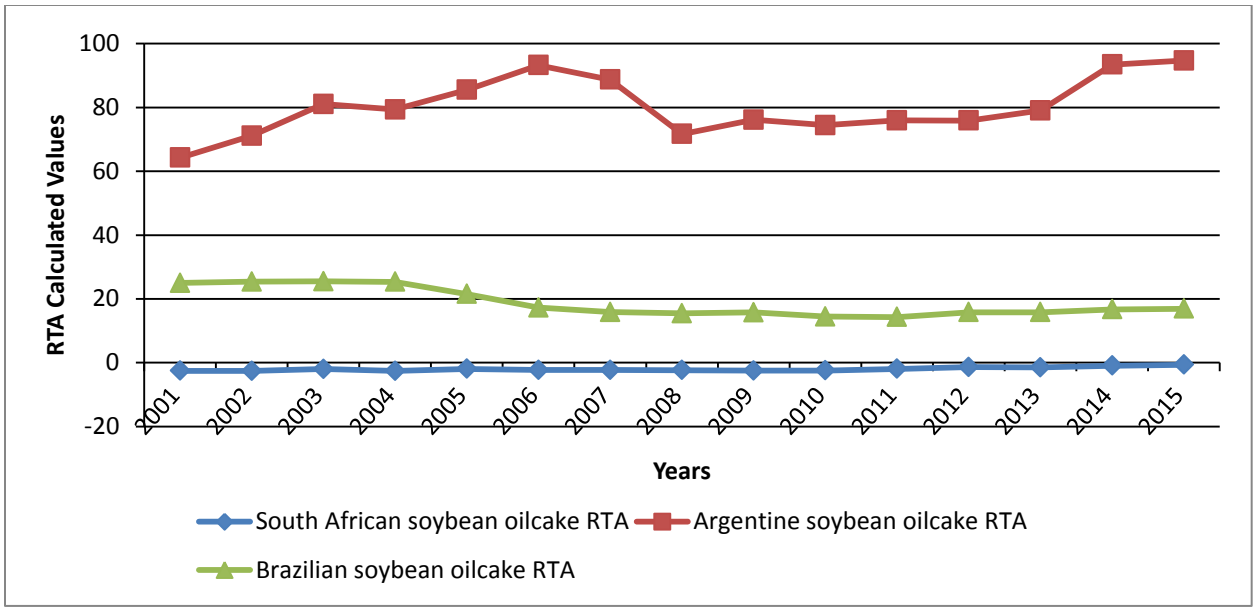

Figure 4-3: RTA index of soybean oilcake for South Africa, Argentina and Brazil

Source: Own calculations, based on the WITS of the World Bank (2016)

Figure 4.3 clearly illustrates the fact that South African soybean oilcake has a disadvantage in international competitiveness, as well as a lower competitive advantage, while those of Argentina and Brazil are internationally competitive.

Based on the above analysis, South Africa is at times marginally competitive when it comes to the soybean seed but uncompetitive otherwise. At the same time, Argentina and Brazil are competitive throughout the value chain with Brazil being more competitive in soybean seed and Argentina most competitive in soybean oil and oilcake.

4.3 Key drivers for the soybean industries in Argentina and Brazil

It is clear, based on the results set out above, that South Africa lacks international competitive advantage in value-added soybean products, while both Argentina and Brazil are competitive at all levels of the soybean value chain. It therefore becomes important to ask why South African soybean is only marginally competitive at the primary level, and uncompetitive at the processing level, while both Argentina and Brazil are competitive. The following section assesses the key success factors in both Argentina's and Brazil's value chain analyses.

It is also important to note that the scope of this thesis does not allow for providing a comprehensive account of both Argentinian and Brazilian national policies that affect soybean production, trade and consumption. The following section only provides a brief summary of the relevant policies and main trends currently in place. The review of those policy measures confirms that a wide range of government measures (by both Argentina and Brazil) is in place and strongly affects the allocation of resources for the development of the soybean industry.

4.3.1 Argentina: Key success factors

As illustrated earlier, Argentina is the world's leader in the export of soybean products (soybean oil and soybean meal/oilcake) and is ranked third, behind the USA and Brazil, as a soybean producer and exporter. According to Reguanaga (2009), the strength of the soybean value chain in Argentina is a result of the effective set-up and performance of private-sector companies and organisations. Both the private sector and the public institutions collaborate efficiently and effectively in the running of the value chain. All of the key role-players are primarily influenced by the government's policies and the institutional governance system of Argentina (a macro-approach to competitiveness). The global competitiveness of the Argentinian soybean value chain is primarily attributable to the highly efficient structure of production, processing and marketing, and its success can be attributed to the following:

- A modernised and efficient inputs industry that has excellent connections with the producers.
- Producers that are highly efficient and innovative. This is primarily due to a higher percentage that involves partnerships with efficient access to capital, technology and markets.
- Well-established networks that allow for the higher rotation of capital goods, as well as economies of scale.
- A domestic soybean market that is transparent.
- A highly competitive crushing industry which is also in charge of the port facilities.
- Highly competitive and large trading companies (in many instances, they are the crushing firms).

