THE COMPETITIVENESS OF THE SOUTH AFRICAN AND AUSTRALIAN FLOWER INDUSTRIES:
An application of three methodologies.

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1. Introduction

The South African cut flower industry comprises of the production of a wide variety of the traditional temperate flowers (roses, chrysanthemums, carnations, gypsophila, asiatics, irises) commercially grown across the world and is also well-known for its spectacular range of indigenous flowers such as proteas, freesias, Guernsey lilies and gladioli. Total production is currently valued at approximately R400 million[1] and consists of approximately 420 ha of production area and 20 000 ha of natural veld where proteas, pincushions and ferns are harvested (Taschner, 1997b).

Most of South Africa's 935 commercial flower growers are located within 300 kilometres of Johannesburg and supply approximately 70% of their produce to the Multiflora auctions in Pretoria and Johannesburg. Large growers (with about 5 ha and more) dominate this sector in South Africa and they supply the local market and have been involved in floriculture for many decades. In the Cape region there are also a few hundred export-oriented protea growers. This group ranges from "growers" who pick from wild tracts of veld to farmers who cultivate irrigated, orchard-style plantations of selected varieties. In 1993 and 1994 South Africa was ranked the fifteenth largest exporter of cut flowers but in 1995 and 1996 South Africa dropped to the seventeenth position.

The Australian cut flower industry consists broadly of two subindustries – one involved in growing and harvesting Australian native flowers and the other in producing the traditional temperate flowers that dominate commercial production and consumption throughout the world (ACIAR, 1996). The wildflower industry in Australia is significantly export-oriented with Western Australia and Queensland the main production areas (FECA, 1996). The wildflower industry in Australia includes native flower species and South African proteaceae species. The Australian native flowers grown or picked exclusively for the fresh flower export market include Australian waxflower, kangaroo paw, banksia, waratah, snowflower and boronia. The South African proteas grown in Australia consist of pincushions, sylvan red, safari sunset and protea pink ice - all forming the basis of Australia's protea plantations (James, 1996). Native Australian flowers are produced in many other countries in the world and the estimated size of Australian native flower production worldwide is estimated at R1,3 billion (wholesale). Australia produces wildflowers worth about R284 million. In world terms, Australian production of "Australian" native flowers and exotic proteas comprises only

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[1] In August 2000 the following exchange rates applied: US$1 = R7.00 ; US$1 = A$2.85 and R1 = A$0.25.

10% of world production, although industry sources suggest that Australia produces about 30% of world waxflower production (FECA, 1996).

The vast majority (about 90%) of flowers grown in Australia are the traditional commercial varieties such as roses, carnations, orchids, lilies, statice, alstroemeria, lisianthus, calla lily, tulips, freesias and gypsophila. They are grown primarily to service the domestic market and to a lesser extent, the export sector. At present, most traditional flowers are grown in Victoria, New South Wales (NSW) and Tasmania. Victoria is the largest producer state in value terms, followed by Queensland, NSW and Tasmania. Growers tend to locate close to the major markets. Most of the growers depend on longstanding ties with overseas breeders and technology suppliers in the Netherlands, USA and Japan (James, 1996). Australia is beginning to face import competition from low-cost growers in Africa and Asia who are extensively involved in greenhouse production.

This paper compares the competitiveness of the South African and Australian flower industry by applying different approaches to evaluate competitiveness. We apply three different methods in order to obtain a better understanding of the ability of these two countries to compete in the international flower market and with each other. The first method defines the determinants of competitiveness using the well-known Porter methodology (Porter,1990); the second uses the Revealed Comparative Advantage model of Balassa, (1989); and the third method involves the compilation of a Policy Analysis Matrix (PAM) (Monke, *et al.,* 1990).

The following 3 sections of the paper describes and applies the three methodologies on the South African and Australian flower industries. The final section provides a synthesis and some implications of the results.

2. The Determinants of Competitiveness

When is an industry internationally competitive? To answer this question, a second question posed by Porter (1990) should first be addressed: "Why does a nation achieve international success in a particular industry?" Porter believes the answer lies in the six broad attributes of a nation that shape the environment in which local firms can compete, and that foster a competitive advantage.

- Factor conditions. The nation's position in the factors of production, such as skilled labour or infrastructure, needed to compete in a given industry.
- Demand conditions. The nature of home demand for the industry's product and service.
- Related and supporting industries. The presence or absence in the nation of supplier industries and related industries that are internationally competitive.
- Company strategy, structure and rivalry. The conditions in the nation governing how companies are created, organised and managed, and the nature of domestic rivalry.
- Government. The government plays a vital role, if not the most important role in international competitiveness. Government can be influenced by and influence each of the above determinants either positively or negatively. This is why government, as a determinant of competitiveness, can be viewed separately from the four determinants mentioned above.
- The role of chance. Chance events are occurrences that have little to do with conditions in a nation and are often largely beyond the control of firms (and often the national

government). Chance events may include wars, political decisions by foreign governments, large increases in demand, shifts in world financial markets and exchange rates, discontinuity of technology and input demand.

This method as developed by Porter (1990) is now applied to provide a broad assessment of the factors influencing the competitiveness of the South African and Australian flower industries.

2.1 Factor conditions

In past years, factor conditions were regarded as almost the only way for a country to gain a competitive advantage. Factor theory can partly explain the increasing success of flower exports from such countries as Colombia, Kenya, Sri Lanka, Malaysia, Thailand and Zimbabwe; all of which, to varying degrees, are generally well endowed with the basic factors of production (Batt, 1994).

The position regarding the factors of production necessary to serve both the South African and Australian flower industries should be explored so as to define the role that these factors play in creating a competitive advantage. These factors can be categorised as human resources, physical resources and infrastructure, and are discussed below.

2.1.1 Human resources

The management and administration of the farm require skilled people. Porter (1990) states that the availability and degree of excellence of skilled people will ensure a strategic or sustainable competitive advantage. The superior production knowledge and efficiency of the Dutch flower growers and marketers are a good example of their sustainable competitive advantage over growers in other countries (Maharaj *et al.,* 1995).

