CHAPTER THREE

MEASURING AND ANALYSING COMPETITIVENESS IN THE AGRIBUSINESS SECTOR: METHODOLOGICAL AND ANALYTICAL FRAMEWORK

3.1 INTRODUCTION

The globalisation of business activities and trade liberalisation has given rise to the current drive by business and government to assess, understand and improve the international competitiveness of firms, sectors and industries. A more open economy in a world focused on global markets for products and global sources of inputs increases the need for the agribusiness sector in South Africa to be internationally competitive. The sector can only provide increased incomes for its participants and enhance its contribution to national economic growth if it improves its competitiveness.

The main objective of this Chapter is to develop a framework for measuring and analysing the competitiveness of the agribusiness sector in South Africa. The analysis of competitiveness is concerned with providing answers to classical questions of economics – what determines investment, what determines firm success and what represents optimal government policy (Pitts & Lagnevik, 1997). Abbott & Bredahl (1994) states that the analysis of competitiveness seeks to address trade policy questions within the distorted world in which we live, by replacing comparative advantage and relegating it to the status of a theoretical concept of little practical value.

Three aspects are important when developing a framework for analysing a sector's competitiveness: Firstly, the current and past competitiveness status of the sector must be determined. The second aspect is to determine the key success factors that established competitive advantage. Constraints that impact negatively on competitiveness must also

be identified. Thirdly, the aspect of the sustainability of the sector's competitiveness status must be investigated.

Many methods have been developed and used by researchers to measure and analyse competitiveness. In this chapter the most widely used measures of competitiveness will be discussed. A framework will then be developed to analyse the competitiveness of the agribusinesses sector in South Africa.

3.2 MEASURES OF COMPETITVENESS

Researchers have mainly used two scientific approaches to measure and analyse competitiveness, namely models and indicators. Models are complex and are usually custom-build to answer specific questions. Models require a relatively large investment in data collection and analysis. As a result, they are appropriate primarily for academic research or high-stake investment decisions and policy choices. It is also generally appropriate to employ specialist staff, as new developments in modelling methods are constantly being introduced.

The main alternative to models is index-number indicators, designed to measure some change over time or comparison across industries. Like the Consumer Price Index of inflation, such indicators do not pretend to simulate the economy itself - they serve as thermometers or barometers, not weather forecasters (Masters, 1995).

One important aspect of competitiveness is that it is a relative measure. There must always be a comparison with a base value (Frohberg & Hartman, 1997). If, for example, market share is being assessed, it must concern market size. If competitiveness in factor markets is being analysed, the relation is to the value a factor would have in another production process.

The quality of the results obtained with these indicators depends to a considerable extent on the quality of the data available. Although this is common to all analyses, it affects

some more than others. The quality, type, and amount of data required also vary between the measures - the choice of the method to be used is therefore often dictated by data availability.

Measures of competitiveness may also differ with respect to the level of investigation. Table 3.1 provides an overview. Studies can be carried out for various levels of product aggregation: across the entire economy, a specific sector, or for a single product (or aggregate of products). Another differentiation of competitiveness exists in the spatial dimension of the analysis. Studies can be carried out for a firm, for a entire country or regions within a country. Since it is a relative measure, the competitiveness of enterprises or regions within a country, or between countries could be compared (Frohberg & Hartman, 1997).

The indicator used does not necessarily always reveal the spatial extension and the level of product aggregation of a given analysis. A large number of analyses of competitiveness evaluate the performance of a sector either by using an aggregate of all the outputs of this sector, or by looking at its most important commodities.

Table 3.1: Analyses of competitiveness according to level of product aggregation and spatial extension

Product aggregation	Spatial Extension		
	Regions within		
	Firms	**a Country**	**Countries**
Entire economy	No	No	Yes
Single sector	No	Yes	Yes
Single product	Yes	Yes	Yes

Source: Adapted from Frohberg & Hartman, 1997

In addition to the different levels of product aggregation and spatial extension at which the concept of competitiveness can be applied, past performance (ex-post), current or the potential of competitiveness (ex-ante) could be the focus of the analysis.

Buckley, Christopher & Prescott (1988) have made a useful distinction between different measures of competitiveness:

- ? **Performance measures** compare how well a country, sector or firm has done relative to its rivals.

- ? Measures of **competitive potential** consider the availability of factors that can deliver superior performance.

- ? Measures of **competitive process** are often qualitative by nature and seek to measure either the management process or how competitive potential is converted into competitive performance.

In section 3.2.1 and section 3.2.2 twelve different methods used to measure competitiveness will be discussed critically. In section 3.2.1 the predominant concern will be to review measures of competitive performance. In section 3.2.2 the focus will be on measurements of competitive process and potential, and in particular the Porter diamond (1990, 1998) and business confidence indexes will be discussed.

3.2.1 Measures of competitive performance

3.2.1.1 Internationally published competitiveness reports

The most well-known measure of international competitiveness used to be the Competitiveness Index produced annually in the World Competitiveness Report by two Swiss institutes, the World Economic Forum (WEF) and the International Institute for Management Development (IMD). This index was based upon a huge number of variables (378 in 1995). Many of these were subjective and impressionistic, drawing extensively upon comments from business executives. The two institutions separated their indices since 1996, using different (and fewer) variables and weights – both of which are now widely used and cited.

The two reports have different views on the concept of competitiveness. The IMD defines competitiveness as "the ability of a country to create added value and thus increase national wealth..." (IMD, 1996). This definition may imply that Gross Domestic Product (GDP) and productivity can be proxies for competitiveness, but the IMD argues that competitiveness cannot be reduced to the mere notions of GDP and productivity (IMD, 1996). In contrast, the WEF accepts GDP and/or productivity as proxies for competitiveness by defining competitiveness as "the ability of a national economy to achieve sustained high rates of economic growth, as measured by the annual change in gross domestic product per person" (WEF, 1996).

While their definitions of competitiveness differ, both institutes have selected nearly the same factors of competitiveness. The Global Competitiveness Report prepared by the WEF formulates an index of economic indicators correlated with medium- to long-term economic growth. The index combines data on a country's economic performance (trade, technological capacity, infrastructure, regulatory framework) – the Growth Competitiveness Index - with qualitative survey data from business executives on their perception of the business environment in the countries in which they operate – the Business Competitiveness Index (WEF, 1996).

The World Competitiveness Yearbook prepared by the IMD measures and compares how well countries are providing an environment for the firms operating within its borders. It also uses two types of data to capture quantifiable and qualitative information. It obtains statistical indicator data from international and regional organisations, private institutions, and national institutes. It also gathers, through an in-depth questionnaire, qualitative data from top executives and middle management, who are asked to evaluate the current and future competitiveness of the country in which they operate (IMD, 1996).

The two reports use different weights in their calculations. The IMD report contains both hard data, that are statistical indicators published by organisations, and soft data, which are survey data compiled from executives. Soft data may be volatile; therefore the IMD applies a one-third/two-thirds balance between hard and soft data. On the other hand, the

WEF applies quite different weights. According to the report, the four factors – openness, government, finance and labour – are given a weight of three; the two other factors – infrastructure and technology – are given a weight of two; the remaining two factors – management and civil institutions are given a weight of one. Hence, the weighting of factors is somewhat arbitrary.

Although the notion of national competitiveness scores is appealing, some cautionary comments on their construction and use are worth bearing in mind. Firstly, a great deal of subjectivity is built into the scores through the interview-based methodologies, and the weights given to the qualitative attributes are not disclosed. Secondly, the scope of the measures is so broad that the computation of competitiveness includes variables with no clear relationship to competitiveness, but merely a simple correlation (Nabi & Luthria, 2002).

Lall (2001: 10) criticises the two indices by stating that the underlying analytical framework is weak and suspect. The connection between the variables in terms of producing growth or structural competitiveness is unclear, often tendentious. Countries often receive high marks because they are good places for international investment: the underlying theory seems to be that liberal environments for business are the only criteria of good policy, and that free markets are always optimal. The possibility that markets may be deficient, and that interventions may actually promote competitiveness is ruled out by assumption; thus, interventionist governments (like Korea) are given low marks compared to more *laissez-faire* ones (like Hong Kong) simply because they are interventionist. The emphasis on current macroeconomic factors and perceptions also makes the index volatile, with rankings shifting significantly from one year to the next – this conflicts with most analysts' concept of structural factors underlying competitiveness. Lall (2001) concludes the critique regarding the two indices with the following: "whatever the indices capture, it is not an economically justifiable concept of competitiveness" (Lall, 2001).

Kaplan (2003: 75 - 88) examines the competitiveness indicators developed by the WEF and IMD, specifically in respect of South Africa. He concludes that neither the Global Competitiveness Report nor the World Competitiveness Yearbook provide a clear and persuasive guide as to South Africa's overall competitiveness ranking, nor how this has altered over time. The problem resides principally in the assessment of technological capacities and the contribution that technology makes to overall competitiveness. The IMD's and the WEF's approaches to technology diverge significantly, but both are inadequate. As a consequence, there is a substantial discrepancy between the two with regard to South Africa's current overall competitiveness ranking. "Neither individually, nor collectively, are these competitiveness indicators – as they are currently constituted – useful as a guide to policy" (Kaplan 2003).