4.3.1.1 Soybean expansion programme

The introduction of biotechnology in Argentina has enabled its farmers to produce shorter-cycle soybeans. This has, in turn, allowed for double-cropping in areas that historically planted only one crop per growing season. The majority of soybean farmers who previously cultivated maturity groups 5, 6, and 7 are in a position to utilise maturity groups 3 and 4, which have a shorter cycle and can yield more than the older varieties do. The maturity group is an illustrator of the length of a growing season. Higher maturity groups are longer-season varieties, while lower-numbered maturity groups indicate shorter-season varieties (USDA-FAS, 2006). As a result of the introduction of biotechnology, the area cultivated with soybeans increased from 11.4 million hectares in 2001/2002 to 19.4 million hectares in 2015/2016, and production increased from 30 million tons in 2001/2002 to 56.5 million tons in 2015/2016 (USDA-FAS, 2014; 2016).

4.3.1.2 Foreign Direct Investment (FDI)

In Argentina, a strong development of input providers, involving local and international firms, which are constantly bringing innovations to the market (in improved seeds, fertilisers, chemicals, and machinery) have been crucial for increasing productivity and reducing production costs. Advancements in the set-up for both foreign and domestic investment have been extremely important for the soybean value chain participants. This has resulted in massive investments in the areas of production, crushing and trading. The private sector has participated in a meaningful way in the development of research and development in recent decades. This means that a good set-up for investment (IPRs, free movement of capital, and non-discrimination) is crucial for competitiveness (Reguanaga, 2009).

4.3.1.3 Soybeans and products use and trade

According to Reguanaga (2009), the growth in exports of both oil and meal was the result of the differential export tax and a highly effective crushing industry. The export tax that was imposed on soybean was higher than that for value-added products and this provided a massive advantage to crushers, since they could procure raw soybean at prices 3% cheaper in the local market. In theory, assuming a quotation of Free on Board (FOB) at US$330.00 per ton for the soybean,

such difference implies a reduction in cost of US$10.00 per ton. Furthermore, the crushing industry in Argentina also has competitive advantages in costs vis-à-vis other major producers, such as US and Brazilian crushers in terms of the scale, plant locations at the ports, and the technologies applied. All these policy advantages have enabled Argentina to become the leader in the exports of soybean products (meal and oil).

4.3.1.4 Infrastructure and agro-logistics

The key agricultural producing zone in Argentina is situated within 300 kilometres of the major ports in the country. Argentinian agricultural producers have almost entirely relied on trucks to transport their products because of their proximity to ports. This is despite the fact that transport by railway or barge is generally cheaper than trucking, on a ton per kilometre basis. In order to accelerate the efficiency in the industry, the Argentinian public sector and the private sector investors have implemented several projects aimed at improving and modernising logistics for the sector. The projects are aimed at improving waterways, export terminals, road conditions, and rail networks. The cost of transport by rail was reduced and the services were improved as a result of the privatisation of all government railroads. Investments from the private sector through expanded tarred roads to rural areas resulted in the growth in private road development. However, high tolls have resulted in increased costs for the movement of bulk grains by road (Schnepf, Dohlman and Bolling, 2001).

4.3.2 Brazil: key success factors

Brazil is the second largest producer and exporter of soybeans and products (oil and meal) in the world. The country is second only to the USA in terms of the production of soybean, and to Argentina in terms of the exports of soybean products. Soybeans only joined the list of major Brazilian field crops very late. Soybeans were predominantly cultivated on smallholdings in the southern parts of Brazil in the 1960s. There was a rapid growth of the Brazilian soybean industry in the 1960s and 1970s. This growth was attributable to the rising demand from the global markets. At the same time, the Government of Brazil also continued with policies that enabled industry growth by particularly targeting soybeans, as well as the general development of the massive region of Cerrado (Schnepf *et al*., 2001).

4.3.2.1 Low soybean production costs

According to Filho, Batalha and Aguiar (2009), Brazil's large-scale mechanised agricultural expansion into the vast, undeveloped interior regions was due to the introduction of better crop varieties and cultural practices adaptable to the tropical conditions and soils of the regions. High-yielding, temperate-zone plant varieties for soybeans that are suitable to the tropical climate of the massive interior savannas were developed and adapted by the Agency for Research on Agriculture and Animal Husbandry (EMBRAPA). These interventions finally managed to resolve the Brazilian interior's great problem of acidic soils, as well as those related to the humid and tropical climate. These challenges previously presented enormous barriers to attempts in Brazil's interior regions' for developing commercial agriculture.

As a result of the advancements in seed technology, goods practices, and technology transfer through EMBRAPA, Brazil managed to benefit from the huge expansion programme in soybean production. As a result, the area planted with soybeans expanded from 16.3 million hectares in 2001/2002 to 33.3 million hectares in 2015/2016, and production increased from 43.5 million tons in 2001/2002 to 99 million tons in 2015/2016 (USDA-FAS, 2014; 2016).

