A Decision Support Model to identify realistic export opportunities for South Africa

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"Now to the King eternal, immortal, invisible, the only God,

be honor and glory forever and ever.

Amen".

(1 Timothy 1:17)

Opsomming

Uitvoergeleide ekonomiese groei is 'n belangrike kenmerk van byna alle ekonomieë wat die afgelope dertig jaar beduidende groei getoon het. Ook in Suid-Afrika na 1994, is die verhoging van ekonomiese groei deur middel van die versnelling van uitvoer deur die regering as 'n belangrike beleid herken.

Outeurs soos Dunning (1997) en Shankarmahesh, Olsen and Honeycutt Jr. (2005:203) stem saam dat dit nie meer is "of" regerings betrokke moet wees in die toedeling van hulpbronne en die bevordering van handel nie, maar eerder "hoeveel" en "watter tipe" regeringsbetrokkenheid daar moet wees. Nasionale hulpbronne is egter skaars, daarom word 'n groot mate van selektiwiteit benodig vir die ontwikkeling en implementering van uitvoerbevordering-strategieë en -aktiwiteite (Cuyvers, 2004:256). 'n Land wat ekonomiese groei wil stimuleer deur uitvoerbevordering moet tussen beperkte alternatiewe onderskei (Jaffe, Salazar & Brambila, 1996). "Die uitdagings waarvoor regerings te staan kom is die noodsaaklikheid om op spesifieke sektore vir uitvoerbevordering te fokus en om hul beperkte hulpbronne aan hierdie sektore toe te ken" (Shankarmahesh *et al.*, 2005:204). Hierdie selektiwiteit moet gebaseer word op die ontleding van realistiese uitvoergeleenthede.

Die aktiewe rol wat die Asiatiese regerings gespeel het in die ontwerp van aansporingsprogramme vir die bevordering van spesifieke binnelandse sektore het tot die uitvoersukses van die Asiatiese "tier-ekonomieë" bygedra (Glenday & Ndii, 2000).

Die privaat- en openbare uitvoerbevordering-instellings kom in baie uitvoerlande te staan voor 'n dubbele toekenningsprobleem, naamlik hoe om skaars hulpbronne aan aktiwiteite in verskeie uitvoermarkte te bestee; en hoe om die hulpbronne aan alternatiewe uitvoerbevordering-instrumente toe te ken (Cuyvers, De Pelscacker, Rayp & Roozen, 1995:173). Suid-Afrikaanse handelbevordering-organisasies het 'n soortgelyke probleem, soos aangedui in die Nasionale Uitvoerstrategie: "Suid-Afrika se huidige uitvoerbevorderingaktiwiteite het staatgemaak op historiese uitvoerprestasie-tendense. Huidige bevorderingsaktiwiteite neem nie nuwe uitvoergeleenthede in onontginde markte of geleenthede vir nuwe produkte in bestaande markte in ag nie" (DHN, 2005:47).

Hierdie studie is in opdrag van die Departement van Handel en Nywerheid (DHN) uitgevoer en fokus eerstens op die toepassing van 'n besluitondersteuningsmodel vir Suid-Afrika. Die model is gebaseer op die besluitondersteuningsmodel wat deur Cuyvers *et al.* (1995:173-186) ontwerp is. Tweedens het die studie die bestaande besluitondersteuningsmodel aangepas deur die Suid-Afrikaanse handelsituasie in ag te neem. Derdens identifiseer die studie realistiese uitvoergeleenthede tesame met die uitvoerkennis van die DHN, en groepeer hierdie realistiese uitvoergeleenthede in 12 groepe volgens geografiese verwantskap. Hierdie groepering van uitvoergeleenthede sal die DHN in staat stel om hulle bevorderingsaktiwiteite te fokus asook hulle in staat te stel om beperkte hulpbronne meer effektief te allokeer.

Die resultate van hierdie studie dra by tot strategiese beleidsvorming oor uitvoerbevordering as deel van die Nasionale Uitvoerstategie van Suid-Afrika en verskaf aan die

DHN wetenskaplik verantwoordbare realistiese uitvoergeleenthede (DHN, 2005:47-56).

Abstract

Export-led economic growth has been an important feature of almost all economies where significant economic growth has taken place over the previous thirty years. After 1994, the achievement of economic growth through the acceleration of exports has been recognised as an imperative policy by the South African government.

Authors such as Dunning (1997) and Shankarmahesh, Olsen and Honeycutt Jr. (2005: 203) agree that it is no longer "if" governments should be involved in the allocation of resources and the promotion of trade, but the principal questions are "how much?" and "what kind of?" government involvement there should be. However, national resources are scarce and, therefore, great selectivity is required in developing and implementing export promotion strategies and activities (Cuyvers, 2004:256). Limited alternatives should be considered when a nation wish to stimulate economic growth through export promotion. (Jaffe, Salazar & Brambila, 1996). "The challenges faced by governments, therefore, lie in the necessity to choose specific sectors for export promotion and allocate their limited resources among these sectors" (Shankarmahesh, *et al.*, 2005:204). This selectivity should be based on the analysis of potential export opportunities.

The involvement of governments in the designing of export promotion programmes to promote specific domestic sectors has led to the export success of the Asian "tiger economies" (Glenday & Ndii, 2000).

In many exporting countries, however, public and private export promotion institu-

tions face a double allocation problem namely how to allocate limited resources to activities in different export markets, and how to allocate the resources to alternative export promotion instruments (Cuyvers, De Pelsmacker, Rayp and Roozen, 1995:173). South African trade promotion organisations face a similar allocation problem as expressed in the National Export Strategy (NES): "South Africa's current export promotion activities have relied on historical export performance trends. Current promotion activities do not take into consideration new export opportunities in unexploited markets or opportunities for new products in existing markets. There was little, if any, scientific justification for current funding of export promotion activities" (DTI, 2005:47).

In the light of the above mentioned this study was commisioned by the Department of Trade and Industry (DTI) and firstly focused on the application of a Decision Support Model (DSM) for South Africa. The DSM for South Africa was based on the DSM developed by Cuyvers *et al.* (1995:173-186). The DSM was adapted by taking the South African trade circumstances into consideration. The next step was to identify realistic export opportunities with the use of the DSM and thereafter, with the export expertise of the DTI, cluster these realistic export opportunities into regional clusters. These export clusters will enable the DTI to focus their export promotion activities and to allocate limited resources more efficiently.

The results from this study contribute towards strategic policy making on export promotion and will be part of the NES of South Africa and will provide the DTI with scientifically justified realistic export opportunities (DTI, 2005:47-56).

Abbreviations

ASEAN	Association of Southeast Asian Nations
CIS	Common Wealth of Independent States
CV	Critical Value
DSM	Decision Support Model
DSS	Decision Support System
DTI	Department of Trade and Industry
ECIC	Export Credit Insurance Corporation
EMIA	Export Marketing and Investment Assistance Scheme
EPA	Export Promotion Agency
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GGIC	Credit Guarantee Insurance Corporation
HHI	Herfindahl-Hirschmann Index
IDC	Industrial Development Corporation
IMF	International Monetary Fund
LAC	Latin American Countries
MENA	Middle East and North Africa
NES	National Export Strategy
OECD	Organisation for Economic Co-operation and Development
ONDD	Office National Du Ducroire
RCA	Revealed Comparative Advantage
R&D	Research and Development

ROI	Return on Investment
SITC	Standard International Trade Classification
SSA	Sub-Saharan Africa
TISA	Trade and Investment South Africa
TPO	Trade Promoting Organisation
WTO	World Trade Organisation
US	United States

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1 Introduction

1.1 Problem statement

The involvement of governments in the designing of export promotion programmes to promote specific domestic sectors has led to the export success of the Asian "tiger economics" (Glenday & Ndii, 2000).

Authors such as Dunning (1997) and Shankarmahesh, Olsen and Honeycutt Jr. (2005: 203) agree that it is no longer "if" governments should be involved in the allocation of resources and the promotion of trade, but the principal questions are "how much?" and "what kind of?" government involvement there should be. However, national resources are scarce and, therefore, great selectivity is required in developing and implementing export promotion strategies and activities (Cuyvers, 2004:256). Limited alternatives should be considered when a nation wish to stimulate economic growth through export promotion (Jaffe, Salazar & Brambila, 1996). "The challenges faced by governments,

therefore, lie in the necessity to choose specific sectors for export promotion and allocate their limited resources among these sectors" (Shankarmahesh, *et al.*, 2005:204). This selectivity should be based on the analysis of potential export opportunities.

The rest of the chapter is constructed as follows: section 1.2.1 will give a short overview of the role that governments play as Trade Promotion Organisations (TPO) in the world and section 1.2.2 will focus on the need for a Decision Support Model (DSM) for export promotion in South Africa. In 1.2.3 the current situation on the prioritisation of export promotion will be discussed. The objectives of the study are stated in section 1.3, followed by the demarcation of the study in section 1.4. In section 1.5 the methodology of the study will be discussed. In section 1.6 the importance of the study is highlighted, followed by an outline of the study. The chapter concludes with section 1.8.