Flower farming is a perfectionist activity requiring skill and talent from each labourer. Due to the emphasis on quality, labourers must be trained to perform precise and sometimes complex tasks, such as pruning, spraying, fertilising, harvesting, irrigation and packaging. Therefore the labourers have to be semiskilled, as well as able and willing to learn.

South Africa and Australia both have tertiary training facilities such as universities, colleges, and agricultural schools that offer a high standard of horticultural and farm management training, with the result that people skilled in these fields are available in both countries

In South Africa a typical traditional cut flower farm employs between 15 and 25 full-time labourers per hectare (de Bruin, 1998). However, labour requirements and costs vary from one flower variety to another and from farm to farm. Labourers in South Africa are generally regarded as less expensive but also less productive than European or Australian labourers. Labour activism in South Africa is also regarded as a significant problem, owing to ongoing labour strikes and increasing friction with trade unions about wage increases (Malter *et al.,* 1996).

South Africa's wage rate is higher than in other African countries. In South Africa labour costs on traditional flower farms range between 10% and 20% of the annual operating costs (excluding manager cost) whereas labour costs in Zimbabwe and Zambia come to between 6% an 8% of their annual operating costs (including manager cost). This encouraged a great

deal of European investment in African countries like Zimbabwe, Zambia, Uganda, Kenya and Malawi. South Africa's higher wage rate hampers competition in this regard, but it still has an advantage in comparison to the high labour costs in Europe, which range between 30% and 40% of annual operating costs (White, 1996).

Labour costs on traditional flower farms in Australia range between A$10 and A$13 per hour (Young, 1998) and are estimated to contribute to about 50% of operating cost (Hardy, 1993). However, labourers in Australia are considered to be more productive than those in South Africa.

When comparing the labour costs for native flower production in Australia and South Africa, the following came to light: the labour cost of producing proteas in Australia comprise almost 90% of annual operating costs, while labour makes up 81% of operating costs to produce waxflowers (Karingal Consultants, 1998). South Africa's labour cost is much lower since wages contribute to only 42% of the operating cost (Department of Agriculture – Western Cape, 1997).

South Africa might have a competitive position regarding the availability of low-cost labour but on the other hand it is outweighed by labour disputes, limited skills and poor labour productivity.

2.1.2 Physical resources

The influence of abundance, quality, accessibility, and cost of resources like land, water, soil, and climatic conditions have major influences on the competitiveness of an industry (Porter, 1990).

Biological diversity

Both South Africa's and Australia's strength in the world flower market lies in its biological diversity and the opportunity available to develop valuable 'new' lines of wildflowers for the world cut flower market (Nederwieser, *et al.,* 1997; Lewis, 1997). An opportunity exists for Australia to continually introduce new flowers ahead of competitors and obtain a premium price once the market accepts them. Development systems to continually bring new lines to the market will help the Australian industry increase its sales of flowers (Lewis, 1997).

Geographical position

South Africa is in the same time zone as most Western European countries, making it possible for a South African grower/marketer to do business with European companies during a normal working day. In a world of instantaneous global communications, South African exporters to Europe (world wide the most popular export destination) will have this advantage over many other countries like Colombia, Australia etc. that compete in the same market. Australia is more or less in the same time zone as Japan and they will have similar advantages over South Africa when competing for Japanese market share than South Africa have over Australia when competing for European market share.

Climate

Flowers are very sensitive to climate and generally require high light intensity, mild temperatures, and high relative humidity of 65% to 70%. The light intensity should be as high as possible, but high levels of radiation can result in temperatures that are too high. The ideal day temperature is 24°C to 29°C, while the best night temperature is 15°C to 18°C. Considering the ideal climatic conditions may imply that South Africa and Australia have a competitive advantage over the most large European flower producers where climatic conditions are far from ideal with long, cold and dark winters. However, in comparison to large flower producing countries in Africa, South America and the Middle East, South Africa and Australia does not have a competitive advantage. Local growers believe that unfavourable climatic conditions are the fourth largest factor that negatively influence South Africa's competitiveness with the rest of Africa.

Australia has at least ten geographic regions and varied climatic conditions, thus enabling it to produce a wide range of traditional, exotic and native flowers (FECA,1996). However, it is also believed that Australia's weather is both too extreme and too variable to create a competitive advantage over countries such as Zimbabwe, Kenya, and Colombia.

Physical infrastructure

Infrastructure is very important for the success of perishable exports. In comparison to other African flower producing countries, South Africa has very good infrastructure. South Africa is serviced by 54 airlines with more than 10 inter-continental flights per day, many direct to markets in Europe. South Africa pays less than other African exporters as shown in Table 1 due to more competition among carriers, more southbound cargo and a larger off-season volume.

Table 1: Guideline air freight rates from Africa to Europe ($ / kg) 1995

Type of aircraft	Product	Zambia	Zimbabwe	South Africa	Kenya
Passenger	Vegetables	1,5	1.6	1.35	1.5 - 1.60
Passenger	Flowers	2,6	2.55	1.87	
Freighter	Vegetables	1,45	1.83	1.35	
Freighter	Roses	2,22	2,8	1,87	1,95 – 2,22
Freighter	Summer flowers	1,81	2,29	1,87	1,6 – 1,8
Freighter - Total cost ($)		56 000	70 000	55 000	50 – 55 000

Notes:　　*Rates shown include 5% freight forwarder's commission*
　　　　　Rates per kilogram were calculated from rate per pallet
　　　　　Rates in some countries may vary by airline
　　　　　Rates may be considerably less in off-season
Source:　　*TDI/Landell Mills Ltd / Doxiadis Associates, Zega -*
　　　　　Development of Air Freight Strategy, Zambia export development
　　　　　Programme, June 1995

Allerts *et al* (1998) found that the supply of airfreight to South African producers of especially fynbos is aggravated by the unbalanced availability of cargo space on southbound and northbound trips originating from Cape Town. If the price and quantity of cargo space were determined by supply and demand, an imbalance couldn't arise in a perfect market, as prices would balance cargo space supplied and demanded. Airfreight tariffs are rigid per

weight level with the result that items with a higher mass per volume unit represent a higher income per palette, and are therefore preferred by export agents. There is thus indication of limitations in airfreight space, which has implications for future growth in the industry.