4.3.2.2 High domestic demand from the poultry industry

While the country was in a position to benefit greatly from the economies of scale, it became necessary to develop a domestic market to absorb those volumes. The poultry sector became an important soybean consumer in the country. The growth of the poultry sector was heavily dependent on the success of the soybean industry. This was because the low costs of soybean contributed to a growth in poultry production, which led to a growth in soybean demand and a decrease in soybean costs as a result of the massive economies of scale. Long-term decreases in the production costs of poultry have contributed immensely towards stimulating increases in local consumption of poultry, while at the same time strengthening Brazil's standing as a serious and competitive global exporter (ACET, 2013).

4.3.2.3 Government support targeted higher value final consumption goods

Public sector support of the poultry industry at the production stage, instead of for soybean production, has effectively stimulated the vertically integrated soybean-to-poultry sector completely. Providing finance at low cost and the promotion of exports has, in particular, assisted both the productivity and development of the poultry sector, thus driving the demand for soybean products in the domestic market (ACET, 2013).

4.3.2.4 Infrastructure and agro-logistics

Approximately 80% of Brazilian agricultural exports have been handled traditionally by the three south-eastern main ports of Santos, Rio Grande, and Paranagua. This is despite the fact that Brazil has a long coastline with various major seaports. There are numerous projects in Brazil aimed at easing the transportation of the country's agricultural output to ports (Schnepf *et al*., 2001).

At the same time, processing companies and trading points that are located in the centre west are investing in multi-modal systems of transport, which involve the use of roads, rail and inland waterways to reach seaports. Among the main axes of inland waterway transportation are the Tietê and Paraná rivers in the south/southeast, and the Madeira, Araguaia and Tocantins, in the north (Filho *et al*., 2009).

4.3.2 The summary of Argentina and Brazil: key success factors

In summing up, both Argentina and Brazil have better global competitive advantages in their soybeans value chains than South Africa has. According to Schnepf *et al*. (2001), the success for both countries can be attributed to the following:

- Political and economic reforms during the 1990s in the form of competitive exchange rate policies, unilateral reductions of import duties, adjustment of export strategies and systems, assisting numerous export promotion institutions and their initiatives, as well as opening up their economies to FDI. These initiatives by both countries underpinned their growths in agricultural outputs.

- The economic and policy reforms, as well as improved post-harvest infrastructure and logistics, in Argentina and Brazil have reduced the costs of both production and post-harvest activities, and intensified the transfer of signals by the global market.

- The Brazilian expansion of large-scale commercial agriculture into the massive and least-developed interior regions benefited greatly from the crop varieties and cultural practices developed specifically to suit its tropical and soil conditions.

- Both countries (Argentina and Brazil) are capable of producing soybeans and other crops naturally at a lower cost. This is mainly because of their abundant land and good climate.

4.4 Key drivers of competitiveness of the South African soybean industry

Figure 5.4 below illustrates the various elements that drive the South African soybean industry's competitiveness. The supply of raw soybean by the domestic market is a crucial component in the industry. The lack soybean seed supplies may reduce crushing activities when there are not enough raw soybeans available in South Africa. South Africa operates in a deregulated market system whereby global price events and Rand/Dollar exchange fluctuations will heavily influence domestic prices. Elements with the highest likelihood of impacting on the South African competitiveness of the soybean industry are discussed in this section.