1.2 Background

1.2.1 The role of governments as trade promotion organisations

How effective are government assisted export promotion programmes? According to Wilkinson and Brouthers (2006:233-252), several studies have shown that government assistance has proven to be useful and that a positive relationship exists between the firm satisfaction of export performance and government-sponsored trade shows. Gencturk and Kotabe (2001:51-72) found that export success can be attributed to government involvement, where the competitive positions of firms improved through export assistance. Another study conducted by Coughlin and Cartwright (1987) considered the effect of a $1000 increase in the government's export promotion programmes and found that this resulted in an increase of $432000 in exports. Export success can thus be attributed to

the involvement of governments. In the next section the need for a DSM as a tool for the South African government to promote exports in an efficient manner will be discussed.

1.2.2 The need for a decision support model for export promotion in South Africa

The Department of Trade and Industry (DTI), as the export promotion authority of the South African government, has recently indicated that a more extensive study on export promotion in South Africa would greatly assist senior management to ensure that government resources are used to maximum potential in determining priority markets to combat the challenges of globalisation in the following areas (Erero, 2004):

- It will result in a list of priority markets for South African products that can be pro-actively applied to government financing schemes and foreign promotional strategies.
- It will give government a clear sense of where it should deploy it's Foreign Economic Representatives to best effect.
- It would lead to optimal use of financial and human resources in government to promote exports.
- Results from this study introduced into the Customised Sector Programme may enhance the implementation of this programme.

From this it can be concluded that the South African government wants to fulfill it's obligation, not only to assist potential exporters, but also to prioritise export promotion activities in such a manner that will lead to the highest success rate for exporters in

foreign markets. In the next section the current need to justify export promotion activities scientifically from a government perspective will be discussed.

1.2.3 The current situation on the prioritisation of export promotion activities in South Africa

Various export promotion schemes are available for South African exporters and these export promotion schemes will be discussed in chapter 2 of the study (see section 2.6). "The current funding of export promotion activities in South Africa relies on historical export performance trends. Little, if any, scientific justification could be given for the current funding of export promotion activities and these export promotion activities do not take into consideration new export opportunities in unexploited markets or opportunities for new products in existing markets" (DTI, 2005:47).

According to the National Export Strategy (NES) these export promotion schemes need to address the following shortcomings (DTI, 2005:85):

- Increase the competitiveness of exporters in order to gain access to foreign markets.
- Increase the number of existing exporters in South Africa.
- Increase the value and volume of exports for South Africa.

A Decision Support Model (DSM) approach will help to justify export promotion activities scientifically in the future and act as a tool for the South African government to address the shortcomings mentioned above.

From an export promotion perspective, a DSM will enable the DTI, as the TPO in South Africa, with a powerful tool to identify realistic export opportunities for South

Africa on a country/product level, but more importantly to prioritise export assistance for potentially successful exporters. This assistance will in turn lead to exporters that have the ability to access foreign business opportunities for their specific products. The identification of these realistic export markets will lead to an increase in export profitability of firms and increased export volumes and in turn address the shortcomings mentioned in sections above. The results from the application of the DSM for South Africa will contribute towards strategic policy design on export promotion and will be integrated into the DTI's NES for South Africa (DTI, 2005:47-56).

1.3 The objectives of the study

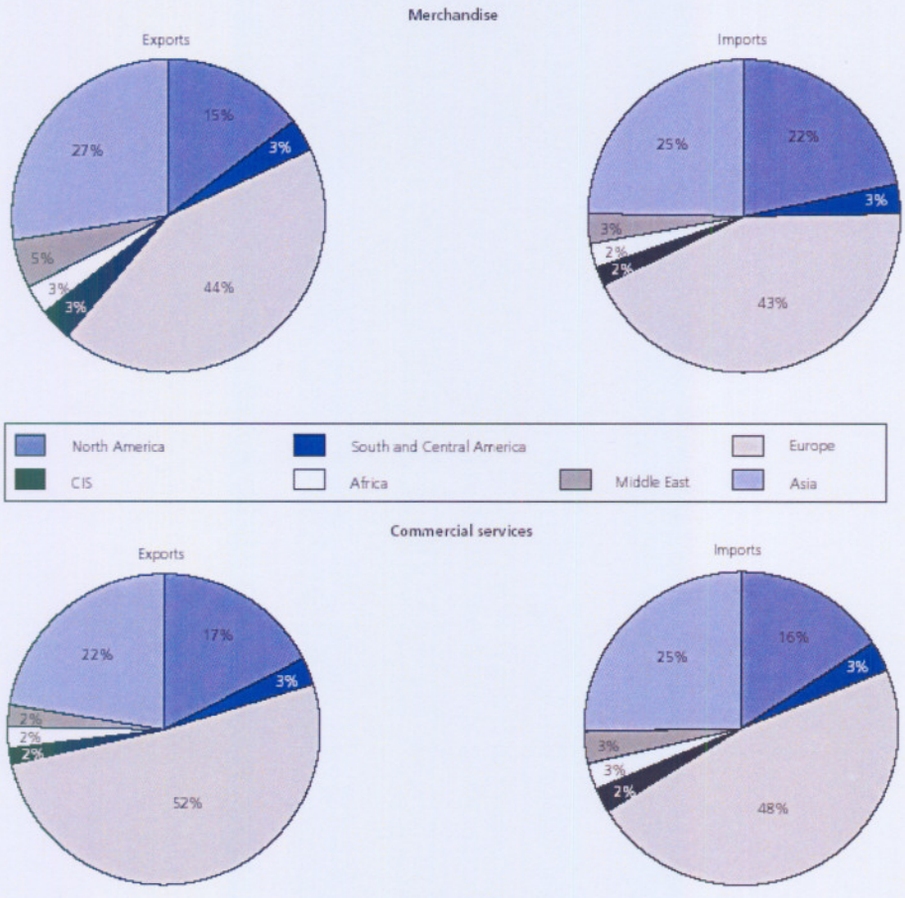
The objectives of this study are to:

- Firstly, apply a DSM for South Africa, based on the DSM which was developed by Cuyvers, De Pelsmacker, Rayp and Roozen (1995:173-186) taking into consideration the specific export conditions for South Africa (including data on country risk, macro-economic data and international trade statistics).

- Secondly, analyse and discuss the results obtained from each of the filters of the DSM and adapt these filters where necessary to accommodate the South African trade circumstances.

- Thirdly, provide the DTI with the results from the DSM in order for them to justify export promotion activities scientifically in the future.

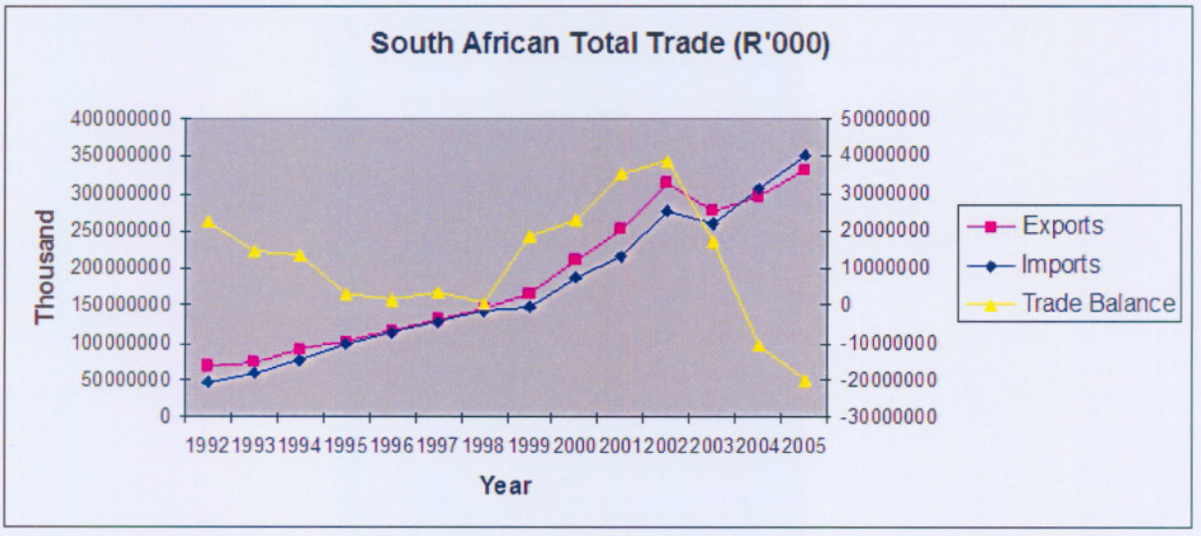
- Lastly, to provide export clusters for government to prioritise their export promotion activities in the future.