Another important form of infrastructure in the flower industry is cold transport. Even though there is a well-developed network of cold transport services available in South Africa, only a few South African producers make use of cold transport.

Australia also has a highly developed infrastructure with excellent roads, an extensive network of cold transport services and arguably the best communication system in the world (Musson, 1998). In Australia there is fierce competition among airlines, especially on routes to Japan and the USA, consequently freight costs are relatively low. However, over the peak harvesting and export season (September to December) the limited air freight capacity is an increasing cause for concern as the air freight requirements for cut flowers are growing at a rate of 10% - 20% per annum (Karingal Consultants, 1997; Young, 1998).

Information infrastructure

The production technology for traditional flowers in both South Africa and Australia is mainly imported from Europe and adjusted by consultants, growers and institutions to make it more suitable for local conditions. This technology boosts productivity but producers have to realise that this technology was developed under vastly different conditions than those prevailing in South Africa or Australia.

South Africa does have a well-developed agricultural research system and, as a result, general climate and soil data have been collected in South Africa for many decades and are used by some local floriculture advisers. Although scientific floriculture information systems are limited in capacity, there are some institutions that support the knowledge information system available to South African growers.

The flow of research results and information between the researchers and the growers of traditional flowers is very limited. There is virtually no contact between the some of the research centres in South Africa and the growers (Van Rooyen, 2000). The situation is somewhat different for growers of indigenous flowers. The ARC - Fynbos information service is the most prominent source of information and consists of publications, extension services, consultations and training courses (Wessels *et al.,* 1997).

In Australia the informational infrastructure is mainly focused on the Australian wildflower industry. Numerous research reports have been published and the infrastructure to support growers with production and market research does exist (Young, 1998). Institutions developed for this purpose are the Native Flower Group, Rural Industries Research and Development Corporation (RIRDC), the Horticultural Research and Development Corporation (HRDC), universities, Austrade, the Department of Foreign Affairs and Trade and the Department of Primary Industry (Karingal Consultants, 1997).

2.2 Home demand conditions

The most important influence that home demand has on competitive advantage is the mix and the character of the household buyer's needs (Porter, 1990).

South African and Australian consumers spend considerably less than their European consumers on flowers. South Africa's per capita consumption expenditure on flowers averages approximately R3,04. Australia's per capita consumption expenditure on flowers is estimated at between R48 and R58 per annum (Karingal Consultants, 1997). By contrast, Switzerland has the highest per capita consumption expenditure in the world, averaging R385.53.

South Africa

The relative attractiveness of distant export markets has diminished for South African growers because of the domestic market that is large enough to purchase all their production at reasonable prices and without the competition and complications involved in export sales.

Another hindrance to competitiveness is that local buyers are not as quality conscious as European buyers. Therefore the local buyer does not pressure local growers to innovate faster and achieve more sophisticated competitive advantages than their foreign rivals.

Well-established flower growers in South Africa may have benefited unduly for many years by having an isolated domestic market. Some producers also seem to lack the motivation to modernise and take the steps necessary to launch successful export drives or compete against new imports.

Australia

Australia has a small market for flowers seen in the context of the world flower trade, with a population of about 18 million (1995) and an estimated consumption expenditure of A$ 352 million on flowers (FECA, 1996; Karingal Consultants, 1998; James, 1996).

More than 90% of flowers purchased by Australian consumers are exotic or traditional flowers. Like South Africans, Australians do not have a culture of buying flowers. Purchasing trends are confined to special occasions, and per capita flower consumption is relatively low. Personal consumption expenditure appears to be closely linked to economic conditions. The Australian population growth rate is about 1,1% per annum and flower consumption is projected to increase by 5% per annum (Yencken, 1997). The market is also price sensitive. For example, a recent Sydney Market Authority survey indicated that there are price barriers at A$6 and A$12 for flowers for personal use and that the usual amount spent for special occasion purchases ranges from between A$20 to A$30. Such purchases face competition from other gift lines such as alcohol, confectionery, artificial flowers and soft toys. Supermarket and roadside sales have contributed to the increased impulse buying of flowers (Lewis *et al.,* 1997; Karingal Consultants, 1994).

The low per capita consumption expenditure on flowers in South Africa and Australia is perhaps related to the fact that consumers in these countries do not have to endure the harsh winters of countries like Germany or Switzerland, where a fresh bunch of cut flowers is essential to add colour to the grey and gloomy days. Most Australians and South Africans have home gardens but this is seldom the case in Japan or Europe (Lynch, 1988).

2.3 Related and supporting industries

The presence or absence in the nation of supplier industries and related industries that are internationally competitive, has a major influence on an industry's competitiveness (Porter, 1990). Both South Africa and Australia have excellent industries able to supply almost every input necessary for flower production at a price that can compete with that of imported products. These products include greenhouses, EC controllers and spray equipment, fertilisers, and chemicals.

2.4 Strategy, structure and rivalry

The fourth broad determinant of competitive advantage in an industry is the context in which entities in the flower industry are created, organised and managed as well as the nature of domestic rivalry (Porter, 1990).

As growers in both Australia and South Africa do not give much support to industry organisations, it is difficult for these organisations to create a structure and strategy for the industry (De Bruin, 1998; Young, 1998). The primary role of any industry organisation is to obtain benefits for and represent the interests of its members. This lobbying and representative role is crucial in dealing with government at all levels (Karingal Consultants, 1993). Governments will listen to the views of a well represented, coherent industry when given by an organisation that is clearly recognised as representing that industry.