In Table 3.2 the competitiveness rankings of the top ten countries as well as that of South Africa is compared between the IMD World Competitiveness Yearbook and the WEF Global Competitiveness Report for the years 2001, 2002, 2003 and 2004. From the Table it is clear that there are some major differences in the competitiveness rankings. For example: in the WEF Growth Competitiveness Index and Business Competitiveness Index, Finland receives the highest ranking of competitiveness in the world and this ranking has remained nearly constant the past four years. In the IMD competitiveness index Finland is ranked the eighth most competitive country in the world in 2004, dropping from a fifth place in 2001.

South Africa is ranked the 49th most competitive country in the world by the IMD in 2004. The WEF Growth Competitiveness Index ranked South Africa 41st and the WEF Business Competitiveness Index ranked South Africa 25th in the world in 2004.

Table 3.2: A comparison between competitiveness rankings of the IMD World Competitiveness Yearbook and the WEF Global Competitiveness Report

	2001	2002	2003	2004
IMD WORLD COMPETITIVENESS YEARBOOK				
USA	1	1	1	1
SINGAPORE	3	8	4	2
CANADA	9	7	6	3
AUSTRALIA	12	10	7	4
ICELAND	10	11	8	5
HONG KONG	4	13	10	6
DENMARK	15	6	5	7
FINLAND	5	3	3	8
LUXEMBOURG	2	2	2	9
SOUTH AFRICA	37	39	47	49
WEF GROWTH COMPETITIVENESS INDEX				
FINLAND	1	1	1	1
USA	2	2	2	2
SWEDEN	9	3	3	3
TAIWAN	7	6	5	4
DENMARK	14	4	4	5
NORWAY	6	8	9	6
SINGAPORE	4	7	6	7
SWITZERLAND	15	5	7	8
JAPAN	21	16	11	9
ICELAND	16	12	8	10
SOUTH AFRICA	34	34	42	41
WEF BUSINESS COMPETITIVENESS INDEX				
USA	2	1	2	1
FINLAND	1	2	1	2
GERMANY	4	4	5	3
SWEDEN	6	6	3	4
SWITZERLAND	5	5	7	5
UNITED KINGDOM	7	3	6	6
DENMARK	8	8	4	7
JAPAN	15	11	13	8
NETHERLANDS	3	7	9	9
SINGAPORE	9	9	8	10
SOUTH AFRICA	25	29	27	25

Source: WEF and IMD, 2004

3.2.1.2 Real exchange rate

In the literature of neoclassical economics, the real exchange rate (RER) is considered as a measure for competitiveness (Edwards, 1989; Lipschitz, 1979). Accordingly, the appreciation/depreciation of the real exchange rate of a particularly country shows the loss/gain in competitiveness of that country (Edwards, 1989). The equilibrium real

exchange rate is used as a benchmark for determining whether the real exchange rate is appreciating or depreciating. Even though the RER in most cases is applied to the entire economy, it is increasingly also employed as a measure for specific sectors (Frohberg & Hartman, 1997).

The RER is defined as the ratio of the price index of tradable commodities to that of non-tradable inputs.

$$RER = p^T/p^{NT}$$

Where:

p^T = price index of tradable commodities
p^{NT} = price index of non-tradable inputs

The cost of producing a tradable good differs between countries, mainly because of the varying prices of non-tradable inputs used in the production of this commodity and, to a lesser extent, that of the tradable inputs. The latter cannot cause large divergence because the price differences between countries are only due to trade policies. Therefore, a relative increase in the cost of non-tradable inputs which is equivalent to an appreciation of the real exchange rate leads to higher production costs.

There are, in general, several problems associated with the real exchange rate as a measure of competitiveness (Minale, 2002). The problems are both at the conceptual and methodological level. At the conceptual level two problems can be identified. Firstly, measuring competitiveness as a relative price/cost narrows the definition of competitiveness. As argued in Chapter two, competitiveness of an economy is not just a function of its wages and prices (relative to other countries), but it is also greatly influenced by non-price factors (for example, delivery date, quality design etc.).

Secondly, the intuitive behind using the RER as a measure of competitiveness is applied with difficulty to developing countries, which have advanced countries as their trading

partners (Minale, 2002). Implicit in the definition of RER is the assumption of the homogeneity of tradables in the domestic economy and tradables in the rest of the world (trading partner countries). The assumption that technology is without cost and available to all countries is also embedded in this definition.

The problems with these assumptions are the following: Technology is more costly and difficult to obtain in developing countries and tradables in developing countries (unprocessed primary products) are quite different from the tradables in the more developed trading countries (sophisticated and manufactured products). Thus, an increase in the world price of tradables with respect to the domestic price of non-tradables does not indicate a shift of resources to the production of tradables in the economy of developing countries (Minale, 2002).

Development over the last decades suggests that changes in real exchange rates are in the short to medium term very often more influenced by capital movements and their impact on the nominal exchange rate rather than by changes in the basic conditions of the real economy (Frohberg & Hartman, 1997). Thus, in order to establish a causal relation between changes in the real exchange rate and international competitiveness, information about the driving force behind the movement in the former is required.

3.2.1.3 Foreign Direct Investment

Foreign Direct Investment (FDI), a measure of foreign ownership of productive assets, such as factories, mines and land, is a reasonable measure of national competitiveness. The factors that make a country attractive for inward FDI are similar to those that determine its competitiveness (Nabi & Luthria, 2002). Countries compete for FDI flows. Increasing FDI can also be used as a measure of growing globalisation. Figure 3.1 shows the growing inflow of FDI in the 1990's, mainly in developed countries.

Most FDI inflows go to industrialised countries whilst Latin America and East Asia dominate amongst developing countries - as one would expect (Nabi & Luthria, 2002).

In 1997 nearly 71% of FDI in developing countries went to just nine nations, and of that over 30% was invested in China alone (Todaro, 2000)
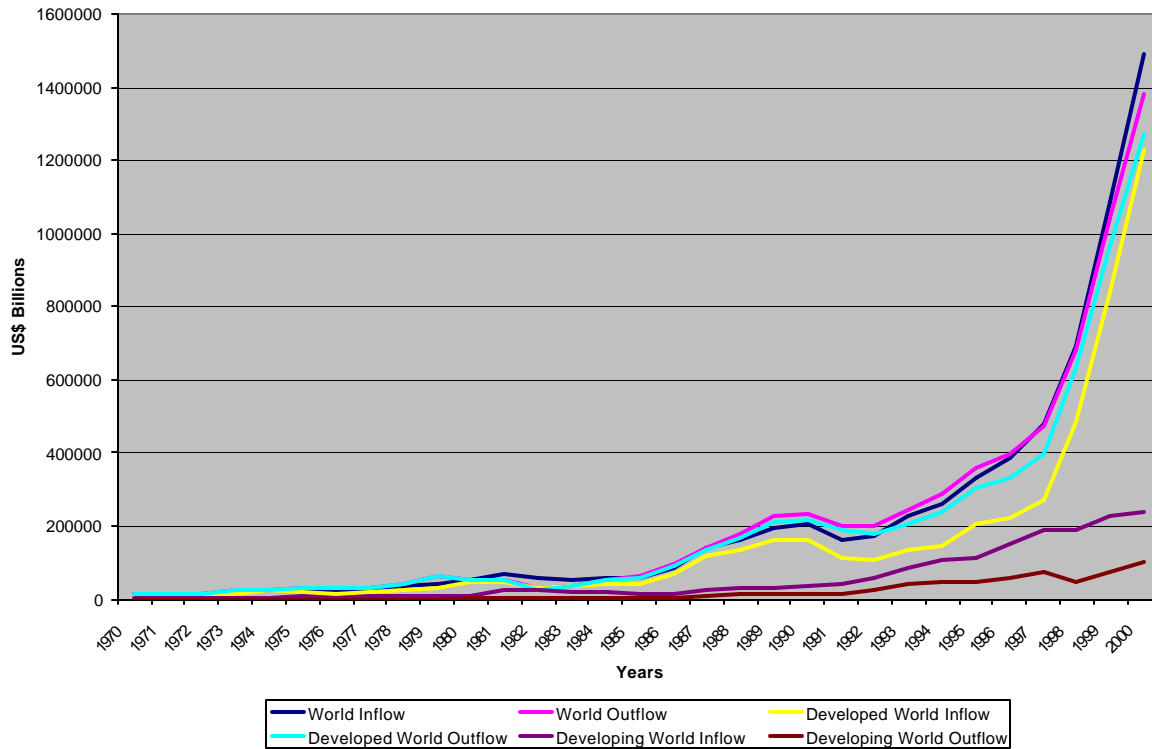
Figure 3.1: Trends in FDI in the world, developing countries and developed countries

Source: World Bank, 2000

While it is true that FDI flows into countries that possess the fundamentals of a competitive production structure, such as skilled labour, sound business laws, and good logistics, these are not the only factors affecting FDI inflows. For instance, the Republic of Korea, which possesses a sound production and innovation base, chose not to welcome FDI, unlike most other East Asian economies (Nabi & Luthria, 2002).

On the other hand, one way to overcome trade barriers is by investing in other countries. FDI can therefore lead to a partial substitution of exports. If a particular nation has a high

level of investment in foreign countries, this is also seen as an indicator of competitiveness.

Thus, one needs to differentiate with respect to FDI. If a large part of such investments is aimed primarily at opening up foreign markets that are perhaps not accessible via exports due to trade barriers, it mirrors the competitiveness of the donor country; otherwise it points to a competitive advantage of the country or region attracting FDI. Unfortunately, it is generally not easy to distinguish which of the two causes dominates.