Source: WTO, 2006

Figure 2.1: *Share in world merchandise and commercial services trade by region, 2005 (Percentage share)*

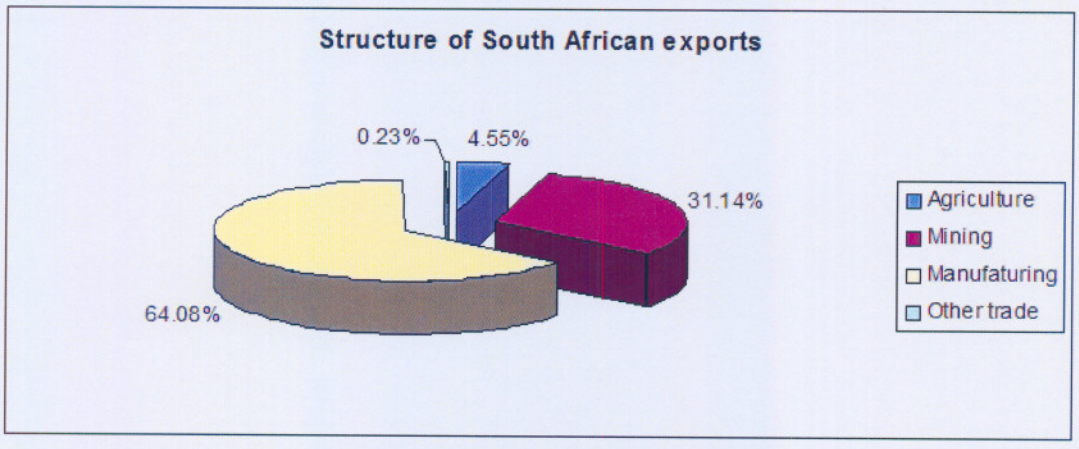
illustrated in Figure 2.4.



Source: DTI, 2006

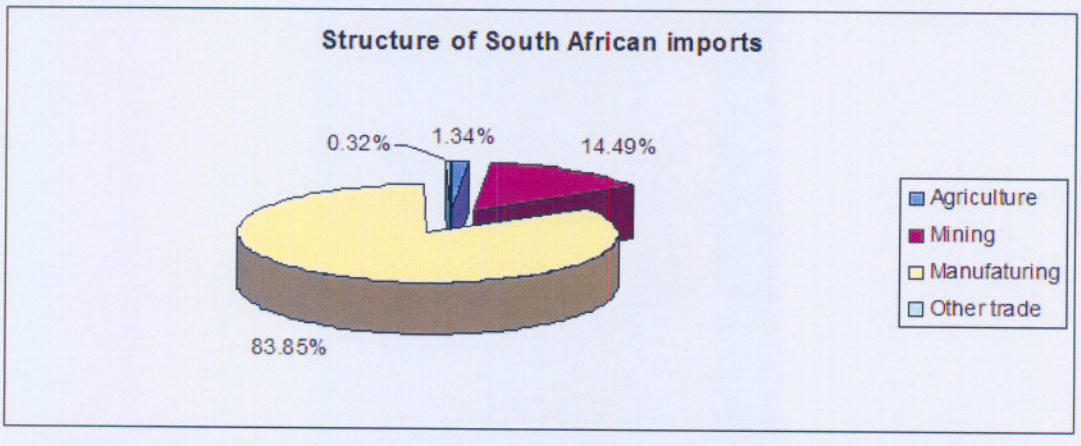
Figure 2.2: *South African total trade*

In Table 2.3 basic economic statistics on South Africa are given. The Table illustrates that real GDP growth for 2004 was 4.5% and for 2005 a growth rate of 4.9% was achieved. South Africa achieved an economic growth rate of 5% in 2006 (SARB, 2007). In the same periods export volume growth was reported as 2.5% for 2004 and 6.7% for 2005.



Source: DTI, 2006

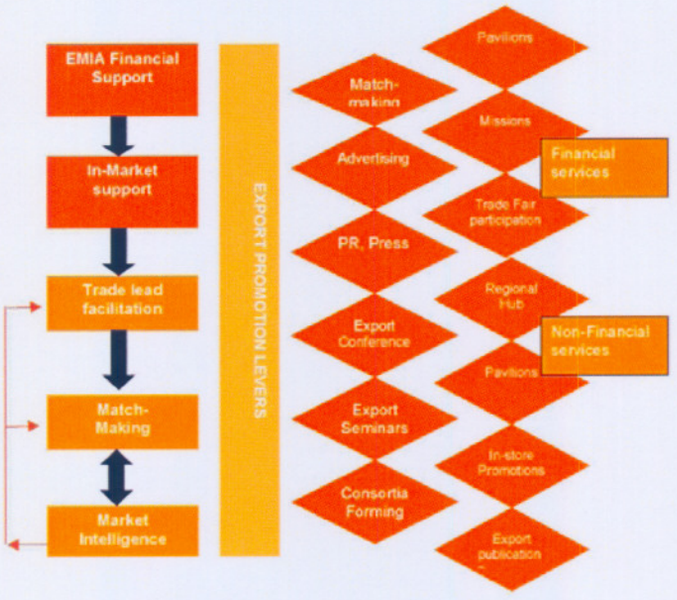
Figure 2.3: *Structure of South African exports*



Source: DTI, 2006

Figure 2.4: *Structure of South African imports*

Given the overview of current international trade trends as well as the situation of South African exports and imports, the next section will discuss the importance of exports in general and focus on the importance of exports as a determinant for economic growth.



Source: DTI, 2006

Figure 2.5: *TISA's export offerings*

and facilitation as well matching markets and logistical requirements (DTI, 2006).

2.6.5 Export Marketing and Investment Scheme (EMIA)

The main aim is to incur some of the cost related to the international marketing of firms' products. Offerings under EMIA include: Trade National Pavillions, Individual Exhibitions, Out and Inward Trade Mission Support, Primary Market Research, Patent Registration, Investment Mission Support and Sector Specific Assistance (DTI, 2006).

These export offerings provided by TISA encompasses the major objectives of export promotion programmes as given by Cavusgil and Zou (1994) and Francis *et al.* (2004:479):

- knowledge of export practices

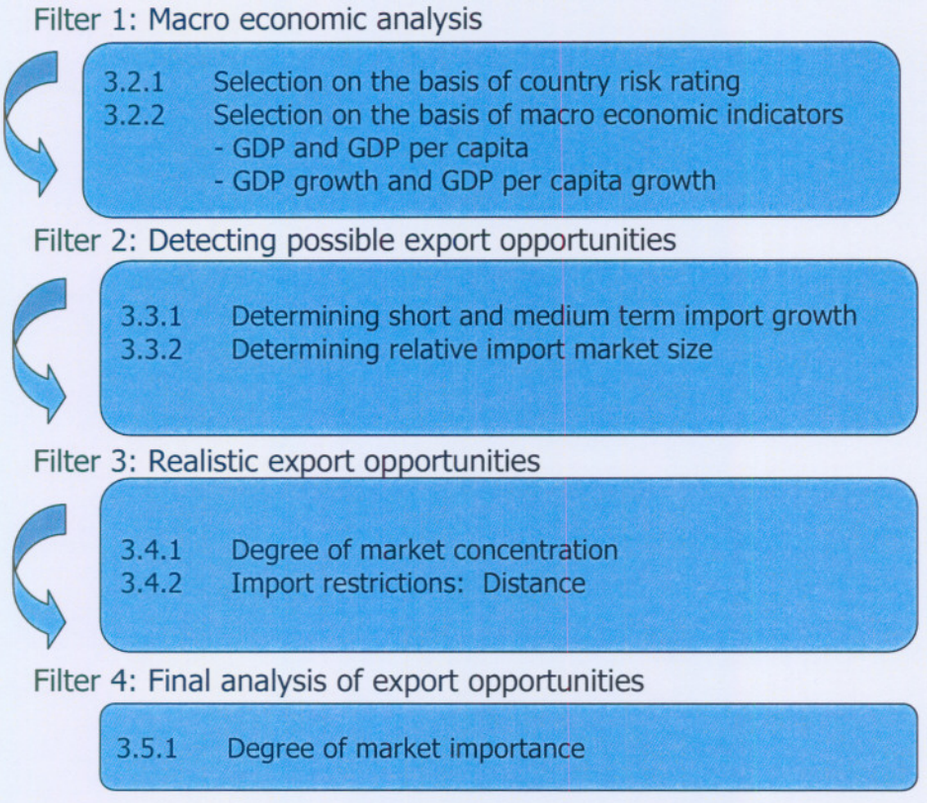


Figure 3.1: *Flowchart of the filtering process of the DSM*

3.2 Filter 1: Macro economic analysis

3.2.1 Selection on the basis of country risk ratings

Country ratings will form the base for the first elimination process of the DSM. Country risk ratings provide information regarding the political[1] and commercial[2] risk associated with a specific country. Country risk ratings are provided by various private and public institutions. In South Africa the Credit Guarantee Insurance Corporation (CGIC) provides country risk ratings, but the categories are broadly defined and not of particular use for this study. Another institution that provides this information is the Office National

[1]Political risk refers to political uncertainty within a country, default or suspension of payments or low levels of foreign currency. (Source: http://www.ondd.be)

