AN ANALYSIS OF SOUTH AFRICA'S MANUFACTURING SECTOR EXPORT POTENTIAL USING THE GROWTH IDENTIFICATION AND FACILITATION FRAMEWORK (GIFF).

by

GIFT CHIRWA

submitted in accordance with the requirements for
the degree of

MASTER OF COMMERCE

in the subject

ECONOMICS

at the

UNIVERSITY OF SOUTH AFRICA

SUPERVISOR: DR K.O AMUSA

CO-SUPERVISOR: PROF B MOYO

(August 2023)

Declaration

Name: Gift Chirwa

Student number: 64109879

Degree: Master of Commerce in the Subject of Economics

AN ANALYSIS OF SOUTH AFRICA'S MANUFACTURING SECTOR EXPORT POTENTIAL USING THE GROWTH IDENTIFICATION AND FACILITATION FRAMEWORK (GIFF).

I declare that the above dissertation is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

I further declare that I submitted the dissertation to originality checking software and that it falls within the accepted requirements for originality.

I further declare that I have not previously submitted this work, or part of it, for examination at Unisa for another qualification or at any other higher education institution.

10 August 2023

SIGNATURE DATE

Abstract

Increased world trade has enhanced competition between manufacturers globally across countries. However, over the past 20 years, the manufacturing industry's share in South Africa's GDP, employment, and exports has been waning. In the wake of these changes, this study seeks to identify the potential export products of the South African manufacturing industry. Further, this study seeks to identify the sector's main constraining factors and suggest mitigation policies. To this end, the Growth Identification and Facilitation Framework (GIFF) is utilised. This is an industrial development approach that identifies other countries with similar economic endowments as South Africa whose manufacturing sectors and exports have grown relatively faster over the 20 years between 1998 and 2018, but which now have lost that export competitiveness. It is envisioned that if the benchmark countries can grow manufacturing export competitiveness relatively faster than South Africa by exporting these products, then South Africa may realize similar success by trailing their manufacturing sector and targeting similar goods for export.

Utilising the GIFF, this study identifies Vietnam, India and China as the benchmark countries and uses the Normalised Revealed Comparative Advantage (NRCA) index on 200 manufacturing sub-sectorial export data to determine the competitiveness of these subsectors from 1998 to 2018. A total of 24 manufacturing subsectors from the benchmark countries are identified for South Africa's production focus. In addition, this study identifies scaling-up potential in subsectors where South Africa exhibits fast export growth through gaining more competitiveness in the export market. A total of 37 of the 199 South African manufacturing subsectors were found to be competitive as at 2018 and are forecast to remain competitive through to 2023. However, while 15 manufacturing subsectors were not found competitive, their NRCA has been increasing such that they are forecast to attain competitiveness by 2023. Of the 33 subsectors identified as labour-intensive and resource-intensive manufactures, the study found a general increase in imports of natural resource manufacturers, 25 of the 33 subsectors did not show any export competitiveness from 2000 to 2018 and neither are they forecast to gain it. Consequently, the lack of export competitiveness of these sectors may instead justify their importation as necessary raw materials for South Africa. However, within the list, South Africa possesses the capability to manufacture certain goods locally.

The study finds that rising wages in the benchmark countries presents an opportunity for South Africa to attract labour-intensive firms that seek new, low-cost production locations. However, while South Africa had the lowest electricity costs prior to 2017, from 2018 electricity costs for South Africa became the second highest among these countries which now suggests that other constraints may have limited the improvement of manufacturing competitiveness prior 2017. Compared with its benchmark countries, South Africa had the highest real interest rate in 2018, representing the highest cost of borrowing for manufacturers. The current sunset industries of China, India and Vietnam have potential

to be South Africa's sunrise industries that can improve locally manufactured exports and create local employment. This study concludes by recommending that South Africa improves the quality and policies governing exports, and that it addresses the constraints of interest rates, labour, and electricity costs (amongst other factors) to safeguard and strengthen the dynamics that enable South Africa's competitive subsectors.

Key Terms: South Africa; Growth Identification and Facilitation Framework (GIFF); Competitiveness; Comparative Advantage; Manufacturing; Export Potential; Normalised Revealed Comparative Advantage.

Isifinqo

Nakuba ukwanda kohwebo lwamazwe ngamazwe kukhuphule ukuncintisana phakathi kwabakhiqizi emhlabeni jikelele, kule minyaka engama-20 edlule, isabelo semboni yezokukhiqiza ku-GDP yaseNingizimu Afrika, ukuqashwa kanye nokuthunyelwa kwempahla kwamanye amazwe besilokhu sincipha. Ngemuva kwalezi zinguquko, lolu cwaningo luhlose ukuhlonza imikhiqizo engase ibe khona embonini yokukhiqiza yaseNingizimu Afrika. Ngaphezu kwalokho, lolu cwaningo luhlose ukuhlonza izici ezingqala eziyisithiyo kulo mkhakha futhi luphakamise nezinqubomgomo zokunciphisa lokhu. Kuze kube manje, kusetshenziswa i-Growth Identification and Facilitation Framework (GIFF). I-GIFF iyindlela yokuthuthukisa izimboni ehlonza amanye amazwe anekhono lezomnotho elifana nelaseNingizimu Afrika futhi imboni yawo yezokukhiqiza kanye nokuthunyelwa kwempahla kwamanye amazwe kukhule ngokushesha uma kuqhathaniswa phakathi neminyaka engama-20 phakathi kunyaka we-1998 nowezi-2018 kodwa manje aselahlekelwe yilelo khono lokuncintisana kwamanye amazwe. Kucatshangwa ukuthi uma amazwe okulinganisa angakhulisa ukuncintisana kwezokukhiqiza ngokushesha kuneNingizimu Afrika ngokuthumela le mikhiqizo emazweni angaphandle, iNingizimu Afrika ingase ithole impumelelo efanayo ngokulandela umkhakha wawo wokukhiqiza futhi iqondise izimpahla ezifanayo ezizothunyelwa kwamanye amazwe.

