

# An Evaluation of Competitiveness of South African Maize Exports

By

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## DECLARATION

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## *ABSTRACT*

South Africa's maize exports are generally irregular and inconsistent. This lack of consistency is attributed primarily to uneven surplus levels which, in certain years, preclude South Africa's regular participation in larger import markets. We therefore applied a revealed comparative advantage index, agri benchmark production model, growth-share matrix, indicative trade potential index, relative indicative trade potential index and market attractiveness index to assess the competitiveness of South African maize exports, and the scope to expand the market share in existing markets and to identify unexploited and attractive markets.

We found that South Africa's maize exports are competitive relative to leading global exporters. However, the production costs analysis showed that South Africa is less competitive relative to Argentina, Brazil, the USA and the Ukraine. High-potential and attractive markets were identified as Japan, Mexico, Taiwan, the United Arab Emirates, Thailand and Zimbabwe. These are markets that South Africa should prioritise to develop in the short to medium term. Moreover, the Market Attractiveness Index showed that Indonesia, Nigeria, Malaysia, Saudi Arabia, Mauritius, the United Arab Emirates, Taiwan, Iran, the Democratic Republic of Congo and Yemen are the top ten attractive markets for South African maize exports.

In terms of market access, South Africa faces relatively similar tariff levels in global markets compared to its competitors. However, with regard to non-tariff barriers, South Africa faces restrictions in markets such as Thailand, Saudi Arabia and within the EU countries, since South Africa's maize production is approximately 85% genetically modified.

Recommendations for developing South African maize exports would be to closely view the top 25 attractive markets presented on the Market Attractiveness Index and strategically position the industry to access these markets. There also is a need to design an industry export strategy that will prioritise these markets in line with business interests and to explore the existing potential. The current South African maize exports are concentrated and there is scope to access new markets.

## OPSOMMING

Suid-Afrika se mielie-uitvoere is oor die algemeen onreëlmatig en onkonsekwent. Hierdie gebrek on konsekwentheid word hoofsaaklik toegeskryf aan oneweredige oorskotvlakke wat in sommige jare Suid-Afrika se gereelde deelname in groter invoermarkte verhoed. Ons het dus 'n onthulde vergelykende voordeel-indeks (*revealed comparative advantage index*), die *agri benchmark* produksiemodel, die groei-aandeel matriks, aanduidende handelspotensiaal-indeks (*indicative trade potential index*), relatiewe aanduidende handelspotensiaal-indeks (*relative indicative trade potential index*) en die mark aantreklikheidsindeks (*market attractiveness index*) gebruik om die mededingendheid van Suid-Afrikaanse mielie-uitvoere te bepaal, sowel as die moontlikheid om die marktaandeel in huidige markte uit te brei en om onontwikkelde en aantreklike markte te identifiseer.

Ons het gevind dat Suid-Afrika se mielie-uitvoere mededingend is relatief tot die voorste globale uitvoerders. Die produksiekoste-analise het egter getoon dat Suid-Afrika minder mededingend is relatief tot Argentinië, Brasilië, die VSA en Oekraïne. Aantreklike markte met 'n hoë potensiaal is in Japan, Meksiko, Taiwan, die Verenigde Arabiese Emirate, Thailand en Zimbabwe geïdentifiseer. Hierdie is markte waaraan Suid-Afrika voorkeur moet gee om in die kort- tot mediumtermyn te ontwikkel. Verder het die mark aantreklikheidsindeks getoon dat Indonesië, Nigerië, Maleisië, Saoedi-Arabië, Mauritius, die Verenigde Arabiese Emirate, Taiwan, Iran, die Demokratiese Republiek van die Kongo en Jemen die top tien aantreklike markte vir Suid-Afrikaanse mielie-uitvoere is.

In terme van marktoegang staan Suid-Afrika voor redelik eenderse tariefvlakke in die globale markte as sy mededingers. Met betrekking tot nie-tarief struikelblokke staan Suid-Afrika voor beperkings in markte soos Thailand, Saoedi-Arabië en binne die EU-lande, aangesien Suid-Afrika se mielieproduksie ongeveer 85% geneties gemodifiseer is.

Aanbevelings vir die ontwikkeling van Suid-Afrikaanse mielie-uitvoere behels 'n nadere beskouing van die top 25 aantreklike markte in die mark aantreklikheidsindeks en om die bedryf strategies te posisioneer om hierdie markte te betree. Daar is ook 'n behoefte aan die ontwerp van 'n bedryfsuitvoerstrategie wat voorkeur gee aan hierdie markte in lyn met

sakebelange en om die huidige potensiaal te ondersoek. Huidige Suid-Afrikaanse mielie-uitvoere is gekonsentreerd en daar is ruimte vir toegang tot nuwe markte.

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*Come, all you who are thirsty, come to the waters; and you who have no money, come, buy and eat – Isaiah 55, v 1*

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## CHAPTER ONE: INTRODUCTION

### 1.1 BACKGROUND

The origin of maize can be traced to the Tehuacan Valley of Mexico, from where it spread throughout the Americas in about 2500 B.C. (Mangelsdorf & Reeves, 1938). The first documented account of maize on the African continent was in 1549, when a Portuguese pilot noted established maize fields in the Cape Verde Islands (McCann, 2001). Maize was first introduced in South Africa 1655, and has since become one of dominant food crops (Kempton, 1931; McCann, 2001).

Maize is produced in all the provinces of South Africa, but the most significant producing regions are the Free State, Gauteng, Mpumalanga and North-West province (GSA, 2015a). On average, between 2.5 and 2.75 million hectares of commercial maize is planted in South Africa each year (MaizeTrust, 2014). Furthermore, about 350 000 to 500 000 hectares is planted by small-scale farmers. In general, South Africa's maize-planting season starts in late spring or early summer, with optimal planting times between October and December. The harvesting time usually starts in March and ends in August (GSA, 2015a).

Genetically modified (GM) maize crops were introduced in South Africa in the 2001/2002 season (GSA, 2015a). By 2010, South Africa was the ninth's largest global cultivator of biotech crops, with more than 2.2 million hectares under GM maize (Pioneer, n.d.). According to the Maize Trust (2014), 85% of South Africa's total maize crop is GM maize. The adoption of genetically modified maize, coupled with other technological improvements has led to significant increases in yields. For example, before the introduction of GM maize, yield levels under irrigation in the Northern Cape province were around 9.12 tons per hectare in the 1997/1998 production year, but these increased to 12 tons per hectare in the 2007/2008 production year, which to date is the highest commercial yield on the African continent (GSA, 2015a).

Besides its importance as a staple food for the majority of the population, maize is a major feed grain for livestock. Estimates by Grain South Africa indicate that, on a 10-year average (2005-2015) national maize production of 11 million tons, 84% is consumed domestically (GSA, 2015b). Approximately 40% of that total is for human consumption, whilst the animal

feed industry has a share of 38% (GSA, 2015b). The rest might be used for gristing or farm uses. White maize is mainly for human consumption and yellow maize for animal feed.

The maize industry is important to the South African economy and food security of the country, and therefore its competitiveness is a matter of concern. The industry has seen some dramatic changes over the past two decades, moving from a heavily regulated market environment towards a free-market environment that is interlinked to the global market environment (Traub & Jayne, 2004).

## 1.2 PROBLEM STATEMENT

Prior to 1997, the Marketing of Agricultural Products Act No. 59 of 1968 provided the framework for domestic and international trade in agricultural commodities. For the maize industry, a single-channel fixed-price scheme was established using a cost-plus approach to commodity pricing and margin determinations (Traub & Meyer, 2010). However, following the gradual liberalisation of the grain commodity markets in the mid-1980s and the removal of trade sanctions against South Africa, the South African agricultural industry had become fully liberalised by 1997, with producers and marketing agents more interlinked to global markets and thereby to market forces.

The Marketing of Agricultural Products Act No. 47 of 1996 currently shapes agricultural marketing policy in South Africa (Traub & Meyer, 2010). Under this Act, prices are based on negotiations between market actors, and several trade reforms were enacted to meet the objective of establishing a market-orientated economy and to comply with the requirements of various trade agreements. These structural changes in the maize market have given rise to the drive by many agricultural entities and government to assess, understand and improve the competitiveness of the industry (Esterhuizen, 2006). In this respect, a number of studies were done in many agricultural industries by both international and domestic researchers, but little has been done on the South African maize industry.<sup>1</sup>

Evidence suggests that, on the production side, South Africa's maize industry, when compared to other leading global exporters, is less competitive (Bureau for Food and Agricultural Policy [BFAP], 2014). For example, South African farmers establish maize at

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<sup>1</sup> Van Rooyen and Van Rooyen, 1998; Van Rooyen, Esterhuizen and Doyer, 2000; Valentine and Krasnik, 2000; Pitts and Lagnevic, 1997; Ferto and Hubbard, 2001; Esterhuizen, 2006; Esterhuizen and Van Rooyen, 2005.

higher costs than farmers in the United States, Argentina and the Ukraine, owing to high fertiliser and pesticide costs (BFAP, 2015). However, on the production side, South Africa is competitive when compared to regional maize producers. According to ReNAPRI (2014), the costs of fertiliser (urea) in the commercial market, in the 2011/2012 season in the South African small farming environment was US\$38 per 50 kilograms, while in Malawi it cost US\$59 per 50 kilograms and US\$41 per 50 kilograms in Zambia. Moreover, South Africa's cost of maize seed in 2011/2012 was at US\$85 per hectare, while Zambia's seed costs were at US\$112 per hectare.

In the same vein, South Africa's traditional maize export markets are highly concentrated, meaning that large proportion of South Africa's maize exports go to a few countries (ITC, 2015a). This is on the back of the adoption of the Comprehensive Africa Agriculture Development Programme in 2003, which aimed at increasing African countries' agricultural gross domestic product growth by 6% per year (Bahiigwa & Benin, 2013). This meant that governments had to spend 10% of their national expenditure on agriculture. This, in turn, led to increased subsidies and price support for maize, which ultimately resulted in surplus production in Malawi and Zambia, which were previous South African export markets (Ricker-Gilbert, 2011).

At the same time, South Africa's commercial maize production has shown a significant increase. From 2009/2010 to 2013/2014, South Africa's maize production increased by 12%, from 12.8 million tons to 14.3 million tons. Within the same period, South Africa's commercial domestic consumption grew by just 6%, and currently is at 9.7 million tons (GSA, 2015b). The development of new export markets might bring profit for the farmers and foreign earnings to the economy. There is little understanding of the competitiveness of the South African maize industry and the possibility to access new markets.<sup>2</sup> Thus, this study will address these research gaps.

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<sup>2</sup> Van Rooyen and Van Rooyen, 1998; Esterhuizen and Doyer, 2000; Valentine and Krasnik, 2000; Pitts and Lagnevic, 1997; Ferto and Hubbard, 2001; Esterhuizen, 2006; Esterhuizen and Van Rooyen, 2005

### 1.3 OBJECTIVES OF THE STUDY

The broad objective of the study was to evaluate the competitiveness of South African maize exports relative to the global exporters.

#### Specific Objectives

- To describe and provide evidence of the competitiveness status of the South African maize exports.
- To assess the scope for South Africa to increase its market shares in existing maize export markets.
- To identify unexploited potential markets for the South African maize exports.

### 1.4 KEY ASSUMPTION

The key assumption underlying the study is that maize is homogeneous, as trade databases do not offer more nuanced product differentiation and, as a result, both yellow and white maize statistics conflate into a single product. To address the research question and test the various hypotheses, this study made use of the International Trade Centre's (ITC) Harmonized Systems classification data, quoting the product line "HS100590" (i.e. maize (corn) nes (not elsewhere specified)), which essentially treats maize as a homogeneous product.

### 1.5 RESEARCH METHODOLOGY AND HYPOTHESES

The study attempted to assess the competitiveness of South Africa's maize exports by following the quantitative approaches of Balassa (1965), the growth-share matrix of Henderson (1979) and the International Trade Centre's (2014) Market Attractiveness Index. Table 1.1 presents a summary of the research questions, hypotheses and methodology of the study.

**Table 1.1: Research questions, hypotheses and methodology**

<b>Research question</b>	<b>Hypothesis</b>	<b>Methodology</b>
How competitive are South African maize exports relative to leading global exporters?	South Africa's maize industry is competitive relative to leading global exporters.	Revealed Comparative Advantage of Balassa (1965), as well as an agri benchmark production model (BFAP, 2015)
Can South Africa increase its market share in existing maize market?	South Africa has limited scope to increase its market share in existing traditional markets.	Growth share matrix of Henderson (1979) and Indicative Trade Potential (Helmerts & Pasteels, 2005)
Which are other, unexploited potential markets for the South African maize industry?	South Africa has a high export potential to access new markets.	Market Attractiveness Index (ITC, 2014)

## 1.6 OUTLINE OF THE STUDY

To address the objectives of this study, Chapter 2 provides an overview of the South African maize industry. This is done by exploring the agricultural marketing and trade policy, the production pattern over the years, international trade of South Africa's maize and lastly, domestic consumption and international trade of maize products. Chapter 3 provides a summary of the theoretical framework that underpins the notion of comparative advantage. In Chapter 4 the methodological approaches that were applied to measure the competitiveness of the South African maize industry are discussed. Chapter 5 presents the results of the Revealed Comparative Advantage model, Production Cost Comparisons, Growth Share Matrix and Market Attractiveness Index. Chapter 6 provides the conclusions and recommendations of the study.

## CHAPTER TWO: A BRIEF OVERVIEW OF THE SOUTH AFRICAN MAIZE VALUE CHAIN

### 2.1 INTRODUCTION

The South African maize industry contributes significantly to the economy of South Africa, both upstream to the input industries and downstream to the processing industries (MaizeTrust, 2014). In 2014, the primary agricultural industry contributed 2.5% to the gross domestic product (GDP) of South Africa (StatsSA (Statistics South Africa), 2014). At the same time, the maize industry's contribution to the total GDP was estimated at 0.4%. Maize plays a vital role as an input in the manufacturing industry, which contributes about 13% to the total GDP of the country (StatsSA, 2014).

Moreover, the maize contribution to foreign earnings has been growing. From 2001 to 2014, South African maize foreign earnings grew significantly, from R629 841 000 to R4 865 266 000 in real terms (ITC, 2015a). This was on the back of increasing maize exports, from 599 156 tons to 1 642 540 tons (ITC, 2015a).

The South African maize industry comprises producers or farmers, governmental organisations and agribusinesses (i.e. trading companies, co-operatives, financial institutions, etc.). However, the umbrella producer or farmer organisation is Grain South Africa (Grain SA). Moreover, the maize industry is divided into commercial and small-scale agriculture. In 2011, the number of commercial maize farmers was estimated at 8 000 and the number of developing agricultural farmers remain unknown (Tshilambuli, 2011).

The South African maize industry provides income to the value chain agents: farmers, processors, exporters and transporters. Hence, it is an important crop from both the food security and income generation perspectives. It is worth noting that the industry is one of the most mechanised industries in South Africa, hence requires highly skilled labour relative to industries such as the table grape industry (Goldblatt, 2009). Primary agriculture, with the maize industry included, contributes about 6% to formal employment in the country (StatsSA, 2015a).

## 2.2 BASIC CONDITIONS: AGRICULTURAL MARKETING AND TRADE POLICY FOR MAIZE

### 2.2.1 Brief Overview of Agricultural Marketing Policy

In South Africa, agricultural policy has a significant impact on the maize industry. From the 1930s up to 1997, maize marketing and pricing were heavily regulated by the state (Traub & Jayne, 2004). This was under the Marketing Act of 1937. Nonetheless, it is important to highlight that, in the early 1960s, the South African agricultural industry faced increasing pressure to liberalise its markets, which led to the deregulation of state agricultural marketing schemes within the framework of the Marketing Act of 1968. These deregulation steps had an influence only on the domestic environment, since South Africa was isolated from the world market due to international sanctions under the Apartheid regime.

The first opening for the maize sector to the influences of the world market came with the Marrakesh Agreement of the General Agreement on Tariffs and Trade (GTT) in 1993, when all government controls on agricultural trade were replaced by tariffs (Vink & Kirsten, 2002). The most significant policy change, however, was brought about by the Marketing of Agricultural Products Act, No 47 of 1996. After the implementation of this Act, farmers had to take sole responsibility for the production and marketing of their products for the first time since the 1930s (Vink & Kirsten, 2002). The Maize Board, which used to do the marketing and pricing of maize, was abolished and futures trading was introduced through the South African Futures Exchange (SAFEX) (Traub & Jayne, 2004).

The deregulation process meant that prices and production decisions were to be influenced by global market forces (Chabane, 2002). These were challenging market forces to which farmers had to adapt after operating in a guaranteed and enclosed environment for decades. These challenges included international maize price volatilities and influences, exchange rate volatilities, local production and consumption levels, and stock level (world and domestic market) influences. It is worth noting that the deregulation of agricultural marketing was a success, with notable improvements in increasing production efficiency (Chabane, 2002). Thus, the South African maize industry is among the world's notable maize producers and exporters (ITC, 2015a).

### 2.2.2 Brief Overview of South African Agricultural Trade Policies

Trade policy reform is one of the important policy interventions made in the maize industry. Before 1994, South African trade policy involved quantitative restrictions, tariff lines, ad-valorem duties and surcharges (Vink & Kirsten, 2002). These methods changed after the Marrakech Agreement of the GATT in 1993. The South African maize trade currently is under tariff restrictions which are calculated by the world maize reference prices (GSA, 2014a). The reference price in October 2015 was at US\$110/ton and delivers a tariff when prices trade below this reference price by US\$10 for 21 consecutive days (GSA, 2014a).

These reforms included the phyto-sanitary standard, import and export permits. Moreover, a number of institutions were established to implement these reforms, such as the International Trade Administration Commission, Food Safety and Quality Assurance, South African Agricultural Food, Quarantine and Inspection Services Directorate, Perishable Products Export Control Board, Plant Health and Quality Directorate and the Department of Health (Traub & Meyer, 2010). The main aim of this policy was to enhance South Africa's international maize competitiveness (Vink & Kirsten, 2002).

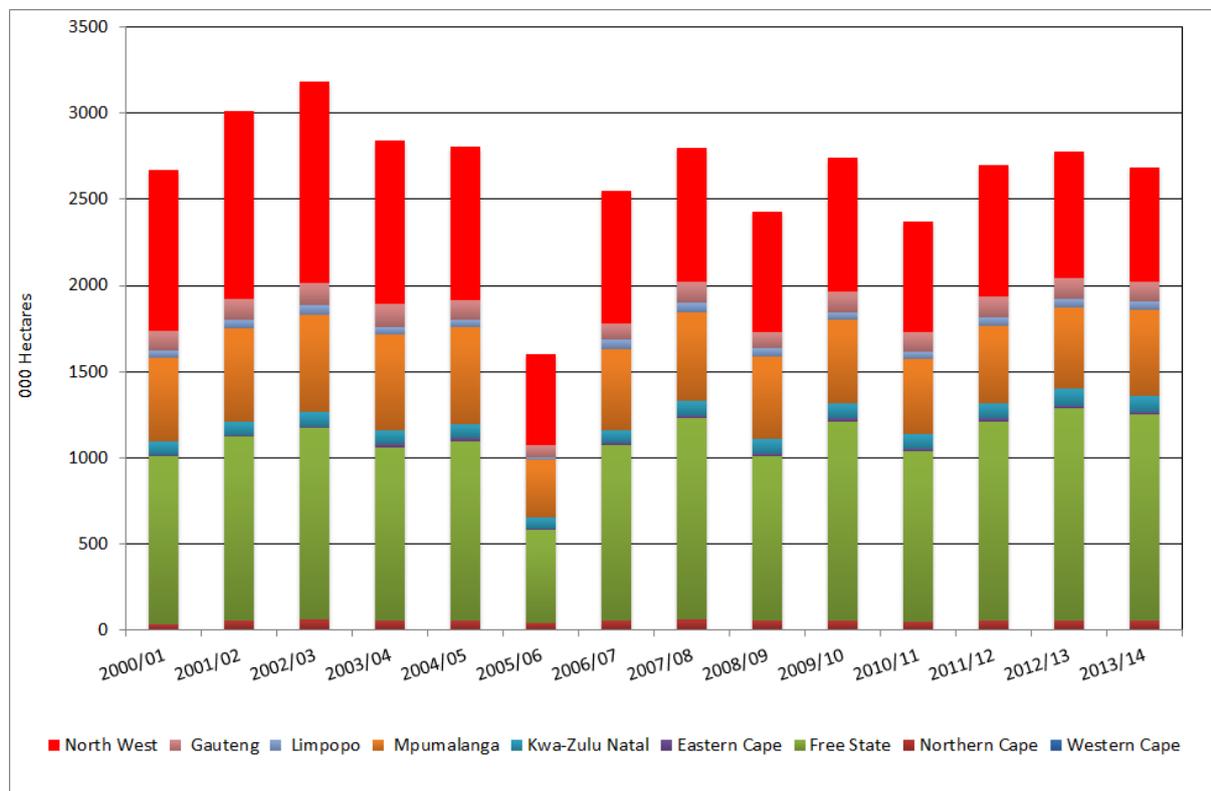
South Africa also has successfully negotiated favourable trade agreements, such as all the World Trade Organisation agreements, African Growth and Opportunity Act, the Trade and Development Cooperation Agreement, the Southern African Development Community, and the Southern Africa Customs Union Treaty, and in 2015 was negotiating the Tripartite Free Trade Area (Traub & Meyer, 2010; Andriamananjara, 2015).