[2]Commercial risk takes into consideration export credits and investment circumstances within a country. (Source: http://www.ondd.be)

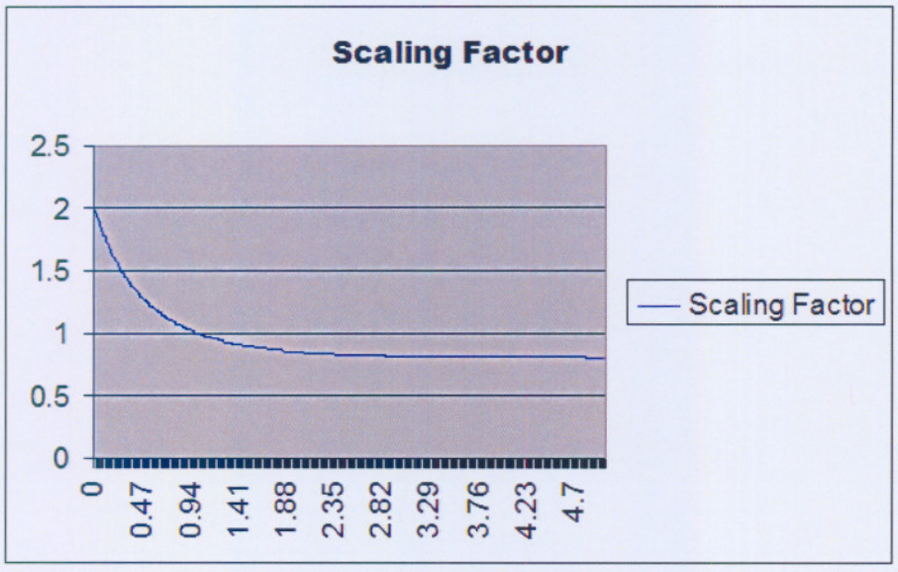


Figure 3.2: *Scaling factor as function of the RCA*

$$g_{ij} \geq G_j \tag{3.4}$$

where g_{ij} denotes the rate of growth of imports either on the short or medium term of product group j by country i. If $g_{W,j}$ denotes the total world export of product group j then G_j is calculated as:

- $G_j = g_{W,j} s_j$, if $g_{W,j} > 0$ and
- $G_j = g_{W,j}/s_j$, if $g_{W,j} < 0$.

In Table 3.3, a 1 is given in column 2 and 3 if the condition in equation 3.4 is fulfilled for the short and medium term (see Table 3.3) (For results see section 4.3).

3.3.3 Determining relative import market size

In section 3.3.2 the growth of imports in the short and medium term were considered as a measure to eliminate less interesting export markets. To determine whether a particular

Table 3.4: *Determining the value of alpha numerically.*

Alpha-value	Number of country/product combinations	Difference	arrive 1,0	arrive 1,1	.....	arrive 4,0	Average
0	8131						
0.1	8154	23					
0.2	8182	28					
0.3	8215	33					
0.4	8248	33					
0.5	8283	35					
0.6	8313	30					
0.7	8335	22					
0.8	8370	35					
0.9	8396	26					
1	8429	33	298				298
.....	.....	.....	.....	.....			.....
12.2	9517	0	20	19.09091	.....	43.25	27.44697
.....	.....	.....	.....	.....	.....	.....	.....
20	10138	4	78	77.27273	.....	74	76.42424
						Min	27.44697

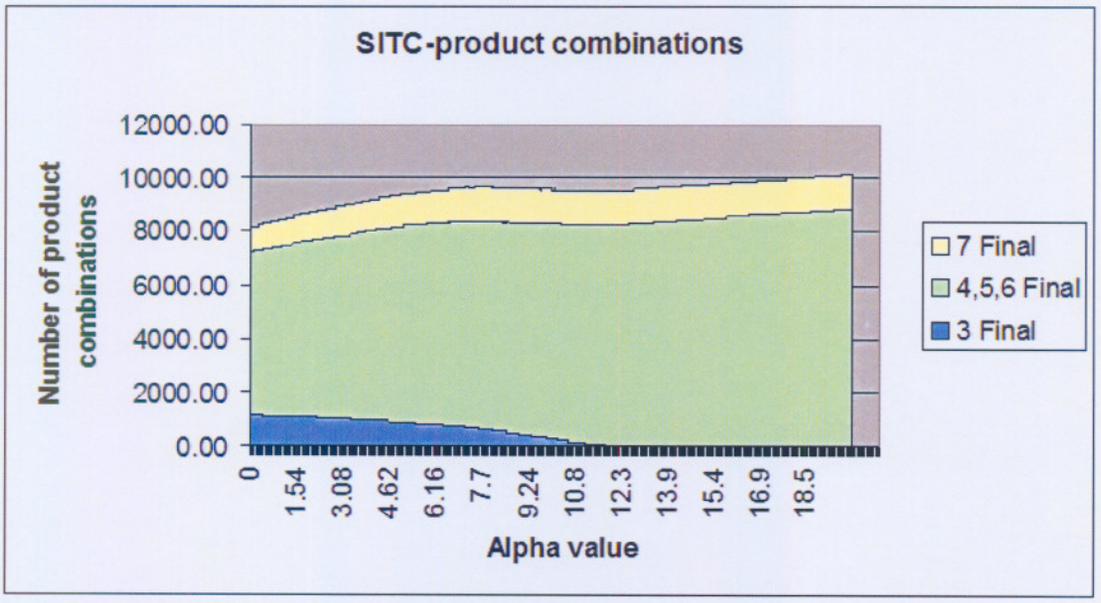


Figure 3.3: *Determining the value of Alpha in filter 3*

3.4.2 Import restrictions

At this stage of the DSM the current study does not include the second part of filter 3's methodology followed by Cuyvers *et al.* (1995:180-181) and Cuyvers (2004:261-262) in

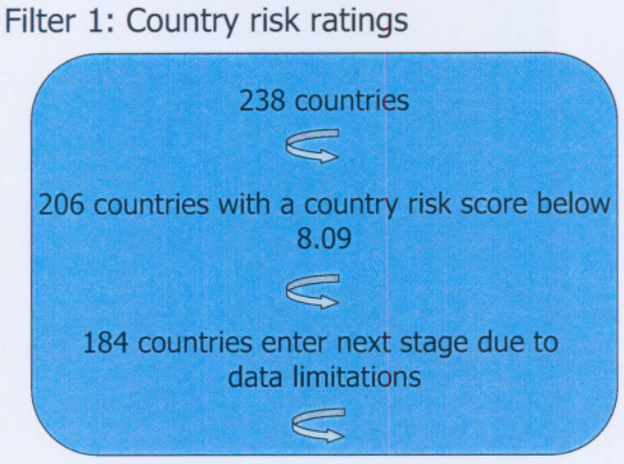


Figure 4.1: *Flowchart of filter 1: Country risk score*

arbitrary α[1] value. In the South African DSM the value chosen for α is 0.067 for both the analysis of GDP and GDP per capita. The result was that 35 countries were chosen on the basis of GDP and 49 countries on the basis of GDP per capita. The total single country selection for filter 1: GDP and GDP per capita analysis was 58[2] countries (see Appendix A, Table A.3). For instance if an α value of 0.5 was chosen, then the number of countries included in this filter on the basis on GDP and GDP per capita would be 101 and 184 respectively. As discussed in section 3.3.2, all 184 countries can enter the GDP growth and GDP per capita growth analysis and have another chance of being included into filter 2, whether they were included in the previous stage or not. Figure 4.2 and Figure 4.3 illustrate the number of countries eliminated when *alpha* is increased from 0 to 1 in increments of 0.001 in terms of GDP and GDP per capita respectively. In Figure 4.4 the results of the filtering process due to GDP and GDP per capita are illustrated.