A final cautionary note about using FDI flows as indicators of competitiveness: FDI proved far more resilient during the East Asia financial crisis of 1997-98, staying reasonably stable. The same was true during the Mexican crisis in 1994-95 and the Latin America debt crisis of the 1980's. These trends point to the relative inelasticity of FDI to measure change in competitiveness in the short run. However, FDI is a good indicator of long-term or structural competitiveness of a country (Nabi & Luthria, 2002).

3.2.1.4 The Growth-Share matrix

In the literature from business schools a number of techniques for analysis of competitiveness have been developed, one of the most important and widely used of which is the growth share matrix devised by the Boston Consulting Group (BCG) (Traill & Pitts, 1997). The essence of this technique is to develop a composite picture of a firm's businesses, by plotting each on a matrix according to its relative market share and its market growth rate.

The market growth rate on the vertical axis indicates the annual growth rate of the market in which the business operates. High growth markets are assumed to be more attractive because market gains are more easily obtained. In order to be able to distinguish between high and low market growth, 10% per annum is considered as the midpoint.

The growth rate of the market can also affect a firm's cash flow. A firm that operates within a rapidly growing market that wishes to maintain its market share will have to reinvest more in aspects such as added plant capacity and working capital than a firm that operates within a slowly growing or declining market. As market growth slows down, as it does at the end of the product life cycle, a business will usually generate cash well in excess of its needs (Fry & Killing, 1989)

On the horizontal axis, relative market share refers to the share of its market held by the business compared with that of its largest competitor. A relative market share of 0.1 means that the company's sales volume is only 10% of that of the market leader, while a figure of 10 would imply that its market share was 10 times that of its nearest competitor.

Relative market shares are drawn on a log scale so that equal distances on the graph represent equal percentage increases. The midpoint is 1.0; at this point the company's market share is equal to that of its largest competitor. High market shares imply a strong competitive position.

On the basis of these ideas and in terms of their ability to generate cash, the Boston Consulting Group classified products and businesses into one of four quadrants:

? **Cash cows** are characterised by high market shares and low market growth. Profitability should be good; both investment and cash requirements are low. Such products should have a good competitive position and generate resources to support other product-market combinations.

? **Stars** are market leaders in high growth markets. Profitability should be good but investment requirements are high. These products should be top priority and become the company's future cash cows.

? **Wild cats** (also called problem children or question marks) are products with low market shares in high-growth markets. Cash requirements are high. If the

position of these products cannot be improved, cash will be absorbed continuously.

?   **Dogs** are characterised by low market shares in low-growth markets. Profitability is generally absent and cash requirements high.   Divesting is normally recommended for these products.

The competitive position of two or more companies can be assessed by classifying their products in this matrix. Clearly firms with a large share of their sales in the cash cows or stars categories are more competitive than those with a large share in the dog or wildcat categories.

The BCG matrix is widely used for strategic market planning within large companies, with many business units, but it has some weaknesses (Traill & Pitts, 1997; Fry & Killing, 1989):

?   Some users criticise the model for being too mechanical and simplistic, incapable of capturing the real world complexities of a firm's competitive position and environment.   The matrix also does not address the issue of the timing of investments.

?   Market growth is not a completely valid measure of evaluating market attractiveness. Other factors, such as entry barriers, bargaining power and size of the market are also important.

?   Market share is limited as a sole measure of competitive strength.   Other elements, such as location, degree of vertical integration and capacity utilisation also have an influence.

?   Definition of the market is not always simple, as many market segments can be identified for one type of product.

The BCG matrix has the additional advantage that it can be easily used as an indicator of competitive strength, not only at the level of an individual company but also for an industry as whole. By mapping all product-market combinations of competing companies, the competitive position of both domestic and export markets can be determined and compared with its competitors. Gellynck & Viaene (1993) have adapted this technique to enable them to analyse the competitiveness of a portfolio of products of a sector on foreign markets.

3.2.1.5 Export performance

A host of different indicators have been developed to measure competitiveness based on market and trade information. Although designed for international comparison, they may also be used to contrast the competitiveness of different regions. These measures are usually calculated for single products, an aggregate of products or commodity chains. Most of these indicators are based on trade rather than on domestic market information. Although this is not without problems, one advantage of using trade data is that demand and supply responses are considered simultaneously. An additional advantage of using trade data is that the costs of marketing and transport to and from the port of entry are also taken into account.

As already mentioned above, competitiveness is a relative measure. Thus, indicators based on absolute production and market share give little information on the competitive position of a product, sector, or supply chain in an economy. Indicators that compare one sector relative to others should be considered instead.

Success in export markets, measured by rising market shares, is an indicator of an economy's level of global integration (Nabi & Luthria, 2002). However, success in export markets needs to be interpreted carefully. For instance, the loss of some market shares in trade may not signify loss of overall competitiveness if there is a rising share of other products, signalling an upward movement in the value chain. A proper picture of

competitiveness requires specifying the relevant market shares, the cause of changes in shares, and the changes that are desirable for national welfare.

A useful extension of the simple export market share indicator is market positioning. In a matrix of share of a product in world trade and share of exports in world trade of the specific product, market position relates product-level market shares to the dynamism of exported products in world trade in an attempt to indicate how a country is positioned for growth in the world markets (Table 3.3).

A country's firms and industries are considered to be "competitive" in products in which their market shares are on the increase. An export product is considered "dynamic" in world trade if its market share is growing faster than the average for all products.

The ideal market position is to have the highest share of exports as "rising stars", indicating that the country is gaining market share in fast-growing products. "Lost opportunity", the loss of market share in dynamic products, is the least desirable. "Falling stars" are also undesirable, although less so than lost opportunity, since market shares are rising, even if not in dynamic products. Finally, "retreat" may be undesirable, or it may be desirable if the movement is away from stagnant products and towards growth in dynamic products. The rationale for applying this matrix approach is that competitive structures are difficult to change quickly, and that the ability to adapt is unevenly distributed.

Table 3.3: Matrix of market positioning

	Share of product in world trade	
Share of country's export in world trade	*Rising* *(Dynamic)*	*Falling* *(Stagnant)*
Rising *(Competitive)*	Rising stars	Falling stars
Falling *(non-competitive)*	Lost opportunity	Retreat

Source: Nabi & Luthria, 2002

3.2.1.6 Unit labour costs

Unit labour cost – the cost of the labour input required to produce one unit of output or the ratio of hourly compensation to labour productivity – can be another indicator of competitiveness. As productivity rises, the labour input needed to produce a unit of output falls. An increase in productivity can offset an increase in compensation per hour and its effect on unit labour costs. Note for instance that Basel, Switzerland, with one of the highest wage rates in the world, has one of the lowest unit labour costs in the industrial world because of very high labour productivity (Nabi & Luthria, 2002).

To be able to compare across countries, unit labour costs need to be converted using a common denominator, such as the exchange rate. The variables required to calculate unit labour cost – wages, product prices, output and exchange rates – embody both the micro and macro elements of the economy. However, calculating unit labour costs is far from easy given the sensitivities associated with obtaining accurate wage information and the difficulty of finding comparable baskets of goods across nations. Hence, it is nearly impossible to get accurate unit labour costs for most developing countries.

Furthermore, competitiveness based on low labour cost does not last very long. History shows that successful nations have a tendency to close the labour cost gap relatively quickly with their competitors. For example, in 1980, the total labour cost in manufacturing was US$5.52 in Ireland and US$6.03 in Japan. In 2004, it reached US$21.02 and US$21.54 respectively. The same trend is likely to occur in countries in Central Europe that show high growth rates. Within the next decade, these nations will probably see their labour costs aligning with their neighbour countries resulting in the development of a competitive edge based on other factors (IMD, 2005).

3.2.1.7 Balassa's Revealed Comparative Advantage method

The concept of "Revealed Comparative Advantage" is widely used in practice to determine a country's weak and strong sectors. Although Liesner (1958) was the first to utilise an index of Revealed Comparative Advantage, the most frequently used measure in this respect is called the "Balassa index", after its refinement and popularisation by Balassa (1965, 1989).

Balassa's (1965) development of the 'Revealed Comparative Advantage' model and its subsequent extension (Balassa, 1977) to encompass a 'stage' approach to industrialisation was a major innovation.

The difficulty of measuring comparative advantage itself, led Bela Balassa (1965) to investigate trade patterns directly, without reference to underlying resources, productivity, subsidies or prices. For a particular country, the revealed comparative advantage in a product is defined as the ratio of the share of that product in world trade. If this index takes a value greater than unity, the country is considered to have a revealed comparative advantage in the product while a value below unity indicates a comparative disadvantage.

Balassa (1965) argued that revealed comparative advantage (or competitive advantage) could be indicated by the trade performance of individual commodities and countries in the sense that the commodity pattern of trade reflects relative market costs as well as differences in non-price competitive factors, such as government policies.

Based on empirical studies, Balassa (1977) concluded that inter-country differences in the structure of exports are in large part explained by differences in physical and human capital endowments. His results lend support to the 'stages' approach to comparative advantage, according to which the structure of exports changes with accumulation of physical and human capital.