## 2.3 OVERVIEW OF SOUTH AFRICAN MAIZE PRODUCTION

### 2.3.1 South African Maize Production Trends

Maize is produced throughout South Africa, with the Free State, Mpumalanga and North West provinces being the largest producers, accounting for approximately 80% of the total production (GSA, 2015a). Figure 2.1 shows the trend of maize area planted by province over the past 14 seasons. The area has varied throughout the 14 production seasons, with an average area of 2.6 million hectares (GSA, 2015a). The Free State province has the largest area planted to maize, accounting for about 44.45% of the total maize area planted in the 2013/2014 production season. The second largest maize area planted is in North West province, accounting for 24.74% of the total area planted in 2013/2014. The third largest

maize area planted is in Mpumalanga province, accounting for 18.60% in the 2013/2014 production season (GSA, 2015a).



**Figure 2.1: Area planted to maize by province**

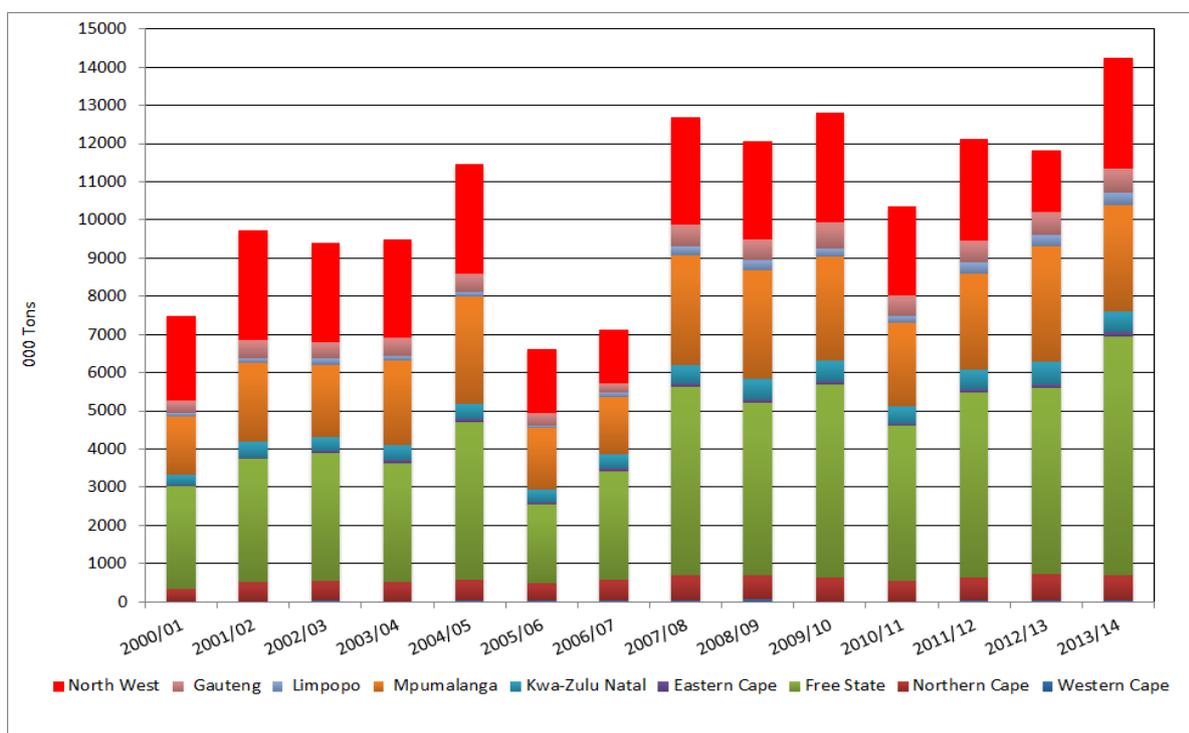
Source: Grain SA (2015a)

The maize hectares are expected to decrease in Mpumalanga province in the near future (2021), as the main agricultural land is continuously being taken by the coal mining industry (BFAP, 2012). In 2013/2014, the area planted to maize in Mpumalanga was 500 000 hectares. The BFAP (2012) argues that there is a possibility that 326 022 hectares of total agriculture in the Mpumalanga province might be lost as a result of coal mining expansion. This would include all summer crop hectares, such as soybeans, sunflower seed, sorghum, etc. The BFAP (2012) further claims that 439 577 hectares of agricultural land in Mpumalanga province is at risk of being transferred to the mining industry between 2012 and 2021. This area totals to 765 599 hectares.

Gauteng province also is a significant player in the production of maize, with the area planted to maize accounting for 4.39% of the 2.6 million hectares planted in 2013/2014 (GSA, 2015a). The other provinces, such as the Eastern Cape, KwaZulu-Natal and Limpopo,

are also significant players in South African maize production, but most importantly in small-scale farming, which contributes significantly to household food security (TIPS (Trade and Industrial Policy Strategies), 2009). The total area planted to small-scale farming or non-commercial farming was estimated at 408 000 hectares in 2013/2014, which is 15% of the total area planted to commercial maize, at 2.6 million hectares (CEC, 2015).

Figure 2.2 illustrates the production trends of total maize production by province for the past 14 seasons. During this period, South African maize production increased by 91%, from 7.5 million tons to 14.3 million tons. The significant increase in production was largely driven by yields due to improved production technologies, production methods and new seed varieties (Pioneer, n.d.; BFAP, 2012). The observed production volatility in some years is due to changes in climatic conditions. Evidently, the 2005/2006, 2007/2008 and 2012/2013 production seasons were heavily affected by drought, especially in the western maize-producing areas of the country, which are the North West province and the western parts of the Free State province, which are the main white maize-producing areas (GSA, 2015a).



**Figure 2.2: South African maize production by province**

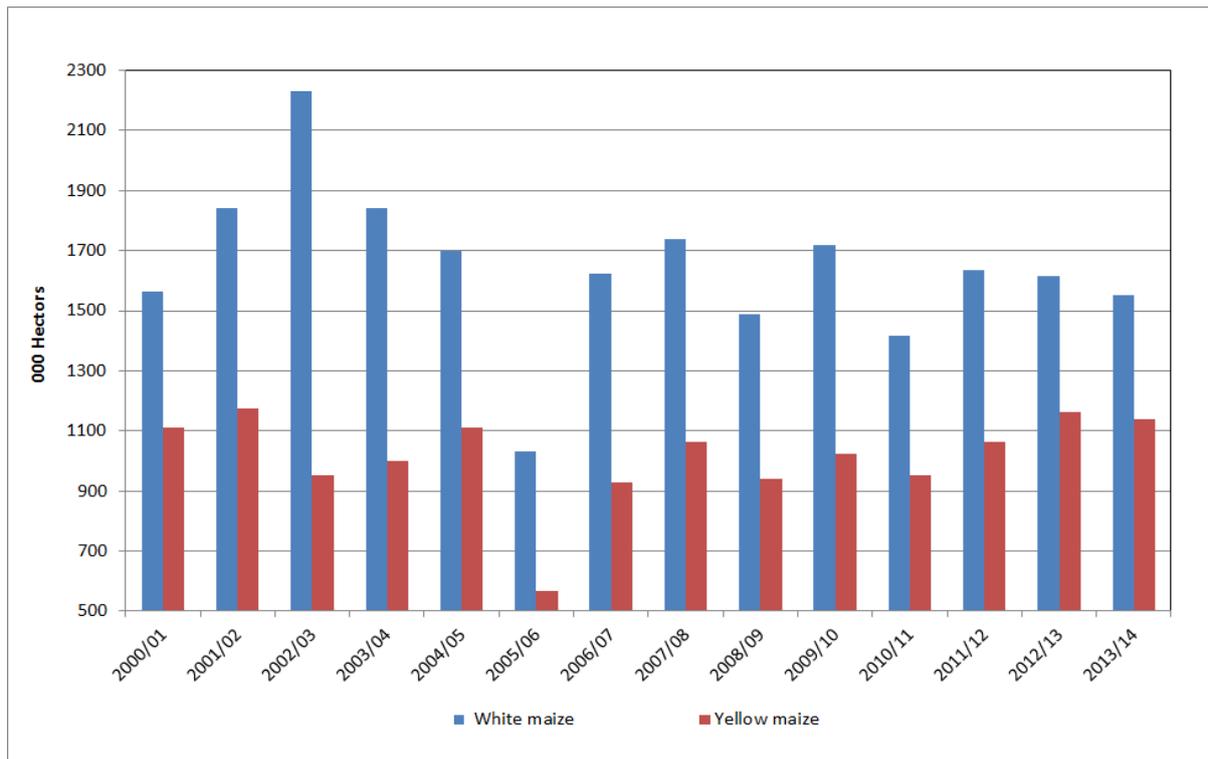
Source: GSA (2015a)

From 2000/2001 to 2013/2014, the total maize production or output of the Free State increased by 44%, to 6.3 million tons, which accounts for 43.84% of the total production. As previously highlighted, the production increase is due to improved production practices, favourable weather conditions and the adoption of improved technologies, such as GMO seeds (GSA, 2015a). The second largest maize-producing province is North West, accounting for 20.34% in the 2013/2014 production season. The third largest maize producing province is Mpumalanga, accounting for 19.52%. Gauteng, the Northern Cape, KwaZulu-Natal and the Eastern Cape province are also significant maize producers (GSA, 2015a). The smallest maize-producing province is the Western Cape. The Western Cape province mainly produces winter grains, such as wheat, barley, canola and oats (GSA, 2015a).

Additionally, maize production takes place largely on dry land, although there is about 17% that is produced under irrigation, mainly in the Northern Cape province (GSA, 2015a). There are many factors that influence maize production, ranging from inputs to climatic conditions. Successful maize production depends on the correct application of production inputs that will sustain the environment, as well as agricultural production (Du Plessis, 2003). Some essential methods are improved seed cultivars, plant population, soil tillage, fertilisation, weed, insect and disease control (GSA, 2015a).

The eastern parts of South Africa are mostly conducive for yellow maize production, while the western regions of the country are mostly conducive for white maize production (GSA, 2015). These production variations are due to climatic differences. The production proportion between white and yellow maize has been changing over the years. Research shows that much of this is largely due to changes in household consumption. Rising income and positive class mobility rates have led to diet diversification and the increasing consumption of protein. Therefore, over the past decade or so, the demand for yellow maize from the feed industry has risen significantly (BFAP, 2014). This phenomenon is apparent on both the domestic and global front.

Figure 2.3 illustrates the changes in South African maize hectares over the past 14 production seasons. By the 2013/2014 marketing year, the area planted to maize had generally decreased, but, in proportion, yellow maize area planted increased by 8% from 2000/2001 to 2013/2014 in response to the global demand. White maize area planted is still significant and likely to remain that way, as white maize is the staple food for millions of people in Southern Africa (see Figure 2.3).



**Figure 2.3: Area planted to white maize and yellow maize in the past 14 seasons**

Source: GSA (2015a)

## 2.4 INTERNATIONAL TRADE OF SOUTH AFRICA'S MAIZE

### 2.4.1 South Africa's Maize Exports

South Africa can be considered as one of the smaller players in the global maize export market, contributing a modest 1.2% of total world maize exports in 2014 (see Table 2.1). Given the relatively small size of South Africa in the global context, the domestic industry is a price taker, with production and exports in the USA, Brazil, Argentina and the Ukraine largely influencing global maize prices (Mofokeng, 2012). According to Bahta (2004), South Africa's participation in global markets has seen some fierce competition from the larger exporters, particularly those among the top four global players. Global maize exports are concentrated within the top four largest exporters, which are countries that account for 74% of total global exports. Meanwhile, 97% of the volume of the world's maize exports comes from the top 20 exporters (see Table 2.1).

With the exception of Argentina, the USA, France, Hungary, Serbia, Poland, Thailand, Germany and the Republic of Moldova, all the other countries within the top 20 largest exporters grew at a faster pace than South Africa's exports. The Ukraine, Romania, India, Russia, Bulgaria, the Netherlands and Mexico showed phenomenal growth rates in export volumes between 2001 and 2014, with average annual growth rates of between 20% and 86%. South Africa's exports grew by 13.3% over the same period, which is above the world average growth rate of 3.7%.

**Table 2.1: Ranking of the 20 largest global maize exporters in 2014**

Rank	Country	Volume of exports (tonnes)	Share of world total (%)	Growth rate of exports (2001-2014)
1	United States of America	49 606 270	35.6%	-2.1%
2	Brazil	20 638 756	14.8%	17.9%
3	Ukraine	17 546 296	12.6%	34.4%
4	Argentina	15 851 594	11.4%	4.4%
5	France	5 622 995	4.0%	-1.5%
6	Romania	3 630 291	2.6%	39.2%
7	India	3 543 956	2.5%	37.3%
8	Russian Federation	3 475 549	2.5%	87.1%
9	Hungary	2 393 953	1.7%	6.7%
10	Serbia	2 372 557	1.7%	0.0%
11	Paraguay	2 372 315	1.7%	16.1%
12	Bulgaria	1 828 783	1.3%	26.7%
13	Canada	1 776 962	1.3%	18.6%
<b>14</b>	<b>South Africa</b>	<b>1 642 540</b>	<b>1.2%</b>	<b>13.3%</b>
15	Poland	756 087	0.5%	0.0%
16	Thailand	755 350	0.5%	4.9%
17	Netherlands	657 698	0.5%	27.1%
18	Germany	538 534	0.4%	-0.9%
19	Republic of Moldova	422 057	0.3%	8.7%
20	Mexico	393 984	0.3%	35.9%
	Others	3 579 271	2.9%	-7.6%

Source: ITC (2015a)

In 2014, South Africa exported significant volumes of maize to five of the top 20 major importers of maize, including Japan, Korea, Chinese Taipei, Italy and the UK (ITC, 2015a). As shown in Table 2.2, South Africa's market share in these countries is as follows: Japan (1.3%); Republic of Korea (1.5%); Chinese Taipei (7.2%); Italy (0.4%); and the UK (0.1%). These five countries, altogether, took up 41% of South Africa's total maize exports.

A look at South Africa's export markets shows that, outside of these five major markets, South Africa exported 53% of its maize within the Southern African Development Community (SADC) countries (i.e. Zimbabwe, Mozambique, Angola, Lesotho and all the states in the Southern African Customs Union (SACU)). The remaining 6% of maize exports was destined for other markets, such as Portugal, the United Arab Emirates (UAE), Thailand, Côte d'Ivoire, Cameroon, Madagascar and North Korea (ITC, 2015a).

**Table 2.2: Ranking of South Africa's top 20 maize export markets in 2014**

Rank	Country	Volume of SA exports to country i (tonnes)	Share of country i in SA exports (%)	Country i imports from the world (tons)	Market share of SA in country i (%)
1	Taipei, Chinese	303 158	18.5%	4 211 679	7.2%
2	Zimbabwe	234 409	14.3%	283 873	82.6%
3	Japan	198 697	12.1%	15 032 129	1.3%
4	Botswana	189 118	11.5%	194 173	97.4%
5	Korea, Republic of	155 807	9.5%	10 220 987	1.5%
6	Namibia	150 363	9.2%	166 053	90.6%
7	Mozambique	116 053	7.1%	149 831	77.5%
8	Swaziland	89 451	5.4%	999 085	9.0%
9	Lesotho	88 874	5.4%	88 874	100%
10	Portugal	52 500	3.2%	1 768 666	3.0%
11	Italy	20 001	1.2%	4 580 354	0.4%
12	Angola	6 721	0.4%	NA	NA
13	Viet Nam	5 331	0.3%	NA	NA
14	Cameroon	5 118	0.3%	33 423	15.3%
15	Thailand	4 908	0.3%	36 974	13.3%
16	United Arab Emirates	4 335	0.3%	N/A	NA
17	Area Nes	4 031	0.2%	4 034	NA
18	Côte d'Ivoire	2 558	0.2%	3 050	83.9%
19	United Kingdom	1 718	0.1%	2 192 625	0.1%
20	North Korea	1 575	0.1%	17 233	9.1%
	Total	1 634 726	99.5%	39 964 604	+

Source: ITC (2015a)

a. Area Nes – Not elsewhere specified.

b. SA – South Africa

c. NA – Data is not available

In total, South Africa exported its maize to 115 different countries over the 14-year period (2001 to 2014), with some countries being more consistent importers than others. The SACU and SADC countries feature more prominently each year, while countries such as Sweden, Kuwait, Mauritania, Turkey, Benin, Seychelles and Thailand, among others, appear sporadically in particularly years (ITC, 2015a)

Moreover, South Africa's maize export market structure is concentrated, meaning that significantly large share of South Africa's maize exports go to only a few countries. Between

2001 and 2014, South Africa's top five export markets accounted for an average of 48% of the country's total maize exports. At the same time, the top ten markets have averaged 61%, while the top twenty have averaged 65% of the total maize exports (ITC, 2015a).

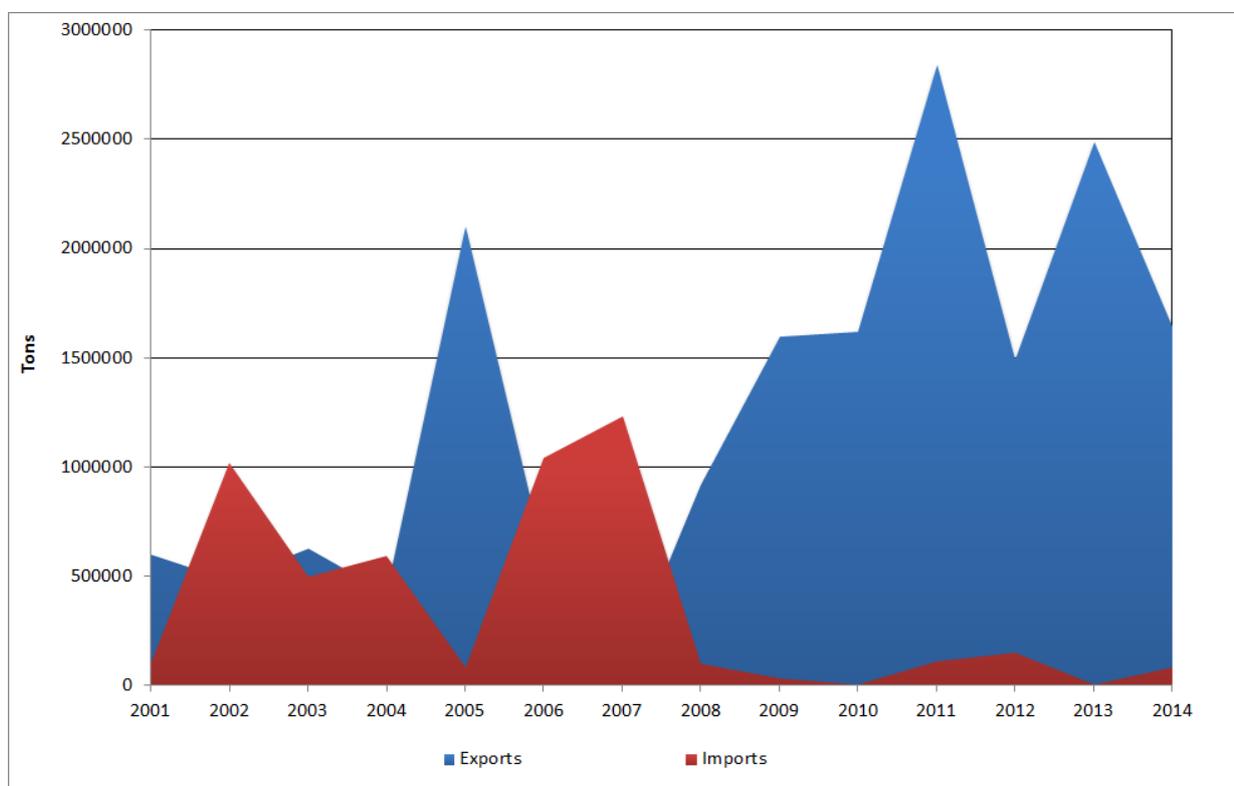
The percentage share of the top five, ten and twenty countries dipped in particular years, namely 2004, 2007, 2009, 2011 and 2012. The drop in the share of the major markets in South Africa's total exports was due to the opening up of new markets, an occurrence that is sporadic and random, as well as low output on the back of drought conditions, particularly in 2007 and 2012 (GSA, 2015a). In 2009, 70% (1 117 702 tons) of South African maize was exported to Kenya, which is currently not part of the top twenty existing markets, thus there was a significant drop in that year's export concentration.