There is a strong association between vigorous domestic rivalry and the creation and persistence of international competitive advantage in an industry (Porter, 1990). Nations with leading positions in the world almost invaribaly have a large number of strong local rivals whereas firms with limited local rivalry are seldom highly competitive. The availability of close substitutes limits the price competitors that can charge without inducing substitution and eroding industry volume. A large number of competitors will push down margins as they seek to increase their market share (Porter, 1990).

There is strong competition on local markets in South Africa. Growers tend to be extremely secretive to maintain or create a competitive advantage. Most South African growers are situated in the Johannesburg and Pretoria region. The rivalry among growers in this area is intense, especially where there is a high concentration of growers in a particular area, often literally a stone's throw from one another. The reasons for this concentration are access to well-developed infrastructure, mild weather conditions, close proximity to the largest local distribution channel (Multiflora) and easy access to Johannesburg International Airport for exports.

The factors of strategy, structure and rivalry cannot be regarded as important to creating a competitive advantage for the South African flower industry. Flower growers are unable or unwilling to co-operated with increasing their production and marketing capacity. Even though domestic rivalry is apparently keen, it cannot prepare the grower to produce flowers of a high quality for the export market. However, the Multiflora auctions, which are the central point of the distribution channel, can be regarded as a strategic part of the infrastructure.

In Australia fewer than 25% of the eligible growers or organisations are members of their industry associations. However, in most cases the associations nevertheless represent a major proportion of production and are influential in the industry (Karingal Consultants, 1997).

Most associations restrict membership to those involved with the primary interest of the organisation, i.e. growers, exporters or retailers. However, the newly created Flower Industry Association of Australia (FIAA) has been designed so that it can cover retail florists and allied trades in addition to growers, wholesales and exporters. The major representations of FIAA are the state exotic cut flower industry organisations, the Flower Export Council of Australia (FECA) and the Australian Native Plants and Protea Growers Association (APGA).

FECA is a key institution for the wildflower industry, since it exports more than 50% of its production and accounts at present for 94% of flower exports. FECA has been active in negotiations for market access, the promotion of trade (trade shows in Japan, USA, Taiwan and Indonesia) and the promotion and development of the quality assurance (QA) programme. FECA is highly regarded overseas especially in Japan (Young, 1998). However, FECA does not have the support of all growers.

The Australian and South African growers have a remarkably similar attitude. Australian growers tend to be very secretive about any knowledge they gain. This is especially obvious in the relationship between Western Australian wildflower growers and East Coast growers, among whom no love is lost (Young, 1998).

2.5 Government

Porter (1990) claims that firms compete internationally, not nations. Governments cannot create competitive industries, as a government does not control nor is it the source of competitive advantage, it can only influence it. The role of the government should be to stimulate investment, to encourage the introduction of more sophisticated technology, assist firms to penetrate more advanced segments, encourage competition and upgrade demand conditions. In world floricultural production the influence of government intervention has a strong effect on the competitiveness of growers, especially in the EU.

Both Australia and South Africa have to compete with flower growers, especially those in the EU, that receive government subsidies and grants in order to maintain their competitive position in the world. The Dutch government has recognised that floricultural production is an area in which the Netherlands has a lead, which should be maintained through technological development. In order to maintain this lead, grants and subsidies are available for companies conducting research into such areas as biotechnology, the cultivation of new species, the development of installations for the mechanisation of processes, environmental protection and energy conservation measures. It is possible to obtain from the Dutch government, grants of up to 40% for technological development and 50% - 60% for research. Further grants are available from European Union funds. Small and large companies are both eligible, but bigger companies have easier access to grants because their research projects tend to be more ambitious. Individual grants usually range from 200 000 to 300 000 Dutch guilders, but bigger projects may receive up to one million guilders (Maharaj *et al.,* 1995).

Australia does not charge any tariffs on flower imports (APEC, 1998). Large producers of low-cost flowers, such as Zimbabwe, Malaysia and South Africa (FECA, 1998), are increasingly viewing Australia as a viable export destination. Australian exotic or traditional flower growers admit that they cannot compete with these countries and that there is growing uncertainty about the future for growers of roses, carnations and chrysanthemums (FECA Update, 1998)

Government research is mainly focused on the Australian wildflower industry. Numerous research reports have been published and the infrastructure to support growers with production and market research does exist (Young, 1998). The institutions established for this purpose are the Native Flower Group, Rural Industries Research and Development Corporation (RIRDC), the Horticultural Research and Development Corporation (HRDC), universities, Austrade, the Department of Foreign Affairs and Trade and the Department of Primary Industry. The RIRDC currently spends a rate of about 2,5% of gross Production Value (PV) on the R&D of the wildflower industry, while other agencies and individuals have an expenditure of an approximate additional R3.4 million. Government research on the production and distribution of traditional or exotic flowers is non-existent and the growers of these flowers rely heavily on European consultants and the research conducted in Europe (Karingal Consultants, 1994).

In general, government research in Australia still tends to focus heavily upon the need for on-farm productivity gains without necessarily examining the opportunities for such gains throughout the entire supply chain (Gleeson *et al.,* 1994).

2.6 Interpreting the results

To "quantify" this qualitative analysis, a multicriteria analysis was conducted where values were awarded to each of the criteria identified above. An award schedule was developed in order to quantify performance. Table 2 presents the performance-award schedule. The evaluation of the performance of the countries in a specific determinant was based on the published facts and general attitudes of industry experts, as portrayed in the literature studied.

Table 2: Performance-award schedule

Performance	Points awarded
Low	1
Low+	2
Medium	3
Medium+	4
High	5
High+	6
Very High	7
Very High+	8

Before conducting this analysis, the following assumptions had to be taken into consideration:

1) Each of the five determinants was weighted equally
2) The scale is linear
3) There are no absolute threshold values for any criterion

Comparing the competitiveness of the industries by taking all the determinants into consideration would require a highly complex multi-criteria analysis in which weights should be assigned to each industry's individual determinants. As stated in the assumptions above, each of the five determinants is weighted equally in the present analysis. This can be regarded as a weakness and will decrease the validity of the results of this analysis, but this methodology will still provide some insights into the competitiveness of these industries, especially when comparing the individual determinants.