Balassa's Revealed Comparative Advantage (RCA) method, an ex-post measure of competitiveness, compares a country's share of the world market in one commodity relative to its share of all traded goods. Given a group of reference countries, the Balassa index basically measure normalized export shares, where the normalisation is with respect to the exports of the same industry in the group of reference countries.   In particular, if X_{Aj} is country A's export value of industry j, X_{refj} is industry j's export value for the group of reference countries, and we define $X_i = ?\ _jX_{ij}$ for i = A, ref, then country A's Balassa index of revealed comparative advantage for industry j, RCA_{Aj}, equals:

$$RCA_{Aj} = X_{Aj}/X_A \Big/ X_{refj}/X_{ref} \qquad \qquad ....1$$

If RCA_{Aj} exceeds 1 country A is said to have a comparative advantage in industry j, since this industry is more important for country A's exports than for the exports of the reference countries.

The RCA is often multiplied by 100 for ease of presentation. An index of 110 for a particular industry in a particular country would then mean that its share of the world market was 10% higher than its share in total exports and that the country had a comparative advantage in that industry. Figures below 100 indicate comparative disadvantage.

The RCA measure can therefore identify sectors for which an individual country has a comparative advantage and a comparative disadvantage. It measures relative success in exporting and (despite its name) is not dependent on any theory regarding inter-industry trade, factor endowments, the existence, or otherwise absence, of free trade or perfect competition (Pitts & Lagnevik, 1997). RCA's are basic measures of success and failure and it can provide useful data for the testing of hypotheses in these other areas.

The use of the Balassa index for identifying a country's weak and strong sectors is widespread, both among academic scholars and policy makers (Hinloopen & Marrewijk, 2000). Balassa (1977) himself used these indices to measure changing competitiveness of the United States economy in research intensive industries. Michael Porter (1990) used a Balassa index exceeding one to identify a country's strong sectors in his influential book "The Competitive Advantage of Nations". Other empirical examples where the Balassa index is used, include Ariovich (1979), Reza (1983), Yeats (1985), Peterson (1988), Crafts (1989), Amiti (1999), Valentine & Krasnik, (2000), Esterhuizen & Van Rooyen (1999), Esterhuizen & Van Rooyen (2001), Agricultural Business Chamber (2001), Van Rooyen, Esterhuizen & Doyer, (2000), ISMEA, (1999), Pitts, O'Connell & McCarthy, (2001), Ferto & Hubbard, (2001).

There have also been some detailed discussions and analyses on the Balassa index (see Kunimoto [1977], Hillman [1980], Bowen [1983, 1985, 1986], Balance, Forstner and Murray [1985, 1986, 1987], Vollrath [1991], Bowen et al [1998], Hinloopen & Van Marrewijk [2000]).

RCA data can therefore be used as a measure of competitive performance as defined by Buckley, Christopher & Prescott (1988). From the perspective of this study, this data can identify successful and unsuccessful agro-food and fibre industries in South Africa. The only data required are trade statistics. The measure can be calculated for a whole sector such as food and drink, or for relatively small sub-sectors such as milk, yoghurt, sausages and maize meal. Trade data is available at a highly disaggregated level and it is usually possible to aggregate trade data into meaningful industry sectors.

An RCA index, being based on trade data, can be calculated yearly, and trends in competitiveness in a sector or industry can be identified. Although the focus is usually on performance within individual countries, by aggregating the data the technique can also be used to assess the competitiveness of sectors within trade blocs. The absence of appropriate trade data, in general, precludes the use of RCA at regional (sub-national) level.

The RCA index differs from a market share indicator in that the RCA index examines relative or comparative performance of an industry as compared to other industries in the same country, whereas the market share indicator looks at the absolute performance of an industry or company *vis-à-vis* its competitors.

Following analyses of international competitiveness in agriculture (Vollrath, 1987 & 1989) and in view of the open world economy, Volrath (1991) offered three alternative specifications of Revealed Comparative Advantage. The first of these measures is the Relative Trade Advantage (RTA), which accounts for imports as well as exports. It is calculated as the difference between relative export advantage (RXA), which equates to the Balassa index, and its counterpart, relative import advantage (RMA).

RTA is formulated as:

$$RTA_{iv} = RXA_{iv} - RMA_{iv} \qquad \qquad \dots 2$$

Where for $(n + v)$ countries and $(m + i)$ products,

$$RXA_{iv} = \left[X_{iv} / \sum_{n=1}^{u} X_{in} \right] / \left[\sum_{m=1}^{h} X_{mv} / \sum_{m=1}^{h} \sum_{n=1}^{u} X_{mn} \right] \qquad \dots 3$$

$$RMA_{iv} = \left[M_{iv} / \sum_{n=1}^{u} M_{in} \right] / \left[\sum_{m=1}^{h} M_{mv} / \sum_{m=1}^{h} \sum_{n=1}^{u} M_{mn} \right] \qquad \dots 4$$

where X and M refer to exports and imports, respectively. The numerator in equations [3] and [4] is equal to a country's export (imports) of a specific product category relative to the exports (imports) of this product from all countries except for the country in consideration. The denominator reveals the exports (imports) of all products except for the commodity in consideration from the respective country as a percentage of all other countries' exports (imports) of all other products. The level of these indicators represents the degree of revealed export competitiveness/import penetration.

While the calculations of indices RXA and RMA are exclusively based on either export or import values, the RTA considers both export and import activities. This seems to be important in view of trade theory and globalisation trends and due to the growth in intra-industry and/or entrepot trade (ISMEA, 1999).

The importance of using both exports and imports simultaneously in calculating an indicator of competitiveness may be illustrated by a simple example. Let us assume the RXA for product h in country j reveals a value of 3, thus indicating a high level of competitiveness for this product. However, the RTA value for the same commodity and country amounts to –1, thereby pointing to a lack of competitiveness. What may have caused these contradictory results? The answer is rather straightforward: intra-industry trade makes up the difference. Although exports have reached a sizeable share, imports of this commodity must have been even larger. Therefore, in considering both exports and imports the RTA is a more comprehensive and superior measure of competitiveness.

The RTA indicator implicitly weighs the revealed competitive advantage by calculating the importance of relative export and relative import competitive advantages. Hence, it is not dominated by extremely small export or import values of the commodity considered.

Vollrath's second measure is simply the logarithm of the relative export advantage (lnRXA).

The third measure is revealed competitiveness (RC), defined as:

$$RC \quad = \quad lnRXA \quad - \quad lnRMA \quad\quad\quad \dots 5$$

The advantage of expressing the latter two indices in logarithmic form is that they become symmetric through the origin. Positive (negative) values of RTA, lnRXA and RC reveal a competitive advantage (disadvantage).

When comparing a cross-section of RTA indicators, different aspects of the formula can change, and with it, the interpretation of the RTA indicators. Therefore, care should be exercised when interpreting RTA's. Table 3.4 gives some indication of how to interpret different cases of the RTA index. It is important to note that there are three aspects of the formula that can change when calculating the RTA indicators. Firstly, there is the product or product group; secondly, there is the country or group of countries for which one is estimating competitive advantage; and thirdly, there is the group of reference countries.

Table 3.4: A framework for interpreting different cases of the RTA index

Case	Country or group of countries to be analyse	Commodity, product or commodity group	Group of reference countries	Interpretation
1	Same	Different	Same	RTA indicators can be compared between products/commodities. The higher the value of the indicator, the greater the competitive advantages the product has over the other products in the country that has been analysed.
2	Same	Same	Different	A specific country's competitiveness for a specific product or commodity is compared to different reference countries. A comparison of the RTA indicator rank enables one to determine the relative importance of the traded commodity with different trading partners.
3	Different	Same	Same	Special caution needs to be exercised in this case. The index is affected by the size of the economy. Trends should preferably be used to compare the competitiveness between the countries

Source: Based on Valentine & Krasnik (2000)

Consider case 1 in Table 3.4. A comparison of differences in the RTA indicators for different commodities or products traded for the same country with the same reference countries can make use of the real value of the RTA indicator. The higher the value of the indicator, the greater the competitive advantage the product have over other products. Consider case 2 in Table 3.4. In this case a specific country's competitiveness for a specific product or commodity is compared against different reference countries. A comparison of the RTA indicator rank enables one to determine the relative importance of the traded commodity to different trading partners.

In case 3 of Table 3.4, special care needs to be exercised as different size economies will affect the absolute value of the RTA indicator. However, by using a trend analysis, the competitiveness of different countries can be compared.

A limitation of RTA analysis is that it does not explain how a country or region acquired its international market share and competitiveness status. Market share may well be attained by means of high export subsidies paid by governments (such as is for EU, USA, etc.) or protection (i.e. "uneven playing fields"). The sustainability of a competitive position may thus be in question, especially in view of the ongoing global movement to "free-up" markets and reduce subsidies and protection.

3.2.1.8 Production cost comparisons

Production costs and/or gross margins are often compared across farms to indicate which enterprise has a competitive advantage. Gross margins are obtained by subtracting costs of variable inputs from gross revenue. Since these calculations can be carried out only for a single commodity, such analyses are done at the product level. In general, data of existing enterprises are taken. Sometimes information obtained from individual farms, but averaged over a region or even a country, is also used. The underlying data determine the spatial extent of the analysis, i.e. whether enterprises at a regional or country level, or whether different types of farms are compared.