Furthermore, from 2004 to 2010, Kenya was among the largest South African maize export markets, but volumes have since decreased due to increased competition from Zambia and Malawi (ITC, 2015). These countries' increased maize production has mainly been supported by fertiliser subsidies (Ricker-Gilbert, 2011). Zambian maize imports have been on a decreasing trend since 2009; from 41 929 tons to 2 207 tons in 2014. However, the existing leading suppliers still are South Africa and Malawi. On the one hand, Zambia's maize exports increased from 8 845 tons in 2001 to 75 533 tons in 2014 (ITC, 2015b). In 2012, Zambia recorded the highest export volume of 613 588 tons, with Zimbabwe, Mozambique, the Democratic Republic of Congo and Kenya being the leading importers. The available data shows that Malawian maize exports increased from 6 688 tons in 2001 to 357 246 tons in 2011 (ITC, 2015b). There was a decrease from 2012 to 2014, with exports at 3 847 tons (ITC, 2015b). This decrease can be attributed to low output on the back of unfavourable weather conditions.

Moreover, in 2011 and 2012, Mexico imported about 36% (1 030 430 tons) and 62% (919 568 tons) of South African maize respectively (ITC, 2015a). These imports were on the back of drought conditions in Mexico, which in turn led to low output (Reuters, 2011). Nonetheless, the long-term trend suggests declining levels of concentration over time, signifying that; overall, South Africa is exporting its maize to more countries than it used to.

## 2.4.2 South Africa's Maize Imports

South Africa's domestic demand is largely met by domestic supply (GSA, 2015b). In most years, the country is a net exporter of maize. Nonetheless, at times of drought, South Africa usually imports maize from the Ukraine, Botswana, Zambia, Argentina, the USA and Brazil (ITC, 2015a). In 2002, 2004, 2006 and 2007, South Africa had low output due to unfavourable weather conditions, which in turn resulted in large import volumes. Figure 2.4 illustrates South African maize imports and exports over the past 14 years (2001 to 2014).



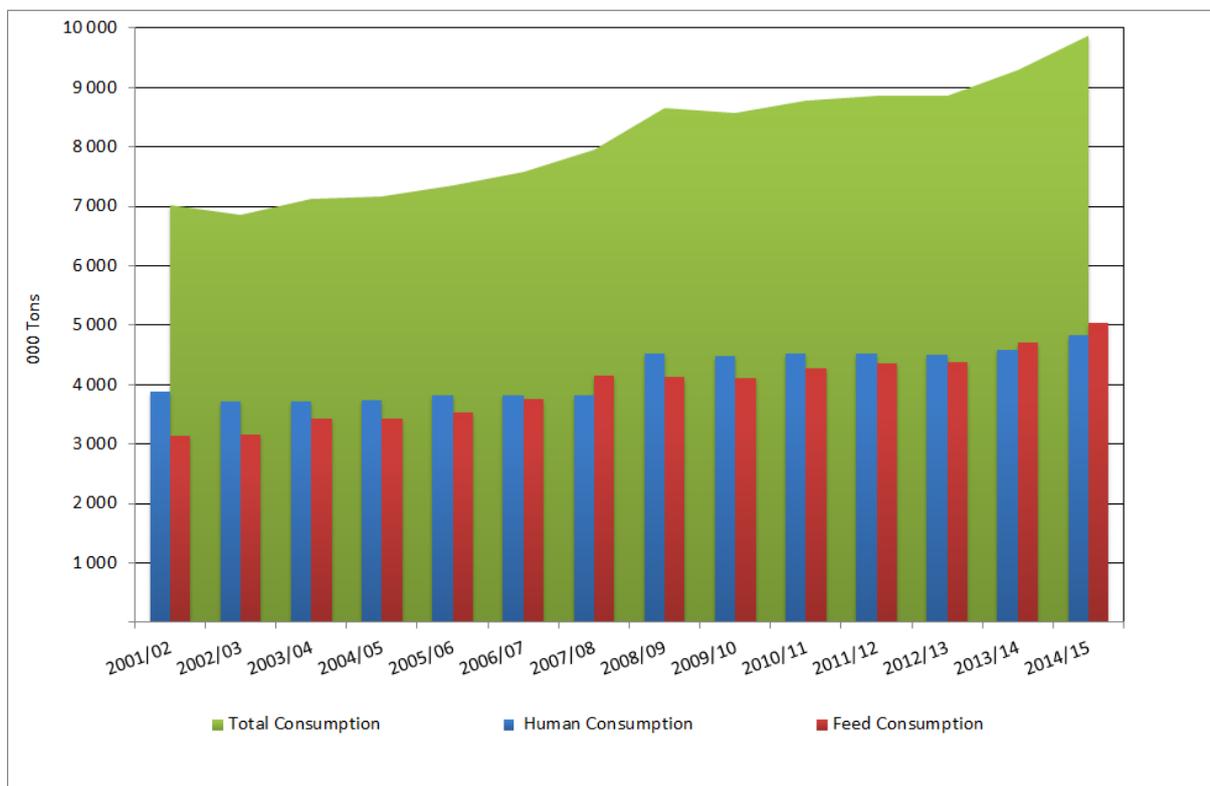
**Figure 2.4: South African maize imports and exports (2001 to 2014)**

Source: ITC (2015a)

## 2.5 DOMESTIC CONSUMPTION AND INTERNATIONAL TRADE OF MAIZE PRODUCTS

### 2.5.1 Overview of Domestic Maize Consumption Trends

In South Africa, maize is consumed by both humans and the animal industry. In the past 14 years, South Africa's maize consumption averaged at 8.1 million tons (GSA, 2015b). Of this total, 3.9 million tons went to the feed industry while the rest was for human consumption. In the 2014/2015 market year, South Africa's human consumption accounted for 34% of that season's total output of 14.3 million tons. In the same season, animal feed consumption accounted for 35% and the rest was for farm use and export markets. Figure 2.5 shows South Africa's maize consumption.



**Figure 2.5: South Africa's maize consumption**

Source: GSA (2015b)

As noted earlier, yellow maize consumption has been increasing due to the high demand from the animal feed industry. From the 2001/2002 to 2014/2015 marketing years, South African feed consumption grew by 62%, from 3.1 million tons to 5.04 million tons. At the same time, human consumption grew by 23%, from 3.9 million tons to 4.8 million tons (GSA,

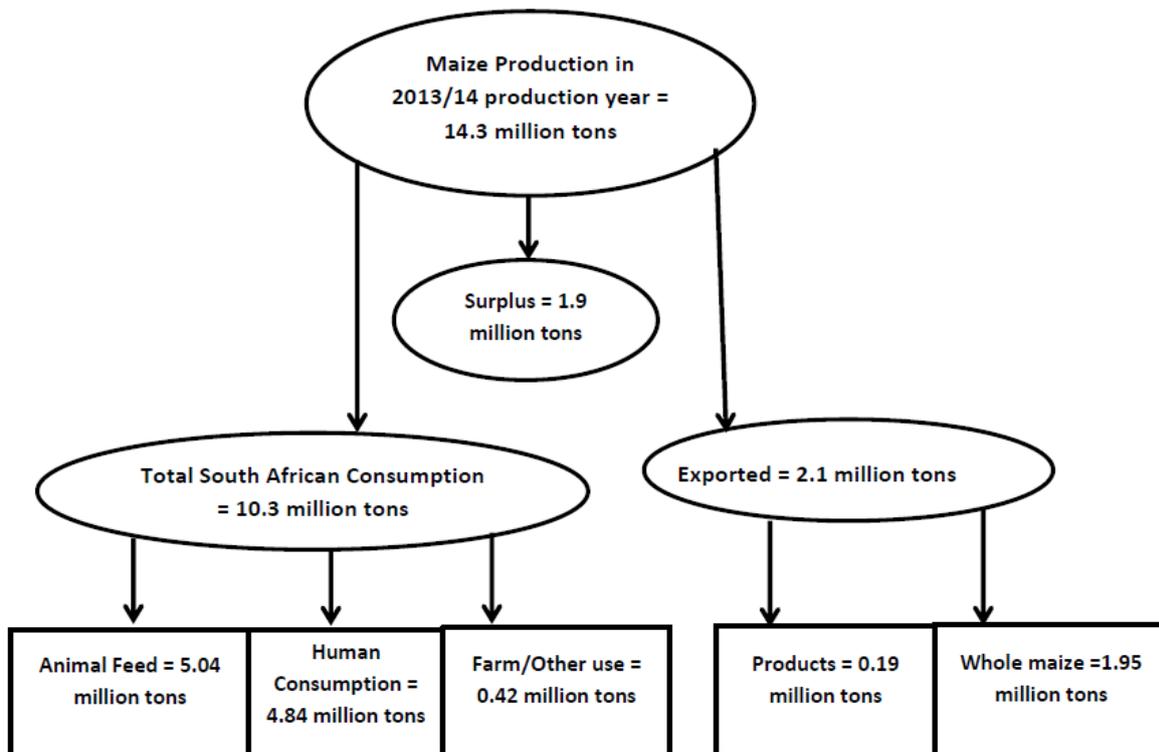
2015b). Moreover, South African population growth is also among the main drivers of increasing consumption. From 2004 to 2015, the South African population grew from 46 million people to 54 million people (StatsSA, 2015b).

#### 2.5.2 Brief Overview of Maize Products Trade

South Africa also exports maize products, which are usually maize meal and samp. These export products mainly go to regional markets, such as Zimbabwe, Lesotho, Swaziland and Botswana (SAGIS, 2015). From 2001/2002 and 2014/2015, average maize products exports averaged 111 000 tons (SAGIS, 2015). Over this period, maize export products grew by 267%, from 54 000 tons to 198 000 tons (SAGIS, 2015). Nonetheless, maize products exports are still significantly lower than the exports of maize, which average at 1.2 million tons from 2001/2002 and 2014/15 (SAGIS, 2015).

#### 2.6 CONCLUSION

Maize is the staple food for millions of South Africans and continues to contribute significantly to the GDP of the country. The industry is interlinked with many industries in the manufacturing sector, hence increasing its contribution to the overall economy. The exports also contribute significantly to the South African economy. Over the years there have been increasing foreign earnings, through increasing maize exports. It is important to note that the maize area planted has decreased significantly, but productivity has shown a meaningful increase, thus compensating for the lost hectares. The policy changes that were made over the years have also contributed positively to the South African maize industry's competitiveness. Figure 2.6 presents a summary of the graphic flow of the South African maize.



**Figure 2.6: South African maize flow**

Data Source: GSA (2015)

In some seasons, such as in 2013/2014, South Africa had large surpluses which would have generated the country additional revenues and supported the maize prices if they were exported timely. This study hence aims to evaluate the competitiveness of South African maize exports and further identify unexploited potential markets for the maize industry.

## CHAPTER THREE: THEORETICAL FRAMEWORK

### 3.1 INTRODUCTION

Rising globalisation within the food system has given rise to the need for agricultural industries to compete not only in domestic markets but also globally. As a result of these new challenges, competitiveness has become a key focus for many industries (Esterhuizen, 2006). Hence there is a real need for businesses and governments to assess, understand and improve their international competitiveness with respect to trade. Against this background, an open economy such as that of South Africa, which has large imports of agricultural inputs, gives rise to a need for the maize industry to be more internationally competitive. The current trade environment in the South African maize industry is informed by the deregulation process of agricultural markets and re-submission to World Trade Organization agreements. Hence this chapter reviews the trade theories and briefly refers to their alignment with the current trade environment.

#### **Comparative and competitive advantage briefly tabulated**

The concepts of competitiveness and comparative advantage are usually confused with one another (Lim, 1997). From a business perspective, competitiveness is defined as the “ability of companies, industries, regions, nations, and multinational regions to generate relatively high factor income and factor employment levels on a sustainable basis, while remaining exposed to international competition” (Latruffe 2010, p.5). In short, it is the advantage that a firm has over its competitors, allowing it to generate greater sales or margins and/or to retain more customers than its competition. The source of this advantage can arise from the firm's differential advantage and/or comparative advantage. Differential advantage refers to the uniqueness of a firm's product offerings relative its competitors. In contrast, comparative advantage (or cost advantage) refers to a firm's ability to produce a good or service at a lower opportunity cost than its competitor (Serin & Civan, 2008). Thus, competitiveness and comparative advantage are the essential ideas of trade theory, as countries are expected to export goods for which autarky relative prices are lower than those of other countries.

In spite of the clarity on competitive and comparative advantage, this chapter focuses only on comparative advantage (no concerted effort was made to describe the evolution of competitive advantage).

### 3.2 EVOLUTION OF TRADE THEORIES

The origin of the current trade theories can be traced back from the 1500s, a period that marks the era of Mercantilism. This theory was later challenged in 1776 and 1817 by Adam Smith in his publication *The Wealth of Nations*, and by David Ricardo in his *Principles of Economics* respectively. Adam Smith and David Ricardo's theories heralded the formulation of a theory of free trade. Table 3.1 presents a summary of the evolution of trade theories.

**Table 3.1: Evolution of trade theories**

Theories	Key concepts
<p><b>Mercantilism</b></p> <p>Approximately 1500 - 1800</p>	<p>The objective was to make the state strong; the economic basis for strength – wealth – was given great weight. The most important form of wealth was considered to be precious metals.</p>
<p><b>Classical trade theories</b></p> <ul style="list-style-type: none"> <li>• Adam Smith (1776)</li> <li>• David Ricardo (1817)</li> <li>• J.S. Mills (1848)</li> </ul>	<ul style="list-style-type: none"> <li>• Absolute advantage</li> <li>• Comparative advantage</li> <li>• International values</li> </ul>
<p><b>Neoclassical models</b></p> <ul style="list-style-type: none"> <li>• Heckscher-Ohlin (1919, 1933)</li> <li>• Stolper-Samuelson (1941)</li> <li>• P. Samuelson (1948)</li> <li>• T.M. Rybczynski (1955)</li> <li>• Salter (1959) Swan (1960)</li> </ul>	<ul style="list-style-type: none"> <li>• Factor endowment</li> <li>• Stolper-Samuelson theorem: emphasised the relationship between output prices and factor prices within a single country</li> <li>• Factor price equalisation theorem: the relationship between relative prices in two countries</li> <li>• Rybczynski theorem: the relationship between the supply of a factor and the output of the commodity that uses that factor</li> <li>• Exchange rates</li> </ul>

Challenges to comparative advantage	
<ul style="list-style-type: none"> <li>• Leontief (1953)</li> <li>• S. Linder (1961)</li> <li>• R. Vernon (1966)</li> <li>• Krugman (1979) Lancaster (1979)</li> </ul>	<ul style="list-style-type: none"> <li>• Leontief Paradox</li> <li>• Overlapping demand</li> <li>• The product cycle</li> <li>• Economies of scale</li> </ul>

Source: Masters (1995) and Esterhuizen (2006)

### 3.2.1 Mercantilist and Classical Trade Theory

The Mercantilist view dominated trade theory between 1500 and 1750 (Appleyard, Field & Cobb, 2010). The fundamental principle of the mercantilists' school of thought was that a nation's growth pathway was determined by its ability to remain a net exporter. Throughout this process, a nation's revenue was the inflow of precious metals, primarily gold and silver generated through trade. However, in the short run there was a fixed amount of gold and silver, which meant that nations could not simultaneously be net exporters. This implied that trade could only occur at the expense of the other nations (Appleyard *et al.*, 2010). Hence this zero-sum game led to the emergence of import restrictions and export promotion to the advantage of the king, exporters and domestic producers, while domestic consumers lost due to higher domestic prices and limited product variety.

The challenges of zero-sum games that emerged from the mercantilist period were later addressed by the classical economists, namely Adam Smith (1723-1790), David Ricardo (1772-1823) and John Stuart Mill (1806-1873). Adam Smith, in his book *The Wealth of Nations* (1776) argued that Mercantilism ensured that only a few benefited and therefore weakened a nation in the long run. He reasoned that, through specialisation and free trade, all nations could benefit from trade. His viewpoint was that when nations specialised in industries that they have absolute advantages, trade becomes a positive-sum game, where all trading nations benefit. As a result, Smith strongly advocated a policy of *laissez-faire* government involvement in trade, arguing that free trade would increase productivity and maximise world welfare (Salvator, 2011). Figure 3.1 below illustrates the net welfare gains from free trade using the market model.

Country A in 1 day's labour produces	3 units of X and 2 units of Y
Country B in 1 day's labour produces	4 units of X and 1 unit of Y

### Figure 3.1: Adam Smith's absolute advantage

Assuming that two countries, A and B, produce goods X and Y and require labour for their production (see Figure 3.1). Country A takes one day to produce three units of X and two units of Y, while country B takes one day to produce four units of X and one unit of Y. Therefore, country A has an absolute advantage in terms of the production of Y, as it can produce it at a lower cost than country B, which has an absolute advantage in the production of X. Country A will benefit if it produces and exports good Y and country B will benefit by specialising in the production and export of good X. In this situation, both countries will benefit from trade (Salvator, 2011).

David Ricardo (1772-1823), further refined Adam Smith's notion of specialisation and gains from trade. In contrast to Smith, Ricardo emphasised the concept of comparative advantage, which proved that mutually beneficial trade could occur even when one nation was absolutely more efficient in the production of all goods (Salvator, 2011). As did Smith, Ricardo advocated specialisation, although arguing that the pattern of specialisation and trade should be in industries in which they have lower opportunity cost in production. Figure 3.2 below illustrates the gains from trade through specialisation in industries for which a country has a comparative advantage.

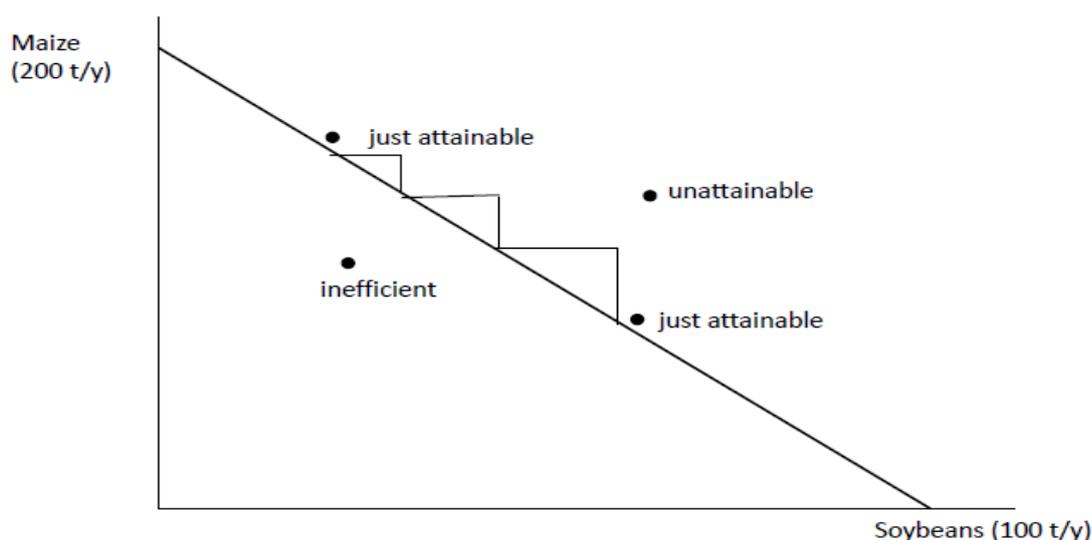


Figure 3.2: Production possibility frontier (PPF)

Figure 3.2 shows the production possibility frontier for country A, which has fixed endowments to produce 200 tons of maize and 100 tons of soybeans per year. The slope of the frontier shows the marginal opportunity cost of producing one commodity (either maize or soybeans) in terms of the amount of the other. For example, the marginal opportunity cost of soybeans in terms of maize is increasing when moving down the PPF. The country has a comparative advantage for the good with the lower marginal opportunity cost (Salvator, 2011).

The main assumptions behind Ricardo's view were that labour and capital were immobile between countries, and also that costs remained constant as output increased. Without these assumptions, specialisation would not be met (Esterhuizen, 2006). Ricardo's views were then measured in terms of the labour theory of value, which stresses the role of labour in value creation.