Kusetshenziswa i-GIFF, lolu cwaningo luhlonza iVietnam, Indiya kanye neShayina njengamazwe okulinganisa futhi lisebenzisa inkomba ye-NRCA ye-Normalized Revealed Comparative Advantage (NRCA) kudatha yokukhiqiza enga-200 yokuthekelisa engaphansi ukuze kutholwe ukuncintisana kwalezi zigaba ezingaphansi kusukela ngonyaka we-1998 kuya kowezi-2018. Isamba sezigatshana zokukhiqiza ezingama-24 emazweni okulinganiswa ahlonzwe ukuze iNingizimu Afrika igxile ekukhiqizeni. Ukwengeza, lolu cwaningo luhlonza amandla okukhula emikhakheni engaphansi lapho iNingizimu Afrika ikhombisa ukukhula okusheshayo kokuthunyelwa kwempahla kwamanye amazwe ngokuzuza ukuncintisana okwengeziwe emakethe yokuthekelisa. Isamba esingama-37 kweziyi-199 zezimboni zezokukhiqiza zaseNingizimu Afrika ezitholwe zikwazi ukuncintisana ngonyaka wezi-2018 futhi kubikezelwe ukuthi zizoqhubeka nokuncintisana kuze kube ngunyaka wezi-2023. Izigatshana eziyi-15 zokukhiqiza zitholakale zingakwazi ukuncintisana, nokho, i-NRCA yazo ibilokhu ikhula kangangokuthi kulindeleke ukuthi ifinyelele ukuncintisana ngonyaka wezi-2023. Ezigabeni ezingaphansi ezingama-33 ezihlonzwe njengabakhiqizi abasebenza kakhulu nabasebenzisa izinsizakusebenza, izigaba ezingaphansi ezingama-25 kwezingama-33 ezingabonisi noma yikuphi ukuncintisana kokuthekelisa phakathi konyaka wezi-2000 nowezi-2018 futhi azibikezeli ukuthi zizokuzuza. Ngakho-ke, ukuntuleka kokuncintisana kwamanye amazwe kwalezi zinkampani kungase kuthethelele ukungenisa kwazo izimpahla zokusetshenziswa ezidingekayo eNingizimu Afrika. Kodwa-ke, iNingizimu Afrika inamandla okwenza kuleli lizwe izimpahla ezithile ohlwini lokungeniswa kwamanye amazwe .

Ucwaningo luthola ukuthi ukukhuphuka kwezindleko zikagesi kanye nenzalo ephezulu yangempela yizingqinamba emkhakheni wezokukhiqiza wezwe. Izimboni zamanje zokushona kwelanga eShayina, eNdiya naseVietnam zinamandla okuba izimboni zaseNingizimu Afrika eziphuma ngaphandle, zithuthukise ukuthengiswa okukhiqizwa kuleli kanye nokudala amathuba omsebenzi akuleli. Lolu cwaningo luphetha ngokuncoma ukuthi iNingizimu Afrika kufanele ithuthukise izinga kanye nezinqubomgomo ezilawula ukuthunyelwa kwayo emazweni angaphandle, nokuthi kufanele ibhekane nezingqinamba zentela yenzuzo, izindleko zabasebenzi kanye nogesi (phakathi kwezinye izinto) ukuze kuvikelwe futhi kuqinise amandla okwenza iNingizimu Afrika ibe nokuncintisana kwezigaba.

Amagama abalulekile: iNingizimu Afrika; I-Growth Identification and Facilitation Framework (GIFF); Ukuncintisana; Inzuzo yokuqhathanisa; Ukukhiqiza; Amandla Okuthumela ngaphandle; Inzuzo Eqhathanisayo Eveziwe futhi Ejwayelekile

