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**A Comparison in transit: To adapt, apply and
evaluate the ITC's TPI for analysing export
industries' export strategies: The case of fresh
grapes and oranges**

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1. Introduction

The purpose is to evaluate an adapted version of the International Trade Centre's Trade Performance Index from a sectoral to an industry application. Applying it to export¹ results for 1995 to 1999 of fresh grapes and fresh oranges from SACU² will test the validity. It will evaluate the instrument's ability to test if there is differences in the two products to obtain and retain market share within the international market³. It is not intended to explain differences between export managers' strategies for these two products nor the complexities of the target markets, but only to compare how RSA (SACU) exporters adapted to global change.

In the first analytical section the products are statistically compared on basis of their general export profile and position in 2000 as well as how marketing strategies influenced their adaptation to domestic and global change. It is followed by a comparison of their global growth possibilities and prospects of market diversification.

Van Rooyen et al (2000) state that the objective of analysing South Africa's agricultural supply chain's competitiveness is to answer the question: "Can businesses in the agro-food system compete in the global market?" Referring to an ISMEA study (1999) van Rooyen et al state, "such analysis would highlight the ability of each sector (or activity) in a particular chain (production, marketing, processing, etc.) to adapt to marketing changes, to produce and adopt technological innovations, its particular access to capital and its capacity to obtain and retain market share within the international market. In short, these variables measure and evaluate the efficiency, effectiveness and sustainability of a particular supply chain." (van Rooyen et al, 2000, pxx).

¹ The analysis refers throughout only to grapes and oranges.

² Trade statistics are usually reported for SACU and if not it will be stated.

³ The comparison is based on COMTRADE statistics accessed via software packages developed by the International Trade Centre UNCTAD/WTO in Geneva, Switzerland. The data in the paper is sourced according to the HS classification.

The Trade Performance Index (TPI), which was developed at the International Trade Centre UNCTAD/WTO (ITC) (Fontagné L, Mimouni M, 2001) complements these, needed variables.

2. The Trade Performance Index

"The TPI is a sectoral benchmarking tool of trade performance and competitiveness with a unique coverage of countries, product sectors and country specific indicators, both static and dynamic" (Fontagné *et al*, p. 3). With this tool insight can be gained into some of the causes of a country's export performance such as gains and losses in world market share and shed light on the factors causing these changes (Fontagné *et al*, p.3).

The TPI comprises of indicators that is divided into three main categories, namely a general profile, countries' international position in a specific year and change in its international marketing performance over a specified period. See Table 1. The TPI was developed to compare countries with one another. In this paper its indicators are adapted and applied to export products from a specific country. A cryptic explanation of the indicators in Table 1 applicable to this analysis as presented in Table 2, will be explained under the following three headings.

2.1. General profile

The general profile is descriptive in nature. G1 is the FOB value of exports in terms US dollars. The weighted trend of exports (G2), calculated using the ordinary least squares method, measures the annual percentage growth from 1996 to 2000. The trend is weighted against the individual weight of grapes and oranges. Share in national exports (G3) (imports:G4) is exports (imports) of oranges or grapes as percentage of total RSA exports (imports). The relative unit value (G6) is the ratio average relative unit value of exports to the world average unit value for oranges and grapes respectively; unity is the reference point and if a product's ratio is equal to or more than one it is equal to and better than the world average.

The Balassa index (Balassa, 1989) known as the "Revealed comparative advantage" (RCA) is in trade flow context more appropriately considered as an Index of Specialisation (IS: G7) (ITC, 2001, p. 34, 35.). Orange and grape IS's were calculated as their respective export values relative to SACU's share of these products in world trade.

2.2. Position in 2000.

The first indicator of position in Table 2 (P1) is the value of net exports. It is for two reasons a reliable indicator of a product's position on the world market. Firstly, net exports eliminate re-exports, which would otherwise introduce a bias into the raw data. Secondly,

it provides a very simple but reliable correction for dealing with globalisation of production processes and the induced vertical specialisation of countries at various stages of production (Fontagné *et al*, p.6).