John Stuart Mill (1806-1873) advocated David Ricardo's view of comparative advantage and further introduced the law of international trade values, arguing that the actual barter terms of trade depend not only on domestic costs, but also on the pattern of demand (Esterhuizen, 2006). Mill's theory also highlighted that the value of an imported commodity equals the value of the commodity exported to pay for it. Mill concluded that the terms of international exchange depended on the strength and elasticity of demand for each product in the foreign country.

### 3.2.2 Neoclassical Models

In general, the classical economists concluded that almost all nations could improve the welfare of the population and spur economic growth through international trade. Even today this is still one of the fundamental principles underlying trade agreements and the need to improve the competitiveness of industries. Classical economists recommended free trade and that government should focus on maintaining competitive national markets by investing in public initiatives such as research and education, instead of restricting trade. In the 1900s, international trade theory developed further through the contribution of neoclassical economists. Adam Smith, David Ricardo and John Stuart Mill clearly demonstrated the gains from trade; however, they provided no explanation for differences in productivity (Salvator, 2011). Neoclassical economists, however, attempt to understand

and explore explanations for why opportunity costs differ across nations and/or firms. Without such explanations for the rise and fall of major industries, it could be argued that the theory of learning by doing (experience) is the only source of comparative advantage (Masters, 1995).

Eli Heckscher (1919) and Bertil Ohlin (1933) introduced the concept of factor proportions and further developed these into a theory. The basic notion of the Heckscher-Ohlin theorem is that international trade is based on differences in the factor endowments of nations, which means that a nation will have a comparative advantage in, and therefore will export, a good of which production is relatively intensive in the factor with which the country is relatively well endowed (Salvator, 2011). Heckscher-Ohlin concludes that the more abundant the factor, the lower the costs of production. Hence each nation will export the goods intensive in its relatively abundant and cheap factor and import the goods intensive in its relatively scarce and expensive factor. Consequently, all nations will enjoy gains from trade simultaneously.

In 1941, a publication by Wolfgang Stolper and Paul Samuelson led to the introduction of the Stolper-Samuelson theorem (Samuelson, 2005). This theorem contributed to the Heckscher-Ohlin model, which suggests that a change in the price of a good changes, in the same direction and more than proportionally, the price of the factor used intensively in the good's production. The Stolper-Samuelson theorem highlights that the ratio of trade results to output price changes, which alter real factor rewards, hence creating incentives for nations with abundant input resources to support and nations with scarce input resources to resist moves towards free trade. In conclusion, this theorem presents the relationship between output prices and factor prices within a single country (Samuelson, 2005). This idea will be scrutinised in Chapter 5 when applying the agri benchmark production model, which measures maize production inputs across the leading maize-producing countries.

In 1948, Paul Samuelson further contributed to the Heckscher-Ohlin model by introducing the factor price equalisation model. The model argues that international trade will bring about an equalisation in the relative and absolute returns to homogeneous factors across nations (Salvator, 2011). However, there are certain assumptions that need to hold for factor price equalisation to occur. These are zero transportation costs, no trade barriers and

identical technology. The model highlights that foreign investments are not necessary in free trade, assuming foreign investment to be an international transfer of production factors such as technology, labour and capital (Esterhuizen, 2006). It is important to note that the real world brings many market imperfections, which limit the success of the factor price equalisation model. Ossa (1998) highlighted that this is because the model is based on counterfactual assumptions. Moreover, as early as in 1964, some scholars, such as Travis (1964) and Rassekh and Thompson (1993), argued that the ability of trade to equalise factor returns is limited, even if transport costs would be zero.

In 1955, Tadeusz, Mieczyslaw and Rybczynski introduced the Rybczynski theorem, which highlighted that, if an economy produces two goods using two factors of production (i.e. capital and labour), then – under neoclassical technology with constant returns to scale – an increase in its endowment of capital will result in an expansion of the output of the capital-intensive good and a contraction of the labour-intensive good (Rybczynski, 1955). For example, if only labour grows in a nation, then the output of labour-intensive industry will expand more proportionally, while the output of capital-intensive industry will decline (Long, 1992). Esterhuizen (2006) presented an example of economic development in Japan and Korea, which showed that because both these countries have had high savings and investment, they consequently have produced more capital-abundant goods. At the same time, the labour-abundant sectors contracted in both countries, with labour being released into the capital-abundant sectors.

In 1959, Salter and Swan advocated the concept of an exchange rate on international trade and developed the Salter-Swan theorem. The theorem assumes the economy is split into a traded goods and a non-traded goods sector (Adenauer & Vagassky, 1998). The traded goods comprise exportable and importable goods, hence their price is determined in the world market; the non-traded goods are those which do not enter the world market, mainly traded on domestic markets. For traded goods, foreign exchange leads to increasing domestic income; consequently, the added income results in added expenditure on both traded and non-traded goods. This consequently will lead to labour being drawn to the non-traded goods sector (Adenauer & Vagassky, 1998). On the other hand, goods with high transport costs relative to their real value will be “non-traded”, hence their prices will not be influenced by international trade.

### 3.2.3 Challenges to the Comparative Advantage Theories

The classical and neoclassical models are fundamental to trade theories. However, over time the economies or industries have grown and became more complex, hence making it hard to apply the classical and neoclassical models (Esterhuizen, 2006). In particular, the empirical data on trade flow patterns do not support classical trade theory, the result being the development of alternative techniques that have led to new measurement methods such as the real exchange rate index, the revealed comparative advantage model, net exports index, production costs comparison and market attractiveness index. These methodologies will be discussed in Chapter 4 and some be applied in chapter 5 in assessing the competitiveness of South African maize exports.

In 1951, Wassily Leontief conducted an empirical test of the Heckscher-Ohlin model using United States data for the year 1947 (Leontief, 1956). Leontief's expectations were in line with the Heckscher-Ohlin model, namely that the United States (the most capital-abundant country in the world) should export capital-intensive goods and import labour-intensive goods; however, the results showed that the United States' import-competing goods required 30% more capital per worker than its export goods (Esterhuizen, 2006). Leontief's calculations showed that the US capital-labour ratio was US\$14 000 per worker in export goods and US\$18 100 per worker in import-competing goods (Esterhuizen, 2006), hence proving the opposite of what Heckscher-Ohlin's model suggested.

In 1961, just eight years after the introduction of the Leontief Paradox, Stefan Linder recognised the contribution of the Heckscher-Ohlin theory in explaining the supply-oriented theory in the trade of primary products. However, he argued that another explanation was necessary to explain demand-orientated theory (Bukhari, Ahmad, Alam & Butt, 2005). This led to the introduction of the Linder theory, which notes that the pattern of trade derives from "overlapping demand", which means that countries generally produce goods for the domestic market and then export the surplus (Bukhari *et al.*, 2005). This demand-oriented explanation was in contrast to Heckscher-Ohlin's view of the supply-oriented factor-endowment theory, which focuses on factor endowments and intensities as sources of comparative advantage and international trade patterns.

The demand-oriented theory states that customers are strongly affected by income levels, and therefore a nation's income per capita determines the kinds of goods they will demand. Furthermore, in a given country, domestic industry will produce goods to meet the domestic demand, and these products reflect a country's income per capita. A surplus of these goods will eventually be exported. This gave rise to Linder's view that international trade in manufactured goods will be stronger between countries with similar per capita income levels (Dakal, Pradhan & Upadhyaya, 2009). The Linder theory concluded that the goods that will be traded between countries are those for which there is an overlapping demand.

In 1966, Raymond Vernon introduced the concept of the "product life-cycle". The product life-cycle assumes that firms tend to be stimulated by the needs and opportunities in the domestic market (Vernon, 1966). The idea behind the theory is that new goods are developed in advanced countries and exported to less-developed countries. The product cycle has three stages, namely new product stage, maturing stage and standardised product stage (Vernon, 1966). In addition, when the production of a good becomes old, production location changes and the comparative advantage ranking is reversed (Marjit, 1989). The product cycle presents two technology-based arguments, noting that technical innovation that leads to new and profitable products involves capital and highly skilled labour. These production factors are mainly available in industrialised nations (capital intensive).

In 1979, Paul Krugman advocated the idea of economies of scale. Economies of scale are generally understood as a situation in which increasing output leads to decreasing costs (Krugman, 1979). Additionally, as firms produce more they learn ways to improve efficiency, hence resulting in a reduction in production costs. Economies of scale make a significant contribution to international trade theory; they show that a nation can become a low-cost producer without having abundance in production factors. Furthermore, the economies of scale explain trade patterns that cannot be explained by the Heckscher-Ohlin theory. The Heckscher-Ohlin theory assumes constant returns to scale; however, the economies of scale postulate that, in production, output will be more than doubled if inputs are doubled (Krugman, 1979).

All the theories discussed above remain relevant even today. They serve as a guideline in many nations when they engage in trade policies. However, with globalisation and trade liberalisation, today's world is more complex, hence cannot be simplified by a single theory.

#### 3.2.4 Relevance of Trade Theories for the South African Maize Trade Environment

The international trade literature comprises mostly theories that are in favour of free trade. Hence, it becomes important to review the relevance of these theories to the World Trade Organization agreements that currently dominate the maize trade environment. Generally, agriculture is among the highly distorted industries. These distortions exist in the form of tariffs, quotas, subsidies and other forms of agricultural support (Nyhodo, 2009). South Africa's maize industry, for example, currently is under a tariff restriction that is calculated from the world maize reference prices (GSA, 2014a). At the time of the commencement of the study, this reference price was at US\$110 per ton.

Subsidies are another form of distortion that still dominates the agricultural industry globally. These refer to the funding that farmers receive from government, regardless of commodity market conditions (Nyhodo, 2009). For example, within the top twenty global maize exporters, some countries and regions, such as the United States and the European Union, receive subsidies or producer support of about 9.8% and 18% respectively. South Africa's level of producer support is estimated at 2% (OECD, 2015). This means that some countries might have an advantage, relative to others, not because of natural endowment – as suggested by trade theories, but because of government support. It remains unknown if the same outcome would prevail if the same level of support were to be applied across all countries.

### 3.3 NEW TRADE THEORY SCHOOL OF THOUGHT

The new trade theory was established in the 1980s and comprises a collection of economic models in international trade.<sup>3</sup> These models attempt to address the shortcomings of standard trade theory, as highlighted briefly in the section above. This is done by incorporating a number of factors in the analysis that might have been left out of the standard trade theories. These models also serve as a link between comparative advantage and competitiveness.

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<sup>3</sup> Ethier (1982), Krugman (1984) and Eaton and Grossman (1986)

### 3.3.1 Porter's Diamond Model

In this globally linked economy, one of the most frequently asked questions is: when and why is a certain industry internationally competitive? And also, how sustainable is its position? Esterhuizen (2006) suggests that, in answering these questions, one must first address a question posed by Michael Porter (1990), namely “why does an economy achieve international success in particular industry?” This question led Porter (1990) to develop a competitive diamond model that was aimed at explaining the nation's competitiveness. Porter (1990) noted that competitiveness depends on six key factors, namely:

- *Factor conditions*
- *Demand conditions*
- *Related and supporting industries*
- *Firm strategy, structure and rivalry*
- *Government attitude and policy*
- *The role of chance*

These factors are discussed in detail below.

*Factor conditions:* for any specific nation or industry, factors of production such as human resources, capital availability, physical infrastructure, administration infrastructure, information infrastructure, and scientific and technological infrastructure are essential for increasing competitiveness (Porter, Delgado, Ketels & Stern, 2008). Such factors are apparent in the South African maize industry, which has sophisticated infrastructure relative to other African countries and other leading maize producers. Moreover, these critical aspects of competitiveness are not inherited, but rather created within a nation or industry, and the process in which that is done differs across nations and industries. Esterhuizen (2006) highlights that sustainable and specialised investments are essential for increasing competitiveness of a county or industry.

*Demand conditions:* the other important component in determining the competitiveness of an industry is the home demand conditions of the specific product. Demand conditions basically refer to the nature, changes and knowledge of the market demand for the industry or country's commodity. The domestic demand plays a vital role in influencing the industry's

improvement and innovation (Porter, 1990). This is apparent in the South African maize industry, whose annual consumption is estimated at 84% of the domestically produced crop (Maize Trust, 2014). Moreover, if local consumers challenge the quality, safety and environmental standards of maize it might lead to increased efforts for innovation within the industry.

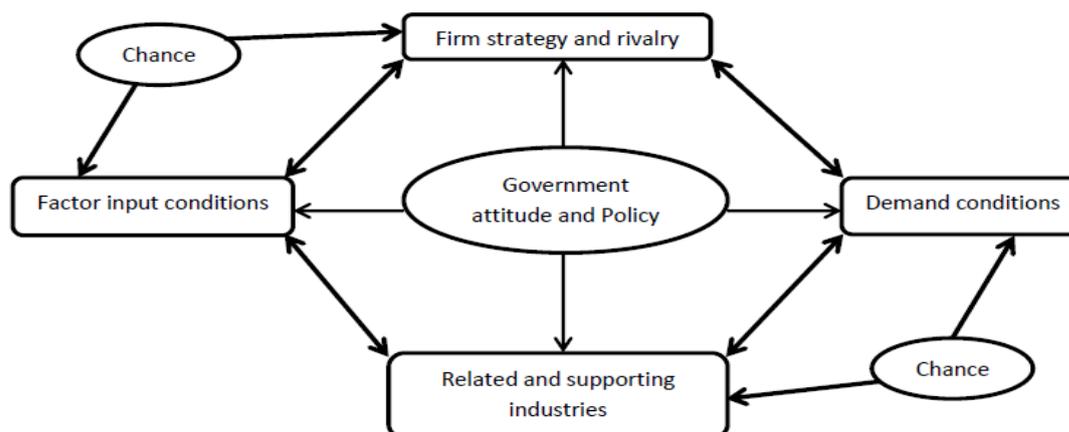
*Relating and supporting industries:* competitiveness also depends on the presence or absence of suppliers of a specific commodity, as well as related industries that are internationally competitive (Porter *et al.*, 2008). Mashabela (2007) adds that a number of strong related and supporting industries are vital for the competitiveness of a nation or a firm. The supporting industries can supply most cost-effective inputs in an efficient way. Furthermore, Porter *et al.*, (2008) advocates for clusters of firms, instead of isolated firms, so that nations or industries can increase their competitiveness. This aspect seems to be a challenge in the South African maize industry, as the country depends mainly on imports for the input supplies. For example, South Africa imports approximately 80% of the fertilisers it uses and more than 90% of agro-chemicals (GSA, 2014b).

*Firm strategy, structure and rivalry:* this segment basically evaluates a nation's competitiveness by assessing the nature in which firms are created, organised and managed, and at the same time also assessing the nature of domestic rivalry (Porter, 1990). Esterhuizen (2006) argues that the ways industries are organised vary widely across nations. Social and historic differences have led to different managerial practices across nations. Local competition fosters innovation, which leads to high-quality, sustainable production (Esterhuizen, 2006). Additionally, Porter *et al.*, (2008) highlight that domestic rules and incentives that encourage investment and productivity increase competitiveness. An example is the incentive of capital investments in the maize industry that possibly would lead to increased competitiveness.

*Government attitude and policy:* government plays a crucial role in the competitiveness of an industry or nation (Mashabela, 2007). Government intervention or policies can highly influence all the aforementioned factors, either positively or negatively. These policies can be implemented through subsidies, tax in the form of import or export tariffs, etc. Some forms of interventions can be the provision of public goods to support the industries'

operations and social stability. Nonetheless, Esterhuizen (2006) cautions that government should not implement policies that are aimed at directly influencing the competitiveness of its industries, but should rather create an environment in which industries can gain a competitive advantage.

*The role of chance:* this factor relates to situations that are mainly beyond the power of firms and national governments (Porter *et al.*, 2008). The role of chance can either be beneficial or harmful to a nation or industries. Chance events are events such as wars, political decisions by foreign governments, large increases in demand, shifts in financial markets, exchange rates, input demands, etc. In this context, South Africa is a stable country, hence has a minimal chance of the aforementioned instances. However, the maize industry is operating in an open, global environment, which makes it prone to outside influences.



**Figure 3.3 Porter's cluster theory of competitiveness**

Source: Porter *et al.*, (2008) and author's deductions

Figure 3.3 above illustrates the six key factors of competitiveness. Van Rooyen *et al.*, (2000) state that Porter's diamond method evaluates the competitiveness of individual firms, as well as other stakeholders within the supply chain. Furthermore, this method enables one to analyse the structure of the industry so as to identify the strengths and weaknesses, as well as gaps for improvement. Van Rooyen *et al.*, (2000) have adapted this model to enable them to assess the competitiveness of agribusiness in the South African food commodity

chain. Esterhuizen (2006) also adopted the Porter diamond model to enable him to evaluation the competitiveness of South African agribusiness. The Porter diamond model captures a number of factors for identifying the competitiveness of an industry. However, this study mainly aimed to assess the competitiveness of South African maize exports, which can be measured by other techniques such as the revealed comparative advantage technique.

### 3.3.2 Growth Share Matrix

The growth share matrix concept originates from the field of business and the strategic management school of thought. It was developed to assist firms in prioritising resources among alternative products within a portfolio (Kapuya, Chinembiri & Mmatlou, 2014). This matrix was developed by the Boston Committee Consulting Group in the 1960s. Its core value is to develop a combined picture of a firm’s business by plotting a matrix according to its relative market share and market growth rate (Esterhuizen, 2006).

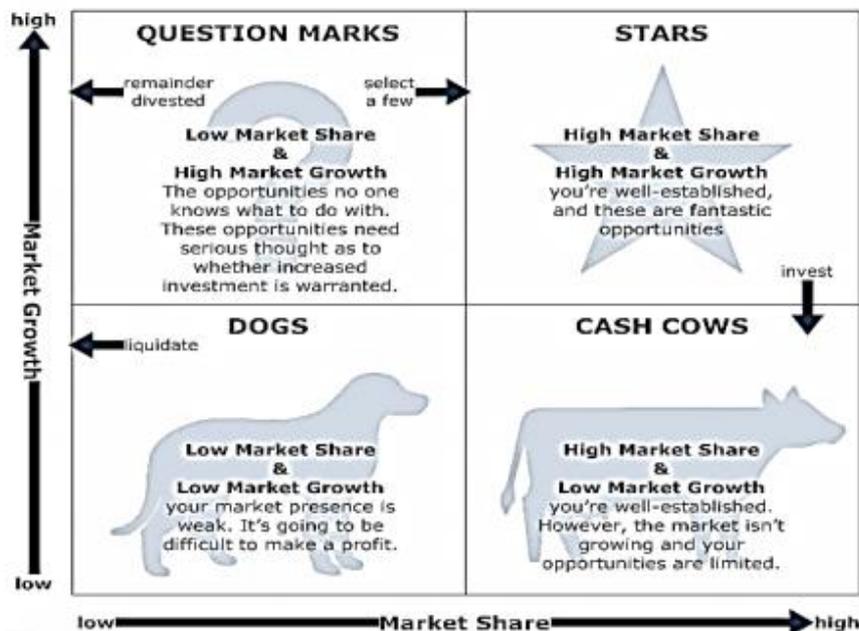


Figure 3.4: The growth-share matrix

Source: Henderson (1979)

Figure 3.4 above, the vertical axis indicates the market growth, which is the annual growth rate of the market in which the business or industry operates. High growth is viewed as

more attractive, as market gains are more easily obtained. For the purpose of distinguishing between high and low market growth, 10% per annum will be assumed to be the midpoint between *dogs and question marks*. According to Esterhuizen (2006), the growth rate of the market can also affect a firm's cash flow, as a growing industry which intends to maintain its market share would have to reinvest more in the business. In the case of the maize industry, investments would be in aspects such as seeds, machinery, infrastructure, etc.

Moreover, the horizontal axis illustrates the market share, which represents the share of the market held by the business compared with that of its competitors (see Figure 3.4). For the purpose of differentiating between a high share and a low share, the midpoint is assumed to be 1. At this point the company's market share is equal to that of its competitors. Any reading higher than the midpoint is viewed as a high share and represents a strong competitive position (Esterhuizen, 2006).

According to Henderson (1979), the Boston Committee Consulting Group categorised the products and businesses into one of the four quadrants (as shown in the growth share matrix in Figure 3.4):

- *Question Marks*: this quadrant represents a situation in which no one knows what to do. The opportunities here need serious thought about whether increased investment is warranted.
- *Dogs*: this is where your market presence is weak, hence it is going to be difficult to make a profit.
- *Stars*: the market presence is well established and these are fantastic opportunities. The products in this quadrant should be top priority and become the company's future cash cows.
- *Cash Cows*: the market share is well established. However, the market is not growing and opportunities are limited.