Isishwankathelo

Nangona urhwebo lwamazwe ngamazwe ehlabathi lwandise ukhuphiswano phakathi kwabarhwebi behlabathi kule minyaka ingama-20 idluleyo, isabelo sabarhwebi baseMzantsi Afrika kwiGDP siya sisihla. Ngenxa yezi nguqu, esi sifundo sifuna ukuchonga iimveliso zorhwebo loMzantsi Afrika ezinokuthunyelwa kwamanye amazwe. Ngaphezulu, esi sifundo sifuna ukuchonga izinto ezibambezela urhwebo, emva koko sicebise ngeenkqubo ezinokuba luncedo. Ukuze kuphunyezwe ezo ngcebiso, kusetyenziswe isakhelo sokusebenza esaziwa ngokuba yi*Growth Identification and Facilitation Framework (GIFF)*. Le *GIFF* yindlela yophuhliso echonga amanye amazwe anemithombo yezoqoqosho efanayo neyoMzantsi Afrika, mazwe lawo anamacandelo okuvelisa nokuthumela kumazwe ehlabathi akhule ngokukhawuleza kule minyaka idluleyo ingama-20 nebiphakathi kweminyaka ye-1998 kunye nama-2018 ekubonakala ukuba ngoku liyehla izinga lokhuphiswano phakathi kwaloo mazwe. Kukholelwa ukuba xa la mazwe achongiweyo enokukhulisa izinga lokhuphiswano ngokukhawuleza okudlula uMzantsi Afrika ekuthumeleni iimveliso zawo kwihlabathi liphela, uMzantsi Afrika unganempumelelo ekulandeleni loo macandelo amanye amazwe, nawo uzame ukuthumela iimveliso ezifanayo kumazwe ehlabathi.

Ngokusebenzisa i*GIFF*, esi sifundo sichonge iVietnam, i-India kunye neChina njengamazwe othelekiso, sabuya sasebenzisa isalathisi esiyi*Normalised Revealed Comparative Advantage (NRCA)* sengxelo yokuthunyelwa kweemveliso ezingama-200 kumazwe ehlabathi phakathi kweminyaka ye-1998 nama-2018 ngenjongo yokuqwalasela amandla okukhuphisana kula macandelo. Angama-24 ewonke amacandelo okuvelisa achongiweyo kula mazwe othelekiso, ngenjongo yokuqwalasela ukuvelisa koMzantsi Afrika. Ngaphaya koko, esi sifundo sichonge Amandla okuziphucula kumacandelo apho uMzantsi Afrika ubonakalisa ukukhawuleza kokukhula ekuthumeleni iimveliso ehlabathini ngokuthi ukhulise ukhuphiswano kwimarike yokuthumela iimveliso kwihlabathi ngokubanzi. Angama-37 kwi-199 amacandelo oMzantsi Afrika afumaniseka enokhuphiswano ngonyaka wama-2018, nekwaqikelelwa ukuba aya kuhlala enjalo de kube ngowama-2023. Amacandelo okuvelisa ali-15 afumaniseka engenalo ukhuphiswano, noxa kunjalo i*NRCA* yawo iyakhula, kangangokuba kuqikelelwa ukuba amandla awo okhuphiswano aya kuba ekhule ngokwaneleyo ngowama-2023. Kumacandelo angama-33 achongwe njengalawo asebenzisa nzima nafuna imithombo emininzi, angama-25 akabonisanga mandla okhuphiswano phakathi kweminyaka yama-2000 neyama-2018 kwaye akuqikelelwa ukuba angakhula loo mandla okhuphiswano. Ngoko ke, ukungabikho kwamandla okhuphiswano kula macandelo, ekuthumeleni iimveliso kwihlabathi kungasisizathu esivakalayo sokubizela ngaphakathi imithombo ekrwada yokuxhasa ukuvelisa eMzantsi Afrika. Noxa kunjalo, uMzantsi Afrika unawo Amandla okuvelisa iimveliso ezithile ezikuluhlu lwezo zidweliselwe ukubizelwa ngaphakathi.

Esi sifundo sifumanise ukuba ukunyuka kwamaxabiso ombane nawenzala yeebhanki kuyimiqobo ekukhuleni kwecandelo lorhwebo. Urhwebo olukhoyo lweemveliso eziphelelwayo (olwaziwa ngokuba yi*unset industries*) eChina, eIndia naseVietnam lunakho ukukhokelela kurhwebo lweemveliso eziphelelwayo eMzantsi Afrika, lukhulise ukuthunyelwa ngaphandle kweemveliso ezenziwe apha ekhaya, ludale namathuba engqesho. Esi sifundo sivala ngokucebisa ukuba uMzantsi Afrika mawuphucule umgangatho nemigaqo nkqubo elawula ukuthunyelwa ngaphandle kweemveliso zawo, kwaye kufuneka uqwalasele imiqobo edalwa sisantya senzala yeebhanki, iindleko zokusebenza nezombane (phakathi kweminye imiba) ukwenzela ukuba ikhusele kwaye yomeleze imibandela eguquguqukayo ekhulisa amandla okhuphiswano kumacandelo orhwebo eMzantsi Afrika.

Amagama aphambili: Mzantsi Afrika; Isakhelo Sokuchonga Nokukhuthaza Ukukhula Kurhwebo (*GIFF*); Amandla Okukhuphisana; Amandla Othelekiso; Ukuvelisa; Amandla okuthumela ngaphandle; Amandla Okhuphiswano Kuveliso Nokuthumela Ngaphandle.