The value of per capita exports (P2), i.e. US\$/capita of RSA population, indicates the export tendency and extent to which a country's population produces for the world market.

Two measures of share in world market are calculated. The first (P3) is the 2000 value of SACU oranges (grapes) exported relative to total world exports of oranges (grapes), which is a measure of size in the orange (grape) export market. Secondly P3a compares their 1999 export values with world exports of HS-08

Market diversification is a strategy to spread a country's market risks over more markets. Two complementary indicators, namely the equivalent number of markets (NEM) and the spread, measure the degree of market diversification (Fontagné *et al*, pp. 10,11).

The NEM (P5a) is a measure of the number of markets of equal size that would lead to the observed concentration of exports. The larger this value the better, i.e. the greater the market diversification and thus the spread of risk. The NEM value however ignores the differences in each market's share in total exports and only focuses on the number of markets exported to.

The spread (P5b) measures the dispersion between the highest and lowest value in a given statistical series. The greater the spread as compared to the average, the higher the value of the index. The spread does not take into account the number of markets to which a country exports its products, but only the share of each market in total exports. The spread indicator thus does not distinguish between markets, whereas the NEM finds differences between them.

NEM is calculated as in equation 1 and the spread, using a weighted standard error, as in equation 2. In the equations to follow, when referring to global trade the world trade in HS-08 (xxxxx), to which oranges (HS 080510) and grapes (HS 080610) belong, is used.

$$NEM_i^t = \frac{1}{\sum_{j=1}^p \left(\frac{X_{ijcl}^t}{X_{i.cl}^t} \right)^2} \dots\dots\dots (1), \text{ where}$$

X_{ijcl}^t = the export value of country i of products in cluster cl (respectively oranges and grapes) to country j in year t;

$X_{i.cl}^t$ = for country i total exports (.) of respectively oranges and grapes (cluster cl) in year t;

$\frac{X_{ijcl}}{X_{i.cl}}$ = the share of market j in the total exports (.)
of country i of respectively oranges and grapes.

$$S_{pcl}^t = \left[\frac{\sqrt{\sum_{j=1}^p (X_{ijcl}^t - \bar{X}_{ipcl}^t)^2}}{N(\bar{X}_{ipcl}^t)} \right] \dots\dots\dots(2), \text{ where}$$

X_{ijcl}^t = export value of cl (oranges /grapes) from country i
to market j in year t;

\bar{X}_{ipcl}^t = average export value of oranges/grapes from country
i to the p markets in year t;

$\sqrt{\sum_{j=1}^p (X_{ijcl}^t - \bar{X}_{ipcl}^t)^2}$ = standard deviation.

2.3. Change in world market share 1995 -1999.

Percentage change in a country's world market share p.a. (C1) is important as it adds a dynamic element to the analysis of their trade performance. It is divided into four complementary, additive effects that are quantified separately, namely the effects of competitiveness, initial geographic specialisation, initial product specialisation and responsiveness to changes in world demand. The market share variation (C1) is calculated by adding the values according to these four criteria (Fontagné *et al*, pp. 12, 13). The calculations for the period 1995 - 1999 is functionally expressed as follows:

Competitiveness effect p.a.:

It measures the gains in market share due to increased competitiveness.

$$\sum_j \sum_k d \left[\frac{X_{ijk}}{X_{.jk}} \right] * \left[\frac{X_{.jk}^0}{X_{...}^0} \right] \dots\dots\dots(3), \text{ where}$$

X_{ijk} = exports of product k from country i to market j;

$X_{.jk}$ = world exports (.) of product k to market j;

$X_{.jk}^0$ = world exports (.) of product k to market j in base
year (0=1995)

$X_{...}^0$ = global exports of HS-08 in base year 1995.