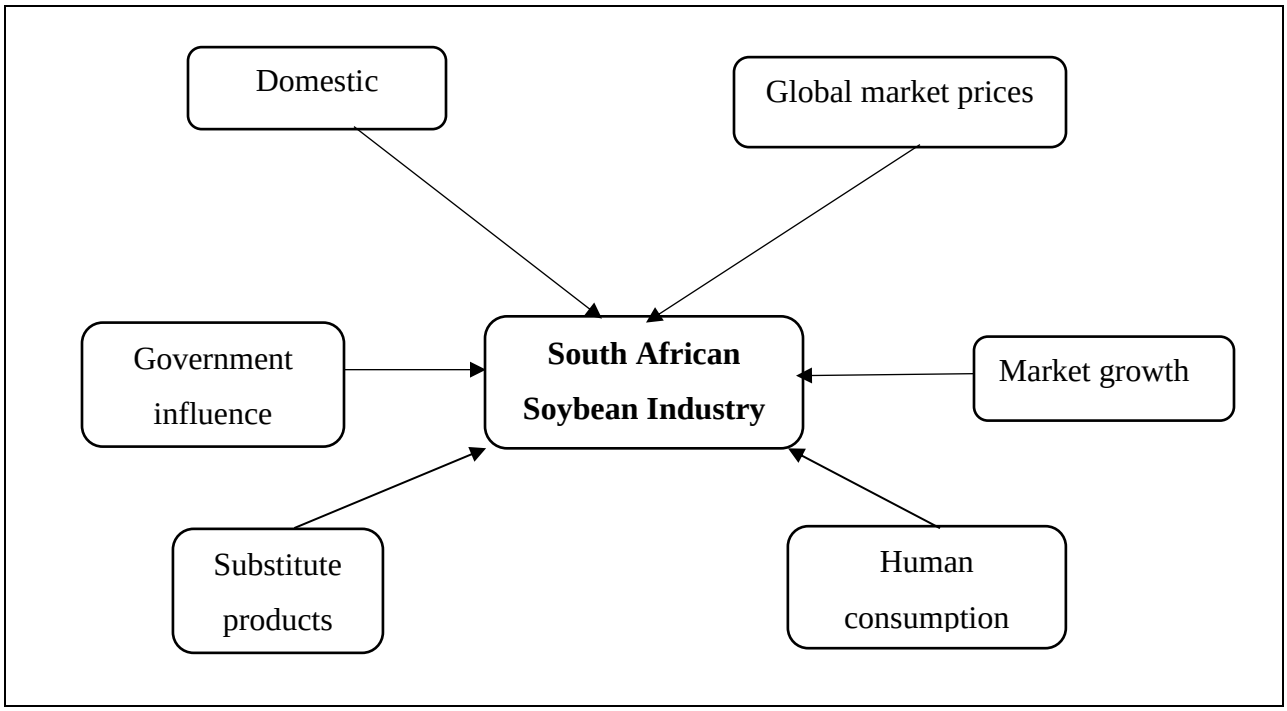

Figure 4-4: Factors affecting the South African soybean industry

Source: Adapted from Dennis (2011)

4.4.1 Domestic supply of soybeans

As illustrated earlier, the South African production of soybeans has shown a steady increase over the past decade. The major driver behind the increase in soybean production has been the additional demand from the recently established soybean crushing plants. Despite the increase in soybean production, South Africa is a net importer of soybean products (oilcake). South Africa primarily imports soybean oilcake from Argentina.

Figure 4.5 illustrates the trends in soybean oilcake imports and domestic soybean production between 2005/2006 and 2014/2015. It is evident that from 2005/2006, South Africa experienced a surge in imports, from 626 244 tons to 989 112 tons in 2009/2010. There was a decrease in the imports of soybean oilcake into South Africa in 2010/2011. The decrease was primarily due to the increase in the production of soybean in the domestic market. The fact that the domestic market imports soybean oilcake, primarily from Argentina, will transfer any changes in prices of raw soybean or oilcake from Argentina to the South African soybean–to–soybean oilcake value chain.

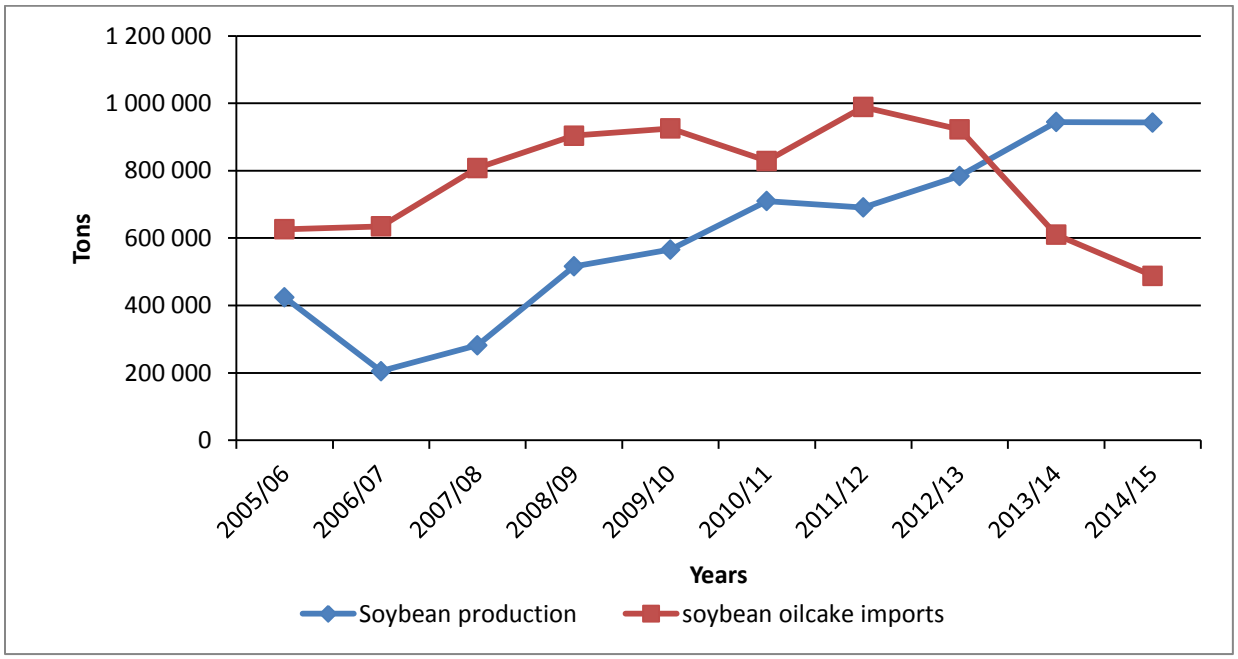

Figure 4-5: The domestic production and imports of soybean oilcake

Source: SAGIS (2014) and AFMA (2014)

Soybean oilcake imports declined for four successive years, to reach 487 919 tons in 2014/2015. This represents an indication of the structural adjustment currently happening in the South African soybean industry. As illustrated in Chapter 2, the DTI initiated an IPAP with the main purpose of developing specific action plans to spur industrial growth and reduce unemployment. This mechanism has permitted extra domestic soybean oilcake to be crushed by the domestic industry, substituting the historically high quantities of soybean oilcake imports. This was made possible by the increased domestic crushing capacity which has enabled more crushing for the animal feed industry. It is clear that this trend of soybean oilcakes imports being replaced by more domestic product in future is likely to continue.