Contents

Declaration ii
Abstract iii
List of Figures xiv
List of Tables xv
List of Appendices xvii
Abbreviations and Acronyms xviii
Chapter One 1
1.0 Introduction 1
1.1 Background of the Study 3
1.2 Problem Statement 5
1.3 Research Objectives and Questions 7
1.3.1 Research Objectives: 7
1.3.2 Research Questions 7
1.4 Significance of the Study 7
1.5 Research Design and Methodology 8
1.6 Data Analysis and Data Sources 9
1.7 Demarcations and Limits of the Study 10
1.8 Conclusion 11
1.9 The Structure of the Rest of the Dissertation 12
Chapter Two: Overview of South African Manufacturing Sector 14
2.0 Introduction 14
2.1 The Manufacturing Sector's Contribution to the South African Economy 14
2.2 The Contribution to Employment of the South African Manufacturing Sector 19
2.3 The South African Manufacturing Sector and International Trade 20
2.4 Global Share of South African manufactured exports 24
2.5 Number of exported HS6 digit products 25
2.6 South Africa's Manufacturing Exports by Technological Classification 26

2.7 South Africa's Manufacturing Sector Export Destinations and their Trade Agreements 28
2.8 South African Trade Indicators 31
2.8.1 Manufacturing Exports Per Capita for South Africa 32
2.8.2 Revealed Comparative Advantage (RCA) for South African manufacturing. 32
2.8.3 Export to Output Percentage Ratio for South Africa's Manufacturing Sector 34
2.9 Binding Constraints for South African Manufacturing Subsectors 34
2.9.1 Metals, Metal Products, Machinery and Equipment 35
2.9.2 Clothing, Textiles, Footwear and Leather – The CTFL Subsector 37
2.9.3 The Sugar Sector 38
2.9.4 Wood and Paper; Publishing and Printing 39
2.9.5 Petroleum, Chemicals, Rubber and Plastic Subsector 39
2.9.6 Furniture Manufacturing 40
2.9.7 Food, Beverages and Tobacco Manufacturing Subsectors 41
2.10 Programmes to Support the South African Manufacturing Sector 42
2.10.1 Industrial Financing and Incentives 42
2.10.2 Developmental Trade Policy 43
2.10.3 Innovation and Technology 44
2.10.4 Special Economic Zones (SEZ) and Industrial Parks 44
2.10.5 Public Procurement 45
2.11 Conclusion 45
Chapter Three: Literature Review 47
3.0 Introduction 47
3.1 Trade Theories on Competitiveness and Trade. 47
3.2 The Concept of Competitiveness, Comparative Advantage, and Export Potential 49
3.3 Measures of Comparative Advantage 50
3.3.1 Measures of Comparative Advantage Pre-Trade 50

3.3.2 Measures of Comparative Advantage Post-Trade 52
3.3.3 Balassa's Index of Revealed Comparative Advantage 52
(a) Advantages of the Revealed Comparative Advantage - RCA or Balassa Index 53
(b) Disadvantages of the Revealed Comparative Advantage - RCA or Balassa Index 54
3.3.4 Alternative Measures of the Revealed Comparative Advantage Index 55
(i) Indices Accounting for Import Data 56
(ii) Trade-Cum-Production Indices - Containing Both Trade and Production Variables 56
(iii) Alternative Measures with Export Only Variables 57
(iv) Indices Using Hypothetical Situation - Normalised Revealed Comparative Advantage (NRCA) 57
3.4 Empirical Review of Comparative Advantage Measures 58
3.5 Factors Influencing Competitiveness 59
3.6 The GIFF Approach to Improving Competitiveness and Growing Exports 64
3.7 Empirical Literature Review 65
3.8 Conclusion 77
Chapter Four: Methodology 79
4.0 Introduction 79
4.1 Application of the Growth Identification and Facilitation Framework (GIFF) 80
4.2 Identifying Benchmark Countries 80
4.2.1 Identifying countries with similar resource endowments as South Africa 81
4.2.2 Identifying countries from (4.2.1) with moderately higher growth in comparison to South Africa 82
4.2.3 Selection of benchmark countries with well performing manufacturing sectors 82
4.2.4 Selecting benchmark countries by levels of competitiveness. 82
4.3 Tradeable manufactured goods of benchmark countries for South African production 83
4.4 Scaling Up South African Manufacturers 86
4.5 Identifying Labour-Intensive Manufactured Imports with Potential to be Manufactured in South Africa 87

4.6 Removing Binding Constraints 87
4.7 Conclusion 90
Chapter Five: Presentation and Analysis of Results 91
5.0 Introduction 91
5.1 Selected Benchmark Countries 91
(a) Vietnam 92
(b) India 93
(c) China 93
5.2 Performance of the Benchmark Countries Relative to South Africa 94
5.3 Manufacturing Subsectors Identified as Possessing Export Potential for South Africa 96
5.4 Scaling-Up South African Manufacturers 110
5.4.1 South African manufacturing subsectors competitive as at 2018 and forecast to maintain competitiveness from 2019 to 2023 110
5.4.2 Uncompetitive South African Manufacturing subsectors as at 2018, but forecast to gain competitiveness between 2019 and 2023 113
5.4.3 South African manufacturing subsectors, competitive as at 2018 but are forecast to lose competitiveness between 2019 and 2023 115
5.4.4 Sectors that had lost competitiveness as at 2018 and projected to remain uncompetitive as at 2023 116
5.5 Labour-Intensive Manufactured Imports with Potential for South African Production 118
5.6 Macroeconomic Binding Constraints across South African Manufacturing Subsectors 120
5.6.1 Labour 120
5.6.2 Electricity 123
5.6.3 Interest Rates 125
5.7 Conclusion 126
Chapter Six: Conclusion and Recommendations 128