Initial specialisation in markets p.a.:

This effect captures the benefits associated with the initial specialisation of domestic exports on dynamic markets.

$$\sum_j \sum_k \left[\frac{X_{ijk}^0}{X_{.jk}^0} \right] * d \left[\frac{X_{.jk}}{X_{...}} \right] \dots\dots\dots(4).$$

The effect of the initial specialisation on destination markets (equation 4a) and that of the impact of the initial product specialisation (equation 4b) are calculated by splitting equation 4 as follows:

$$\sum_j \left[\frac{X_{ij}^0}{X_{.j}^0} \right] * d \left[\frac{X_{.j}}{X_{...}} \right] + \sum_j \sum_k \left[\frac{X_{ijk}^0}{X_{.jk}^0} - \frac{X_{ij}^0}{X_{.j}^0} \right] * d \left[\frac{X_{.jk}}{X_{...}} \right] \dots \dots \dots (4a) \text{ and } (4b)$$

For purpose of this paper the meaning of subscripts are follows:

- ijk** = Imports of product k from country i by country j
- .jk** = Imports of product k by country j from the world.
- ...** = World trade in HS-08.
- ij.** = HS-08 imports by country j from country i.
- .j.** = HS-08 imports by country j from the world.

Initial market specialisation:

It captures the benefits associated with change over time of HS-08 in world markets frequented by oranges and the change of these markets in a global context. The impact is positive if the products benefits from strong initial positions on dynamic markets (Fontagné *et al*, p. 13).

$$\sum_j \left[\frac{X_{ij}^0}{X_{.j}^0} \right] * d \left[\frac{X_{.j}}{X_{...}} \right] \dots \dots \dots (4a)$$

Initial product specialisation:

Equation 4b refers to the impact of the initial product specialisation within the context of HS-08.

$$\sum_j \sum_k \left[\frac{X_{ijk}^0}{X_{.jk}^0} - \frac{X_{ij}^0}{X_{.j}^0} \right] * d \left[\frac{X_{.jk}}{X_{...}} \right] \dots \dots \dots (4b)$$

Adaptation p.a. captures the ability to adjust the supply of oranges/grapes' exports to changes in world demand of HS-08. It is obtained by calculating the cross variation of changes in country i's market share in its destination markets for product k and the change in country j as a market for product k relative to the change in the world market for HS-08 (Equation 5.)

$$\sum_j \sum_k d \left[\frac{X_{ijk}}{X_{.jk}} \right] * d \left[\frac{X_{.jk}}{X_{...}} \right] \dots \dots \dots (5)$$

According to Fontagné *et al* (2001, p. 12) if both the changes of the terms in equation 5 is positive (+,+), this indicates that over the period studied, country i has experienced an increase in its market share on dynamic destination markets and the cross variation will be positive. Changes of the nature (-,-) means that country i has experienced a decrease in its market share on recessive destination markets and the cross variation is positive. In contrast, increasing market shares on recessive markets (+,-) or losing market share on dynamic markets (-,+) leads to a negative cross variation.

Trend of import coverage by exports (C2) is calculated as the average annual growth rate of the cover ratio for 1995 - 1999. It indicates the evolution of trade balance for (a group of) products. A positive index will be associated with a positive trend.

Change in market diversification (C4a) represents the average annual variation over the period 1995 - 1999 in the number of equivalent export markets.

Change in market spread (C5b) is a concentration index and represents the average annual variation over the period 1995 - 1999 in the concentration of export markets.

Contribution to the trade balance:

"This indicator, developed by the French economic research institute CEP11, is probably more appropriate than 'revealed comparative advantages'. It compares in thousands of GDP, the balance of trade of a country for a selected product to a theoretical balance, corresponding to the absence of specialisation" (ITC, 2000, p. 35).

$$CTB_p = \left(\frac{1000}{GDP} \right) * \left[(X_p - M_p) - (X - M) * \left(\frac{X_p + M_p}{X + M} \right) \right] \dots\dots\dots (6)$$

X = total exports and M = total imports. GDP = gross domestic product. CTB = contribution to trade balance.

3. Trade performance of RSA fresh oranges and grapes exported.

The discussion refers to data in Table 2 and the definitions given above.