The results presented in Table 3 indicate that the Australian flower industry has a slight competitive advantage over the South African flower industry. The competitive advantage that Australia has over South Africa is due to (1) superior related and supporting industries, (2) greater capacity in its structure and strategy, (3) better developed physical and information infrastructure, (4) higher capacity of government research programmes and (5) greater access to export markets.

However, these determinants in which Australia and also large European flower-producing countries excel are not necessarily the most important. As floriculture is such a labour-intensive industry, countries with lower labour costs and suitable weather conditions, such as Colombia, Kenya, Zimbabwe and South Africa, have shown remarkable growth in recent years.

Table 3: Results derived from analysing the determinants of competitiveness

Criteria	Performance		Score	
	SA	**Austr**	**SA**	**Austr**
Factor conditions	**High**	**Medium+**	**4,8**	**3,8**
• Human recourses	High+	Low+	6	2
Semiskilled labour (wages)	*High+*	*Low+*	*6*	*2*
Skilled labour	*High*	*High+*		
• Physical resources	High	High	5	5
Biodiversity	*Very high*	*Very high*	*7*	*7*
Land	*High+*	*High*	*6*	*5*
Climate	*High*	*Medium+*	*5*	*4*
• Infrastructure	Medium+	High	3,5	4,5
Physical infrastructure	*High*	*High+*	*5*	*6*
Informational infrastructure	*Low+*	*Medium*	*2*	*3*
Home consumption	**Medium+**	**Medium**	**4**	**3**
Related & supporting industries	**High**	**High+**	**5**	**6**
Strategy, structure & rivalry	**Low+**	**Medium+**	**2,3**	**3,7**
• Domestic rivalry	Medium	Medium	3	3
• Structure	Low+	Medium+	2	4
• Strategy	Low+	Medium+	2	4
Government	**Medium**	**Medium**	**2,7**	**3,3**
• Research	Low+	Medium+	2	4
• Industry protection	Medium+	Low+	4	2
• Accessibility of export markets	Low+	Medium+	2	4
Total	**Medium+**	**Medium+**	**3,76**	**3,96**

Both South Africa and Australia can be considered as mediocre competitors in the world flower industry. However, both countries have a great biological diversity of indigenous wildflower species, which are the envy of every flower-producing country in the world. As the flower industries in both countries are relatively young and underdeveloped, high growth rates can be expected.

3. Revealed Comparative Advantage

According to the Balassa (1989) Revealed Comparative Advantage model an individual country's trade performances are analysed to determine the following:

- The country's relative share in world exports of a individual commodity, and
- how the share changes over time.

The following equations are used to calculate the comparative advantage:

Equation 1 determines an indicator of comparative advantage of country A in commodity j in period 1:

$$(XAj^i / Xwj^i) / (XAt^i / Xwt^i) = xAj^i / xA^i \qquad \text{...(1)}$$

Where:

A = Country (e.g. South Africa)
x = Relative share of country A
j = Product (e.g. flowers)
w = Total world exports
X = Exports
t = Total of all agricultural commodities
i. = Period 1 (e.g. 1994)

Equation 2 calculates the relative share of product j exported by country A to the world exports for period ii:

$$(XAj^{ii} / Xwj^{ii}) / (XAt^{ii} / Xwt^{ii}) = xAj^{ii} / xA^{ii} \qquad \text{...(2)}$$

Where:
ii = Period 2 (e.g. 1995)

The third equation compares the relationship between the relative share in period 1 and the relative share in period 2:

$$(xAj^{ii} / xA^{ii}) / (xAj^i / xA^i) \qquad \text{...(3)}$$

To determine an index for comparative advantage, equations 1 and 2 (indicators of comparative advantage in period 1 and 2) must be combined with equation 3 (indicating the change in comparative advantage between period 1 and 2). Equation 4 combines these two equations as follows:

$$(xAj^{ii} / xA^{ii}).(xAj^{ii} / xA^{ii}) / (xAj^i / xA^i) \qquad \text{...(4)}$$

In equation 4 it is assumed that the change in a country's relative share will grow geometrically. Balassa (1989) states however that the assumption can be partially avoided by

compromising. The average of equation 2 and equation 4 will result in the compromise equation, equation 5.

$$1/2\ [(xAj^{ii}\ /\ xA^{ii}\ ) + (xAj^{ii}\ /\ xA^{ii}\ ).(xAj^{ii}\ /\ xA^{ii}) / (xAj^{i}\ /\ xA^{i}\ )]\qquad ...(5)$$

The assumption of the compromise equation (equation 5) is that past trends will still continue, but at a decreasing rate. Equation 5 can be used to create indices of each commodity. A commodity with an index greater than one will have a comparative advantage but an index of less than one will indicate a comparative disadvantage.

3.1 South Africa

The results for the different subsectors of the flower industry, i.e. the flower, cut flower, cut foliage and houseplant sectors are provided below. In the calculation 1994 and 1995 were regarded as time period 1 and time period 2 respectively.

Table 4: Results derived from the RCA analysis – South Africa

	Floriculture	Flowers	Cut flowers	Cut Foliage	House Plants
Comparative (dis)advantage	1,124	0,707	0,697	7,370	0,518

The results shown in Table 4 represent the comparative advantage (disadvantage) of the total floriculture, flower, cut flower, cut foliage and house plant sectors in South Africa, compared to the performance of other agricultural sectors and world exports. Any figure greater (less) than 1 represents a comparative advantage (disadvantage). The total floriculture sector shows a comparative advantage of 1,124. This comparative advantage is largely due to the high comparative advantage of cut foliage (7,37). However, the flower and cut flower sectors show a comparative disadvantage with figures below one, at 0,73 and 0,70 respectively.

It is important to note that the comparative advantage / disadvantage calculated for each sector represents firstly, the relative share that of the different South African floriculture sectors have in world exports, secondly, the export performance of other agricultural sectors and thirdly, how the share changed between 1994 and 1995.