6.1 Conclusion of Study 128
6.2 Recommendations for the General South African Manufacturing Sector 131
(a) Trade Policy 132
(b) Trade Facilitation Measures 132
(c) Infrastructure 133
(d) Research and Technology 133
(e) Sectoral Policies 134
6.3 Recommendations for the South African Major Binding Constraints Analysed 134
(a) Recommendations on Labour 134
(b) Recommendations on Electricity 135
(c) Recommendations on Cost of Capital 136
6.4 Areas for Further Research 137
List of References 138
Appendices 151

List of Figures

Figure 2.1: South African manufacturing sector exports, imports and trade balance from 2000 to 2018 in current USD 21
Figure 2.2: South African Manufacturing exports as a percentage of total exports; manufacturing exports as a percentage of GDP and total exports as a percentage of GDP (2000-2018) 22
Figure 2.3: Share of South African Manufacturing in world manufacturing exports (2000-2019) 24
Figure 2.4: Number of Exported Harmonised System - HS6 Digit Products 26
Figure 2.5: Manufacturing exports by technological classification for South Africa (1998 - 2018) 27
Figure 2.6: Manufacturing Exports Per Capita for South Africa (2000-2019) 32
Figure 2.7: South Africa's manufacturing export to output percentage ratio and its growth rate (1998-2020) 34
Figure 4.1: Summary of GIFF steps as utilised in the study 89
Figure 5.1: Statutory nominal gross monthly minimum wage for China, India, Vietnam and South Africa from 1998-2013 (U.S. dollars). 121
Figure 5.2: Price of electricity (US cents per kWh) for Vietnam, South Africa, India and China from 2015 to 2020 125
Figure 5.3: Lending interest rates (%) for Vietnam, India, China and South Africa from 1998-2018 125

List of Tables

Table 2.1: Percentage contributions to South Africa's GDP at current prices (1998 to 2018) 15
Table 2.2: Growth of South Africa's Economic Sectors, 1998 to 2018 (%) 16
Table 2.3: Manufacturing subsectors as a percentage of total manufacturing sales / output for South Africa (1998 - 2018) 17
Table 2.4: Size of manufacturing subsectors as a percentage of total manufacturing sales for South Africa (2018) 18
Table 2.5: South African manufacturing sector employment figures from 1995 to 2020 19
Table 2.6: South Africa's top manufactured export products (2000 – 2018) 23
Table 2.7: Ranking of South Africa's top manufactured export products 24
Table 2.8: South Africa's major manufactured export destination as a percentage by region (1995 to 2020) 28
Table 2.9: South African Manufacturing Subsectors with Comparative Advantage for the year 2021 33
Table 2.10: Value of funding approved to IPAP priority industries 2008-2017 from IDC. 43
Table 3.1: South African ranking of the importance of each factor of competitiveness 60
Table 3.2: Summary of Empirical Studies Reviewed on the GIFF 75
Table 5.1: Shortlisted Benchmark Countries and their Sorting Variables 92
Table 5.2: Number of Competitive Manufacturing Subsectors for Vietnam, India, China, and South Africa from 1998 to 2018 96
Table 5.3: Vietnam's manufacturing subsectors that lost competitiveness between 1998 and 2018 or are projected to lose competitiveness from 2019 to 2023. 99
Table 5.4: India's manufacturing subsectors that lost competitiveness between 1998 and 2018 or are projected to lose competitiveness from 2019 to 2023. 101
Table 5.5: China's manufacturing subsectors that lost competitiveness between 1998 and 2018 or are projected to lose competitiveness from 2019 to 2023. 104
Table 5.6: Common Subsectors that lost competitiveness among the benchmark countries between 1998 and 2018 or are projected to lose competitiveness from 2019 to 2023. 106
Table 5.7: Summary of subsectors that lost competitiveness amongst the benchmark countries between 1998 and 2018 or are projected to lose it from 2019 to 2023. 107
Table 5.8: Manufactured Goods identified from the Benchmark Countries as Possessing Export Potential for South Africa 108

Table 5.9: South African manufacturing subsectors competitive as at 2018 and forecast to maintain competitiveness from 2019 to 2023 111
Table 5.10: Summary of South African sectors competitive as at 2018 and forecast to maintain competitiveness between 2019 and 2023 112
Table 5.11: Uncompetitive South African manufacturing subsectors as at 2018, forecast to attain competitiveness between 2019 and 2023 113
Table 5.12: Summary of Uncompetitive South African sectors as at 2018 but forecast to attain competitiveness between 2019 and 2023 114
Table 5.13: South African competitive subsectors as at 2018 but are forecast to lose competitiveness between 2019 and 2023 115
Table 5.14: Summary for South African competitive subsectors as at 2018 but forecasted to lose competitiveness between 2019 and 2023 115
Table 5.15: South African subsectors not competitive as at 2018 and forecast to remain uncompetitive as at 2023 116
Table 5.16: Summary of South African subsectors that lost competitiveness in 2018 and are forecast to remain uncompetitive between 2019 and 2023. 117
Table 5.17: Average annual percentage change in value of manufactured imports for South Africa's Labour-Intensive Manufactured Imports from 2000-2018 (current USD). 119
Table 5.18: Price of electricity (US cents per kWh) for Vietnam, South Africa, India and China from 2015 to 2020 124