[1]The α value is chosen on the basis that a small change in the value will not have a huge effect on the number of countries included in the model (see 3.2.2)

[2]The number is not calculated as the sum of countries chosen in GDP and GDP per capita analysis because some countries may be chosen in both analysis

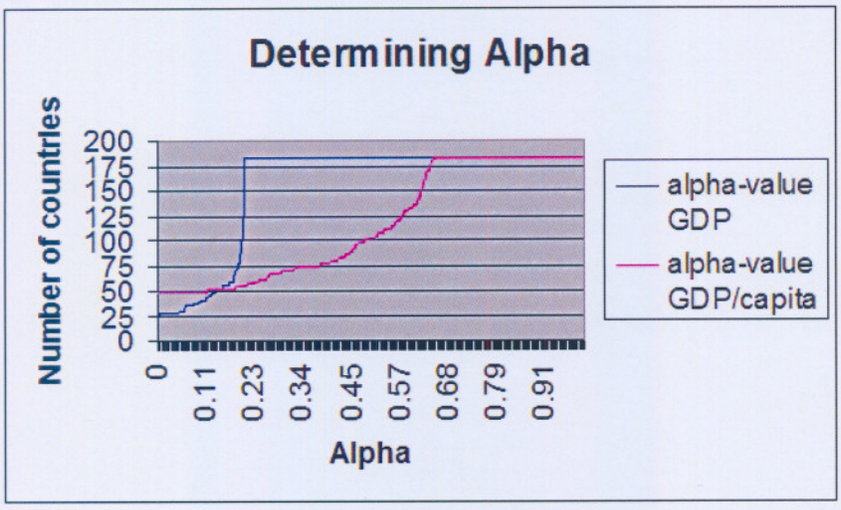


Figure 4.2: *Determining the value of alpha in terms of GDP analysis*

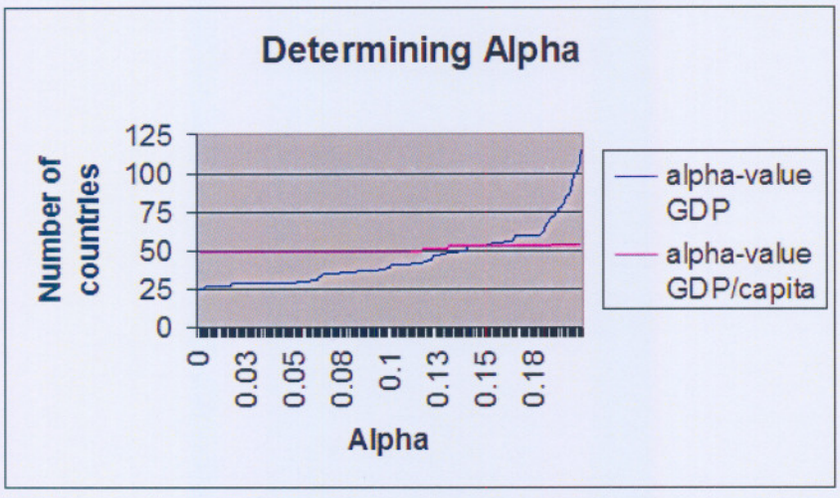


Figure 4.3: *Determining the value of alpha in terms of GDP per capita analysis.*

4.2.3 Results of GDP growth and GDP per capita growth analysis.

In section 3.3.2, countries not included after filter 1: GDP and GDP per capita analysis were given another opportunity to be included in filter 2, due to the fact that some of these countries may present potential export opportunities in terms of their growth. In order for these countries to be included in terms of GDP growth and GDP per capita

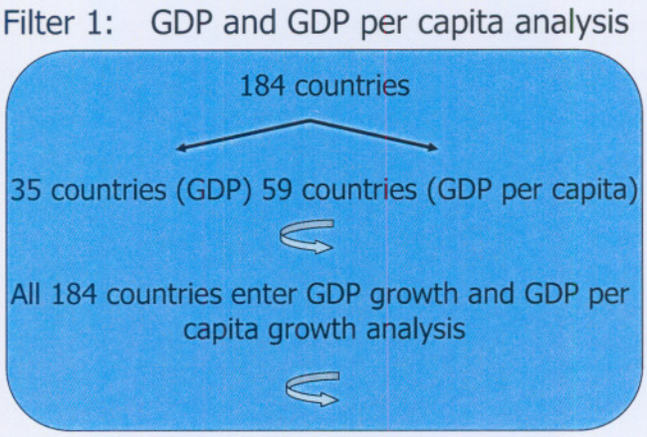


Figure 4.4: *Flowchart of filter 1: GDP and GDP per capita analysis.*

growth, their growth for the respective years should be higher than the average of all the other countries. This resulted in 44 countries being chosen. Figure 4.5 illustrates the number of countries that satisfied the GDP growth and GDP growth per capita analysis, as well as the number of countries entering filter 2. In Table 4.1 the 84 countries entering filter 2 are listed, unfortunately data could only be found for 74 of these countries. Countries such as Antigua and Barbuda, Benin, Bosnia and Herzegovina, Luxemburg (included with Belgium's data) Macoa (China), Netherland Antilles, Puerto Rico, Serbia and Montenegro and Slovak Republic were not included due to insufficient data.

Figure 4.5: *Flowchart of filter 1: GDP growth and GDP per capita growth analysis.*

4.3 Results of filter 2: Detecting possible export opportunities

In this section a possible 46 102[3] country/product combinations are introduced. These country/product combinations will be categorised into 8 categories as shown in Table 3.3. In Table 4.2 and 4.3 the results of the categorisation in terms of products and countries are given respectively. In Tables 4.2 a breakdown of the SITC-product combinations per category are given as discussed in Table 3.3. The last column of Table 4.2 indicates the number of selected product combinations which totals 13 169[4]. SITC-product combinations categories 0 to 9 contribute 18,3%, 2,4%, 13,1%, 3,1%, 1,5%, 8%, 25,5%, 13,6%, 13,9% and 1% respectively towards the 13169 product combinations in terms of the 8 categories discussed.

[3]The number can be calculated as the possible 623 SITC-product combinations multiplied by the 74 countries entering filter 2.

[4]This number can be calculated from Table 4.2 as the summation of the totals of category 3 to 7

Categories / Countries	0	1	2	3	4	5	6	7	Selected
Switzerland	395	44	46	13	90	12	2	21	138
Taiwan	403	67	16	20	61	22	4	30	137
Thailand	371	44	46	11	138	1	3	9	162
Trinidad Tobago	394	45	76	0	107	0	0	1	108
Turkmenistan	444	104	27	4	44	0	0	0	48
Ukraine	311	28	98	0	183	0	0	3	186
United Arab Emirates	332	54	52	5	167	1	0	12	185
UK	250	14	10	86	42	29	23	169	349
USA	214	7	6	189	5	70	34	98	396
Total	26028	3143	3762	1688	8904	525	464	1588	13169

In Figure 4.6 the categorisation of countries and product are illustrated in terms of a flowchart.

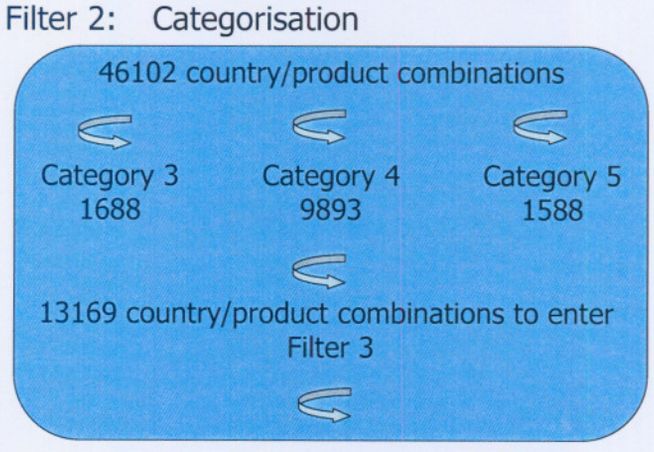


Figure 4.6: *Flowchart of filter 2: Categorisation of countries and products.*

Table 4.4 gives an indication of the number of SITC-product combinations with a RCA > 1. From Table 4.4 only 128 of the 623 SITC-product combinations have a RCA > 1 or 21%. In the next section the focus will be to further reduce the 13169 product combinations already identified.

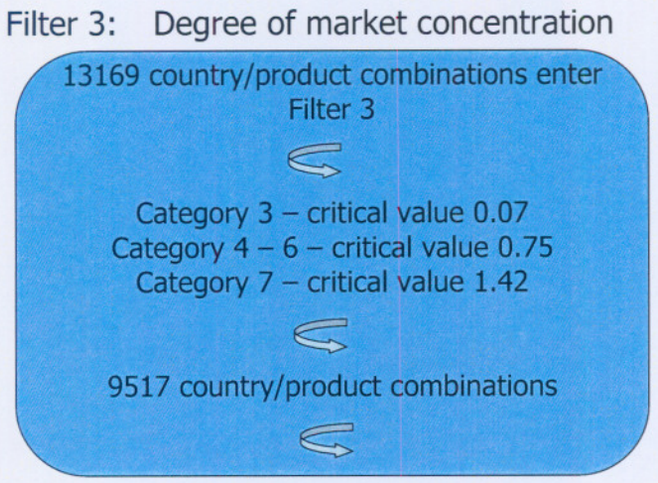


Figure 4.7: *Flowchart of filter 3: Degree of market concentration.*

4.4.2 Distance as a proxy for import restrictions

As discussed in the previous chapter (see section 3.4.2), distance between Pretoria, South Africa and the capital of each of the 74 countries will be used as a proxy for import restrictions. A critical value is calculated as in equation 3.10. The α value chosen is 0.91. Only 10 countries distance is closer than the critical value of 6155 km. The 10 countries are as follows: Burkino Faso, Chad, Comoros, Djibouti, Equatorial Guniea, Ghana, Kenya, Mali, Niger and Saudi Arabia. As could be predicted most of these countries are on the African continent and, therefore, according to the distance criteria only, should be relatively easier to export. The DTI has indicated that the African continent is a high priority and further studies relating to exports to these countries should be undertaken (see section 5.4). The number of potential export opportunities increase from 9517, due to the degree of market importance, to 14987 because of the distance indicator (see section 3.4.2). There are 5470 extra potential export opportunities to these 10 countries. The distance criteria should in the future be further investigated and another possible solution

to use as a criteria could be to develop a logistic index (see also section 5.3). In the next section the 14 987 export opportunities will be further reduced when filter 4 is applied. In Figure 4.8 the results of filter 3, degree of market importance and distance is given.