The Boston Committee Consulting Group matrix is widely used for strategic market planning by large companies. However, the matrix has been criticised for being too mechanical and simplistic and being incapable of addressing other aspects of competitiveness, such as investments (Esterhuizen, 2006). However, the advantage of the matrix is that it can be applied as an indicator of competitive strength for industries or commodities. Kapuya *et al.*,

(2014) adapted this technique to enable them to identify strategic markets for South Africa's citrus exports. Also, Gellynck and Viaene (1993) adapted this technique to enable them to assess the competitiveness of the Belgian meat sector. This study aimed to assess the competitiveness of South Africa's maize exports and further to determine if South Africa can increase its market share in existing maize markets. Hence, the growth share matrix will indicate the competitive strength of the existing maize export markets and further assist in identifying the markets in which South Africa still has scope to increase its export market share.

### 3.4 CONCLUSION

The purpose of this chapter was to provide a foundational literature review on trade theories from the perspective of the competitiveness of South African maize exports. The chapter highlighted the predictions of the patterns of trade theories, driven by absolute and/or comparative advantage, as they are central to the competitiveness of any industry or country, with a particular focus on the mercantilist views, classical views and neoclassical models. Moreover, the chapter also highlighted the challenges to the comparative advantage theories. The aspect of competitiveness is an important focus for many industries and countries and will continue to play a central role in any nation's or industry's development. The classical economists' views suggest that almost all nations could improve the welfare of the population and economic growth through international trade. However, Esterhuizen (2006) argues that economies and industries have grown and become more complex, hence making it hard to progress in business by applying only the classical and neoclassical models. Moreover, globalisation and trade liberalisation have led the world to a more complex state, hence cannot be simplified in a single theory. Consequently, the discussion of the new trade theory served as introductory work to competitiveness and a link between comparative advantage and competitiveness.

## CHAPTER FOUR: TECHNIQUES OF MEASURING COMPETITIVENESS AND IDENTIFYING NEW MARKETS

### 4.1 INTRODUCTION

The previous chapter presented the theoretical framework underlying empirical studies on comparative advantage and competitiveness in trade. This chapter explores a number of empirical methods aimed at assessing competitiveness and techniques utilised in the identification of new markets for firms. These include the revealed comparative advantage index, real exchange rate, the net exports index, production costs benchmarking and the market attractiveness index. The chapter concludes with a brief discussion of the applied method utilised in this study of the competitiveness and expansion potential of the South African maize market.

### 4.2 REVEALED COMPARATIVE ADVANTAGE

Testing Comparative Advantage (CA) includes calculating the price or cost of information to measure production and allocation efficiency. It also includes formulating transport models and linear programming techniques for transport cost proxy and cost minimisation subject to resources (Leishman, Menkhaus, & Whipple, 1999). However such calculations are hindered by a lack of global reliable data. Additionally distortionary measures such as import restrictions, export subsidies and other protectionist policies are not easily quantifiable (Ferto & Hubbard, 2001). CA should ideally capture cross-country differences in pre-trade conditions (i.e. autarky). According to Leishman *et al.*, (1999) true CA in autarky cannot be directly observed because all countries engage in some international trade. This then justifies the use of a Balassa's Revealed Comparative Advantage index. The RCA index is grounded in conventional trade theory and is less-complex to compute given the nature of data that is required. Assuming that trade patterns reflect inter-country differences in 'relative costs as well as non-price factors' RCA is assumed to reveal comparative advantage of trading partners (Leishman *et al.*, 1999).

The revealed comparative advantage (RCA) index is one of the most widely applied indexes to measure and evaluate the trade performance of countries or sectors (Esterhuizen, 2006). This index was first applied by Liesner in 1958, but later refined and popularised by Bela Balassa 1965 (Uyesi, 2003). The RCA index basically measures a country's share of the global

market in one commodity relative to its share of all goods. An index value below one indicates a comparative disadvantage, and a value above one indicates a comparative advantage. The RCA index can be mathematical represented as shown below:

$$RCA_{jk} = \frac{\left( \frac{X_{jk}}{\sum_k X_{jk}} \right)}{\left( \frac{\sum_i X_{ik}}{\sum_i \sum_k X_{ik}} \right)} \quad (1)$$

where  $X_{jk}$  represents country  $j$ 's export value of commodity  $k$ , and  $\sum_k X_{jk}$  and  $\sum_i X_{ik}$  represent country  $j$ 's total export value and total global exports of a commodity  $k$  respectively.  $\sum_i \sum_k X_{ik}$  is the total global exports. If  $RCA_{jk}$  is above 1, country  $j$  is said to have a comparative advantage in commodity  $k$ , since this commodity is more important for country  $j$ 's exports than for the exports of the reference countries.

The RCA index is not dependent on any theory regarding factor endowments, free trade or perfect competition (Pitts & Lagnevik, 1997). Balassa's RCA index has been widely adapted in many studies, and also in Michael Porter (1990)'s book, *The Competitive Advantage of Nations*. Other empirical evidence studies in which RCA index was used include Ariovich (1979), Reza (1983), Yeats (1985), Peterson (1988), Crafts (1989), Pitts, Vianene, Trail and Gellynk, (1995), Amiti (1999), Valentine and Krasnik (2000), Esterhuizen and Van Rooyen (1999; 2001; 2005), Ferto and Hubbard (2001), Esterhuizen (2006), Mashabela (2007) and Jafta (2014).

The RCA was developed further by Vollrath in 1987, who introduced revealed comparative trade advantage, which accounts for both exports and imports (Vollrath, 1991). The second approach that was developed was the logarithm of the relative export advantage, and the last approach was the revealed competitiveness. All these methods were introduced as a means of advancing the RCA index. However, for the perspective of this study, the RCA index was adapted to establish the competitiveness of South African maize exports. The only data required for such an analysis is trade statistics, which in this study were generated from the data of the International Trade Centre. The RCA index for South African maize

exports were identified annually and the trends of competitiveness (advantage or disadvantage) were identified.

### 4.3 REAL EXCHANGE RATE

Real exchange rate is a measure of international competitiveness (Latruffe, 2010). Bella, Lewis and Martin (2007) define the real exchange rate as the relative price of tradable commodities to non-tradable inputs. Thus, an appreciation or depreciation in real exchange rate for a particular country or commodity leads to a gain or loss of competitiveness, and this is determined by considering the equilibrium as a benchmark. The real exchange rate (RER) can be mathematically presented as follows:

$$RER = \frac{P^t}{P_{nt}} \quad (2)$$

where:

$P^t$  = price index of tradable commodities

$P_{nt}$  = price index of non-tradable inputs

The price index of tradable commodities is influenced by international prices, the nominal exchange rate as well as varying prices of non-tradable inputs used in the production of a commodity, while the price index of non-tradable inputs is influenced by domestic factors (Esterhuizen, 2006). However, this technique has some shortcomings that have been highlighted in a number of studies (Masters, 1995; Esterhuizen, 2006; Bella *et al.*, 2007). Masters (1995) presented guidelines for the US comparative advantage and agricultural trade. Esterhuizen (2006) evaluated the competitiveness of the South African agribusiness sector. Bella *et al.*, (2007) assessed competitiveness and real exchange rate misalignment in low-income countries.

The shortcoming of measuring competitiveness using RER is that the relative price index by cost narrows the definition of competitiveness and ignores the non-price factors (Masters, 1995). For example, the variation in climatic conditions in South African maize-producing regions is a non-price factor and might influence maize export competitiveness. Moreover, RER is mostly influenced by capital movements rather than by basic changes in the real

economy. Hence, information about the driving forces of capital movements is essential when evaluating the changes in RER and competitiveness (Esterhuizen, 2006).

#### 4.4 NET EXPORT INDEX

The RCA index has been criticised for only incorporating export data and excluding import data (Mashabela, 2007). Vollrath (1991) argued that, when dealing with differentiated products, intra-industry trade, flows of imports and exports and the net trade effects should be considered when analysing competitiveness, hence the consideration of Balassa's proposed measure called net export index (NEI). According to Carraresi and Banterle (2008), the NEI is basically a particular country's commodity exports minus its imports, divided by the total value of trade. The NEI index can be expressed mathematically as:

$$NEI = [(X_i - M_i)/(X_i + M_i)] * 100 \quad (3)$$

where  $X_i$  and  $M_i$  respectively represent exports and imports. For a particular country, an index with an upper limit of 100 indicates that the country has no imports, while a negative 100 would indicate that there are no exports. However, Galetto (2003) found a shortfall of the NEI being that it ignores the overall level of trade in a specific commodity. This means that a country that is relatively self-sufficient, with a small exportable surplus and no imports, would have an index of 100 and consequently appear to be very competitive, even though it actually has a small share in global trade. For these deductions, Galetto (2003) suggests that both RCA and NEI should be used together in assessing and analysing the competitiveness of a specific industry or commodity.

#### 4.5 PRODUCTION COSTS BENCHMARKING

Production costs are often compared across farms to indicate the farms that have a competitive advantage in the production of a particular commodity (Esterhuizen, 2006). In the South African maize industry, one of the existing measures of production costs that also include global exporters is the agri benchmark model (BFAP, 2014). The agri benchmark is a non-profit network of agricultural economists, advisors, producers and specialists in key sectors of the agricultural and horticultural value chains (Agribenchmark, 2015). This network uses the internationally standardised methods to analyse farms, production systems and their profitability in order to establish their competitiveness. When this study

commenced, data on maize production was available mainly for Argentina, Brazil, the Ukraine, the United States and South Africa (BFAP, 2015).

This data was collected mainly from typical farms for each country. The sampling of typical farms is done by following a number of steps, namely (Zimmer & Deblitz, 2005):

- *Selection of a region and locations*
- *Identify the prevailing production systems*
- *Define the size and management level of the typical farms*
- *Data collection, cross-checking and updating*

*Selection of a region and locations:* the most important regions and locations of the crop (which is maize in this study) are identified for each country. The identification process is based on a defined reference unit, which can be either acreage, arable land or square kilometre. This process also involves the creation of maps illustrating the distribution of the production of a commodity. This process is done by the agri benchmark scientists using the statistics of the country being analysed (Zimmer & Deblitz, 2005).

*Identify the prevailing production systems:* this step follows after the regions of crop production have been identified and involves the selection of the relevant farm population, production systems and farm types to be analysed (Zimmer & Deblitz, 2005). The farm population is usually characterised by the farm's ability to generate at least 50% of farm income. In identifying the prevailing production systems, the agri benchmark scientists follow criteria to identify the farms in order to ensure that most important production systems are represented. These include sizable arable land, capital and labour-intensive farm versus low capita or labour-input system, storage of grain on farm versus grain sold from the elevator immediately, high-yielding farms versus low-yielding farms, and family labour versus hired labour. The characteristics of typical farms for each country are then communicated to the network to allow for a better understanding of cost calculations and comparison (Zimmer & Deblitz, 2005).

*Define size and management level of the typical farms:* size basically refers to hectares used for arable farming. According to Zimmer and Deblitz (2005), the typical agri benchmark farms represent a moderate and a large farm in the region identified. This procedure allows

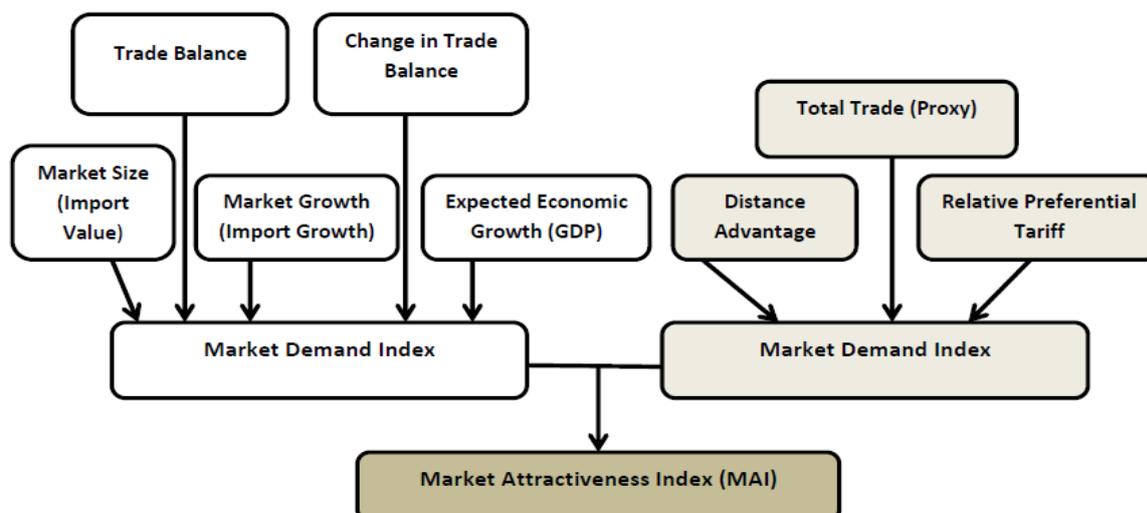
for a large number of farms to be reflected. Regional statistics on farm size distribution are used to determine the position of the farms in the distribution of the farm population or representative surveys.

*Data collection, cross-checking and updating:* this step is done with a local advisor and farmers who understand the region's farm and production systems. This forms part of a panel that consists of agri benchmark scientist, advisor and one to six farmers. All the required data is collected based on a standard questionnaire. The panel reaches consensus on each variable that properly describes what a typical farm looks like. The updating of the typical farms is done annually according to changes in prices and productivity levels. These adjustments are based on three-year averages.

The data specifically involves the prices for the input and output of the farms as well as yields reflecting technological progress (Zimmer & Deblitz, 2005). This is a standard operating procedure for all the typical farms in the agri benchmark network. Hence, adapting this approach in this study would give an indication of the competitiveness of South African maize production relative to that of leading global maize exporters. The South African maize industry joined the agri benchmark network in 2007 and the first published results from production comparisons were available in the 2008/2009 production year (BFAP, 2015).

#### 4.6 MARKET ATTRACTIVENESS INDEX

The market attractiveness index (MAI) is a technique of the International Trade Centre aimed at supporting the selection of attractive markets for a particular commodity from an export development perspective (ITC, 2014b). The MAI is formed when individual indicators are compiled into a single index on the basis of an underlying model of a multidimensional concept that is being measured (OECD, 2004). Figure 4.1 shows indicators used to construct the MAI in order to generate the final rankings of attractive markets. These indicators are all weighted and standardised in order for comparability and will have a value of between 0 and 100 (ITC, 2014b).



**Figure 4.1: The MAI framework and indicators**

Source: ITC (2014b)

As highlighted by Pienaar and Partridge (2014), the detailed steps used to create the MAI in Microsoft Excel are given on the ITC website's step-by-step guide on how to build a market attractiveness index. This is done for a product at the six-digit level of the harmonised system. In this research study, the commodity was maize (HS code 100590). It is important to note that this index is based mostly on trade-related data and it should not be seen as a definite indicator, but rather as a technique to rank different attractive markets. After the MAI analysis, it might be necessary to gain more understanding of the targeted markets. This technique serves as an initial assessment of export markets, thus the assessment of strategic markets requires a more detailed analysis. However, for the purpose of this study, this analysis will suffice. This study aimed to identify unexploited, potential markets for South African maize and the MAI analysis ranks the attractive markets for South African maize exports.

#### 4.7 CONCLUSION

The previous chapters have explored the techniques for measuring competitiveness and also highlighted their shortcomings. This analysis was done in order to understand the techniques that could be applied in assessing the competitiveness of South African maize

exports relative to leading global exporters; assessing the scope for South Africa to increase its market share in existing export markets; and identifying the unexploited and attractive markets for the South African maize industry.

In Chapter 5 the revealed comparative advantage index, growth share matrix, production cost comparisons and market attractiveness index have been adapted. These models address the key research questions of the study. The first study question, which seeks to evaluate the competitive South African maize exports are relative to the world, is answered by applying the revealed comparative advantage index, as well as the production cost comparison model of Agribenchmark (2015). A precise and reliable method for measuring competitiveness is critical in order to recommend the strategic export markets for South Africa's maize. The second study question, which seeks to discover if South Africa can increase its maize market share in existing markets, is answered by applying the growth share matrix. Lastly, the market attractiveness index answers the key question of the study, which is to identify the unexploited potential markets or most attractive markets for the South African maize industry.

## CHAPTER 5: DESCRIPTION AND INTERPRETATION OF THE RESULTS

### 5.1 INTRODUCTION

This chapter is the core of the study and attempts to answer the three main research questions. The first section addresses the question that establishes the competitiveness status of South African maize exports. The second section addresses the question that aims to assess if there is a scope for South Africa to increase its market share in existing export markets. The last section addresses the key question, which aims to identify the unexploited markets for South African maize exports.

### 5.2 HOW COMPETITIVE ARE SOUTH AFRICAN MAIZE EXPORTS RELATIVE TO LEADING GLOBAL EXPORTERS?

South African maize exports are growing at a rapid pace, with the growth rate above the world growth rate (as presented in Appendix A.1, which ranks the twenty largest global maize exporters in 2013). However, the picture provided by South Africa's market structure suggests that the country's maize exports are highly concentrated among the top five markets in most years (Taipei, Zimbabwe, Japan, Botswana and South Korea, as shown in Table 2.1), with the erratic drops in the share of the top three countries being due to occasional droughts, depleted stocks and lower exports in specific years.

The key question then is: are South African maize exports competitive? This question evokes the need to further explore the concept of comparative advantage and competitiveness to establish South Africa's maize export position relative to the other global exporters.

#### 5.2.1 South Africa's Revealed Comparative Advantage Within the Global Context

An analysis of South Africa's revealed comparative advantage (RCA) in relation to maize is presented in Table 5.1, with the term 'revealed' in this case taken to mean that maize's share in the South Africa's export basket is larger than the share of the commodity's trade in the global trade. Otherwise stated, the RCA measures how significant South Africa's maize exports are relative to global maize exports. As presented in Chapter 4, the RCAs can be calculated by using the following formula (Balassa & Noland, 1988):

$$RCA_{jk} = \frac{\left( \frac{X_{jk}}{\sum_k X_{jk}} \right)}{\left( \frac{\sum_i X_{ik}}{\sum_i \sum_k X_{ik}} \right)} \quad (1)$$

where  $X_{jk}$  is the value of South Africa's maize exports;  $\sum_k X_{jk}$  is the value of South Africa's total exports;  $\sum_i X_{ik}$  is the value of global total maize exports; and  $\sum_i \sum_k X_{ik}$  is the value of total global exports.

A similar equation is used to calculate the RCA for other countries (USA, Brazil, Argentina, the Ukraine, France, India, Romania, Russia and Hungary). At the time when this analysis commenced, the data available from the International Trade Centre was only for 2001 to 2013. The results of this calculation are reported in Table 5.1, and show the RCA index values for the years from 2001 to 2013 for the top ten global maize exporters. If the RCA is greater than one, then South Africa possesses a revealed comparative advantage in maize (Galetto, 2003). The higher the value, the more efficient South Africa is in the exportation of maize. In other words, the average maize exports of South Africa are higher than the world's average.