List of Appendices

Appendix 1: SITC Rev.3 Products, By Technological Categories (Lall (2000) 151
Appendix 2: Revealed Comparative Advantage for South Africa's Competitive Manufacturing Subsectors as at 2021 154
Appendix 3: Manufactured goods by degree of manufacturing groups (SITC Rev. 3).....155
Appendix 4: Vietnams NRCAs for subsectors that exhibited competitiveness during the study but were not competitive as at 2018 or were competitive but projected to lose competitiveness by end of 2023 159
Appendix 5; India's NRCAs for subsectors that exhibited competitiveness during the study but were not competitive as at 2018 or were competitive but projected to lose competitiveness by end of 2023 160
Appendix 6: China's NRCAs for subsectors that exhibited competitiveness during the study but were not competitive as at 2018 or were competitive but projected to lose competitiveness by end of 2023 161
Appendix 7: South African manufacturing subsectors competitive as at 2018 and forecasted to maintain competitiveness between 2018 and 2023.....162
Appendix 8: South African sectors not competitive as at 2018 but forecasted to attain competitiveness by 2023.....163
Appendix 9: South African sectors competitive as at 2018 but forecasted to lose competitiveness by 2023.....164
Appendix 10: South African sectors that had lost competitiveness as at 2018 and forecast to remain uncompetitive between 2019 - 2023.....165
Appendix 11: Average Annual Percentage Change in Value of Manufactured Imports for South Africa from 2000-2018 (current USD).....166
Appendix 12: South Africa Manufacturing Sector Trade from 2000-2018 (current USD)...170

Abbreviations and Acronyms

AfCFTA	African Continental Free Trade Area
AGOA	African Growth and Opportunity Act
BRICS	Brazil, Russia, India, China and South Africa
CEO	Chief Executive Officers
CAT	Clothing and Textile
CIP	Competitive Industrial Performance Index
CSPA	Comprehensive Strategic Partnership Agreement
DTI	Department of Trade and Industry
EPA	Economic Partnership Agreement
EFTA	European Free Trade Association
EU	European Union
FDI	Foreign Direct Investment
GATT	General Agreement on Tariffs and Trade
GI	Geographical Indication
GS1	Global Standards
GDP	Gross Domestic Product
GIFIUD	Growth Identification and Facilitation for Industrial Upgrading and Diversification
GIFF	Growth Identification and Facilitation Framework
HS	Harmonised System
IBSA	India, Brazil, South Africa Forum
IDC	Industrial Development Corporation
IPAP	Industrial Policy Action Plan
ICP	International Comparison Program
MVA	Manufacturing Value Added
MERCOSUR	Mercado Común del Sur (Southern Common Market)
MIDP	Motor Industry Development Programme
NACI	National Advisory Council on Innovation
NRCA	Normalised Revealed Comparative Advantage
NAFTA	North American Free Trade Agreement
n.e.s.	Not elsewhere specified
OECD	Organization for Economic Cooperation and Development

PTA	Preferential Trade Agreement
PPP	Purchasing Power Parity
RCA	Revealed Comparative Advantage
SEDA	Small Enterprise Development Agency
SA	South Africa
SAFDA	South African Farmers Development Association
SARB	South African Reserve Bank
SARS	South African Revenue Service
SACU	Southern African Customs Union
SADC	Southern African Development Community
SEZ	Special Economic Zones
SITC	Standard International Trade Classification
SMMEs	Small, Medium and Micro Enterprises
Stat-SA	Statistics South Africa
SWOT	strengths, weaknesses, opportunities and threats
SSA	Sub-Saharan Africa
TIPS	Trade and Industrial Policy Strategies
T-FTA	Tripartite Free Trade Area
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNIDO	United Nations Industrial Development Organisation
USD	United States Dollar
USA	United States of America
WEF	World Economic Forum
WTO	World Trade Organization

Chapter One

1.0 Introduction

International trade makes it possible for countries to import goods and services that they do not readily possess or if they could produce them, trade makes it possible for importing them relatively cheaper or in increased variety. Dinh and Monga (2013) note that exports helps developing nations to benefit from the valuable lessons learned from exposure to international competition and to import the technology and skills required to advance up value chains. For most countries, exports remain the main source of earning foreign currency and in turn, the management of their exchange rates. According to Dinh and Monga (2013) export focused nations have experienced faster economic growth. This is buttressed by the South African National Advisory Council on Innovation (NACI, 2003) who notes that export driven growth rates are higher and more stable than domestic demand driven economic growth. Rankin (2013) after looking at the export trends of South African firms discovered that exporters are more efficient and create employment at relatively higher average salaries, in the process improving standards of living. UNIDO (2020) views the manufacturing industry's exports as promoting South Africa's economic resilience by diversifying the risk from commodity price drops, economy-wide recessions, or dominance of the service sector. Manufactured exports also increase the market size for South African manufacturers, and this can open opportunities for gaining economies of scale which can subsequently result in a reduction in manufacturing overheads (Rankin, 2013).

In 2020, the South African formal manufacturing sector employed 1 134 696 , which was a reduction from the 1 486 036 people employed in 1995. Informal employment for the sector rose from 251 472 to 338 041 for the same period. Overall, the manufacturing sector suffered a 336 000 job loss between 1995 and 2020 (Quantec Easy Data, 2022). The World Bank (2023a) and Statistics South Africa (2019) data each show a steadily declining manufacturing share in Gross Domestic Product (GDP) from 19.6% in 1998 to 13.2% in 2018, for the same time span, growth averaged 2% annually. The proportion of manufacturing in a nation's GDP typically indicates its degree of industrialization.