3.1. General profile of oranges and grapes as export products.

Exports are on FOB terms and the value of grapes exported (US\$160235 million) and its share in total national exports (0,62%) in 2000 was roughly US\$28 million higher than that of oranges (US\$132777 million and 0,51% respectively). Grape exports' trend for 1996 - 2000 was 16% compared to the 4% of oranges indicating a much faster export growth for grapes. It is significant that the faster growth of grapes occurred at a unit value of 0,92 in comparison of 0,67 for oranges. Both are lower than their respective world average value but grapes less so than oranges.

The IS (RCA) value is 18,28% for oranges and 15,81% for grapes meaning that the relative share of SACU oranges exported is 18 times and grapes 16 times higher than their respective world averages. It is also indicative that SACU has a reasonable high specialisation in oranges and grapes in its export economy. The higher share of oranges than grapes in their respective world markets, namely 8% against 7% supports this statement.

However the higher IS value of oranges is discounted by its lower unit value when compared with grapes. This is also echoed in oranges' lower contribution to RSA trade balance of US\$1,0453 per US\$1000,00 RSA GDP compared to US\$1,2629 per US\$1000 RSA GDP. It seems that grapes as an export product has a higher general profile than oranges.

Exports minus imports of a product equals net exports. It seems that SACU is by and large self sufficient in oranges and grapes as the value of net exports is basically equal to their value of exports (Compare G1 and P1 in Table 2). Grape exports per capita are at US\$3,72 slightly higher than the US\$3,08 of oranges.

As discussed above, the number of equivalent markets (NEM) and market spread is complementary. The NEM and spread for oranges is 10 and 15,3 and for grapes 5 and 30,6. Theoretical the orange strategy for risk spreading seems better than that of grapes as it is more evenly spread (15,3) over more markets of equivalent size (NEM of 10). From an export growth standpoint the question is what is the growth potential and realisation of the different markets for different products over time? We will return to this later.

3.2. Dynamism in adapting to world market change during 1995 - 1999.

ITC divides countries' change in world market share into four components.

The competitiveness effect measures whether per annum growth (or lack of growth) in exports is due to improvement (or not) in competitiveness or by staying put in traditional or known markets, complacent to move with these markets. Gains in world market share of both oranges and grapes can be attributed to improvement in competitiveness as it increased by respectively 15,84% and 14,04% per annum.

A follow up question is if the product benefited from the initial markets the country specialised in? The impact is positive if the product benefits from strong initial positions on dynamic markets, that is markets that grew in a global context. With values of 0,92% p.a. (oranges) and 0,73% (grapes) p.a. it appears that both benefited marginally from the markets they initially frequented or they were not globally dynamic.

The impact of the initial product specialisation in the case of oranges was -2,01% and for grapes 2,24%. The calculation of the adaptation p.a. to changes in world demand showed that oranges increased its market shares over time in recessive markets and therefore its index is -2,42%. Grapes on the contrary increased its market share on dynamic markets and thus have an index of 2,23%.

The net effect of these percentage changes for the period 1995 - 1999 is that grapes' percentage change of its

world market share grew by 19,24% per annum and that of oranges by 12,33%.

The reasons for this difference can be attributed to the exporters of oranges who did not adapt fast enough to changes in the world market (negative adaptation p.a.) and/or if they changed it was into non-dynamic markets. Support for this is that for the period 1995 - 1999 they did change as their change in market diversification (number of equivalent markets) was larger than that of grapes, namely 2,89 against 1,94. It also appears that orange exporters experienced a larger variation during 1995 - 1999 in the concentration of export markets, i.e. 2,06 compared to 0,58 in the case of grape exports.

Support for the above is found in Graph 1 and 2. Not only was the growth of total world imports for oranges negative during 2000 but their business were concentrated in the quadrant "Gains in declining markets". The opposite is true in the case of grapes. Graph 3 and 4 echo this as the concentration of SA oranges exported is in countries with a negative annual import growth; the latter represents for SA oranges 88% of the export value and 90% of the volume exported; the weighted average unit value of oranges exported to countries with a positive vs. a negative annual growth was US\$286 against US\$263. For grapes these same values are 12% of value and 11% of volume exported to markets with a negative annual growth and with a weighted unit value of US\$804 against US\$858 in markets with a positive annual growth. It is apparent that the unit value in countries, whose imports for the specific product are growing, is higher.