4.4.2 Global market prices

As illustrated earlier, the exchange rate between the Rand and the US Dollar has a direct impact on the domestic soybean and its products prices. Global markets prices are traded in US Dollars per ton, and as a result, the exchange rate between the Rand and the US Dollar has an effect on domestic prices, which can either increase or decrease with any variations in the global market.

The price of domestic soybean is set by the import parity price, and therefore the exchange rate is almost entirely transferred to the domestic soybean price.

4.4.3 Market growth

There is a need to take advantage of the enormous economies of scale in production presented by the substantial, related market that will absorb these volumes. The animal feed industry (especially the poultry sector) is a critical soybean consumer in South Africa.

According to Table 4.4, AFMA feed sales maintained a favourable growth rate for the period under review. Poultry, when measured against other protein sources, is the most affordable source of protein. However, feed sales in this segment declined in 2015/2016, with broiler feed declining by 1.5% to 2 808 360 tons, and breeder feed declining by 3.3% to 499 307 tons. The decline can be attributed to amongst others the drought conditions experienced around 2014/15 production season.

Table 4-4: AFMA feed sales (Tons)

Type of Feed	2011/12	2012/13	2013/14	2014/15	2015/16	% Growth
Dairy	865 846	875 758	872 467	888 574	912 312	2.7%
Beef & Sheep	730 394	753 039	861 267	922 618	1 030 101	11.6%
Pigs	194 531	229 519	254 575	264 163	285 020	7.9%
Layers	861 482	888 328	922 067	952 607	951 536	-0.1%
Broilers	2 765 740	2 721 295	2 767 681	2 852 105	2 808 360	-1.5%
Broiler breeders	489 381	469 584	484 106	516 484	499 307	-3.3%
Horses	34 776	34 714	34 934	38 998	41 646	6.8%
Dogs	16 564	20 732	22 799	62 260	91 799	47.4%
Ostriches	15 684	11 465	11 183	12 549	15 735	25.4%
Other mixtures	16 978	24 311	30 127	53 722	84 585	57.4%
Aquaculture	2 718	3 727	4 293	4 616	5 281	14.4%

Source: AFMA (2016)

Solid demand for animal feeds has aided protein meal prices, and with a favourable input price structure in relation to other related crops, soybeans have continued to increase their share of the

international oilseed complex (AFMA, 2016). Table 4.5 represents a **s**ummary of total soybean oilcake used by AFMA members.

Table 4-5: Summary of total soybean oilcake usage by AFMA members

Product (Tons)	**2006/07**	**2007/08**	**2008/09**	**2009/10**	**2010/11**	**2011/12**	**2012/13**	**2013/14**	**2014/15**	**2015/16**
Soybean Oilcake	836 510	882 682	808 616	865 895	971 447	1 008 760	892 480	896 937	968 782	1 008 698

Source: AFMA (2016)

4.4.4 Government influence

Government policies related to trade have a massive influence on the agricultural sector. The South African soybean industry is currently protected by an 8.00% tariff, unless in a situation where South Africa has a special trade deal with the countries in question. An increase/decrease in the import duty can have either a positive or a negative impact on the prices of food, as this will have either a positive or a negative influence on the crushing margin at the crushing plants.

As indicated earlier, the South African government has recognised the significance of the soybean industry in the economy. Industrial Policy Action Plan (2012/13 – 2014/15) identified soybean as being one of the crops with a great capacity to stimulate new investments and job creation opportunities (the DTI, 2010). That realisation has, to an extent, resulted in processes that have culminated in investments that have led to the establishment of brand new and modern soybean crushing plants and the upgrading of existing crushing facilities.

When one looks at the end products of processing, grading is done on a different scale and relies heavily on strict reference to protein content. The soybean industry in South Africa uses the following as specifications for high protein soybean meal: Protein basis – 47% and minimum 46%; Fat maximum – 2.5%; Moisture basis – 12% and maximum 12%; Fibre basis – 3.5% and maximum 4%; Ash maximum – 7%; Sand/silica maximum – 2.5%; Ureasic activity – minimum 0.05 and maximum 0.20, Protein solubility – minimum 75% and maximum 85% (KOH 60 MESH); free from added urea. Allowances: Protein 47% to 46.5% 2:1; Protein below 46% rejectable; Fibre – 3.5% to 4%, 1:1; Fibre above 4.0% rejectable; Moisture – 12% to 12.5%, 1:1; Fineness – 90% finely ground, passing through a 4.5 mm sieve.