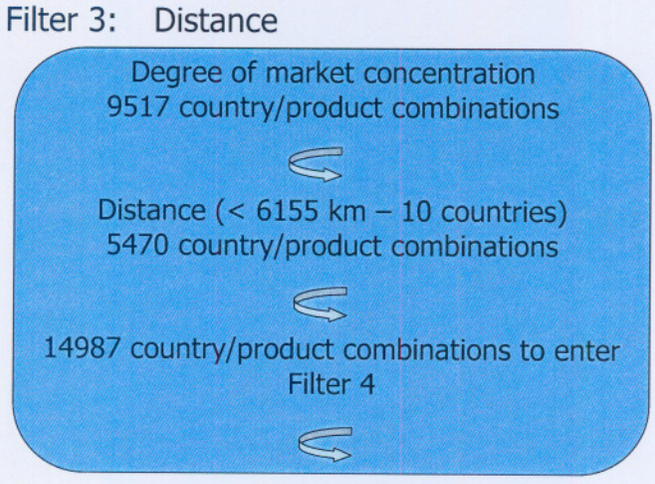


Figure 4.8: *Flowchart of filter 3: Distance.*

4.5 Results of filter 4: Final analysis

In filter 4 it was determined whether South Africa has a relatively large or small market share for a specific product group j to country i in terms of equation 3.11. The following 4 categories were identified:

- 1: South Africa's relative market share is relatively small.
- 2: South Africa's relative market share is intermediately small.
- 3: South Africa's relative market share is intermediately high.
- 4: South Africa's relative market share is relatively high.

Figure 4.9: *Flowchart of the final result of the filtering process.*

4.6 Clustering of the results of filter 4

In the previous sections the results obtained from the DSM, constructed for South Africa, were discussed. The top 25 SITC-product categories per number of export opportunities and the top 20 countries per number of export opportunities were highlighted. After consultation with the DTI and Mr. Riaan Le Roux, Chief Export Directorate, a clustering process followed according to regions in the world as deemed important by the DTI. Some of the 74 countries were excluded from the filtering process due to limited realistic export opportunities as identified through the model as well as the lack of foreign offices. In this section the results of the clustering process will be given.

The study identified 12 clusters in collaboration with the DTI. These 12 regional clusters include: Africa, Asia, Western Europe, Middle Europe, Eastern Europe, Scandinavia, Baltic States, Middle East, Australasia, North America, South America and the Caribbean. In the following subsections these 12 clusters will be discussed in relation to the countries included within these clusters and the number of realistic export opportunities per cluster and/or country identified within the study. In Figure 4.10 the 12 clusters are illustrated.

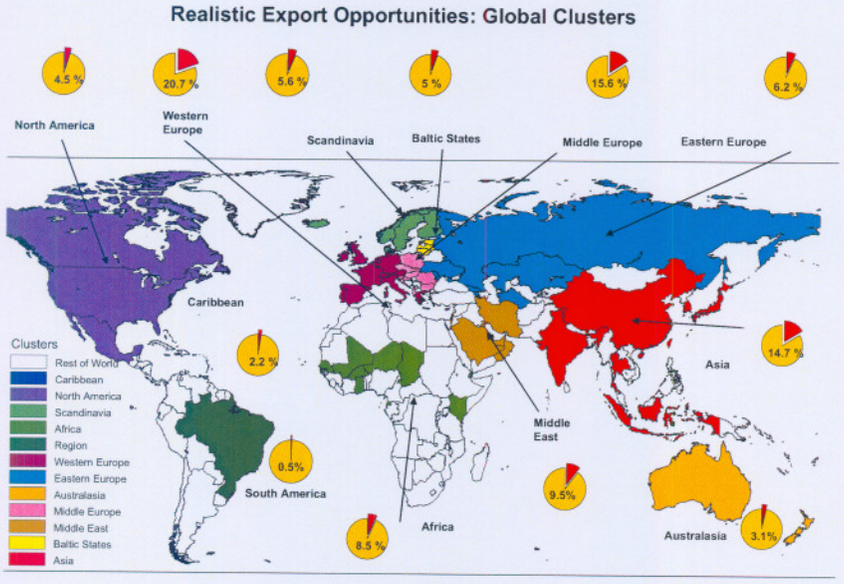


Figure 4.10: *Global clusters according to overall share of realistic export opportunities.*

4.6.1 Africa

Countries within this cluster include: Burkina Faso, Chad, Equatorial Guinea, Ghana, Kenya, Mali, Niger and Senegal. The total number of export opportunities that exist within this cluster totals 824. The major contributors include Ghana with 132 realistic export opportunities followed by Senegal with 111 and Kenya with 104 realistic export

opportunities. Figure 4.11 indicates the countries included in this cluster (see Appendix B, Table B.1).

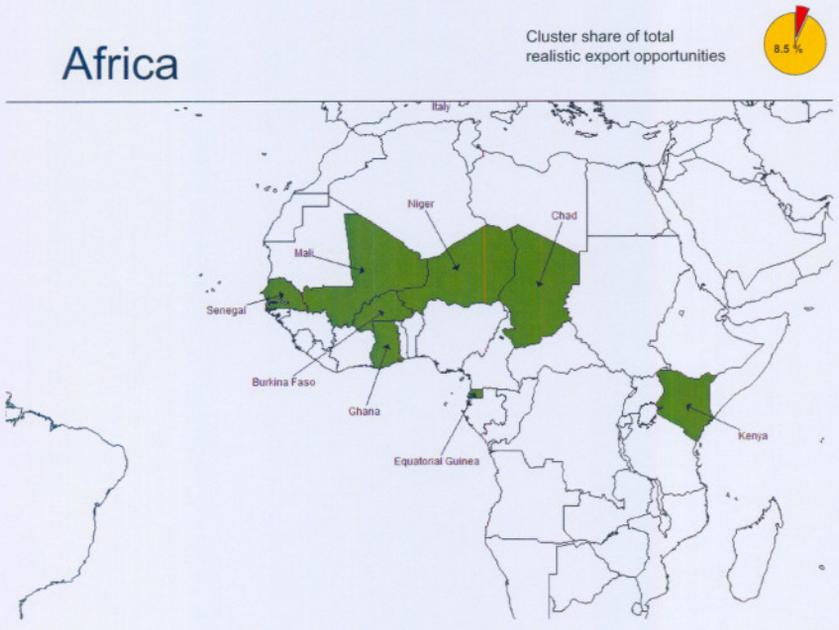


Figure 4.11: *African Cluster.*

4.6.2 Asia

In Figure 4.12 the Asian cluster is highlighted. Singapore, Taiwan, Hong Kong, Japan, Thailand, Indonesia, India, Korea Republic and China form the basis for the Asian cluster. The Asian cluster contributes 1420 realistic export opportunities and the major contributors are China with 259, Korea Republic with 220 and India with 198 realistic export opportunities (see Appendix B, Table B.2).

Europe has been subdivided into 3 regions that include: Western Europe, Eastern Europe, and Middle Europe. In the next sections these regions are discussed according to their number of realistic export opportunities and the countries included within each

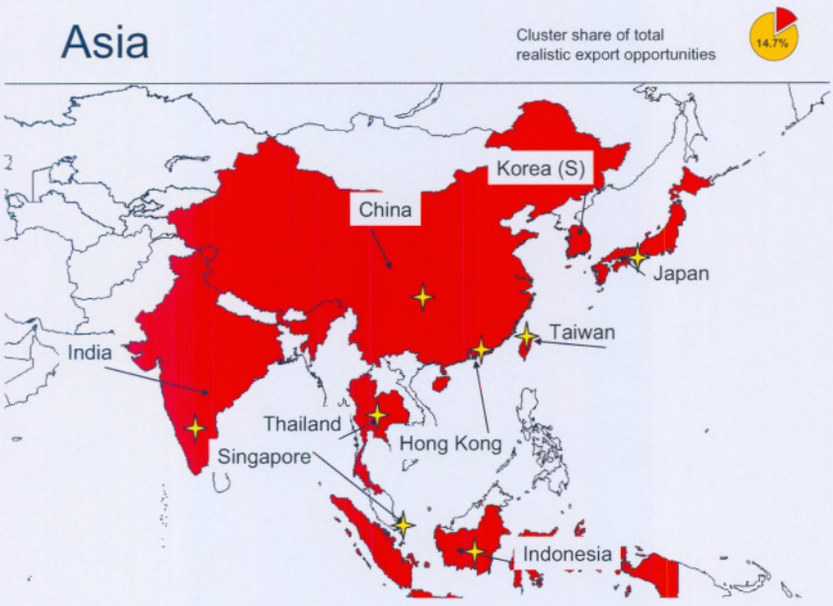


Figure 4.12: *Asian Cluster.*

of these regional clusters.