4. Summary

The analysis above is largely explanatory as it is adapted from an index (TPI, Table 1) developed to compare the export performance of countries and not that of export products within a country. The calculations on a product basis (Table 2) do not, however, contradict the findings based on the different graphs. The lower annual growth of oranges for SA in Graph 1 (4%) compared with the 12,33% change in world market share in Table 2, can be explained by the bad export returns the SA industry received during 2000. There seems to be enough ground to say that the TPI indicators can be adapted for in-country comparisons.

It is apparent that the analysis indicates that the exporters of oranges will have to reconsider their export strategies or is it true that a large number of agents are competing against themselves in the export markets? An area that is ripe for further research.

References.

Fontagné L, Mimouni M (2001): The Trade performance Index. Background paper prepared by ITC Market Analysis Section. Geneva, Switzerland. November.

International Trade Centre UNCTAD/WTO (2001): Foreign trade statistics. Technical document. Geneva, Switzerland. September.
Van Rooyen CJ, Esterhuizen D, Doyer OT (2000): Global competitiveness in the agro-food supply chain: South African case study. Agricultural Business Chamber, AgriSA, Pretoria.

Table 1: Indicators in the Trade Performance Index developed by ITC.

Indicators		SACU
General profile	G1	Value of exports (\$'000
	G2	Trend of exports (95 - 99)
	G3	Share in national export
	G4	Share in national import
	G5	Average annual change in per capita exports
	G6	Relative unit value (world average = 1)
	G7	Average annual change in relative unit value
Position in year 1999	P1	Value of net exports
	P2	Per capita exports (\$/inhabitant
	P3	Share in world market
	P4a	Product diversification (no of equivalent products)
	P4b	Product spread (concentration)
	P5a	Market diversification
	P5b	Market spread (concentration)
Change 1995 - 1999	C1	Percentage change of world market share p. a.
		Competitiveness effect p. a.
		Initial geographic specialisation p.a.
		Initial product specialisation p.a.
		Adaptation p.a.
	C2	Trend of import coverage by exports
	C3	Matching with dynamics of world demand
	C4a	Change in product diversification (no of equiv markets)
	C4b	Change in product spread (concentration)
	C5a	Change in market diversification (No of equiv, markets)
	C5b	Change in market spread (concentration)
		Current index
		Change index