**Table 5.1: Revealed comparative advantage of the top ten global maize exporters**

	USA	Brazil	Argentina	Ukraine	France	India	Romania	RSA	Russia	Hungary
2001	4.24	5.74	24.66	1.58	1.92	0.17	0.17	<b>1.94</b>	0.00	2.97
2002	4.62	2.80	22.91	1.63	2.20	0.13	0.89	<b>2.33</b>	0.00	3.49
2003	4.47	3.40	27.32	3.02	1.98	0.23	0.46	<b>2.16</b>	0.01	2.47
2004	5.09	4.30	24.27	3.64	1.86	1.15	1.12	<b>1.49</b>	0.01	2.84
2005	4.76	0.76	29.76	6.91	2.33	0.54	1.43	<b>4.42</b>	0.02	3.33
2006	6.07	2.94	22.89	4.02	1.85	0.67	0.68	<b>2.13</b>	0.03	3.63
2007	5.26	7.23	24.22	2.11	1.30	1.26	1.15	<b>0.15</b>	0.02	6.39
2008	5.75	3.68	26.93	5.44	1.62	2.57	1.60	<b>3.50</b>	0.04	4.29
2009	5.25	5.15	16.67	15.76	1.79	1.79	4.55	<b>4.72</b>	0.39	5.23
2010	5.26	7.34	30.44	10.19	1.75	1.58	5.87	<b>2.52</b>	0.07	4.99
2011	5.24	5.78	29.59	16.18	1.82	2.00	5.82	<b>4.52</b>	0.17	4.99
2012	3.15	11.27	30.04	29.19	1.62	1.99	5.36	<b>2.15</b>	0.56	5.43
2013	2.17	13.60	38.21	31.68	1.71	1.92	5.93	<b>3.85</b>	0.59	2.71

Source: ITC (2014a)

\*RSA = Republic of South Africa

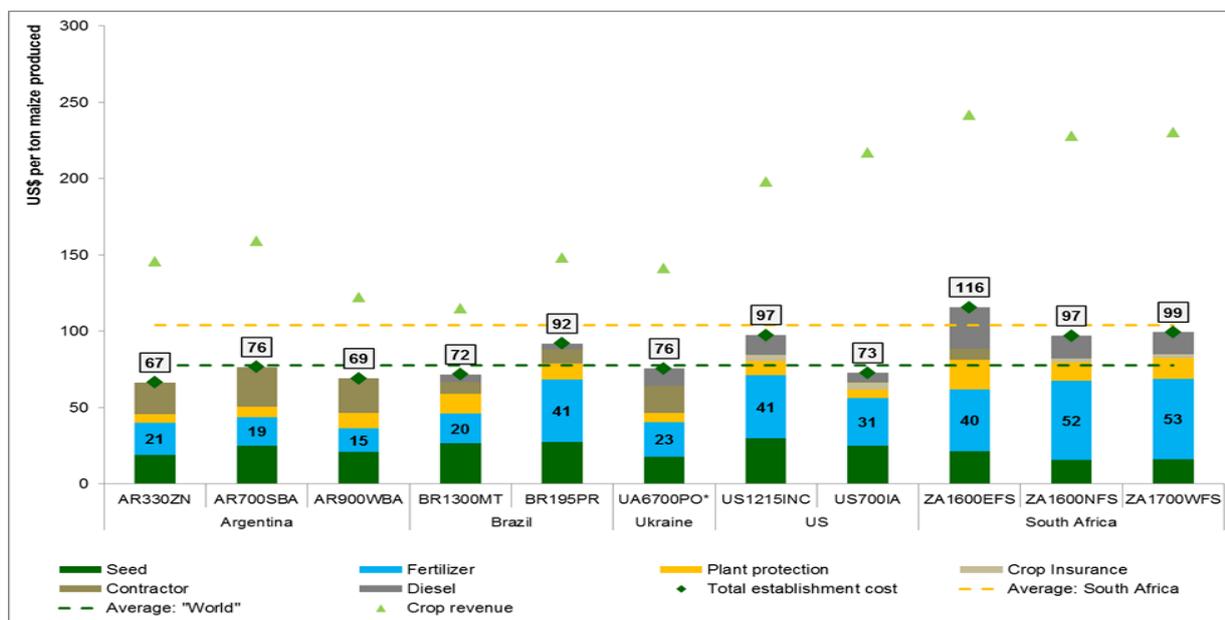
\*USA = United States of America

\* A RCA that is greater than one means a country possesses a revealed comparative advantage in maize exports.

These results show that South Africa’s maize exports exhibit positive RCA index values that are more than one. This is an indication that South Africa has a revealed comparative advantage for maize exports and that the country is on par with some of the largest exporters in the world, such as Hungary and France. Argentina, the Ukraine and Brazil have a very strong comparative advantage in maize, as well as Romania and the USA. Russia does not have a comparative advantage, even though it is a major global exporter, meaning that Russia’s average maize exports to the world are less than the world’s average.

### 5.2.2 Competitiveness of South Africa’s Maize Sector at Farm Level

Under scenarios of trade-distorting subsidies, such as those in the European Union (EU), the USA, India and Russia, amongst others, the comparative advantage theory fails to hold (Bahta, 2004). However, in such situations, a production cost comparison does serve as an indicator of the competitive status of a particular commodity for a country. In this regard, the study employed the agri benchmark technique. The countries analysed were South Africa, the USA, the Ukraine, Argentina and Brazil, as shown in Figure 5.1.

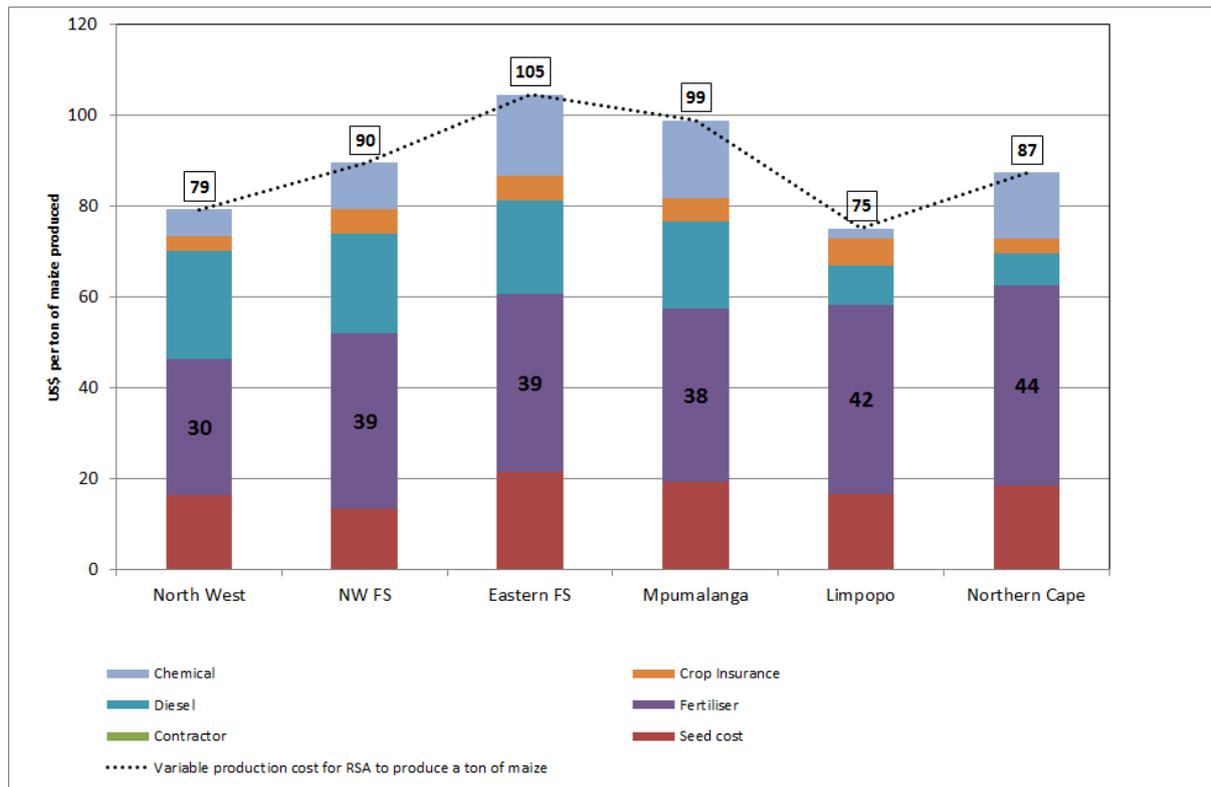


**Figure 5.1: Farm input cost comparison of major global maize producers**

Source: BFAP (2015)

Each bar is coded to represent a typical farm in each country. Argentina and the Ukraine produce a ton of maize more cheaply compared to Brazil, the USA and South Africa. Amongst all the selected countries, South Africa, and to a lesser extent the USA, are relatively high-cost producing countries, requiring more input costs to produce a ton of maize. Furthermore, Brazilian, American and South African farmers pay more for fertilisers, which leads to higher input costs. On a typical South African farm, fertiliser is significantly more expensive compared to in all the other countries. For example, in a typical farm in northern Free State; fertilizer costs accounts for US\$52 to produce a ton of maize, compared to Argentina with fertilizer costs of only US\$15 (see Figure 5.1). Moreover, diesel was also found to be more costly on South African farms compared to other countries (the USA, Argentina, the Ukraine and Brazil) (see Figure 5.1). According to GSA (2014c), approximately 75% of South African fertilisers are imported, and the costs are aggravated by the weakening exchange rate (rand per US dollar). Likewise with pesticides, approximately 98% of South African agro-chemicals are imported (GSA, 2014c). This makes South Africa globally less competitive than the other global maize producers.

It is important to highlight that there is diversity within South African maize production, meaning that production costs differ across regions within the country. Figure 5.2 illustrates dryland maize production costs for different regions across the South African maize-belt.



**Figure 5.2: Farm input costs for South African Maize Farmers**

Source: Grain SA (2014c)

In Limpopo and North West province, maize farmers produce a ton of maize at a cheaper price than all the other regions surveyed. The largest cost component of South African maize farmers is fertilizer, which on average constitutes about 35-40% of the total variable costs of maize production. Diesel is also one of the leading costs to South African maize farmers, accounting for approximately 11-20% of maize farmers production costs (GSA, 2014c). The smallest cost component of all South African maize farmers is crop-insurance. Nonetheless, some regions still struggle to get insurance due to reluctance of crop insurers in areas where they view as high risky, such as North West province.

Maize production costs vary across regions in South Africa; with some areas establishing maize at relatively lower costs than others (see Figure 5.2). Nonetheless, South Africa is still less competitive when compared to other global maize exports. In essence, the analysis of the RCA showed that South Africa, relative to leading global exporters, is competitive. However, the production costs analysis shows that South Africa is less competitive relative to Argentina, Brazil, the USA and the Ukraine.

### 5.3 POTENTIAL MAIZE EXPORT MARKETS: CAN SOUTH AFRICA INCREASE ITS MARKET SHARE IN THE EXISTING MAIZE MARKETS?

The analysis above established that South Africa's maize exports are competitive in the global market. However, the existing export markets are concentrated, which then creates a need for South Africa to empirically evaluate the scope to increase its market share in these markets and later to establish potential or strategic markets. The study adapted the growth share matrix to existing South African maize export markets.

#### 5.3.1 Growth-share Analysis of South Africa's Major Export Markets

This section ranks South Africa's maize export markets on the basis of their relative market share and growth rate, as demonstrated in Chapter 4. At the time this analysis commenced, the data available from the International Trade Centre was only for 2001 to 2013. The analysis applies the data presented in Appendix A.1, illustrating the ranking of the 20 largest global maize exporters in 2013 in value terms. The market categories are defined in the export growth-share matrix. The priority markets are those that exhibit a high growth–high share, high growth–low share, and low growth–high share features. Figures 5.3 and 5.4 present the growth share matrix for South Africa's maize export markets and global major maize importers respectively. The bubble sizes for each country reflect the overall size of the maize market in each growth share matrix.

It is important to highlight that the growth share matrix analysis is subjective. For the purpose of this research, the high-growth markets are classified as those countries whose import growth of South African maize is above South Africa's maize exports to the world, of 21% (as presented in Appendixes A.1, A.2 and A.3). Similarly, high-share countries are those markets whose share in South African maize exports is above South Africa's share in the rest of the world – which is 2.2%. Following these criteria, twenty of South Africa's top export markets were defined as follows:

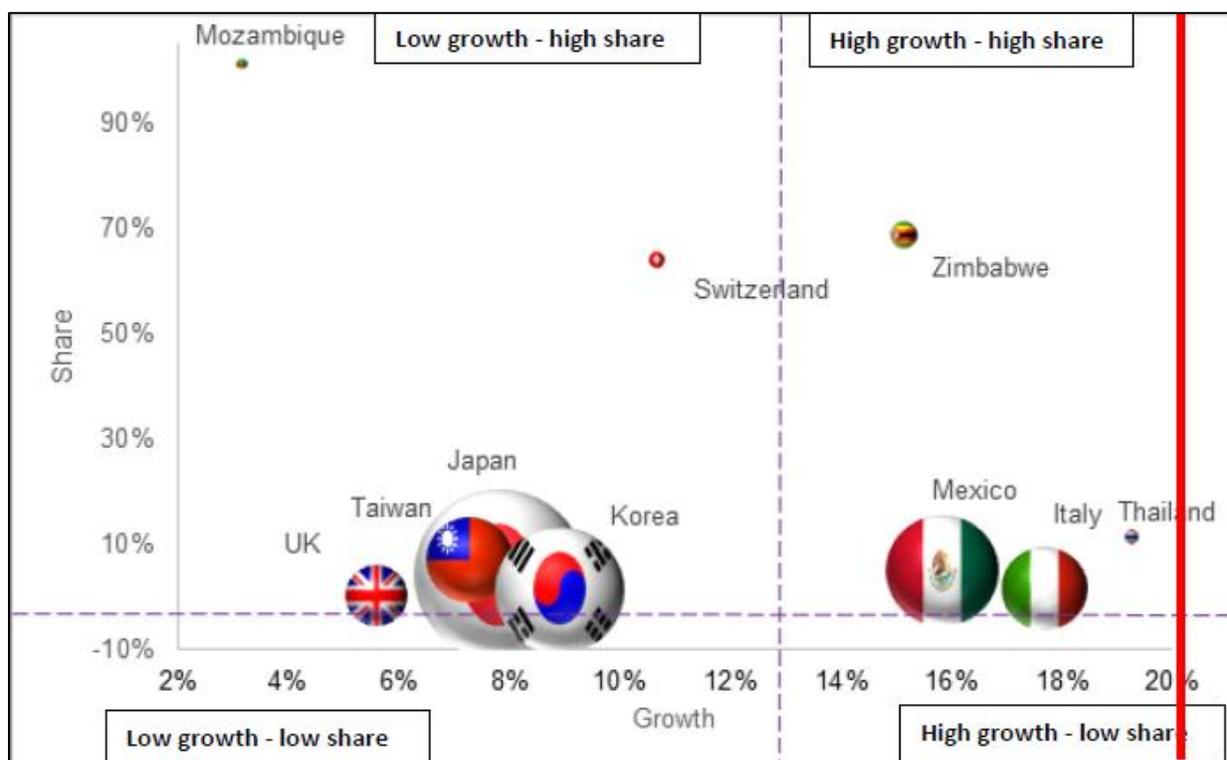
*High growth–high share markets:* These include Madagascar, which was found to be a market opportunity that represents prospects for growth. However, there is a need for some careful consideration of how South Africa increases future maize exports in this market. Worth noting is that Madagascar considers maize as a secondary staple, with cassava, yam, plantains and rice (among others) as the primary staples (Goufo, 2008).

Hence, this country is not attractive to South Africa and not presented in Figure 5.3. When using the world's growth rate of 13%, Mexico, Italy, Zimbabwe and Thailand are amongst the high growth–high share markets (see Figure 5.3). However, when using South Africa's growth share of 21%, these countries are classified under low growth–high share markets.

*Low growth–high share markets:* These include Japan, Mexico, Taiwan, Zimbabwe, Namibia, Botswana, Switzerland, Swaziland, Angola, Ghana, Mozambique, Lesotho, the UAE, Thailand and Côte d'Ivoire. Countries such as Namibia, Botswana, Swaziland, Angola, Ghana and Lesotho have small market sizes relative to other global maize importers; hence they are not visible in Figure 5.3. These are markets in which South Africa is well established, but whose capacity for further growth is limited. This is due to the fact that, for African markets, South Africa already exports a considerable level of exports to those countries, to the extent of filling at least 41% of their import demand. For non-African markets, growth is probably restricted by competing imports that are mostly from the United States of America, India, Argentina, Pakistan and Brazil (ITC, 2014a).

*Low growth–low share markets:* These include Korea, the United Kingdom and Italy. South Africa's market presence in these countries is weak. These countries, although major global importers of maize, are not importing significantly from South Africa, but rather import most of their maize from European countries (i.e. France, Ukraine, Bulgaria, Poland and Russia), as well as from Argentina, Canada and Brazil. Of South Africa's top 20 export destinations, Korea, the UK and Italy are not attractive markets. It should also be noted that these markets have a ban on genetically modified maize, which might be a barrier to most of South Africa's maize exports (Goufo, 2008).

Among South Africa’s major export markets there are no *high growth–low share markets*. While this specific result is of little empirical value, the broader concern emerging from the overall growth share analysis done here is the need for South Africa to expand its reach to new markets. This is necessitated by the fact that there is little scope for export growth in those markets in which South Africa is well established. South Africa therefore needs to develop new export markets while preserving its existing ones. The general challenge in developing markets is South Africa’s lack of consistency in maize exports to certain high-demand countries outside of the SACU and SADC (ITC, 2014a). This lack of consistency can be attributed primarily to uneven surplus levels which, in certain years, preclude South Africa from regular participation in larger import markets.



**Figure 5.3: Growth share matrix for South Africa’s selected major export markets**

Source: ITC (2014a) and own calculations

\* Bubble sizes for each country reflect the overall size of the maize market in each growth share matrix.

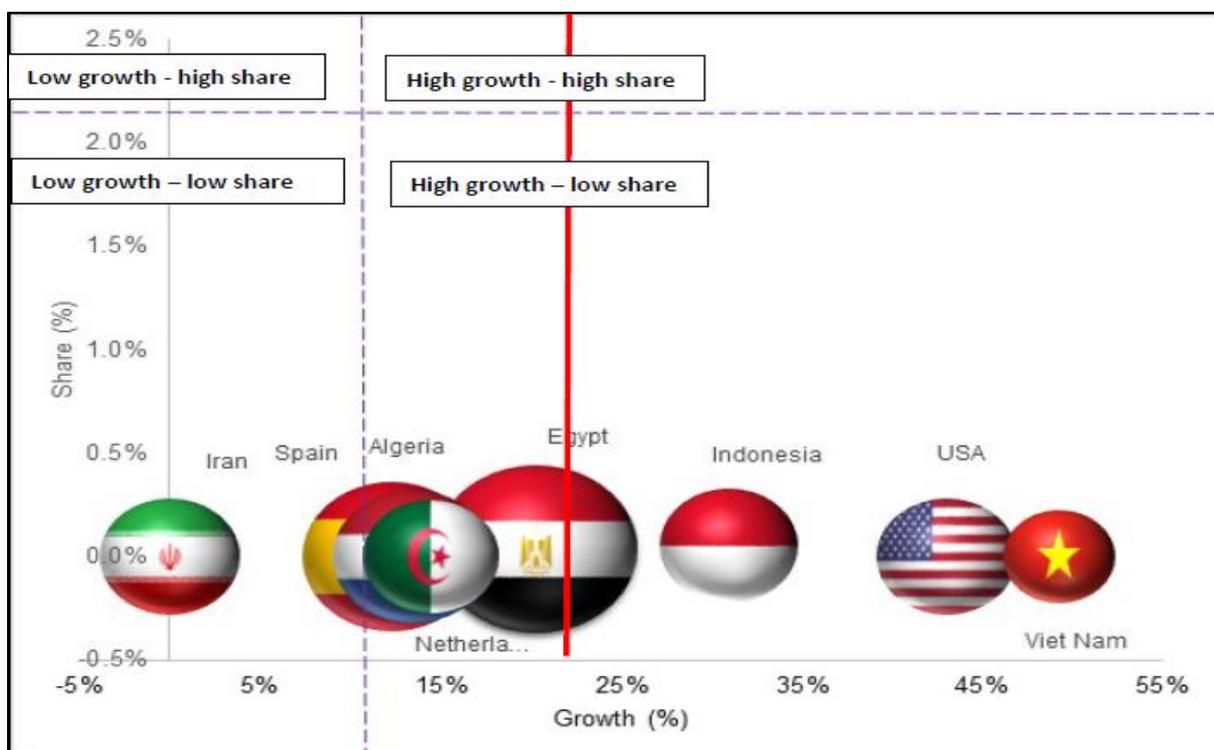
\*The vertical dotted line is at 13%, which is the world’s maize export growth rate (2004 to 2013).

\*NB: Red line = South Africa’s growth rate, which is at 21%, hence the countries in the “high growth–high share” category are classified as “low growth–high share” markets when using South Africa’s maize growth share.

\*The horizontal dotted line is at 2.2%, which is South Africa’s maize export share in the world.

### 5.3.2 Growth-share Analysis of Major Global Import Markets

This analysis was done by applying the South African growth rate of 21% and a share of 2.2%. Given that South Africa exports 60% of its total maize value to four of the major global import markets, this section analyses the scope for South Africa to expand its exports to other large markets, such as Spain, Iran, Venezuela, Algeria, Colombia, Egypt, Vietnam, Indonesia, USA and the Netherlands (ITC, 2014a). It is important to note that South Africa’s market presence in all of the aforementioned countries is generally weak. Apart from Iran, Venezuela, Colombia, Indonesia and the Netherlands, South Africa’s weak presence in major markets is partly explained by the ban of genetically modified maize in larger maize-importing countries (Goufo, 2008).



**Figure 5.4: Growth share matrix for major global import markets**

Source: ITC (2014a) and own calculations

\* Bubble sizes for each country reflect the overall size of the maize market in each growth share matrix.