4.6.3 Western Europe

The main contributors to the Western Europe cluster include: France with 209 realistic export opportunities, Italy 184 and Germany and Belgium-Luxemburg both contributing 172 realistic export opportunities. Other countries included in this cluster are as follows: Austria, Cyprus, Greece, Ireland, Malta, Netherlands, Portugal, Spain, Switzerland and the UK. The cluster contributes 20.7% to the overall realistic export opportunities identified. In Figure 4.13 these countries are illustrated (see Appendix B, Table B.3).

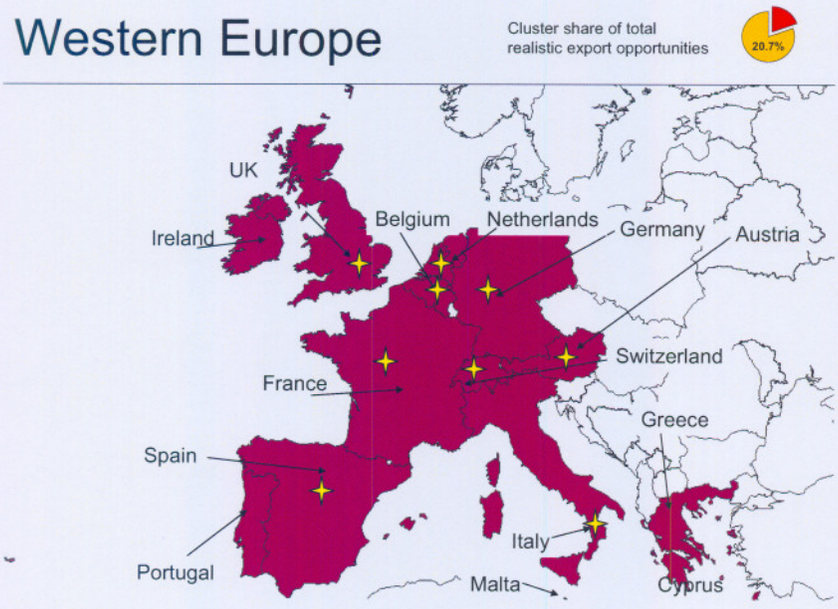


Figure 4.13: *Western Europe Cluster.*

4.6.4 Middle Europe

The following countries are included in the Middle Europe cluster: Albania, Bulgaria, Czech Republic, Croatia, Hungary, Poland, Romania and Slovenia. In Appendix B, Table B.4 the number of realistic export opportunities for these countries are given. In total the Middle Europe cluster contributes 1512 realistic export opportunities, 249 of the opportunities are contributed by Czech Republic and 227 opportunities by Croatia. The Middle Europe cluster is graphically represented in Figure 4.14.

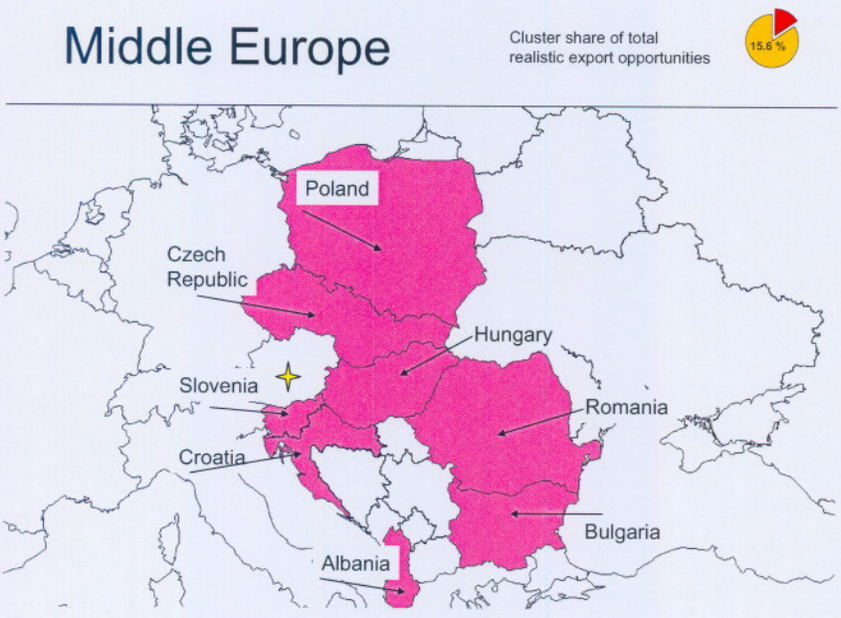


Figure 4.14: *Middle European Cluster.*

4.6.5 Eastern Europe

The Eastern Europe cluster consists of Armenia, Georgia, Moldova, Ukraine and Russia. The total cluster contributes to 7.5% to the overall share of realistic export opportunities. The Eastern Europe cluster is graphically represented in Figure 4.15. The main contributor to this cluster is Russia with 169 realistic export opportunities (see Appendix B, Table B.5).

4.6.6 Scandinavia

Sweden, Finland, Norway and Denmark are included in the Scandinavian cluster. Denmark contributes 162 and Norway 147 realistic export opportunities to the total of 545 realistic export opportunities (see Appendix B, Table B.6).

Figure 4.15: *Eastern European Cluster.*

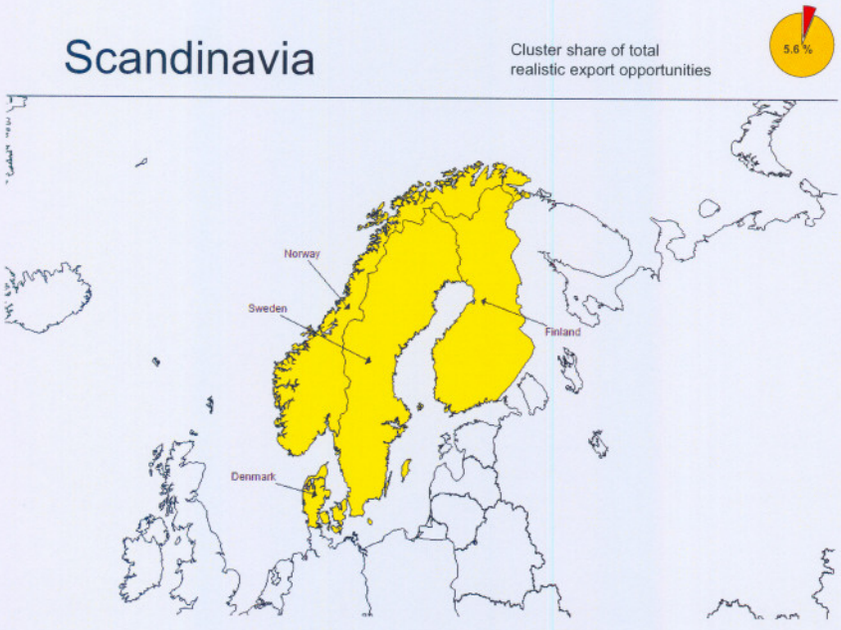


Figure 4.16: *Scandinavia Cluster.*

4.6.7 Baltic States

Latvia, Estonia and Lithuania contributes 152, 158 and 179 realistic export opportunities

to the total export opportunities respectively. The percentage contribution to the overall share of realistic export opportunities for the Baltic States is 5% (see Appendix B, Table B.7).

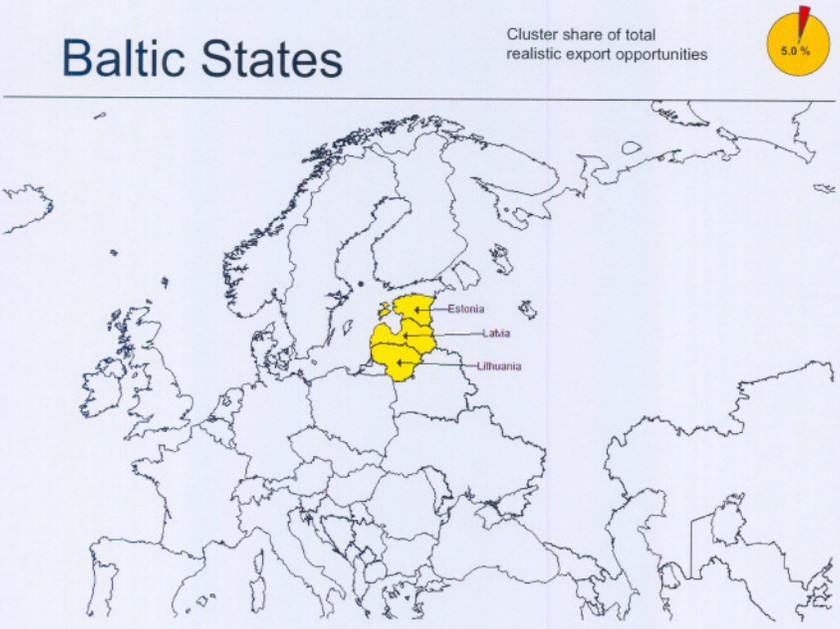


Figure 4.17: *Baltic States Cluster.*

4.6.8 Australisia

Australia and New Zealand form the Australisian cluster. The total contribution made by these two countries to the overall realistic export opportunities is 3.1%. Australia has 139 realistic export opportunities and New Zealand 166 realistic export opportunities (see Appendix B, Table B.8).