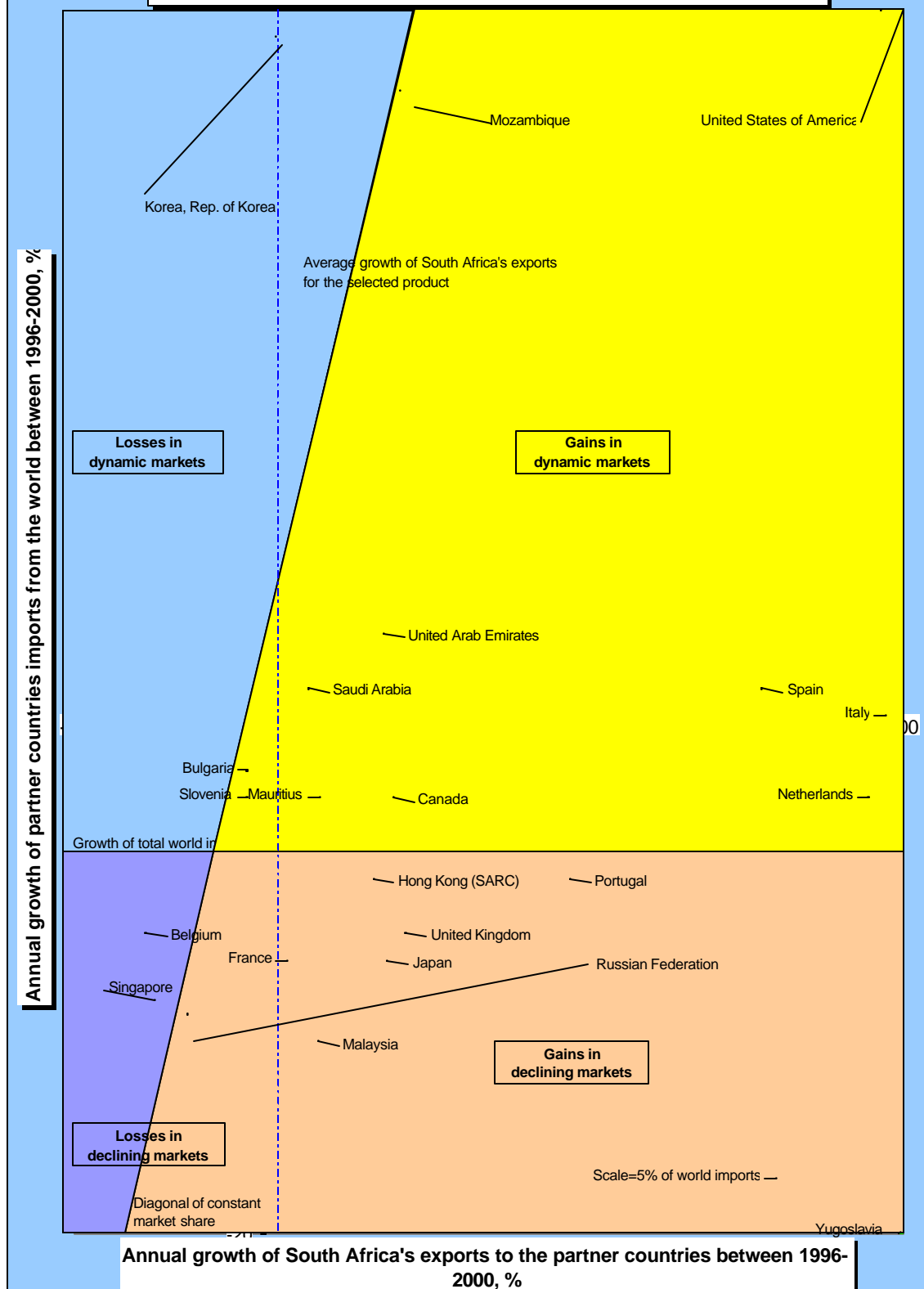
Source: ITC calculations based on COMTRADE of UNSD

Table 2: World trade performance indicators for fresh oranges and fresh grapes.