\*The vertical dotted line is at 13%, which is the world’s maize export growth rate (2004 to 2013)

\*NB: Red line = South Africa’s growth rate, which is at 21%, hence the countries in the “high growth–high share” category are classified as “low growth–high share” markets when using South Africa’s maize growth share.

\*The horizontal dotted line is at 2.2%, which is South Africa’s maize export share in the world.

Out of the countries outlined in Figure 5.4, five are low growth–low share markets (viz. Spain, Iran, Algeria, Egypt and the Netherlands). In these countries, access and growing South Africa’s market presence will be more difficult due to limited growth potential. Three countries (viz. Vietnam, Indonesia and the USA) are high growth–low share markets, implying that they are markets that represent opportunities for expansion, and South Africa should consider these countries in the future.

It is interesting to explore from where Vietnam, Indonesia and the USA source their imports. In this regard, three observations were made from the ITC (2014a) data, and these are as follows: Firstly, Indonesia largely imports from India, Brazil, Argentina, the USA and Paraguay. Secondly, Vietnam imports from India, Argentina, Brazil, Pakistan and Cambodia. Thirdly, the USA mostly imports from Canada, Brazil, Argentina, Uruguay and Paraguay. The countries that feature prominently on the supply side are Brazil, Argentina, India and the USA, and they represent South Africa’s strongest competition. Therefore, South Africa would have to become more competitive than Argentina, Brazil and India if it is to consider effectively penetrating the Vietnamese, Indonesian and USA markets.

### 5.3.3 South Africa’s Maize Export Potential

Given the identified strategic markets for South Africa’s maize exports, it is of interest to extend the growth-share analysis by looking at the export potential that South Africa has in the identified countries. To measure the remaining opportunity that exists in attractive markets, the analysis sought to identify what South Africa potentially could export to each of the identified attractive markets, constrained either by total export supply or import demand. This, per definition, is referred to as the indicative trade potential (ITP), which is calculated as follows (Helmets & Pasteels, 2005; Kapuya *et al.*, 2014):

$$ITP_{ijk} = \min(X_{ik}, X_{jk}) - X_{ijk} \quad (4)$$

where  $X_{ik} = \sum_{j=1}^J X_{jik}$  and  $X_{jk} = \sum_{i=1}^I X_{ijk}$ , and where  $X_{ik}$  is the sum of South Africa’s maize exports to the world;  $X_{jk}$  is the sum of maize imports from the world by attractive markets; and  $X_{ijk}$  is South Africa’s maize exports to the attractive markets. The ITP essentially serves to show the size of the import market that is yet to be fully explored, and serves as a guide to markets that offer substantial trade benefits for South African maize exports.

However, a strong underlying assumption made in calculating the ITP is that the importing country perfectly absorbs all imports from South Africa, which therefore essentially makes the ITP value theoretical and indicative (Helmets & Pasteels, 2005). Despite this weakness, the ITP nevertheless is useful in ranking the markets.

Another important measure that is used is the relative indicative trade potential (RITP). The RITP expresses the ITP values in relative terms (i.e. as a percentage of South African maize exports to the world). The RITP lies between zero and one, with a value of zero indicating that South African maize exports strongly depend on the importing country's economy, and with the opposite being true for a value of one (Helmets & Pasteels, 2005). Table 5.2 shows the trade potential of South Africa's major export markets and is ordered according to the value of trade (see Appendix A.3).

The results from Table 5.2 show that Japan, Mexico, Korea, Taiwan, Thailand, Italy, Angola, Switzerland, Zimbabwe, the UAE and the UK have a high potential for South African maize exports, with relatively large markets that could be considered for export expansion. In contrast, the SACU countries (Botswana, Lesotho, Namibia and Swaziland), Côte d'Ivoire, Madagascar and Ghana are low-potential markets with relatively small markets.

**Table 5.2: Trade potential for South Africa's maize in export markets**

Rank	Country	Indicative trade potential (ITP)	Relative indicative trade potential (RITP)	Overall assessment
1	Japan	499 772	0.72	High potential, large market
2	Mexico	599 951	0.86	High potential, large market
3	Taiwan	611 268	0.88	High potential, large market
4	Zimbabwe	33 897	0.05	High potential, large market
5	Namibia	(180)	0.00	Low potential, small market
6	Botswana	2 322	0.00	Low potential, small market
7	Korea	668 857	0.96	High potential, large market
8	Switzerland	13 243	0.02	Low potential, small market
9	Swaziland	-	0.00	Low potential, small market
10	Italy	677 528	0.97	High potential, large market
11	Mozambique	(168)	0.00	Low potential, small market
12	Lesotho	-	0.00	Low potential, small market
13	UAE	130 398	0.19	High potential, large market
14	Thailand	26 042	0.04	High potential, large market
15	Côte d'Ivoire	470	0.00	Low potential, small market
16	Angola	10 650	0.02	High potential, large market
17	Madagascar	1 756	0.00	Low potential, small market
18	UK	587 422	0.84	High potential, large market
19	Cameroon	4 157	0.01	Low potential, small market
20	Ghana	745	0.00	Low potential, small market

Source: ITC (2014a) and own calculations

\* The RITP lies between zero and one, with a value of zero indicating that South African maize exporters depend strongly on the importing country's economy, and a value of one otherwise.

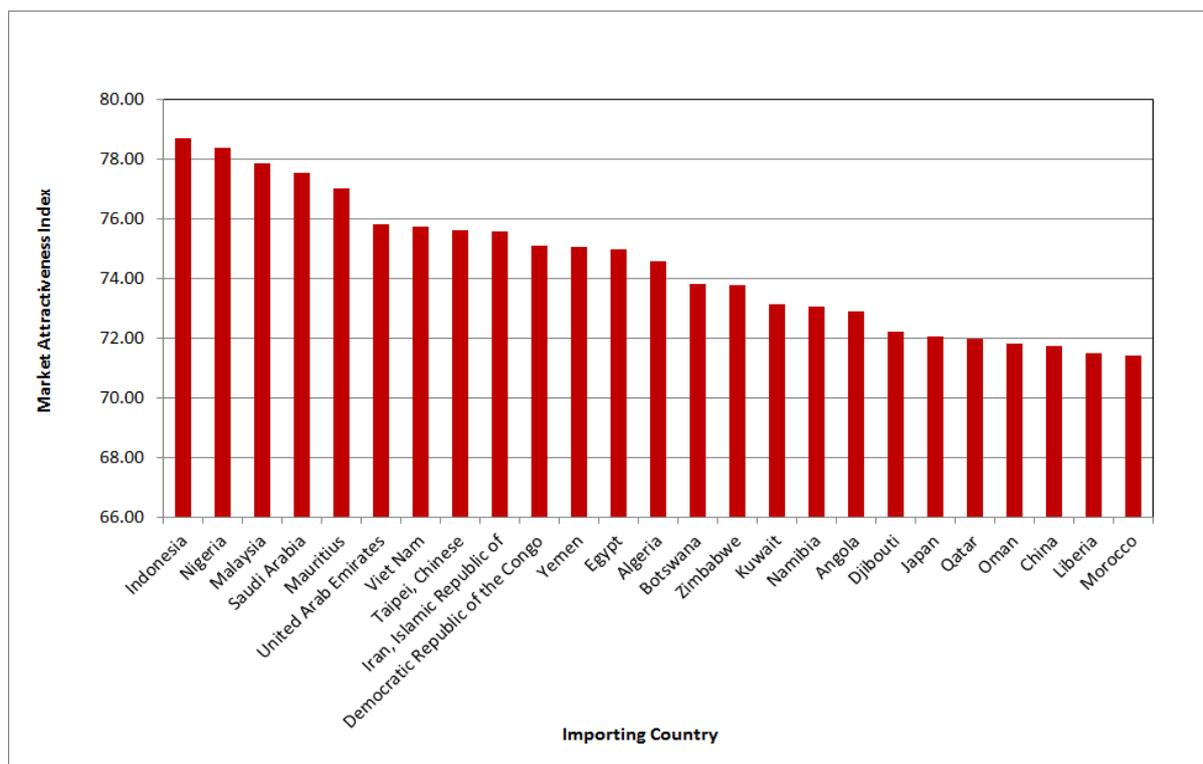
\*The ITP essentially serves to show the size of the import market that is yet to be fully explored.

The RITP in Table 5.2 reveals that South Africa's maize exports are not dependent on the economies of Japan, Korea, Mexico, Taiwan, Italy and the UK. However, South Africa's maize exports are strongly dependent on African markets, particularly its traditional SACU and SADC trading partners. This can be explained partly by the geographic proximity of South Africa to its regional markets, as well as its trading agreements through the Customs Union and the Free Trade Area (FTA).

#### 5.4 WHICH ARE OTHER UNEXPLOITED, POTENTIAL MARKETS FOR SOUTH AFRICAN MAIZE EXPORTS?

In the quest to identify unexploited and possible high-potential export destinations for South African maize in the world, the International Trade Centre's (ITC) market attractiveness index (MAI) was applied and the findings are presented in this section. MAI uses indicators which are standardised for comparability and uses a value of between zero and 100 (ITC, 2014b). The analysis was done for maize (HS code 100590) and the total number of countries analysed was 163. The data used is a five-year series (viz. 2009 to 2013) from the International Trade Centre. The previous section (revealed comparative advantage) used data from 2001 to 2013; however, the MAI uses data for only five years due to the limitations of the model. The results in this section add to the deductions already observed from the growth share matrix analysis.

When interpreting the results it is important to note that these are not absolute measures of market attractiveness, but rather a macro-economic framework to identify the main attractive markets for South African maize exports. Hence, all of the top-ranked markets could possibly have attractive potential for increased maize exports, but need further country-specific research to establish whether or not a market is suitable for market access. In addition, this step is usually taken by export companies and agribusinesses, while the results of the MAI only give a framework to select possible markets or assist in prioritising the export strategy. The countries with high import growth, high expected gross domestic product (GDP) growth, a high level of imports, a negative trade balance and that are closer to South Africa and with lower tariffs might get higher MAI scores and therefore would be classified as attractive markets.



**Figure 5.5: Market attractiveness index for South African maize exports**

Source: Own calculations based on International Trade Centre data (ITC, 2014a)

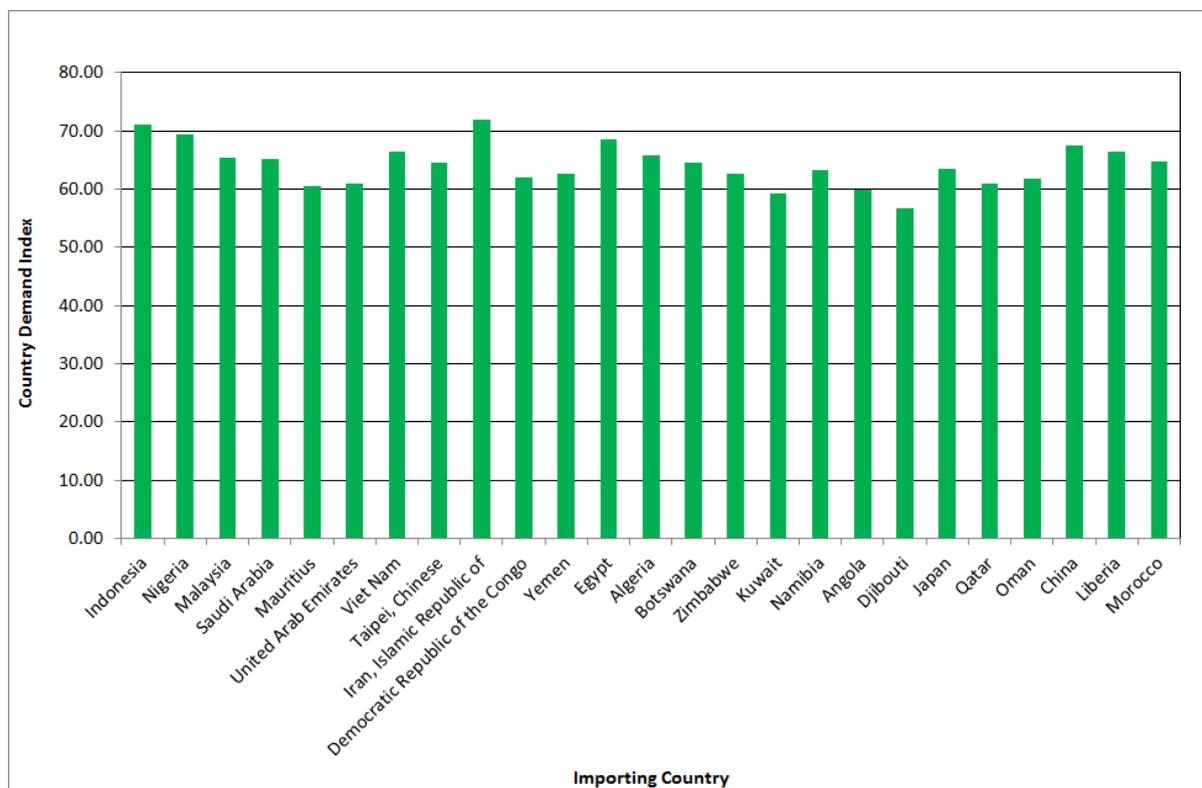
Indonesia, Nigeria, Malaysia, Saudi Arabia, Mauritius, the United Arab Emirates (UAE), Chinese Taipei, Iran, the Democratic Republic of Congo (DRC) and Yemen are the top ten attractive markets that were identified for South African maize exports. Indonesia is ranked top because of the high import demand in the period 2009 to 2013, as well as the tariff advantage for South Africa's maize exports. South Africa faces a tariff of about 5% in Indonesia.

Nigeria was ranked second most attractive market due to strong demand growth, low tariff advantage, high GDP growth expectations, as well as a distance advantage relative to other suppliers (exporters). Nigeria's global maize import growth between 2009 and 2013 was stronger than that of Indonesia. It was calculated at 97%, with Indonesia's import growth at 85%. The reason for this is because of the lower bases in 2009. Furthermore, with high expected population growth, the Nigerian market appears to be very attractive for South African maize exports.

Malaysia, Saudi Arabia and Mauritius are also among the top five attractive export markets for South African maize. In these markets, South Africa has a strong tariff advantage and

there is strong demand. These country's economies are expected to show strong growth of around 4%, which potentially will propel the expected demand growth (IMF, 2015). South Africa relative to other global suppliers has a distance advantage of below 5 000 kilometres in Malaysia and Saudi Arabia. The average distance to export to these nations is just above 11 000 kilometres (ITC, 2014b). All the countries in the top 25 have import growth of more than 10%, while factors such as expected strong economic growth, distance and tariff advantages also contributed to the high ranking (see Figure 5.6). This is with the exception of Iran, which has the highest applied tariff of 45%, and Vietnam, with an applied tariff of 30% (ITC, 2014b). Moreover Japan is the only country with an expected GDP growth of around 1% (IMF, 2015).

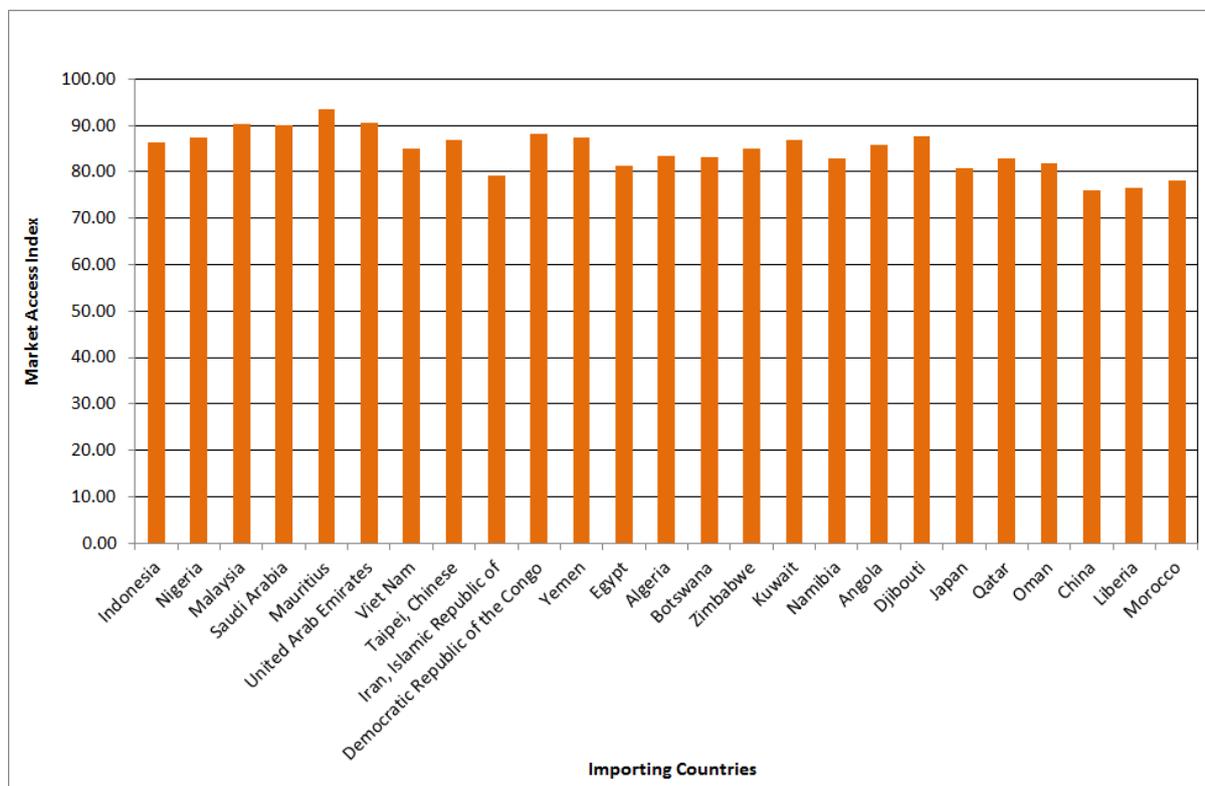
Amongst the identified top 25 attractive market, Indonesia, Nigeria, Malaysia, Saudi Arabia, Vietnam, Iran, Egypt, Algeria, China, Liberia and Morocco have the highest country demand of above 65 index points. This is on the back of strong import growth and expected strong economic growth (see Figure 5.6).



**Figure 5.6: Country demand index for South African maize**

Source: Own calculations based on International Trade Centre data (ITC, 2014a)

Figure 5.7 shows the market access index for South African maize exports. This index captures the tariff and distance advantage. Out of 163 countries, the above noted countries have a market access index point of above 75. This means that South Africa has a relatively fair distance and tariff advantage in these nations.



**Figure 5.7 Market access index for South African maize exports**

Source: Own calculations based on International Trade Centre data (ITC, 2014a)

Table 5.3 provides more comprehensive findings of the market attractiveness index analysis. The analysis was done in 163 countries, but these are the 25 most attractive countries for South African maize exports. The countries represent economies that are fast growing, present good market access prospects and are relatively close to South Africa for market penetration.