4.4.5 Substitute products

Soybean oils can be replaced by sunflower and palm oils in the manufacturing of vegetable oil blends. South Africa consumes approximately 1 million tons of oilseed oil per annum. It is evident from Table 4.6 below that there is a growing trend towards the usage of substitute oils (especially palm oil). The consumption of soybean oil has been characterised by a high level of volatility. There was an increase in the consumption of palm oil from 2011/2012 to 2014/2015, with a slight decrease in 2015/2016. Sunflower oil, like palm and soybean oil, was also characterised by a high level of volatility.

Table 4-6: The consumption of oils (soybean, sunflower and palm) in South Africa (tons)

Marketing year	**2011/12**	**2012/13**	**2013/14**	**2014/15**	**2015/16**
Soybean oil	195 000	240 000	230 000	270 000	300 000
Palm oil	400 000	410 000	430 000	460 000	440 000
Sunflower oil	390 000	360 000	410 000	350 000	335 000
Total	**985 000**	**1 010 000**	**1 070 000**	**1 080 000**	**1 075 000**

Source: USDA-FAS (2014; 2016)

The imports of low-priced sunflower and palm oils are normally at the expense of soybean oil. This is mainly due to the competitive nature of the prices of these oils. This poses a considerable threat to the domestic soybean oil crushing industry.

4.4.6 Human consumption

The human consumption of soybean products in South Africa has been very low. This is primarily due to the low acceptance of soybean products by the South African population. As illustrated earlier, soybeans constitute a minimal percentage of the average household's diet, despite their remarkable nutritional qualities. According to Dlamini *et al.* (2014), soybeans are consumed locally through a variety of food products in the form of soya soups and sauces, as well as other nutritious breakfast foods in the form of yogurt and flavoured soymilk products. Although direct utilisation remains extremely low, there are cases where consumers, especially those who are lactose intolerant, use soymilk. In South Africa, soybeans have historically not been accepted fully within diets, primarily due to their.

4.5 Conclusion

The results of the analysis for the South African soybean industry clearly indicate that raw soybeans are marginally competitive at times, while value-added soybean products have a competitive disadvantage. This means that there is a decline in global competitiveness of domestic soybeans when shifting from the primary to value-added products. The opportunities for beneficiation in the South African agribusinesses, where soybean production is relatively or marginally internationally competitive, are limited.

The analysis also found that both Argentina and Brazil have a competitive advantage at various stages of the soybean supply. Argentina is even more competitive at the value-addition/processing level. Argentina's strength is the result of its focus on the export market, whereas Brazil has a local market for its soybean production.

According to Schnepf *et al.* (2001), economic and political reforms, infrastructure development, and improved application of agricultural inputs have promoted a good environment for increased agricultural production in Argentina and Brazil. Furthermore, the competitive advantage at production level in both Argentina and Brazil stems from the fact that both countries are blessed with massive land resources and excellent climate, and are naturally able to produce soybeans and other crops at low cost. At the same time, Brazil, and Argentina to a lesser extent, still have massive potential to increase the land dedicated to agricultural production.

At the processing level, both Argentina and Brazil regard the soybean industry as one of the key enablers for triggering expansion in agro-processing and input industries. Both countries have made significant investments in modern, more effective, technology and have increased capacity in their oilseed crushing and processing sectors. As a result, both Argentina's and Brazil's production of soybean oil and oilseeds rose sharply due to their countries' intervention measures. The next chapter will provide the conclusions and recommendations of this study.

CHAPTER 5
CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The objective of the analysis conducted in Chapter 5 was to obtain a response to the research question outlined in the first chapter. The research question is on the extent to which the local soybean industry value chain is competitive, in relation to those of Argentina and Brazil. Therefore, the objectives of this chapter are firstly to answer the research question posed in the first chapter through a summary of the most important findings of the study, backed by evidence from Chapter 5. The second objective is to provide some strategies that role-players in the soybean industry value chain may consider adopting in order to enhance competitiveness. The third objective is to provide suggestions or proposals for further research.

5.2 Key research question re-visited

The research question posed in the first chapter is: What is the local soybean value chain's competitive status in relation to those of Argentina and Brazil? From Chapter 5, it is evident that the domestic soybean industry is mainly uncompetitive in terms of global competitiveness. The outcome of the RTA index analysis illustrates the fact that the local soybean value chain is marginally competitive at the production level, and highly uncompetitive at the processing level.

As indicated in the first chapter, both Argentina and Brazil are major competitors to the South African soybean industry. This is primarily due to the fact that both countries share a similar seasonal cycle with South Africa. Comparing the competitiveness of both Argentina's and Brazil's soybean value chains with the local soybean industry, it is seen that both countries have a higher global competitive edge in their soybean industries. According to Schnepf *et al.* (2001), both countries' strength is mainly attributable to economic and political reforms, the development of infrastructure, and the enhanced application of agricultural inputs that have promoted a good environment for increased agricultural production, in both Argentina and Brazil. Furthermore, both countries have made significant investments in modern, more

effective, technology and have increased capacity in their oilseed crushing and processing sectors. As a result, the production of soybean oil and oilseeds in both countries has risen sharply due to those intervention measures.