To allow for ease of comparison, it is common to normalise gross margins, e.g. with the value of sales or labour costs. This indicator can provide rather detailed insights into the reasons why enterprises across regions or countries are or are not competitive in a particular good. This is because the index is based on a detailed breakdown of the various cost items of production and, hence, offers a comparison at this level. Other measures do not reveal such details. This method, however, requires the data employed for comparison to be of the same or at least quite similar quality. This is a strong requirement, which is frequently not met.

Another major limitation is that gross margins do not offer any insight into whether quasi-fixed factors could be paid in accordance to what they would earn were they used in the production of other commodities. Moreover, if quasi-fixed factors were to be used in producing one commodity only, it could be disregarded completely; this, however, is rarely the case. Most quasi-fixed factors are rather immobile concerning other sectors of the economy, but can be employed in producing several agricultural goods. If it is possible to obtain shadow prices to the quasi-fixed inputs used in the production of the good analysed, and to include them in the calculation of production costs, some of the problems could be solved (Frohberg & Hartman, 1997).

Another problem using accounting methods relates to the question of how representative the results will be. Usually the calculations are carried out for specific enterprises. If used for regional or country comparison, care should be taken to find firms that are representative of the corresponding spatial entity. This requires detailed information on the most important characteristics of the enterprises concerning competitiveness, as well as an appropriate sampling method.

For international comparison, the omission of distribution and marketing costs in this method is a disadvantage. Where international competitiveness is determined, the costs of transporting the commodity from the point of production to the port of export or from the port of import to the point of domestic use should not be disregarded. For bulky products, or spatially large and land-logged countries with less developed transportation

systems, such costs can seriously impede or even become prohibitive to trade [see for example the Rwanda Case study (Esterhuizen & Van Rooyen, 2001)].

Additional problems arise if this method is used for considering competitiveness under different policy scenarios. This is a result of the assumption that production can be represented by a Leontief function, which does not allow substitution between inputs. Furthermore, accounting methods neglect any repercussions for prices caused by changes in demand for inputs, and these methods also do not represent similar interdependencies on output markets (equilibrium conditions are not implied). A policy change, however, will affect outputs as well as variable inputs, and the value of quasi-fixed factors. Subjective judgement is required as to whether these omissions affect the results and, if so, by how much (Frohberg & Hartman, 1997).

If conclusions about competitiveness need to be drawn, the production cost comparison has to be used with some care. It is likely that too much can be read into these figures, because the limitations of the approach are not sufficiently taken into consideration.

3.2.2 Measuring competitive potential and process

The methods described in the previous section are only the starting point in any analysis of competitiveness. These methods help to define which sectors are competitive and which are not. They quantify, but do not explain why. The measures of competitiveness discussed in this section seek to answer that question.

3.2.2.1 Domestic Resource Costs

Domestic Resource Costs (DRC) is calculated to measure the comparative advantage of different policy options. DRC, as well as several other important indicators of protection, comparative advantage and social profitability can be illustrated using the framework of Policy Analysis Matrix (PAM) originally developed by Monke and Pearson (1989).

The PAM is a product of two accounting identities: profits are defined as a difference between revenues and costs measured in either private or social terms. The second identity measures the effect of distortions as differences between observed values and social values.

Table 3.5: Policy Analysis Matrix

	Revenue	Tradable Input Costs	Domestic Factor Costs	Profits
Private prices	A	B	C	D
Social prices	E	F	G	H
Transfers	I = A-E	J = F-B	K = G-C	L

Source: Monke and Pearson (1989)

The PAM matrix gives three absolute measures:

- Private profitability $D = A – B – C$
- Social profitability $H = E – F – G$
- Net transfer $L = I + J + K$

Indicators that are used to compare the extent of policy transfers or policy incentives and indicators that are used to compare relative efficiency or comparative advantage between agricultural commodities are summarised in Table 3.6 below.

Table 3.6: Economic indicators derived from the PAM

NPC	Nominal protection coefficient	$(A/E) – 1$
EPC	Effective protection coefficient	$[(A – B)/(E – F)] – 1$
DRC	Domestic resource cost	$G/(E – F)$
SCB	Social cost benefit ratio	$(F + G)/E$
PPR	Private profitability ratio	$A – B – C/A$
PCR	Private resource cost	$C/A – B$

Source: Monke and Pearson (1989)

DRC equals the real domestic resource cost required to save or earn a unit of foreign exchange. It can be interpreted as the shadow value of domestic non-tradable factors

necessary in producing a traded good per unit of tradable value added. If the domestic value added is greater than the opportunity costs of the used domestic resources (DRC < 1), the considered alternative will lead to growth. Otherwise (DRC > 1) the policy is an inefficient alternative (Tweeten, 1992, Masters, 1995). The DRC is calculated as:

$$DRC_i \;=\; \left[\sum_{j=k+1}^{n} a_{ij} V_j^s \right] \;/\; \left[P_i^s - \sum_{j=1}^{k} a_{ij} P_j^s \right] \qquad \ldots 1$$

Where:

a_{ij}, 1 to k	are technical coefficients for traded inputs
a_{ij}, k+1 to n	are technical coefficients for domestic resources
V_j^s	is shadow price for domestic resources
P_s^s	is border price of traded output
P_j^s	is border price of traded input

The DRC is constructed from average budget data based on observed (average) input-output coefficients and imputed shadow prices for the non-traded inputs. Usually, the latter reflect the opportunity costs per unit of domestic labour, of land, as well as fixed capital such as drainage and irrigation. Since the input-output coefficients are assumed constant over different policy scenarios, and because imputed shadow prices for each commodity are calculated separately, the indicators ignore any kind of substitution and other cross-price effects.

In addition, the DRC has been criticised for the biased results it usually offers. Masters (1995) shows that it is often those alternatives, which rely on a high level of non-tradable inputs, that are shown inefficiently. The bias is especially pronounced if the various options to be compared include very divergent combinations of traded and or non-tradable components. Finally, it is not easy to gather the necessary input-output coefficients needed for the analysis.

A major advantage of the DRC is the fact that interpretation of the results is intuitive. A production of a good is not competitive when production under world market conditions generates less income for domestic resources such as labour, capital and others, than the opportunity costs of those resources. In this case the DRC is larger than one.

The inverse of the DRC, called competitiveness coefficient, is also used quite often. It is intuitively more appealing than the DRC, since it reveals the highest values for those policy alternatives which indicate largest returns to fixed resources, and thus presumably have a competitive advantage (Tweeten, 1992).

3.2.2.2 Mathematical models

Simulation models are comprehensive tools for measuring competitiveness. When employed for this purpose, such models must be robust against policy alterations, since policy changes are very likely to induce quite a number of changes in the way the goods investigated are produced in the economy or sector. Therefore, great emphasis has to be placed on the structure of the model and its parameters. In other words, the system should include parameters that do not alter due to new policies. This characteristic, sometimes referred to as external robustness, is highly demanding on the quality of the model. How well the model reflects this robustness clearly also depends on the divergence of the new policies from those implemented in the past (Frohberg & Hartman, 1997).

Not all model types are capable of having such a property. Those econometric models that fall into the class of reduced-form models are less suitable for such analyses, because they include the production and preference structures in a compact and implicit manner that is likely to lack the details necessary to achieve the robustness required. Commodity and sector models, which explicitly include the essentials of the structures, are more appropriate. From this point of view, equilibrium models are preferable to other types, since they depict both supply and demand in a rather detailed way. Among these models, those that depict the entire economy as well as take into account all economic

interdependencies, (general equilibrium models) are most suitable (Frohberg & Hartman, 1997). Since these models are, however, costly and time-consuming to build, they are not often employed for these purposes.

Results of policy simulations with these types of models typically include a variety of different variables, such as changes in output, input use, final consumption, export, import, prices, etc. It is certainly possible to draw conclusions about changes in competitiveness based on these variables. It might, however, be easier and more informative to calculate e.g. the RTA indicator by using the results of such simulations. The same indicators might be calculated for observed data as well, to make comparisons between past and possible future outcomes.

Highly suitable mathematical models are not often employed for comparing competitiveness across countries, due to the high requirements in terms of manpower, data and time; however, once specified they can easily be used to analyse the impact of a variety of policy scenarios (Frohberg & Hartman, 1997).

3.2.2.3 Determinants of competitive advantage – Porter's diamond model

When and why is an industry internationally competitive? How sustainable is its position? In order to find answers to these questions, a question posed by Porter (1990) must firstly be addressed: "Why does an economy achieve international success in a particular industry?"

According to Porter, the answer lies in six broad criteria or attributes that shape the environment in which firms compete and promote the creation of competitive advantage.

The work of Michael Porter (1990, 1998) contributed to strategic thinking about industry and competitive analysis, and then later, about the competitiveness of nations. The Porter (1990, 1998) approach looks at clusters of industries, where the competitiveness of one company is related to the performance of other companies and other actors tied together

in the value-added chain, in customer-client relations, or in local or regional contexts. This work has led to efforts that identify and measure the key factors that influence competitiveness and to develop strategies for achieving it.