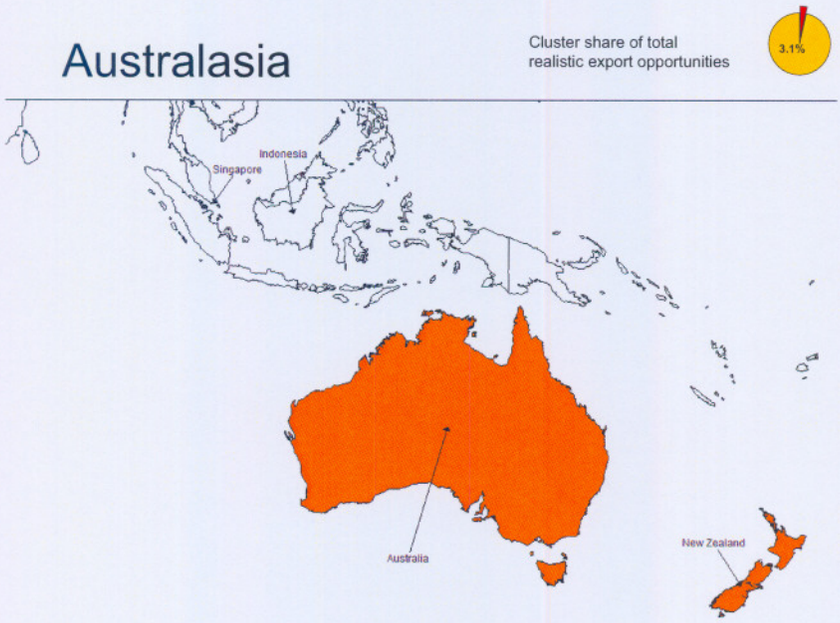


Figure 4.18: *Australisian Cluster.*

4.6.9 North America

The North American cluster has 434 realistic export opportunities with Mexico, Canada and the USA contributing 117, 142 and 175 realistic export opportunities respectively. When considering the overall share in realistic export opportunities, the North American cluster contributes 4.5%. Figure 4.19 illustrates this cluster graphically (see Appendix B, Table B.9).

4.6.10 South America

Brazil was the only country identified with realistic export opportunities within South America. Brazil contributed 0.5% to the overall share of realistic export opportunities with 51 realistic export opportunities (see Appendix B, Table B.10).

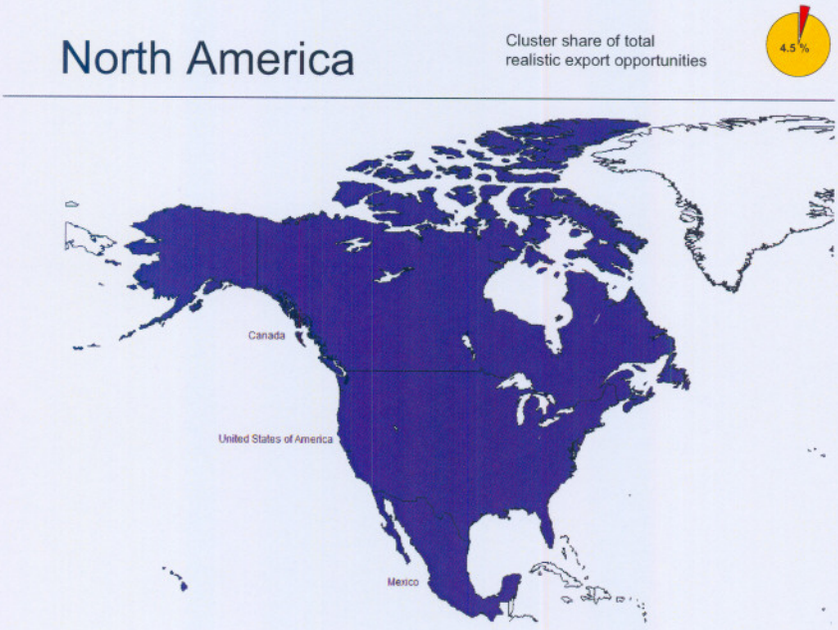


Figure 4.19: *North American Cluster.*

4.6.11 Caribbean

The Caribbean cluster contains the following countries: Bahamas, Barbados, Trinidad and Tobago and St Kitts Nevis. St Kitts Nevis, Trinidad and Tabago contribute 82 and 67 realistic export opportunities. The Caribbean cluster percentage contribution to the overall share of realistic export opportunities is 2.2% (see Appendix B, Table B.11).

4.6.12 Middle East

Countries such as Bahrain, Iran , Israel, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates form the Middle East Cluster. The cluster contributes 924 realistic export opportunities and overall 9.5% of all realistic export opportunities (see Appendix B, Table B.12).

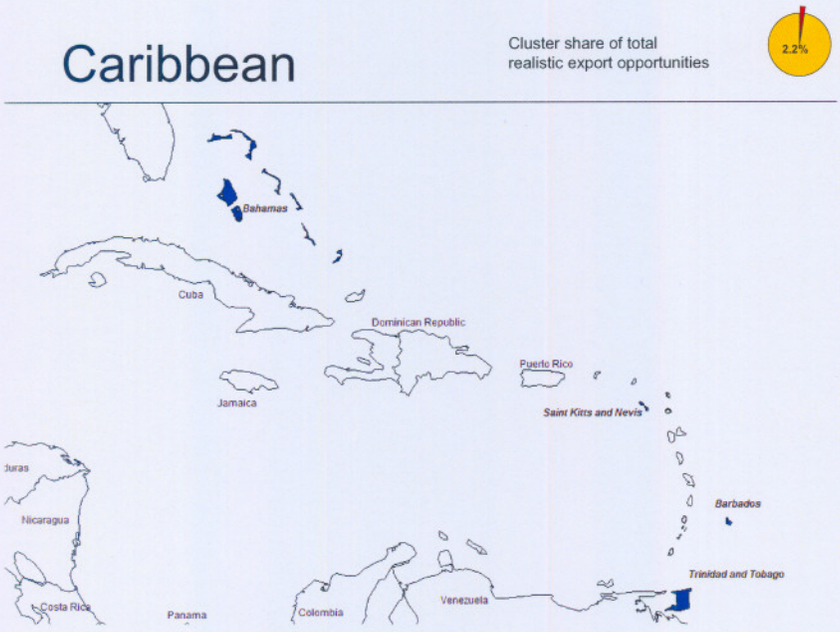


Figure 4.20: *Caribbean Cluster.*

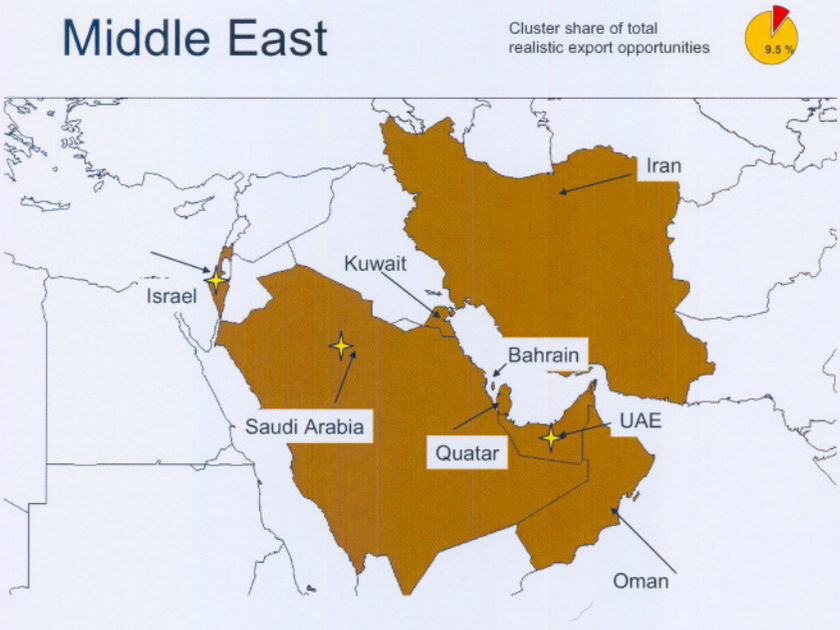


Figure 4.21: *Middle East Cluster.*

4.7 Summary

The results obtained from the application of the DSM for South Africa which was developed by Cuyvers *et al.* (1995:173-186) were discussed in this chapter. At each stage of