The comparative disadvantages of the flower (0,70), and cut flower (0,69) sectors are mainly due to the relative share of world exports (of flowers and cut flowers) which is lower than the relative export share of the South African agricultural sector as a whole. For example, in 1994 the flower sector's share was only 0,4% and the cut flower sector only 0,41% while the share of agricultural exports as a whole in 1994 was 0,55%. This relatively low share of world exports by South Africa may be due to a combination of the following factors:

(a) Political isolation forced the South African flower industry out of international competition.
(b) Large growers who supply the local market and who have been involved with floriculture for many decades dominate the South African flower industry. Most large flower growers concentrate on local demand and are reluctant to export.
(c) The distribution channels for South African exports are poorly developed.
(d) The South African market is satisfied with a much lower quality than the European market.

Between 1994 and 1995 South African flower exports increased in value from R30.3 million to R33.9 million and cut flower exports increased from R23 million to R25.3 million. However, the comparative disadvantage of the flower and cut flower sectors has increased because the relative share of these two sectors in world exports declined between 1994 and 1995.

Owing to a lack of data for previous years, the actual growth rates in the relative share of the different sectors over the past few years are not accurately reflected in equation 5 and may give the wrong impression.

3.2 Australia

The same methodology was followed for the Australian flower industry as a whole and also for sub-sectors within the flower industry. These sub-sectors include the wildflower industry, traditional flower industry and waxflower industry.

The data required to calculate these indicators for the Australian flower industry, were sourced from the FAO statistics web page, the Australian Bureau of Statistics (ABS) and the IFTS (1997). Time series data over the period 1994 to 1996 were used for calculating the RCA for the flower industry. Time series data for the wildflower and waxflower industries were inadequate. However, by combining the estimates that industry experts made in various publications (ACIAR, 1996; Karingal Consultants, 1997; FECA, 1996) data could be gathered to calculate the comparative advantage for 1996. The RCA for Australia was calculated by substituting the appropriate trade data into the equations. In this case only the flower sector had sufficient data to yield a result for equation 5. However, Balassa (1989) indicates that the result of equation 1 also shows the comparative advantage but does not take change over a time period into consideration. The results are shown in Table 5.

Table 5: Results of the RCA analysis - Australia

	Flower industry	Wildflower	Wax flower
Comparative (dis)advantage	0,183	3,245	9,735

The Australian flower industry as a whole scores a value of well below one (0,183) indicating a comparative disadvantage. However, this comparative disadvantage is largely due to the weak performance of the Australian traditional flower sector, since the wildflower sector and more specifically the waxflower sector score a substantial comparative advantage.

Australia is a dominant world player in the production and export of wildflowers. Australia produces and exports approximately 10% of the total world output of wildflowers, and 30% of world waxflowers (ACIAR, 1996; Karingal Consultants, 1997; FECA, 1996). This dominant position resulted in an RCA value of 3,245 for the wildflower sector and 9,735 for the waxflower sector.

The long-term prospects for Australia's competitive advantage in the wildflower sector are under threat because producer countries in Africa and South America are showing an increasing interest in producing inexpensive wildflowers. Australia also faces the threat that other countries may develop more of their own wildflowers. South Africa, in particular, has a pool of potential cut flower species that could be a competing source of wildflowers of a similar type to Australian flowers on world markets.

The only way that Australia can maintain its comparative advantage in this field is to make use of its biological diversity and the opportunity to develop valuable new lines of wildflowers for the world cut flower market. To this end, Australia will have to develop systems that will continually bring new lines onto the market.

3.3 Summary

Based on the trade data obtained for the flower industries in South Africa and Australia it has been estimated that both countries have a revealed comparative disadvantage as indicated by their respective shares of world trade in flowers. Australia has the greater (0,183) disadvantage while South Africa has a far smaller comparative disadvantage of 0,7 indicating that South Africa's flower industry has a comparative advantage over the Australian flower industry. However, Australia reveals a large comparative advantage as a producer of wildflowers. Even though no data were available to compute South Africa's comparative advantage in the production of wildflowers, South Africa would probably also have a comparative advantage in this area. Since the limited export data do not allow significant comparisons, an analysis of representative production systems would be useful. This analysis is in performed by means of the Policy Analysis Matrix.

4. Policy Analysis Matrix (PAM)

4.1 The Construction of Policy Analysis Matrices

For the final part of this study Policy Analysis Matrices were constructed by deriving information from the enterprise budgets of the most representative flower crops in both South Africa and Australia. This analysis was done to establish the competitive and comparative advantages of each system, and also to give insight into the effect that government intervention has on the competitiveness of the systems. In South Africa the farming systems for long stemmed roses and Proteas were analyzed while the Australian case studies were Carnations, waxflower and Proteas.

4.1.1 South Africa

Rose (Long stemmed) / Gauteng Province / 1998

A PAM of a rose production and export system was constructed (Table 6) for South Africa, because roses are the largest export crop of traditional flowers and also the most popular flower on the local South African market (IFTS, 1997; Multiflora, 1998). An enterprise budget (See Van Rooyen, 2000 for details) for a typical rose export farm in the Johannesburg and Pretoria area (in Gauteng Province) was compiled to be able to construct a PAM. The variety produced is long stemmed, large flowered roses, as this variety is believed to be the most profitable to produce and export (Taschner, 1997). Approximately 60% of the production of these roses are exported to the Netherlands, and the remaining 40% sold on the local market. This production system will reach its full capacity in the second year of operations and this analysis is therefore based on the second year of production.