Although the Porter diamond model is a more qualitative description of factors determining the competitive success of an industry in a particular country, it can also be used as a quantitative measure to compare the competitiveness of industries in a particular country or a particular industry among different countries (see for example ISMEA, 1999; Van Rooyen, 1998; Venter, 1999; De Kleijn & Heybroek, 1992; Esterhuizen, Van Rooyen & D'Haese, 2001; Esterhuizen & Van Rooyen, 2004). In these studies, scores are given to each factor determining the competitive success of the industry in the specific countries. The scores are then compared among countries. The Porter analysis can also be used to determine the trends in the factors impacting on the competitiveness of a sector or industry, if the analysis is done annually or even every second year.

There are two disadvantages by using scores to reflect the competitiveness of an industry. Firstly, it is difficult to determine an overall score per country, because different aspects are weighted differently. Another disadvantage is that different qualities are required in different market segments. However, Porter's diamond model is the most widely used framework for an assessment of dynamic competitive advantage. Each of the elements of the diamond will now be discussed in more detail.

Factor conditions: A nation's endowments of factors, land, labour and capital plays a very important role in the competitive advantage of a nation's firms. The role of factors is, however, different and far more complex than is often understood by economists. The factors most important to competitive advantage in most industries are not inherited but are created within a nation, through a process that differs widely across nations and among industries. The stock of factors at any particular time is less important than the rate at which they are created, upgraded and made more specialised to particular industries.

On the other hand, the abundance of factors may undermine, instead of enhance, competitiveness. The most important factors of production are those that involve sustained and heavy investment and that are also specialised. Basic factors, such as a pool of labour or a local raw-material source, do not constitute an advantage in knowledge-intensive industries. Companies can access them easily through a global strategy or circumvent them through technology.

Contrary to conventional wisdom, simply having a general work force that is high school or even college educated represents no competitive advantage in modern international competition. To support competitive advantage, a factor must be highly specialised to an industry's particular need. These factors are scarcer, more difficult for foreign competitors to imitate – and they require sustained investment to create. Competitive advantage from factors depends on how efficiently and effectively they are deployed.

Factors can be grouped into a number of broad categories:

? Human resources: The quantity, skills and cost of personnel and management.

? Physical resources: The abundance, quality, accessibility and cost of the nations land, water, mineral, etc. Climatic conditions can be viewed as part of a nation's physical resources, as can a nation's location and geographic size.

? Knowledge resources: The nation's stock of scientific, technical and market knowledge bearing on goods and services. Knowledge resources reside in universities, government research institutes, private research facilities, government statistical agencies, business and scientific literature, market research reports and databases, etc.

? Capital resources: The amount and cost of capital available to finance industry.

? Infrastructure: The type, quality and user cost of infrastructure available that affects competition, including the transportation system, the communication system, postal service, etc.

Demand conditions: The second broad determinant of competitiveness in an industry is home demand conditions for the industry's product or service. While home demand, through its influence on economies of scale, can confer static efficiencies, its far more important influence is dynamic efficiencies. It shapes the rate and character of improvement and innovation by a nation's firms. Three broad attributes of home demand are significant: the composition or nature of buyer needs of home demand, the size and pattern of growth of home demand, and the mechanisms by which a nation's domestic preferences are transmitted to foreign markets. The significance of the latter two is contingent to the first. The quality of home demand is more important than the quantity of home demand in determining competitive advantage.

It might seem that the globalisation of competition would diminish the importance of home demand. In practice, however, this is simply not the case (Cho & Moon, 2000). In fact, the composition and character of the home market usually has a disproportionate effect on how companies perceive, interpret and respond to buyer's needs. Nations gain competitive advantage in industries where the home demand gives their companies a clearer or earlier picture of emerging buyer's needs, and where demanding buyers' pressurise companies to innovate faster and achieve more sophisticated competitive advantage than their foreign rivals. The size of home demand proves far less significant than the character of home demand.

A nation's companies gain competitive advantage if domestic buyers are the world's most sophisticated and demanding buyers for the product or service. Sophisticated, demanding buyers provide a window into advanced customer needs; they pressure companies to meet high standards; they prop them to improve, to innovate and to upgrade into more advanced segments. As with factor conditions, demand conditions provide advantages by forcing companies to respond to these challenges.

Related and supporting industries: The third broad determinant of competitiveness in an industry is the presence of supplier or related industries that are internationally competitive in a nation. Internationally competitive home-based suppliers create advantages in downstream industries in several ways. They deliver the most cost-effective inputs in an efficient, early, rapid and sometimes preferential way. Far more significant than mere access to components and machinery, however, is the advantage that home-based related and supporting industries provide in innovation and upgrading – an advantage based on close working relationship. Suppliers and end-users located near each other can take advantage of the short line of communication, the quick and constant flow of information and an ongoing exchange of ideas and innovations. Companies have the opportunity to influence their suppliers' technical efforts and can serve as test sites for R&D work, accelerating the pace of innovation.

Companies benefit most when the suppliers are, themselves, global competitors. It is ultimately self-defeating for a company or country to create suppliers who are totally dependent on the domestic industry and prevented from serving foreign competitors. By the same token, a nation need not be competitive in all supplier industries for its companies to gain competitive advantage. Companies can readily source from abroad materials, components or technologies without a major effect on innovation of performance of the industry's products. The same is true of other generalised technologies like electronics or software, where the industry represents a narrow application area.

Firm strategy, structure and rivalry: The fourth broad determinant of national competitive advantage in an industry is the context in which firms are created, organised and managed as well as the nature of domestic rivalry. The goals, strategies and ways of organising firms in industries vary widely among nations. A wide range of social and historical factors have led to differences among countries in management practices and individual attitudes towards risk and international competition. These factors affect how firms are organised and operated. National advantage results from a good match between these choices and the sources of competitive advantage in a particular industry. The

pattern of rivalry at home has also a profound role to play in the process of innovation, as well as the ultimate prospects for international success.

It is often argued that domestic competition is wasteful, because it leads to duplication of effort and it prevents firms from gaining economies of scale. The appropriate solution is seen as nurturing one or two firms who become "national champions", with the scale and strength to compete against foreign rivals or, alternatively, to promote inter-firm cooperation (Porter, 1990). Domestic rivalry, like any rivalry, creates pressure on firms to improve and innovate. Local rivals push each other to lower costs, improve quality and services and create new products and processes. While firms may not maintain the advantage for long periods, active pressure from rivals stimulates innovation as much from fear of falling behind as the inducement of getting ahead.

Vigorous local competition not only sharpens advantage at home but it also places pressure on domestic firms to sell abroad in order to grow. In particular when there are economies of scale, local competitors force each other to look outward in the pursuit of greater efficiency and higher profitability. Toughened by domestic rivalry, the stronger domestic firms are equipped to succeed abroad. It is rare that a company can meet tough foreign rivals when it has faced no significant competition at home.

Domestic rivalry does not only create pressure to innovate but also to innovate in ways that upgrade the competitive advantage of a nation's firms. The presence of domestic rivals nullifies the types of advantage that come simply from being in the nation - such as low labour costs or low-cost debt financing. Domestic rivalry forces a nation's firms to seek higher-order and ultimately more sustainable sources of competitive advantage. Firms must find proprietary technologies, reap economies of scale, create their own international marketing networks, or exploit national advantages more effectively than the competitor down the street. Intense domestic rivalry helps break the attitude of dependence on basic factor advantages, because local rivals have them as well. Without local rivals, a firm in a nation with factor advantage tends to rely on them and, worse yet, to deploy factors less efficiently.

Intense domestic rivalry depends on new business formation to create new competitors. New business formation is also vital to the upgrade of competitive advantage, because it feeds the process of innovation in an industry. New companies serve new segments and try new approaches that older rivals fail to recognise, or to which they are too inflexible to respond.

The diamond as a system: The four key sets of determinants of competitive advantage are dependant on and reinforce each other. For example, effective supplier industries require access to quality factors of production and good working relationships with demanding buyers.

The four determinants, their elements and their interrelationships represent factors that have been observed or considered to be the basis of a competitive advantage by some industry in one country versus that industry in another country. Each of these four attributes defines a point on the diamond of national advantage; the effect of one point often depends on the state of the others. Sophisticated buyers will not translate into advanced products, for example, unless the quality of human resources permits companies to meet buyer needs. Selective disadvantages in factors of production will not motivate innovation, unless rivalry is vigorous and company goals support sustained investment. At the broadest level, weaknesses in any one determinant will constrain an industry's potential for advancement and upgrading.

Government attitude and policy: Government plays a vital role. Government can influence each of the above determinants, either positively or negatively, through policy and operational capacity. That is why government, as a determinant of competitiveness, must be viewed apart from the four determinants.

However, government should not have to employ a host of policies to contribute directly to the competitive performance of industries. Government's proper role is as a catalyst and challenger. Its role is to encourage companies to raise their aspirations and move towards higher levels of competitive performance. Government cannot create

competitive industries; only companies can do that. Government plays a role that is inherently partial, that succeeds only when working in tandem with favourable underlying conditions in the diamond. Still, government's role of transmitting and amplifying the forces of the diamond is a powerful one. Government policies that succeed are those that create an environment in which companies can gain competitive advantage rather than those that involve government directly in the process (Porter, 1998).

The role of chance: Chance events are occurrences largely beyond the power of firms (and often the national government). Events such as wars, political decisions by foreign governments, large increases in demand, shifts in world financial markets and exchange rates, discontinuity of technology and input demand can be described as chance events. Such events can nullify sources of competitive advantage and create new ones. The ability of an industry to respond will depend on the status of other parts of the competitive diamond.