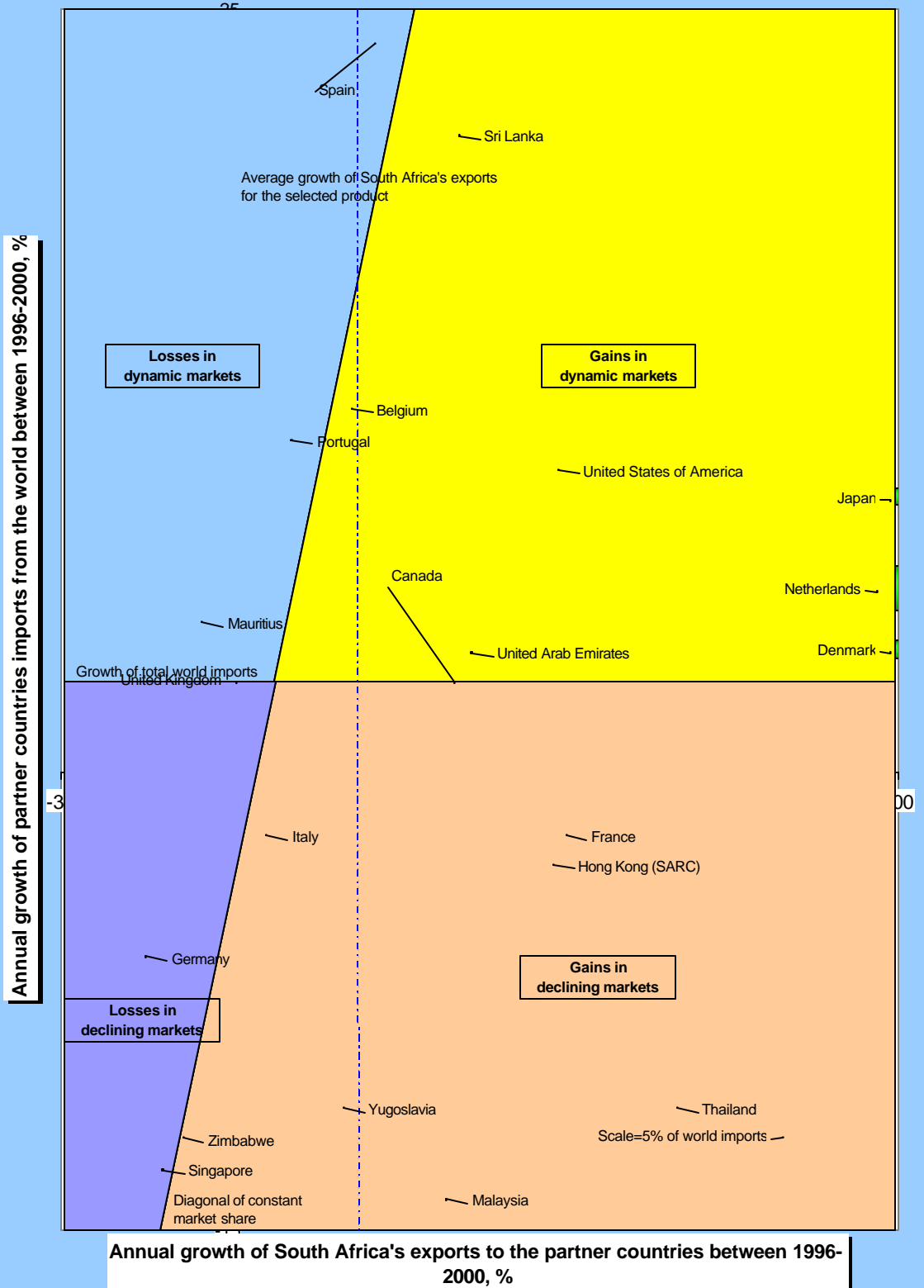
	Indicators	Oranges	Grapes
General profile 2000	G1 Value of exports (US\$'000)	132777	160235
	G2 Trend of exports (1996 - 2000) p a	4%	16%
	G3 Share in national export	0.51%	0.62%
	G4 Share in national import	0.00%	0.00%
	G6 Relative unit value (world average =1)	0.67	0.92
	P1 Value of net exports (\$'000)	132470	160045
Position in 2000	P2 Per capita exports(\$/inhabitant)	3.08	3.72
	P3 Share in world market for oranges and grapes	8%	7%

Change 1995 - 1999	P3a Share in world market (HS -08) (1999)	0.42%	0.96%
	P5a Market diversification (No of equivalent markets)	10	5
	P5b Market spread (concentration)	15.27	30.55
	C1 Percentage change of world market share pa %	12.33%	19.24%
	Sources: Competitiveness effect pa %	15.84%	14.04%
	Initial geographic specialisation pa %	0.92%	0.73%
	Initial product specialisation pa %	-2.01%	2.24%
	Adaptation pa	-2.42%	2.23%
	C2 Trend of import coverage by exports	-0.16%	0.83%
	C3 Matching with dynamics of world demand		
	C4a Change in market diversification (No of equiv. Markets)	2.89	1.94
	C5b Change in market spread (concentration)	2.06	0.58
	G7 Specialisation index (2000): RCA	18.28%	15.81%
	Contribution to the trade balance (2000)	1.0453	1.26288