Table 6: Policy Analysis Matrix: Roses (long stemmed, large flowered), Johannesburg and Pretoria area

		Costs		
	Revenue	Tradables	Domestic factors	Profits
Private prices	2 296 182,06	1 473 164,28	142 903,51	**680 114,27**
Social prices	2 596 238,50	1 350 780,00	141 132,28	**1 104 326,22**
Divergences	**-300 056,44**	**122,384,28**	**1 771,23**	**-424 211,95**

Protea / Western Cape Province / 1995

Another PAM was constructed (Table 7) for South Africa's largest export cut flower, the Protea (Wessels *et al.,* 1997). This analysis was based on the budget of a farming system for export proteas in the Western Cape Province in 1995 (Van Rooyen, 2000). It was estimated that approximately 80% of the produce would be exported and 20% distributed to the local market (Department of Agriculture - Western Cape, 1995). Wessels (1998) conducted an economic cost-benefit analysis (based on the 1995 protea budget) in which both social and private prices were calculated for revenues, tradable and domestic factors. The results of this economic cost-benefit analysis were modified in the construction of the PAM. This system will reach its full capacity in the fifth year of operation and the PAM analysis was therefore based on the fifth year.

Table 7: Policy Analysis Matrix: Proteas - South Africa

		Costs		
	Revenue	Tradables	Domestic factors	Profits
Private prices	37 323,25	9 289,55	4 446,41	**23 587,29**
Social prices	40 966,28	22 576,29	4 895,60	**13 494,39**
Divergences	**-3 643,04**	**-13 286,75**	**-449,19**	**10 092,9**

4.1.2 Australia

Carnation / New South Wales / 1993[2]

Carnations are estimated to be the largest traditional flower crop produced in Australia (Haze, 1998). The PAM for carnations is based on an enterprise budget compiled by Hardy (1993) for a carnation production system of 1 hectare, undercover (igloo) and in soil, supplying only the local market. This system will reach its full capacity in the second year of operations and the analysis was therefore based on the second year.

Table 8: Policy Analysis Matrix: Carnations - Australia

		Costs		
	Revenue	Tradables	Domestic factors	Profits
Private Prices	680 625,00	130 334,42	409 964,86	**140 325,72**
Social	680 625,00	126 549,78	409 964,86	**144 110,37**
Divergences	**0**	**3 784,65**	**0**	**-3 784,65**

Waxflower / Queensland / 1995

Waxflowers are Australia's largest export flower crop (Karingal Consultants, 1997; FECA, 1996) and analysing this crop will give significant insights into the competitiveness of the

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[2] The most recent carnation budget available in Australia.

Australian flower industry. This PAM (Table 9) is based on a budget constructed by International Horticultural Marketing Pty Ltd in 1995 (DPI, 1995). With this system reaching full production in the fifth year the annual budget for the fifth year was taken as the basis for analysis.

Table 9: Policy Analysis Matrix: Waxflowers - Australia

	Revenue	Costs		Profits
		Tradables	Domestic factors	
Private	59 400,00	14 693,34	22 941,64	**21 765,02**
Social	59 400,00	14 172,58	22 941,64	**22 285,78**
Divergences	**0**	**520,76**	**0**	**(520,76)**

Protea / Queensland / 1995

South Africa's proteas are among the most popular wildflower crops produced in Australia. It was not possible to estimate the significance of proteas in the Australian flower industry, but since a number of authors focus a great deal of attention on this crop and as protea systems can be compared for Australia and South Africa, this crop was selected for analysis. This PAM (Table 10) is based on a budget constructed by International Horticultural Marketing Pty Ltd in 1995 (DPI, 1995) for the seventh year after establishment. This production system reaches its full capacity in the seventh year of operations – the reason thus for selecting the seventh year as the basis for analysis.

Table 10: Policy Analysis Matrix: Protea-Australia

	Revenue	Costs		Profits
		Tradables	Domestic factors	
Private	83 820,00	23 651,73	19 641,64	**40 526,63**
Social	83 820,00	23 130,97	19 641,64	**41 047,39**
Divergences	**0**	**520,76**	**0**	**(520,76)**

4.2 Comparison of results

Table 11 shows the ratio indicators for the comparison of unlike output, such as the output of rose and protea systems in South Africa; and of carnation, waxflower and protea systems in Australia.

Table 11: Ratio indicators

	South Africa		Australia		
	Rose	Protea	Carnation	Waxflower	Protea
PCR	0,17	0,16	0,74	0,51	0,33
DRC	0,11	0,27	0,73	0,50	0,32
NPCO	0,88	0,91	1	1	1
NPCI	1,09	0,41	1,03	1,04	1,02

4.2.1 Competitive advantage

The competitiveness of each production system analysed, given current technologies, output values, input costs and policy transfers, is reflected in the value that represents the private profit. It seems that the rose system has the capability to make the greatest profit per hectare.

However, land is not the only limiting factor in question, so it would be inappropriate to compare only the private profits of the different systems.

An alternative measure is required to compare the competitiveness of different systems with one another. This measure is the private cost ratio (PCR) that was developed specifically to compare the competitiveness of different systems. PCR shows how much the system can afford to pay domestic factors and still remain competitive. If the PCR ratio equals 1 the profitability is zero, thus by minimising the PCR, private profits will be maximised.

Of the systems analysed South Africa's protea system proved to be the most competitive with a PRC of 0,16. The second most competitive system is South Africa's rose system 0,17; with Australia's protea system third with a PCR of 0,33; waxflower fourth and carnation fifth with PRCs of 0,51 and 0,74 respectively.

4.2.2 Comparative advantage

The efficiency or comparative advantage of this system is reflected by the social profitability. Efficient outcomes are achieved when an economy's resources are used in activities that create the highest levels of output and incomes. The systems analysed yielded the following results: R1 104 305,05 for roses (SA); R13 494,39 for proteas (SA); A$140 110,37 for carnations (Australia); A$ 22 285,78 for waxflowers (Australia) and A$41 047,39 for proteas (Australia). These results show the social profits that can be made on 1 hectare of land for each of these crops. However, all of the systems differ widely and when comparing these figures one can draw no significant conclusions. Nevertheless, these figures can be used to calculate the domestic resource cost ratio (DRC) which was developed to compare the relative efficiency or comparative advantage of these different systems. Similarly to the PCR, the DRC equals 1 if its profitability measure equals 0. Minimising the DRC is therefore equivalent to maximising social profits.