The approach is clear. Porter (1990, 1998) does not, however, prescribe a methodology. It is clear that a very large number of factors have to be taken into account by the analyst, but there is no list of data requirements or statistical tests. A great deal is left to the individual analysts, including the depth to which they choose to go in the analysis. There is no agreement on what precisely constitutes a Porter study (Pitts & Lagnevik, 1997).

3.2.2.4 Business confidence indexes

Change in virtually every stratum of society is a feature of our time. In addition to far-reaching political changes occurring not only in South Africa, but also in the world at large, demographic, economic and social changes affect the quality of life and the business environment. It is important that these changes are measured, that emerging trends should be determine and that strategies should be developed accordingly.

To measure these changes, economists have developed indicators, generally known as indexes. An index is a ratio that measures a relative change (Steyn, Smit & Du Toit, 1989). The goal with the calculation of an index is to quantify change in a standardised way.

An index is set at a numerical level on the base period or starting point against which a percentage change can be compared to at any particular point of time. Generally speaking, indexes measure the size or magnitude of some object at a particular point in time as a percentage of some base or reference object in the past.

Indexes are also composite measures of variables: measurements based on more than one data item. Thus, a survey respondent's score on an index of confidence would be determined by the specific responses given to several questionnaire items, each of which would provide some indication of his or her confidence.

Over the years, indexes have become increasingly more important to management as indicators of the changing economic and business environment and activity. In fact, the use of indexes has become the most widely accepted procedure for measuring changes in business conditions (Steyn, Smit, Du Toit & Strasheim, 1996).

Although this is not essentially so, an index is usually expressed as a percentage. An index greater than 100% represents an increase whiles an index smaller than 100% indicates a decrease.

Basically, three practical problems can arise when constructing an index. Firstly, each index number must have a base period for which the value of the index is 100. The selection of a typical base year is somewhat arbitrary, but very important. If a particularly exceptional period were selected when the values of the variables were quite extreme, then all other values of the index will be affected (Harnett & Murphy, 1975).

A second arbitrary choice involves the selection of the type of index to use (simple, relative, weighted, etc.) and of the appropriate weights to use in combining the values of different items included in the aggregate measure. Incidentally, the choice of items to include is often very debatable. An attempt should be made to include the most common and representative items. The third and most compelling practical problem in constructing an index is obtaining sufficient and accurate data for all the items included.

A simple index is used to represent the change of a single factor, while a composite index is used to represent the change of more than one factor. When an unweighted composite index is calculated, the changes of all the factors are regarded as equally important, while in a weighted composite index different weights are allocated to the factors according to the relative importance of each.

The selection of the weighting leads to special types of composite index. If the weights of the base period are used, the index is called the Laspeyres index. If new weights for every period are calculated, the index is called the Paasche index (Steyn et al, 1996). The Paasche index requires more data and more computation, because the weights must be determined in each period.

In the long run, the Laspeyres index tends to overstate because it is unable to account for the substitution effects between factors in the index. The Paasche index tends to understate because it overreacts to the substitution effect. During fairly stable times, the substitution effects will have a similar influence on the Lasppeyres and Paasche indexes.

In South Africa, the business confidence indexes developed by the South African Chamber of Business (SACOB, 2002) and the University of Stellenbosch's Bureau of Economic Research (Bureau for Economic Research, 2000), measuring the business confidence of managers in South Africa, are well known. However, until now there was no index measuring the business confidence of agribusinesses operating in the agro-food and fibre complex of South Africa.

The measurement of business confidence is important, as it is a reliable indicator of the current and expected state of the economy. As already shown in Chapter two, there is a direct relationship between competitive performance and confidence (Vealey, 2001). Confidence is, in effect, a belief, a self-assurance in one's own ability. It is essentially a feeling of having an expectation of success (Vealey, 2001). Kanter (2004) stated that confidence is so important that it lies at the heart of civilization. Everything about the economy, a society, an organisation or team depends on it, since every step taken and every investment made is based on whether we count on ourselves and others to accomplish what has been promised. Lingering economic sluggishness can be blamed partly on a sag in confidence (Kanter, 2004). Confidence is an important factor driving behaviour up and down. Business success and failure aren't just episodes, but self-perpetuating trajectories shaped by confidence or the lack thereof (Kanter, 2004).

Business confidence will therefore have a direct influence on the competitive performance of firms. Business confidence is a belief, an assurance, in the business environment, company resources and in the business's ability to adapt and compete successfully. Expectancy of success and the level of aspiration are very closely related to the actual level of success. If the business confidence is low, investment will be less and energy and productivity levels will be low, which will directly influence the competitive performance of businesses. In life, confidence can determine the difference between success and failure, mastery and misfortune. This is the phenomenon of the self-fulfilling prophecy which shows quite conclusively that, in performance situations people tend to confirm their own beliefs and in fact do "live up" to their expectations (Davies, 1989).

The South East Asian crisis reflects the importance of business confidence and sentiments in any market (Srivastava, 1999). Despite the strong fundamentals of these economies, the speed and extent of the crisis shocked everyone. The single plausible explanation that seems to have emerged for this crisis is a shift in the expectations equilibrium. Expectations or sentiments therefore have an impact on economic growth. This is evident from the pattern observed between economic growth and business

sentiment. Different elements of economic growth are impacted on by sentiment to varying degrees.

3.3 A FRAMEWORK FOR ANALYSING THE COMPETITIVENESS OF THE AGRIBUSSINESS SECTOR IN SOUTH AFRICA

In Chapter two and thus far in Chapter three the concept of competitiveness and the theories and measures of competitiveness were discussed. This section builds on this by developing a framework for assessing the competitiveness of the agribusiness sector in South Africa and analysing its determinants and sustainability. This framework must help to answer the questions stated in the problem statement and meet the objectives of this study. Given this conditions, a framework consisting of five steps was developed to determine and analyse whether the South African agribusiness sector can successfully compete on a sustainable basis within the global environment.

The five steps are as follows (see also Figure 3.2):

?   **Step 1: Defining competitiveness:** This step is important as it will focus the competitive measurement and analysis of the agribusiness sector in South Africa. The definition of competitiveness will guide the choice of methodology and consequently the data needed and the gathering process. In Chapter two competitiveness was defined as *the ability of a sector, industry or firm to compete successfully in order to achieve sustainable growth within the global environment while earning at least the opportunity cost of returns on resources employed. To compete means to try to gain or win something by defeating other competitors.*

From the definition five aspects emerged as being important to focus a comprehensive competitiveness analysis of the agribusiness sector in South Africa, namely:

? Competitiveness is a dynamic and involved process, instead of an absolute state of affairs.

? Competitiveness can only be assessed within a relative sense.

? Competitiveness is a tool for agribusinesses to continuously exploit the local and/or global market reality, including uneven economic "playing fields", for gain relative to other competitors. Competitiveness can therefore only be measured by the gains from this trade.

? Competitiveness is a holistic viewpoint on the ability to sustain the gains achieved through trade and is dependant on key success factors and constraints that must be identified.

? In order to sustain competitiveness it is important to predict change correctly and act upon such predictions in an innovative manner to mobilise and attract scarce resources from other economic endeavours.

? **Step 2: Measuring the competitiveness status:** The second step is to measure whether the South African agribusiness sector can compete internationally. The Revealed Comparative Advantage model as developed by Balassa (1977, 1989) and extended by Volrath (1991) to the Relative Trade Advantage (RTA) method, will be used. In this quantitative method, it is argued that competitive advantage could be indicated by the trade performance of individual commodities, chains and countries in the sense that the commodity trade pattern reflects relative market costs as well as differences in non-price competitive factors, such as government policies.

This method supports the final definition developed on competitiveness and also the notions describe in Chapter two. To measure how competitive the agribusiness sector in South Africa is, it is necessary to determine how

successfully the sector sold its products over time in the local and global environment relative to other competitors. The Relative Trade Advantage method allows for the measurement of competitiveness under real world conditions such as uneven economic "playing fields", distorted economies and different trade regimes and is therefore the most suited for measuring competitiveness status.

The competitiveness status relative to global competition at the commodity or industry level will also be determined. A supply chain approach will be used in this analysis.

A supply chain focus on competitiveness is necessary. Supply chains are institutional arrangements that link producers, processors, marketers and distributors (from the farm, beyond the farm-gate right up to serving the final consumer) – often separated by time and space – that progressively add value to products as they pass along the chain. Supply chains distribute benefits and apportion risks among participants, thus enforcing internal mechanisms and developing chain wide incentives for ensuring timely production and delivery. Supply chain analysis (or added value analysis) indicate the competitiveness of each element or activity in the value chain. A "supply chain perspective" gives a particular description to the food and agribusiness sector.

In South Africa, a supply chain approach for agribusiness sector analysis is important.   Wentzel (1996) showed that farm level wool production and woodpulp production in South Africa is internationally highly competitive. However, when processed further ("value-adding") these commodities show a reduced level of competitiveness.   Similar trends are observed for maize (unmilled) when processed as animal feed. Milled white maize, however, is internationally highly competitive. Inus van Rooyen (1999) analysed the competitiveness of the flower industry in South Africa and concluded that South African wild flowers and foliage production is internationally highly competitive, while houseplants and cutflowers, being more industrialised processes, are less.

These observations indicate that certain processes in the supply chain can indeed be competitive, while others are less or even non-tradable - which will constrain overall sector/industry competitiveness.   Any comprehensive statement on competitiveness should thus account for supply chain relationships.