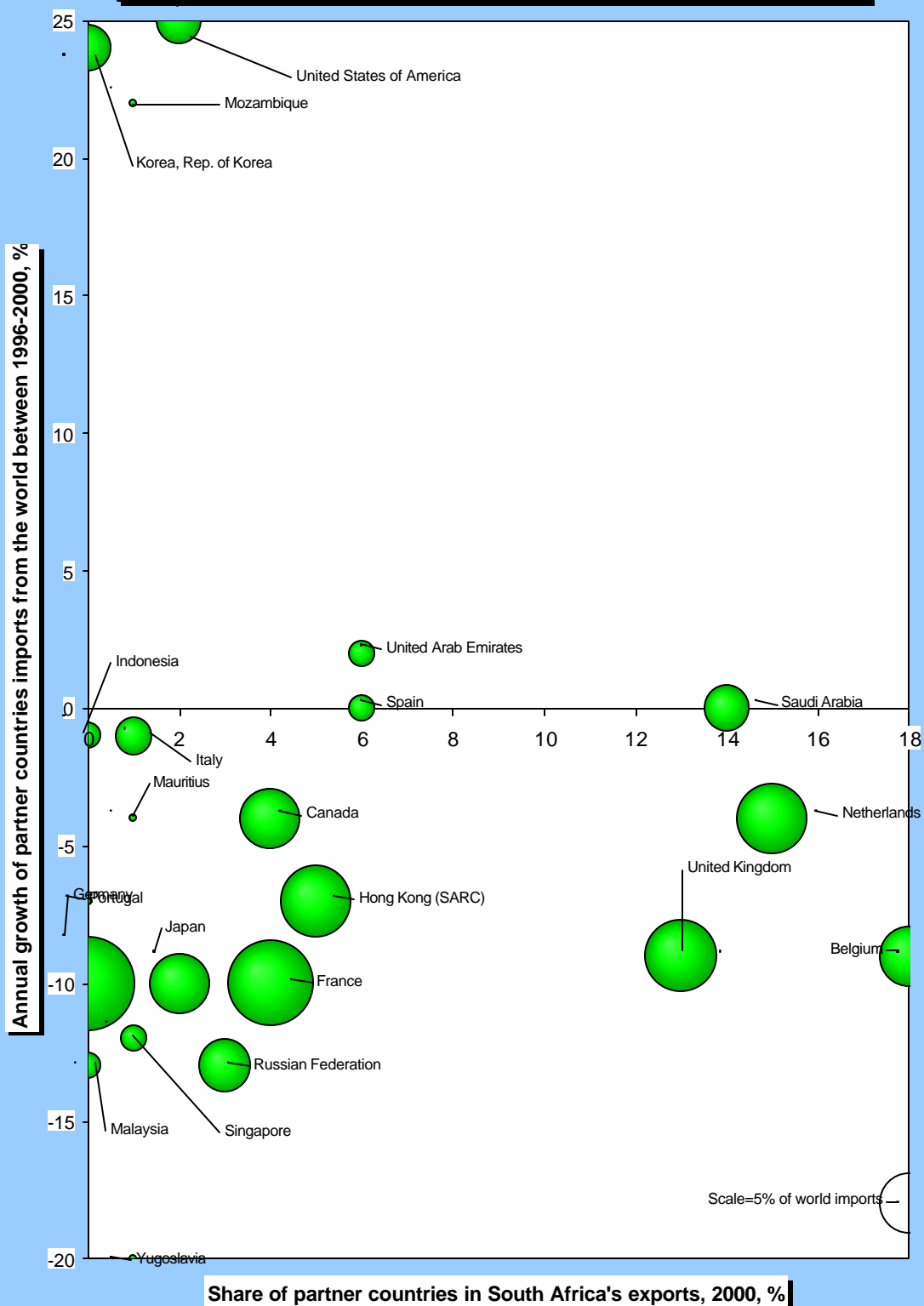
Graph 1: Growth in demand for the selected export product from South Africa in 2000
Product : 080510 Oranges, fresh or dried



Graph 2: Growth in demand for the selected export product from South Africa in 2000
Product : 080610 Grapes, fresh



**Graph 3: Prospects for market diversification for a product exported
by South Africa in 2000**
Product : 080510 Oranges, fresh or dried



**Graph 4: Prospects for market diversification for a product
exported by South Africa in 2000
Product : 080610 Grapes, fresh**