Over the last 30 years, globalisation has resulted in increased trade and subsequent increased competition between manufacturers across countries (Siddique & Ganguly, 2019). Several researchers (see Draper et al., 2018; Bhorat & Rooney, 2017; Kaplan, 2007; Marshall, 2009; Pillay, 2013; Viljoen, 2016) attribute the increase in trade to amongst others; a reduction in tariffs, technological advancements in communication, global value chains and transportation which have all contributed to lowered trading costs. The global competition can be seen through lower production costs, improved quality, higher performance products, and shorter lead and innovation times as well as reduced inventories. These developments can be a source of opportunity or risk for South Africa.

The United Nations Industrial Development Organization - UNIDO (2019) assesses and benchmarks industrial competitiveness of countries using its annual Competitive Industrial Performance (CIP) index. The CIP measures a nation's ability to manufacture and export products in a market-competitive manner and to restructure its economy towards industrialisation. South Africa's CIP ranking has regressed 8 positions from a ranking of 44 out of 150 countries in 1998 to 52 out of 152 countries in 2018. Although the drop in the ranking is marginal, considering the twenty-year time span from 1998 to 2018, the drop also reflects a manufacturing sector that is constrained in improvement of competitiveness. These attributes point to a manufacturing sector that is not gaining traction.

South African Reserve Bank (SARB) (2016) lists traditional markets such as China as some of the reasons for the reduction in the competitiveness of South Africa. This is in terms of major downward adjustment in the prices of leading export commodities and a slowdown in real demand for South African exports. These developments eroded real export growth. Exports increase at both the extensive margin (growing the variety of goods exported i.e. diversification or the export markets) and the intensive margin (increasing the value or volume of existing export products to current markets) (Matthee et al., 2016 and Jenkins and Edwards, 2012).

The Trade and Industrial Policy Strategies (TIPS, 2016) and Jenkins and Edwards (2012) attribute a reduction in tariff protection in the 1990s to be the cause of the restructuring of the composition of manufactured goods and exports, along with the diminishing ratio of manufacturing in employment and GDP. The reduction resulted in an increase in import penetration post the 1990s and subsequent increased competition from nations like India and China. UN Comtrade (2020)

shows that between 2000 and 2018, the manufacturing sector consistently ran a trade deficit. According to the World Bank (2017) and Jenkins and Edwards (2012), South Africa is importing increased quantities of manufactured goods, thereby reducing the industry's contribution to the economy.

1.1 Background of the Study

South Africa's manufacturing sector[1] exports as a proportion of total exports was 70% for the year 2000, increased to a peak of 77% in 2002 and thereafter declined to 66% by 2018. Manufactured exports were 12% of GDP in 2000 and increased marginally to 15% in 2018 (UN Comtrade, 2020). Although manufactured exports have grown in absolute value in the past 20 years, manufactured exports have failed to keep up with population growth and hence since 2011, manufactured exports per capita started to show a decline (UNIDO, 2022). According to Statistics South Africa (2016), the volume of South African manufactured goods produced between 2010 and 2017 increased by 7.2%. However, there was no proportionate growth in value terms which suggests that manufacturers may have been constrained in selling at relatively higher prices.

South Africa's share in world manufacturing export markets has shown consistent decline since the global financial crisis, this means real export growth was lower than the world average as other countries' manufactured exports grew relatively faster than South Africa. Since the global financial crisis, these exporters have lost markets and products. These exporters are also losing dynamism, competitiveness, and experimentation through minimal new product introductions into new markets. While new products entered the export basket, they were however less than the products leaving, hence the drop in the number of export products. Entry and development of new manufacturers to become exporters is also inadequate. Although the smaller, more dynamic exporters are growing in terms of both markets and products, they are still too small to be the main export generators. These factors in addition to other challenges affecting the manufacturing sector restrict South Africa from competing with lower cost countries (Rankin, 2013). Bhorat & Rooney (2017) argue that the industrial sector has been unable to compete with businesses in nations like China and Bangladesh since South African markets were liberalized.

[1] Manufacturing sector definition by Lall (2000), See Appendix 1

Flowerday et al. (2017) note that South African exporters are highly concentrated despite greater liberalisation and openness to trade achieved in the past twenty years. More than 90% of exports are produced by the top 5% of exporting companies. Rankin (2013) highlights the reliance on mineral exports as being the main reason for this high concentration. The SARB (2021) is of the view that except for a few subcategories, mineral and metal commodities account for a large proportion of South Africa's exports. South Africa's manufactured exports seem to be concentrated towards lower-value-added manufactured products (SARB, 2021). In 2020, some 6% of manufactured exports from South Africa were high-technology products, and this figure has not changed significantly since 2007 when it was 5.8% (World Bank Data, 2023b). This factor has been ascribed to South Africa lagging behind in export transformation which has meant that the country continues to rely on commodities to grow exports.

Viviers et al. (2014) reveal that the majority of South Africa's export growth was concentrated inside the intensive margin, or the same items exported in larger volume to existing markets. The growth of current products into established markets, which has turned into a significant contributor to the growth of exports, reflects the concentrated nature of manufactured exports. Draper et al. (2018) attribute this market concentration to South Africa's loss in its share of the market in a number of its main exports due to being outcompeted. More South African manufacturers have focussed on the local, less competitive markets in Africa as a result of this loss of global industrial competitiveness. Africa was South Africa's top export market for manufactured goods between 1995 and 2020. Manufactured goods accounted for 64% of South African exports to Africa.