**Table 5.3: Market attractiveness index results for South African maize**

Rank	Country	MAI	Market access index	Country demand index	Value of world import 2013 (US\$)	World import growth, 2009-2013	Value of RSA exports 2013 (US\$)	RSA market share rate
1	Indonesia	78.71	86.32	71.09	914374	88.87	359.00	0.04%
2	Nigeria	78.39	87.33	69.44	46466	213.34	549.00	1.18%
3	Malaysia	77.88	90.43	65.33	512938	12.99	279.00	0.05%
4	Saudi Arabia	77.54	89.93	65.16	678646	15.76	0.00	0.00%
5	Mauritius	77.04	93.57	60.51	30712	13.27	25.00	0.08%
6	UAE	75.82	90.60	61.04	135439	17.45	5070.00	3.74%
7	Viet Nam	75.73	85.08	66.37	624214	19.87	5.00	0.00%
8	Taipei, Chinese	75.63	86.78	64.47	1181513	5.38	86478.00	7.32%
9	Iran	75.60	79.22	71.99	947642	541.90	0.00	0.00%
10	DRC	75.11	88.22	62.00	9341	35.91	1642.00	17.58%
11	Yemen	75.08	87.50	62.66	144835	6.959349	0.00	0.00%
12	Egypt	74.97	81.35	68.60	1982467	24.19	240.00	0.01%
13	Algeria	74.59	83.34	65.85	892252	21.65	5.00	0.00%
14	Botswana	73.83	83.04	64.61	47106	59.26	45950.00	97.55%
15	Zimbabwe	73.77	84.90	62.63	107754	7.134492	79061.00	73.37%
16	Kuwait	73.13	86.90	59.36	54139	7.891565	0.00	0.00%
17	Namibia	73.07	82.96	63.18	53443	37.01536	55648.00	104.13%
18	Angola	72.91	85.89	59.93	12894	11.35461	3307.00	25.65%
19	Djibouti	72.24	87.74	56.75	205	17.10673	0.00	0.00%
20	Japan	72.06	80.70	63.42	4738612	5.973862	196197.00	4.14%
21	Qatar	71.96	83.03	60.90	5186	8.653372	0.00	0.00%
22	Oman	71.83	81.84	61.83	42762	30.7312	0.00	0.00%
23	China	71.73	75.99	67.47	930527	166.7919	0.00	0.00%
24	Liberia	71.52	76.64	66.40	482	33.44456	0.00	0.00%
25	Morocco	71.42	78.17	64.67	473577	7.766879	0.00	0.00%

Source: International Trade Centre data (ITC, 2014a), International Monetary Fund data (IMF, 2015), Coface data (2015) and own calculations

\*MAI = market attractiveness index

## 5.5 A TARIFF BARRIER ANALYSIS OF SOUTH AFRICA'S STRATEGIC AND POTENTIALLY STRATEGIC EXPORT MAIZE MARKETS

Given South Africa's comparative advantage and global competitiveness, this research also attempted to establish the country's market access in both its own attractive markets (in which South Africa has a strong market presence) as well as in major global markets (where South Africa has either a weak or no market presence). Moreover, a comparative analysis of South Africa's market access against that of its major competitors is also a factor that is important to understand. Major global producers of maize, such as Argentina, Brazil, the

Ukraine, the USA, India, France, Romania, Russia and Hungary were identified as South Africa's key competitors in global markets.

#### 5.5.1 Market Access in South Africa's Attractive Markets

Table 5.4 shows South Africa's tariffs for maize in attractive markets (namely Japan, Mexico, Taiwan, UAE, Thailand and Zimbabwe) against those of South Africa's main competitors. South Africa's market share in these countries is as follows: 69% in Zimbabwe, 11% in Thailand, 7% in Taiwan, 5% in Mexico, 4% in Japan and 4% in the UAE (see Appendix A.3). South Africa faces the highest tariffs in Thailand (46.5%) and enjoys the lowest tariffs in Japan, Zimbabwe, Taiwan and the UAE (0%).

**Table 5.4: Tariffs faced by major global exporters in South Africa's attractive markets**

		Major exporters							
		RSA	EU	Argentina	Ukraine	Brazil	USA	India	Russia
Attractive markets	Japan	0.0	0.5	0.5	0.5	0.5	0.5	0.0	0.5
	Mexico	4.4	0.0	0.0	4.4	0.0	0.0	4.4	4.4
	Taiwan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	UAE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Thailand	46.5	46.5	46.5	46.5	46.5	46.5	0.0	46.5
	Zimbabwe	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: TRAINS (2014)

South Africa's main competitors face more or less similar tariffs in these markets. India, as an exception, enjoys more favourable tariffs than South Africa (and the rest of the major exporters), and this is primarily due to the fact that India has free trade agreements (FTA) with Japan, the UAE and Thailand (see Table 5.5). With better access to the Mexican market is the USA, whose geographical proximity as well as the North Atlantic Free Trade Area (NAFTA) affords it a unique advantage. Similarly, South Africa's locational contiguity as well as the SADC Free Trade Area (FTA) provides a selective advantage for the Zimbabwe market, and this explains why South Africa has a high market share in Zimbabwe.

**Table 5.5: Trade agreements of major global exporters in South Africa's attractive markets**

		Major exporters							
		RSA	EU*	Argentina	Ukraine	Brazil	USA	India	Russia
Attractive markets	Japan	GSP <sup>a</sup>	-	-	-	-	-	FTA	-
	Mexico		FTA <sup>c</sup>	PTA		PTA	FTA <sup>d</sup>	-	-
	Taiwan	-	-	-	-	-	-	-	-
	UAE	-	-	-	-	-	-	FTA	-
	Thailand	-	-	-	-	-	-	FTA	-
	Zimbabwe	FTA <sup>b</sup>	-	-	-	-	-	GSP	-

Source: TRAINS (2014)

\* With specific reference to France, Romania and Hungary, which are among the top 10 global maize exporters

<sup>a</sup> Japan's Generalised System of Preferences (GSP) scheme

<sup>b</sup> Southern African Development Community (SADC) Free Trade Area (FTA)

<sup>c</sup> Mexico-EU agreement

<sup>d</sup> North Atlantic Free Trade Area (NAFTA)

With the exception of Zimbabwe, all of South Africa's strategic markets are in Northern Hemisphere countries. This means that, for South Africa to compete effectively and grow its overseas strategic markets, a greater emphasis on reducing the production and logistics cost would be imperative to overcoming the distance-cost factor and improving competitiveness.

### 5.5.2 Market Access in Potential and Attractive Markets

This section focuses on identified potentially strategic export markets for South Africa. These countries are Iran, the USA, Indonesia, Venezuela and Vietnam. These are countries that have a large market share and in which South Africa have a high export potential, but obtains little or no market presence. Tariff data shows that South Africa faces relatively similar tariff levels as its major competitors (see Table 5.6). However, India and Vietnam, as well as the USA, have FTAs and this explains why there are high volumes of maize trade between these respective countries (see Table 5.7).

**Table 5.6: Tariffs faced by major global exporters in potentially attractive markets**

		Major exporters							
		RSA	EU*	Argentina	Ukraine	Brazil	USA	India	Russia
Potential export markets	Iran	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	USA**	-	-	-	-	-	-	-	-
	Indonesia	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
	Venezuela	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Saudi Arabia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Malaysia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Vietnam	17.5	17.5	17.5	17.5	17.5	17.5	0.0	17.5

Sources: TRAINS (2014); Chizari (2013)

\* With specific reference to France, Romania and Hungary, which are among the top 10 global maize exporters

\*\*The USA charges an ad-valorem tariff of between [0.05 cents/kg] and [0.25 cents/kg]

**Table 5.7: Trade agreements of major global exporters in South Africa's attractive markets**

		Major exporters							
		RSA	EU*	Argentina	Ukraine	Brazil	USA	India	Russia
Potential export markets	Iran	-	-	-	-	-	-	-	-
	USA	AGOA	-	-	-	-	-	-	-
	Indonesia	-	-	-	-	-	-	-	-
	Venezuela	FTA	-	FTA	-	FTA	-	-	-
	Saudi Arabia	-	-	-	-	-	-	-	-
	Malaysia	-	-	-	-	-	-	FTA	-
	Vietnam	-	-	-	-	-	-	FTA	-

Source: TRAINS (2014)

\* With specific reference to France, Romania and Hungary, which are among the top 10 global maize exporters

Why has South Africa not established itself in the major global importing markets, given that its competitors face relatively the same tariff levels in these markets? In the case of Venezuela, the main suppliers of maize are Brazil, Argentina, the USA, Paraguay, Mexico, Uruguay and Ecuador, and this is likely due to global competitiveness as well as locational advantage. In 2012, Vietnam imported 71.1% of its maize from India, with 16.2% coming from Argentina, followed by 3.6% from Brazil (ITC, 2014a). India's large market share in Vietnam is most likely due to the geographic proximity, and more importantly, the FTA.

## 5.6 A NON-TARIFF BARRIER ANALYSIS OF SOUTH AFRICA'S STRATEGIC AND POTENTIALLY STRATEGIC MAIZE MARKETS

Adding the constraints highlighted above (which are competitiveness, trade agreements and geo-locational disadvantage) to South Africa's penetration of new maize markets, South Africa faces a non-tariff barrier in the form of non-GM regulations in specific markets. These include Egypt, Spain, Italy, Algeria, the Netherlands and the UK (see Table 5.8). It is important to highlight that approximately 85% of South Africa's maize is GM (Maize Trust, 2014). This implies that most of South Africa's maize is excluded from markets that prohibit GM maize imports.

**Table 5.8: Countries that have a ban on genetically modified (GM) crops**

Continent	Country/State/Countries	Comments
The Americas	USA (California), Brazil and Paraguay	While the United States still largely allows for the growth and import of GM foods and does not demand food labelling, South American countries such as Brazil and Paraguay have restrictions on GM foods
Africa	Algeria and Egypt	Both have laws restricting GM foods. In Algeria, both the planting and distribution of GM foods is illegal, while in Egypt, GM foods must be approved before they can be distributed
Asia	Thailand, China, and Japan	All have laws limiting GM foods. Thailand banned imported GMs as early as in 2001, while the rest of the countries have had more recent bans
Europe	Norway, Austria, Germany, UK, Spain, Italy, Greece, France, Luxembourg and Portugal	All have put in place GM restrictions. France took an important step in the no-GM movement by specifically defining exactly what "GMO-free" means when it comes to food labelling. Ireland has banned all growing and cultivating of GM foods and the European Union as "a governing coalition of European countries" has considered a Europe-wide banning of GM foods
Middle East	Saudi Arabia	It has banned the growing of GM foods and the importing of GM wheat. GM maize importation is allowed

Source: Source: Kamua and Karin (2013)

The aspect of genetically modified maize regulation is an important caveat in considering the capacity of South Africa to establish and grow markets in potentially strategic countries such as China, Saudi Arabia, Algeria and Egypt, as well as in markets in the EU. In Thailand, where South Africa already has a market presence, a strategic position is necessary to understand the legislation that governs GM imports in order to sustainably grow the market share in the short to medium term. Nevertheless, a considerable portion of South Africa's key markets accept GM maize.

## 5.7 CONCLUSION

This chapter determined the competitive status of South Africa's maize exports relative to the world and also identified attractive and potential export markets for South African maize exports. The analysis used the revealed comparative advantage index, agri benchmark production model, growth-share matrix, indicative trade potential index, relative indicative trade potential index, and market attractiveness index. The results of the analyses suggest that South Africa's maize exports are generally competitive. However, at the production level, South Africa is not competitive due to high input costs relative to other leading global maize-producing countries.

An important observation made is that, apart from South Africa's existing markets within the SACU and SADC, South Africa's maize exports are irregular and inconsistent. This is primarily due to the variation in production levels (Figure 2.2). This lack of consistency is then attributed to uneven surplus levels which, in certain years, preclude South Africa's regular participation in larger import markets. Furthermore, South Africa's maize exports are growing faster than the world's annual average growth, and these exports are concentrated in a few countries. The study also identified attractive markets in which South Africa has a high trade potential with a view to defining the basis for a longer term sustainable export market development strategy.

Japan, Mexico, Taiwan, the United Arab Emirates, Thailand and Zimbabwe were identified as high-potential attractive markets. These are markets that South Africa should prioritise for development in the short to medium term. The analysis showed that Madagascar is an attractive market with a high level of growth, and also a market in which South Africa can establish a higher market share. Nonetheless, this market is small and has low export potential. It therefore is a market that should be de-prioritised when considering long-term export market development.

The market attractiveness index showed that countries such as Indonesia, Nigeria, Malaysia, Saudi Arabia, Mauritius, the United Arab Emirates, Chinese Taipei, Iran and the Democratic Republic of Congo are the top ten attractive markets for South African maize exports. These results concur with those of the growth share matrix analysis, with the exception of Mexico, which was ranked at number 75 out of 163 countries analysed, as well as Thailand, which

was ranked number 109 out of the 163 maize-importing countries analysed. This was due to the fact that Mexico is not a consistent market for South African maize; it only appears when there are domestic shortages. The country also imports a large volume of its maize from the United States of America, which would have a geographic advantage over South Africa. Thailand is also not attractive for South Africa. The non-tariff barrier analysis showed that it has a ban on GM importation, as highlighted by Goufo (2008). Since South Africa's maize production is approximately 85% GM (Maize Trust, 2014), this limits the scope for exports to Thailand.

## CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

### 6.1 INTRODUCTION

The objective of the analyses presented in Chapter 5 was to address the research questions highlighted in Chapter 1. The following research questions were raised: How competitive are South African maize exports relative to leading global exporters? Can South Africa increase its market share in existing markets? Lastly, which are the other unexploited potential markets for South African maize exports? Therefore, this chapter will summarise the findings of the study by answering these research questions using evidence from Chapter 5, and lastly giving recommendations for further research.

### 6.2 REVISITING THE RESEARCH QUESTION

The following research question was raised in Chapter 1: how competitive are South African maize exports relative to leading global exporters. The results of the revealed comparative advantage analyses in Chapter 5 indicate that South Africa's maize exports are competitive. However, the results from the agri benchmark production model show that South Africa is not competitive on the production level. South Africa is a relatively high-cost producer of maize, with imported fertilisers, pesticides and fuel accounting for a major part of production costs. This means that South Africa is less competitive at the farm level compared to Argentina, the Ukraine and the USA.

The second research question was to establish if South Africa can increase its market share in existing export markets. From Chapter 5 it is evident that South Africa's maize exports are growing faster than the world's annual average growth. However, large shares of these exports go to a few countries. These two insights suggest the need to expand South Africa's export share beyond its existing markets. South Africa's high-potential strategic markets for maize include Japan, Mexico, Taiwan, the United Arab Emirates and Zimbabwe. These are markets that South Africa should prioritise for development in the short to medium term. They show growth and have low tariffs.

The last research question aimed at identifying unexploited or potential markets for the South African maize industry. The analysis of the market attractiveness index showed that countries such as Indonesia, Nigeria, Malaysia, Saudi Arabia, Mauritius, the United Arab Emirates, Chinese Taipei, Iran, the Democratic Republic of Congo and Yemen are the top ten

attractive markets for South African maize exports. These results were largely in line with the outcome of the growth share matrix analysis.

In terms of market access, South Africa faces relatively similar tariff levels in global markets compared to its global competitors. However, with regard to non-tariff barriers, South Africa faces restrictions in markets such as Thailand, Saudi Arabia and within the EU countries (viz. Italy, UK and Spain).

### 6.3 CONCLUSIONS AND RECOMMENDATIONS

Given the foregoing, South Africa's weak presence in major maize-importing markets can be attributed to a general lack of market development initiatives (i.e. export promotion and bilateral trade agreements), as well as high production costs. In essence, this means that, for South Africa to establish and/or grow its markets, particularly in large import markets, the country has to improve its global competitiveness and seek preferential market access arrangements. The study therefore recommends a revision of the maize export strategy by industries to incorporate these elements with a view of repositioning South Africa as a major player in the global maize market.

The research revealed some unusual markets, such as Indonesia, Nigeria, Yemen, Angola, Qatar, Vietnam and Kuwait. It would be worthwhile for the industry and agribusinesses to closely view the top 25 attractive markets as presented in the MAI and strategically position itself to access these markets. There also is a need to design an industry export strategy that will prioritise these markets in line with business interests and will explore the existing potential. This initiative can be carried out on a public-private partnership, where private sector can provide business intelligence and government can handle the diplomatic trade relations. Current South African maize exports are concentrated and there is scope to access new markets.

### 6.4 FURTHER RESEARCH

This study focused on South African maize exports. However, there remains scope to pursue a similar analysis of other agricultural commodities, such as soybeans and sorghum. Such research studies would be beneficial to organised agriculture and to South Africa. Industry groups such as Grain South Africa are starting to focus on export expansion for grains and

oilseeds (Bloomberg, 2015). Competitiveness studies would be resourceful in guiding the vision of such industries and promoting the efficiency of export processes.

The grain industry is seeing improvements in soybean production and sorghum. Moreover, there is potential for biofuel industry development. Hence competitive studies in these commodities are of importance in order to evaluate if South Africa will have sufficient capacity to provide in the expected consumption, or whether the industry will have to depend on imports.

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APPENDIX A: DATA USED IN CHAPTER FIVE TO CALCULATE SOUTH AFRICA'S GROWTH SHARE  
MATRIX IN ATTEMPTS TO UNDERSTAND IF SOUTH AFRICA CAN INCREASE ITS MARKET  
SHARE IN EXISTING MAIZE MARKET

APPENDIX A.1 RANKING OF THE 20 LARGEST GLOBAL MAIZE EXPORTERS IN 2013

Rank	Country	Value of exports (US\$ millions)	Share of world total (%)	Growth rate of exports (2004-2013)
1	United States of America	6 506	20.7%	7.4%
2	Brazil	6 251	19.9%	30.3%
3	Argentina	5 555	17.7%	16.6%
4	Ukraine	3 807	12.1%	47.2%
5	France	1 837	5.8%	6.4%
6	India	1 229	3.9%	53.6%
7	Romania	741	2.4%	54.7%
<b>8</b>	<b>South Africa</b>	<b>696</b>	<b>2.2%</b>	<b>21.0%</b>
9	Russian Federation	590	1.9%	103.8%
10	Hungary	557	1.8%	18.8%
11	Bulgaria	488	1.6%	39.1%
12	Canada	477	1.5%	29.7%
13	Paraguay	464	1.5%	28.7%
14	Germany	249	0.8%	7.9%
15	Poland	249	0.8%	0.0%
16	Mexico	203	0.6%	48.5%
17	Serbia	159	0.5%	0.0%
18	Thailand	135	0.4%	11.7%
19	Netherlands	124	0.4%	34.1%
20	Austria	120	0.4%	15.0%
	Others	1005	3.2%	-1.8%

Source: ITC (2014a)

\*SA = South Africa

\*USA = United States of America

\*UK = United Kingdom

APPENDIX A.2: RANKING OF THE 20 LARGEST GLOBAL MAIZE IMPORTERS  
IN 2013

Rank	Country	Value of imports of country i (US\$ mil)	Value of SA's exports to country i (US\$ mil)	SA's market share in country i (%)	Share of country i to world total (%)	Growth rate of country i imports (2004-2013)
1	Japan	4739	196.2	4.1%	13.9%	7.8%
2	Korea	2673	27.1	1.0%	7.8%	8.9%
3	Mexico	2013	96.0	4.8%	5.9%	15.8%
4	Egypt	1982	0.2	0.0%	5.8%	20.2%
5	Spain	1551	0.0	0.0%	4.5%	12.3%
6	Netherlands	1216	0.0	0.0%	3.6%	13.5%
7	Taiwan	1189	84.7	7.1%	3.5%	7.3%
8	Italy	1125	18.4	1.6%	3.3%	17.7%
9	Colombia	997	0.0	0.0%	2.9%	13.9%
10	Iran	948	0.0	0.0%	2.8%	0.0%
11	USA	938	0.0	0.0%	2.7%	43.0%
12	China	931	0.4	0.0%	2.7%	156.5%
13	Indonesia	914	0.4	0.0%	2.7%	31.0%
14	Algeria	892	0.0	0.0%	2.6%	14.4%
15	Venezuela	784	0.0	0.0%	2.3%	0.0%
16	Viet Nam	606	0.0	0.0%	1.8%	49.2%
17	Germany	590	0.0	0.0%	1.7%	9.3%
18	UK	588	1.0	0.2%	1.7%	5.6%
19	Saudi Arabia	570	0.0	0.0%	1.7%	16.8%
20	Malaysia	513	0.3	0.1%	1.5%	18.6%
	Others	838	271	-	24.6%	15.9%

Source: ITC (2014a)

## APPENDIX A.3: RANKING OF SOUTH AFRICA'S TOP 20 MAIZE EXPORT MARKETS IN 2013

Rank	Country	SA exports to country i (US\$ mil)	Share of country i in SA exports (%)	Country i imports from the world (US\$ mil)	Market share of SA in country i (%)
1	Japan	196.2	28.2%	4 738.6	4%
2	Mexico	96.0	13.8%	2 012.7	5%
3	Taiwan	84.7	12.2%	1 188.6	7%
4	Zimbabwe	73.9	10.6%	107.8	69%
5	Namibia	53.6	7.7%	53.4	100%
6	Botswana	45.3	6.5%	47.7	95%
7	Korea	27.1	3.9%	2 673.5	1%
8	Switzerland	23.5	3.4%	36.8	64%
9	Swaziland	21.0	3.0%	21.0	100%
10	Italy	18.4	2.6%	1 125.1	2%
11	Mozambique	17.0	2.4%	17.0	100%
12	Lesotho	16.7	2.4%	16.7	100%
13	UAE	5.1	0.7%	135.5	4%
14	Thailand	3.4	0.5%	29.4	11%
15	Côte d'Ivoire	2.5	0.4%	2.9	84%
16	Angola	2.2	0.3%	12.9	17%
17	Madagascar	1.2	0.2%	3.0	41%
18	UK	1.0	0.1%	588.4	0.2%
19	Cameroon	0.8	0.1%	5.0	17%
20	Ghana	0.8	0.1%	1.5	50%
	Total	690.2	28%	12 817.2	+

Source: ITC (2014a)

\*SA = South Africa