? **Step 3:   Analysing the competitiveness status:** The challenge is to determine how the competitive performance of the agribusiness sector in South Africa is achieved.   The aim is to determine the key success factors that established a competitive advantage and the constraints that impacted negatively on the competitiveness of agribusinesses.   The determinants of competitiveness, as described by Porter (1990, 1998), will be used as bases. Porter's (1990, 1998) theory of competitive advantage is an effort to identify the many factors that influence competitiveness and to show how they relate to each other and to the economic performance of a country's industries in a global economy. While the traditional and new trade theories provide the important explanation of production and trade patterns, as well as their effects on economic welfare, the work of Porter aims at understanding the process of change and why particular sectors in particular countries have been more successful than others.

The focus of this institutional analysis will be at the firm level i.e. individual firms will be requested to participate in the data gathering process through questionnaires. Executive opinions will thus be gathered.

Business survey is a technique that was developed in the 1930's in the USA and independently in Germany in the 1940's. Currently, this technique is applied in 57 countries. Some of the best known surveys are those of the European Union and Japan. Today, the business survey technique has a high standing amongst academics, business people and policy makers in South Africa as well as aboard (Bureau for Economic Research, 2000).

In the application of this descriptive methodology, the institutional forces that have an influence on the competitiveness of the agribusiness sector in South Africa will be described. Whereas the hard data in step 2 of the framework is used to measure competitiveness status over a specific period, the survey data measure competitiveness as it is perceived. The survey responses will reflect perceptions of competitiveness and indications for the future by business executives who are dealing with global business situations. Their responses are more recent and closer to reality since there is no time lag, which is often a problem with hard data. The Executive Survey will offer many unique measures and will capture the informed judgments of business leaders and decision-makers in the agribusiness sector of South Africa on issues that influence their sector's competitiveness.

? **Step 4: Analysing the agribusiness decision-making environment:** One important characteristic of today's modern world is that almost daily changes occur on many terrains. Agriculture and agribusinesses are not excluded from this phenomenon and far reaching changes are constantly being experienced. Globalisation, technology and rapidly changing trends in consumer behaviour, in particular, impact heavily on the way agribusinesses conduct their business. The changes are also dynamic, changing the nature of farming and business that create a need for regularly responses. These changes have a direct effect on the business confidence of managers by influencing their next business decision – short, medium and long term. These business decisions will have a direct effect on the future competitiveness performance of agribusinesses. Business confidence is thus an important measure of the status of the decision-making environment in which businesses operate.

An Agribusiness Confidence Index will be developed to determine the confidence of the agribusiness sector in South Africa. The challenge is to develop a measurement of changes in the business confidence of agribusinesses in reaction to the changing environment, in order to make a contribution to competitive

analysis and to assist with decision-making in a dynamic world. The goal of the Agribusiness Confidence Index will be to determine the business confidence of agribusinesses as accurate as possible. Micro and macro indicators will be included in the index. A Laspeyres index type, that assign weights to each indicator will be used in constructing an Agribusiness Confidence Index.

Data will be collected every quarter from a representative group of agribusinesses. Senior executives of these agribusinesses will give their opinion on the current state of the decision-making environment. Their views are obviously based on their individual experiences and perceptions, but it will also be based on hard facts that are essential for sound business decision-making.

In steps three and four of this framework inputs will be contributed exclusively by leading agribusiness executives and entrepreneurs whose current perceptions of the business environment in which they work are captured in their responses to comprehensive and scientifically constructed questionnaires. The respondents will, in participating, also be provided with the opportunity to identify key obstacles to economic growth in the agribusiness sector of South Africa and therefore contribute to an assessment of the quality of the business environment in which their companies operate. This, in turn, may help precipitate an internal debate within the agribusiness sector, between government officials, business leaders, organisations of civil society and the academic community on key problem areas and provide guidance as to how best to address them.

? **Step 5: Developing strategies to enhance the competitiveness of the agribusiness sector in South Africa:** The previous three steps of the framework combine quantitative and hard data with qualitative analysis and opinion survey data. These steps in the analyses will provide a different but complementary viewpoint on the issue of competitiveness, and will contribute to the establishment of an enhanced understanding and comprehensive statements on the competitiveness of the agribusiness sector in South Africa. Using this

intelligence, strategies can be developed to enhance the competitiveness of the agribusiness sector in South Africa.

This 5 step-framework is coherent with the notions on competitiveness used in this study and will analyse the ability of the agribusiness sector in South Africa to compete successfully on a continuous bases in the global economy.

COMPETITIVENESS ANALYSIS OF THE SOUTH AFRICAN AGRIBUSINESSES SECTOR

Defining competitiveness

Measuring the competitiveness status of the agribusiness sector	Determining the key success factors and the constraints impacting on competitiveness	Analysing the decision-making environment of agribusinesses
Quantitative measurement at industry and commodity/product level	Qualitative and quantitative analysis at institutional level	Qualitative and quantitative analysis at institutional level
Relative Trade Advantage (RTA) (Balassa, 1965,1989) (Volrath, 1991)	Determinants of competitiveness (Porter, 1990, 1998)	Agribusiness Confidence Index (Steyn et al, 1996)
Time series data	Questionnaires	Questionnaires

Statistical analysis

Comprehensive statement on competitiveness

Development of strategies to enhance the competitiveness of the agribusinesses sector in South Africa
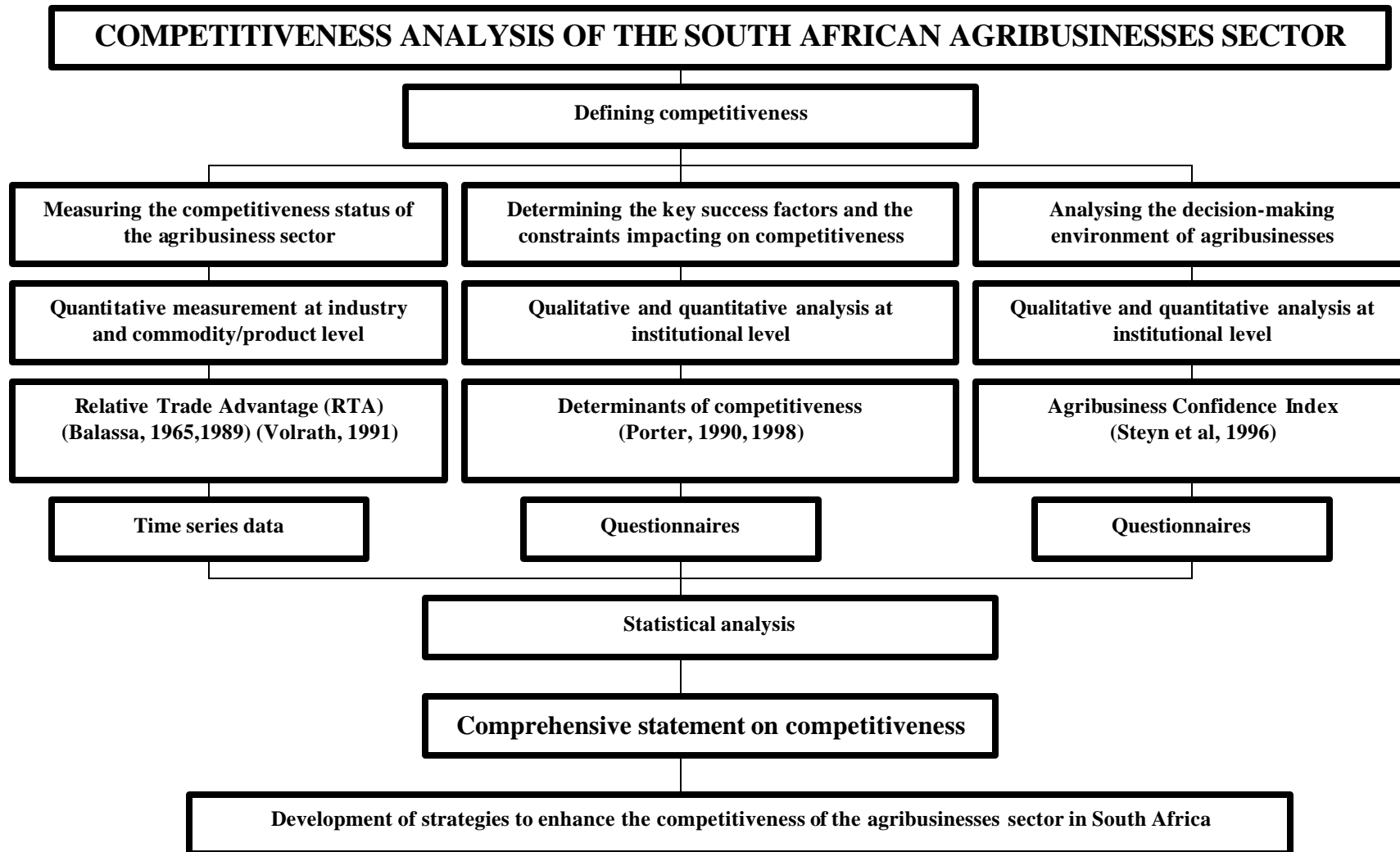
Figure 3.2: A framework for analysing the competitiveness of the agribusiness sector in South Africa

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