5.3 Conclusion

In conclusion, the findings of this study illustrate the fact that the local soybean industry is battling with a challenge of competitive disadvantage regarding its processed products. As a result of these findings, a value chain analysis of the soybean industry was analysed in order to pinpoint several key elements that influence the soybean industry's competitiveness.

Locally produced soybeans are primarily produced for the processing industry for the manufacturing of soybean oilcake/meal and oil; hence, crushing is by far the main value-adding activity in the value chain. There are currently some efforts being made by the South African soybean industry to expand and build new soybean processing facilities. This expansion will enable the local soybean industry to increase the value for role-players. However, even with the introduction of new crushing plants that have come into function, the rates of usage have remained low because of technical problems in some of the newly established plants, and because of the lack of availability of locally produced soybeans. The current underutilised crushing capacity poses a great threat to the domestic soybean processing industry. The fact that massive volumes of soybean oilcake are imported into the local market makes it extremely difficult for soybean oilcake crushers to thrive.

The soybean industry is primarily driven by price. South Africa is a net importer of soybean oilcake and therefore domestic soybean oilcake prices are influenced by the Argentinian oilcake import parity costs. According to the outcome of the value chain analysis, domestic soybean prices remain truly under the import parity levels, since they are determined from the oil and oilcake price. As a result, crushing margins are negatively affected as the cost of soybeans increases to import parity levels. However, utilisation rates are projected to improve over the course of the next decade, and with the local soybean production still growing and only limited volumes of soybeans being occasionally imported.

The other crucial observation made from the analysis is the role of government in the development of the South African soybean value chain. The government has created a conducive agricultural policy environment through the introduction of IPAP and GMOs. That has made it possible for the soybean industry to invest in crushing capacity and increase the production of high-yielding soybeans in recent years. At the same time, there is a crucial gap in the grading standards used by the industry and those prescribed by the APS Act, 119 of 1990. The industry standards place emphasis on the protein content in their classification, whereas the APS Act does not refer to protein or oil content in its classification. It is therefore necessary to align the grading requirements used by the industry with the legislation. This will, in the long term, enable the South African soybean industry to compete at international standards.

5.4 Key intervention measures required to improve competitiveness

The section above clearly indicates that, in order to achieve better competitiveness by the local soybean industry, there will be a need to adopt competitive strategies by all the role-players in the soybean value chain. The management of the value chain can clearly be viewed as being one of the crucial aspects for improving the competitive advantage of the industry. Value will disappear when the value chain does not operate in a productive and well-organised structure. According to Worley (1996), value chains will eventually compete amongst themselves in the future. If only some factors of the value chain operate in a well-organised manner, the complete potential for value addition will then not be attained. Both production and value addition should become the prime focus for investment. As a result, the development of both research and technology will have to concentrate on the demands of downstream consumers, in both domestic and global markets.

5.4.1 Increase the area planted and enhance productivity

In order to stimulate increased production of soybeans, it will be necessary to promote crop rotation (maize/soybeans). Furthermore, significant investments in Research and Development (R&D) of cultivars with higher yields will be required. Furthermore, creating linkages with global seed companies that have made massive progress in the field of soybean seed production should be encouraged.

5.4.2 Improve food quality and safety

Issues regarding food safety and quality are becoming increasingly crucial in the soybean industry. This is primarily due to increasing income and levels of education among the urban consumers. Consumers are also becoming used to high quality standards and produce uniformity. According to Hughes (2004), consumers' knowledge has increased primarily due to higher levels of training and education, as well as improved access to information. This has changed the viewpoint of the consumers on health and diet. Consumers' concerns regarding food safety and quality have increased the importance of the need to improve the competitive advantage of soybean industry.

Hallatt (2005) argued that the production of food of high quality can be regarded as means of bypassing the base of competitive margin's "race to the bottom". Since the local soybean industry has a competitive disadvantage for the majority of its processed products, importance must be placed on this area. Guaranteeing the production of superior soybeans along the value chain, in the form of a coherent concept, to guarantee safety at the base from "farm-to-fork", can therefore be considered as a measure to improve the South African soybean industry's global competitiveness.

5.4.3 Required government support

It is crucial to observe that the competitiveness of the domestic soybean industry cannot be attained without the assistance of the public sector. Policies to assist in avoiding the importation of cheaper soybean oilcakes and oils in South Africa must be put in place.

There is a gap in the grading standards used by the industry and those prescribed by the APS Act, 119 of 1990. The industry standards place emphasis on the protein content in the classification, whereas the APS Act does not refer to protein or oil content in its classification. It is therefore necessary to align the grading requirements used by the industry with those of the legislation. This will, in the long term, enable the South African soybean industry to compete at international standards.

For the soybean industry to become competitive, the public sector should also play a pivotal role in areas of credit provision, as well as R&D. The government should create the proper investment climate. This will ensure that opportunities will exist for the soybean industry to grow, and continue and enhance competitiveness. The public sector's part in strengthening the industry's competitiveness should be to ensure the proper functioning of the industry. The strategic requirement of the soybean industry is to have a generally 'agriculture-friendly' public sector. This means, among other things, the better alignment of challenges faced by the industry, a greater clarity in terms of communication, and better overall means of communication with the public sector.