When comparing the different systems according to their DRCs (Table 11) South Africa's rose system proved to be the most efficient or to have the largest comparative advantage with a DRC of 0,11. The second most efficient system is the South African protea system with a DRC of 0,27; followed by the Australian protea system (DRC=0,32); the Australian waxflower system (DRC=0,5) and the Australian carnation system (DRC=0,73).

4.3 Summary

The results of the PAMs indicate that the South African protea system which is South Africa's main floricultural export crop, has the strongest competitive advantage (PRC=0,16) and the second most efficient system in terms of the use of domestic resources (DRC=0,27). South Africa's rose system is the most efficient (DRC=0,11) and the second most competitive system, whereas the Australian flower production systems were found to be less efficient and less competitive than the South African systems. In the case of Australia, the protea system seems to be the most competitive (PRC=0,33) and efficient (DRC=0,32), and is even more efficient and competitive than the waxflower system, which is the most prominent floricultural export crop in Australia (DRC=0,5; PRC=0,51). Carnations are the least efficient (DRC=0,73) and competitive (PRC=0,74) crop which explains the inability of this flower to compete on international markets and its vulnerability to imports from Zimbabwe and South Africa.

The analysis of the effect of government intervention shows that the South African flower systems are more affected by government than the Australian flower systems. Input prices are higher and output prices lower for the analyses of the South African flower systems. This change in prices has a negative effect on competitiveness. The Australian flower systems analysed were affected negatively with regard to input prices, but output prices were not affected by government intervention.

5. Conclusion

Judging from the results from the three approaches in analysing competiveness, it seems that South Africa is more competitive in producing flowers than Australia. The Porter method shows that Australian flower producers have a sligt advantage over their South African counter parts but the other two methods show that the South African flower industry has a distinct advantage over the Australian flower industry. The results of the three methods are summarised and compared in the figures below.
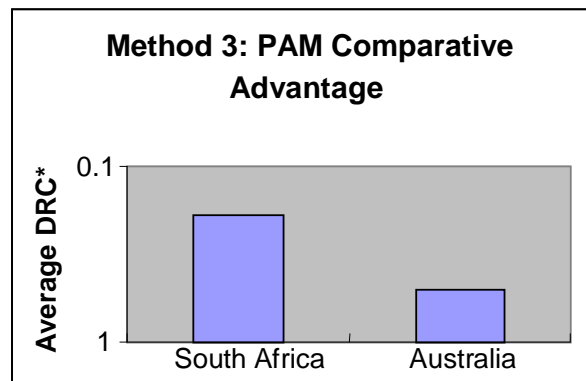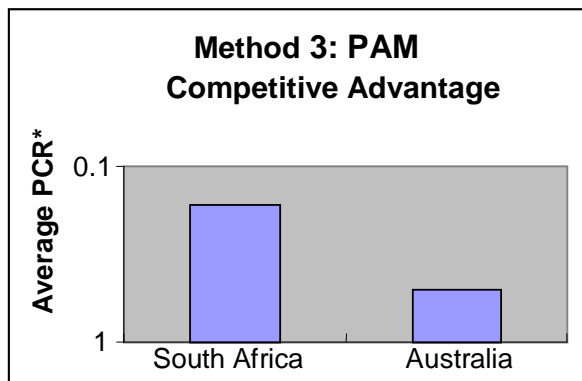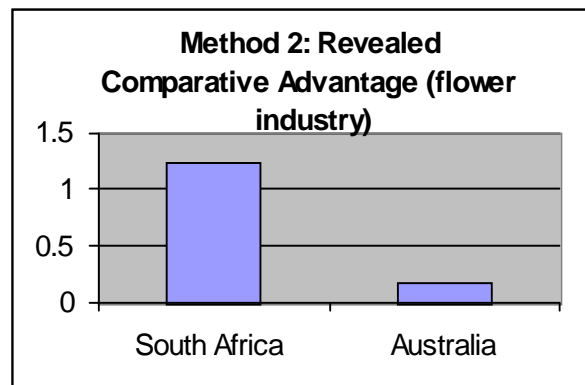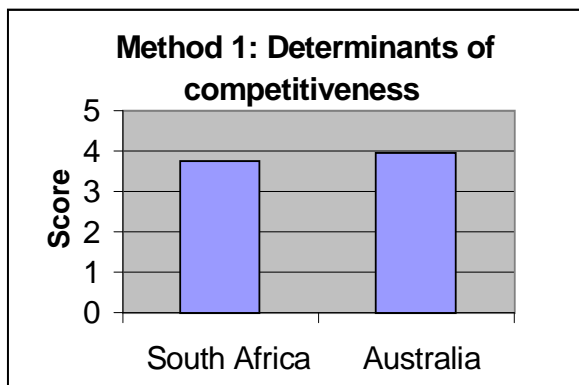
*An average of the PCR and DRC values for different flowers was calculated.

The factors that can be regarded as the main contributors to South Africa's competitive advantage when compared to Australia are lower labour cost, greater accessibility to land, a

more favourable climate, larger growth potential in domestic consumption and greater government protection of the industry.

However, there are many determinants of competitiveness in which South Africa cannot compete with Australia. Factors that give the Australian flower industry a competitive advantage over the South African flower industry, include Australia's superior allied and supporting industries, the greater capacity of its structure and strategy, better developed physical and information infrastructure, less labour disputes and higher productivity, the higher capacity of government research programmes and better access to major export markets.

The South African and Australian flower industries both have a Revealed Comparative Disadvantage with Australia's being the greatest (0,18). South Africa has a much smaller Revealed Comparative Disadvantage of 0,71 indicating that the factors mentioned above as South Africa's main determinants of competitive advantage, have stimulated South Africa's flower industry so that it has a better revealed comparative advantage than the Australian flower industry.

The (PAM) analysis of the competitive advantage and efficiency (comparative advantage) of representative flower systems in South Africa and Australia proved once again that the South African flower systems analysed can produce and compete on local and international markets more competitively and more efficiently than the Australian flower systems analysed.

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