5.4.4 Develop proper marketing and distribution services

The South African soybean industry is still faced with several enormous factors that hamper marketing and negatively affect the competitiveness of the local industry. These factors can be classified into uncontrollable and controllable factors. Uncontrollable factors include the volatility of the local currency against leading global trading currencies. The controllable factors, against which the domestic soybean industry can apply some element of pressure, include the high cost of inputs. Better marketing and distribution services, at both domestic and international levels, can be applied in developing a strategy to enhance competitiveness. This is due to the fact that these can have a positive impact on the local soybean industry's competitiveness. The industry therefore needs to pinpoint the crucial factors where transaction costs can be minimised in the value chain. This will improve the industry's competitiveness, particularly taking into account accessible and required logistical infrastructure.

5.4.5 Strengthen the Research and Development (R&D)

Research and Development can be considered amongst the key strategies that can increase the competitiveness of domestic soybean industry. Research and Development includes innovation, developing technology enhancements, increased efficiency, and improved marketing. According to Van Berkum and Van Meijl (2000), innovation is a crucial factor in establishing the industry's competitiveness. In order to remain competitive, the industry needs innovation, the incorporation of modern ways into business operations, and the capacity to alter business strategies in line with

a constantly changing environment. Innovations can move the competitive advantage when competitors are either unable to perceive a new way of competing or are simply unable to respond. Innovation, research and technology can lead to massive advancements in the competitiveness of the local soybean industry.

Both government and private institutions in South Africa should initiate and strengthen soybean research, particularly in terms of the competitive advantage of the soybean industry within the oilseed industry. Although the public sector has encouraged soybean research, more work is still required in this regard. Government-sponsored research investments should be increased and private sector research and development should be encouraged. Researchers and more role-players with an interest in the soybean industry would gain immensely from well-organised cooperation and information dissemination.

5.4.6 Encourage acceptance of soybeans for human consumption

The human consumption of soybean products in South Africa has been very low. This is primarily due to the low acceptance of soybean products by the South African population. According to the NAMC (2011), the following can be done to stimulate the embracing of soybeans within diets:

- Promotion of the health benefits of soybean and its benefits as an alternative protein source, through proper linkages with health and nutrition practitioners.
- Promote the production of soybean products through investment in the usage of affordable and appropriate "smallholder" technology in rural areas, linked to local production of soybeans.
- Focus more on research that can improve the taste through the development of new cultivars. This can be achieved through proper linkages between government and research universities (private–public partnership).

5.4.7 Increase market efficiency

To improve the South African soybean industry's competitiveness, greater numbers of competitive companies should invest in modern and more advanced technologies, be cost competitive, improve quality, launch new products, and be innovative. The industry has to innovate constantly as a result of the ever-changing environment. Urbanisation increases the drive for requirements of healthier and better quality foods, such as soy products. Value chain management can be regarded as being an integral part of improving competitive advantage. If only some actions within the value chain are conducted in a well-organised manner, the full potential for value adding will not be attained.

5.4.8 Improve coordination of the value chain

All the points raised above (6.4.1 – 6.4.7) clearly indicate that, for the domestic soybean industry to improve its competitiveness, there will be a requirement for competitive strategies to be embraced by all the role-players in the value chain. A powerful group of related and supporting industries is crucial to the competitiveness of local companies and organisations. Research institutions, agro-logistics networks, co-operatives, suppliers, etc., will have to be enhanced in order to grow the soybean industry in South Africa.

5.5 Recommendations for further research

During the course of this study, a need for further research into the following areas was identified:

- **Full analysis of the South African soybean industry** – Future studies should analyse the entire value chain, from farmer to consumer. This would provide an indication of where all the weak links in the soybean value chain lie. Recommendations of how the weak linkages in the value chain could be solved should be provided.

- **Technology used in the soybean industry** – Technology is an integral part in the industry's competitiveness. Research should be conducted on the technology that is currently being applied in the domestic soybean industry, as well as the technology

applied by other leading producers of oilseeds. The variances in profit margins of both the domestic and Argentinian crushing and refining industries should be examined. This would be crucial, since Argentina was found to be more competitive in value-added oilseeds. The steps that need to be taken in order to enhance the South African soybean industry's competitiveness in the value-added industry should be investigated. Lastly, more emphasis should be placed on how to make South Africa one of the global leaders in soybean industry technologies.

- **Demand conditions in the South African soybean industry** – Future studies should investigate the demand conditions in the local soybean industry, as these are integral elements of relative competitiveness. The study should focus on consumer requirements: especially as to what consumers require in soy products and what can be done in fulfilling their needs by the processors. The prospects for the niche markets, especially for the human consumption market, should be studied.

- **The South African soybean oilcake market** – Future studies regarding the soybean oilcake market in South African should be conducted, as well as on the opportunities that exist in that market.

- **Supporting industries in the South African soybean industry** – Supporting industries in the domestic soybean industry should be established with their limitations. Recommendations should be made in order to address the challenge.

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