Since 1995, manufacturing industry exports to the Southern African Development Community (SADC) have dominated, they were 19% at the time and have since grown to 42% of total manufactured exports as of the year 2020. This growth has cushioned the impact of the decline in exports to other regions of the world (Quantec EasyData, 2022). While Draper et al. (2018) believe that South Africa may keep growing by mainly utilising this regionally oriented market, these markets are limited, and the low rates of efficiency needed to succeed in them may hamper the country's ability to compete in the long term. Rankin (2013) affirms this argument and argues that companies that export beyond SADC are relatively more productive than those which export mainly to SADC or those that manufacture exclusively for South Africa's market as higher income regions import relatively high-quality products.

According to Weiner et al. (2008), a nation cannot depend solely on regional markets to grow in today's highly competitive world trade. This is due to its tendency to be shielded from the forces of global competition and development, this type of trade eventually deviates from ideal technological standards. As a result, it frequently fails to capture the actual comparative advantage of a nation. Given the rate at which globalisation is advancing, one could argue that in the long run, South Africa must concentrate on the major markets outside of Africa in order to remain competitive relative to major global manufacturers.

Theoretically, the real exchange rate depreciation during the past 30 years should have contributed to increasing South Africa's export competitiveness (Draper et al., 2018 and SARB, 2021), however, according to Anand et al. (2016) although the depreciation of the Rand presented a potential to increase exports, the previously mentioned bottlenecks in addition to constrained export competition and the intensity of strikes all have hindered the capacity of manufacturers to benefit from the gain in competitiveness.

1.2 Problem Statement

Exports are an important component for economic growth and development. In the context of this importance, the erosion of South Africa's export competitiveness over time is concerning. The decline in the South African manufacturing exports global competitiveness has been attributed to infrastructure deficiencies, reduced foreign direct investment (FDI), constrained local demand, cheaper imports, policy constraints, high production costs, limited domestic investments in innovation, slow absorption of new technologies, constrained supply and cost of electricity, low business confidence, high rail, freight and port charges (Bhorat and Rooney, 2017). In addition, weak structures of production, low literacy rates and unskilled labour force, high incidence of labour conflicts and high proportion of primary product export have been identified as factors that hamper South Africa's manufacturing sector's ability to compete globally. As seen in trends over the past few decades, reliance on primary product exports exposes South Africa to deteriorating terms of trade for commodity focussed countries (Draper et al., 2018; Bhorat & Rooney, 2017; Flowerday et al., 2017; Kaplan, 2007; Pillay, 2013; Viljoen, 2016).

For a country with significant macroeconomic imbalances, specifically, inequality, poverty and, unemployment, enhancing export competitiveness will go a long way in meeting these challenges.

The challenge of harnessing the export potential of manufacturing firms is noted as a major obstacle to South Africa's economic structural transformation, as such, it becomes paramount for policy makers to be able to identify products with export potential. Given the significance of manufacturing to export growth and competitiveness, it is important to comprehensively understand South Africa's manufacturing sector export market changes through the years, in order to be able to recommend ways of growing manufactured exports and mitigating constraints to the sector. Lall (2000), emphasizes that in a world moving towards free trade, achieving export growth has taken a more prominent role in economic performance than before. There is therefore a need to examine ways of improving manufactured exports in the face of the above changes. As exports continue to be the primary source of foreign currency earnings, it is imperative that manufacturing remains adaptive, grows , and is competitive. This study therefore seeks to identify the products with export potential and potential of enhancing South African manufacturing competitiveness at a global level.

Related studies on South African competitiveness and export potential quantify the comparative advantage of the subsectors they examine and remark on whether or not their competitiveness is rising or falling. However, this study examines the manufacturing sector as a whole. In addition to listing South Africa's manufacturing subsector competitiveness as decreasing or increasing, this study utilises the Growth Identification and Facilitation Framework (GIFF) to list the competitiveness of the manufacturing subsectors for selected benchmark nations in an effort to find export opportunities by looking into the sub-sectors in which these trade rival countries are losing export market share. To identify strategies that have been successful in these nations, the GIFF is used to analyse production factors inside these comparison nations and contrasts production costs with those of South Africa. By analysing the structural differences between established and developing countries, the GIFF provides a roadmap for South Africa to pursue in its pursuit of manufacturing export growth. The GIFF methodology was therefore chosen as it allows for a more comprehensive examination of the manufacturing sector. The GIFF is a well-rounded, all-inclusive methodology that makes it easier to accomplish the study's goals when contrasted with the methodologies of related studies

1.3 Research Objectives and Questions

This study's primary objective is to analyse the manufacturing sector export changes so as to identify the manufacturing subsectors that South Africa has latent comparative advantage and should likely focus on. The study aims to address the following objectives;

1.3.1 Research Objectives:

1. To provide an understanding of South Africa's manufacturing sector export performance.
2. To use the Growth Identification and Facilitation Framework (GIFF) to identify South Africa's manufacturing sector potential export products.
3. To identify and provide an understanding of main constraints to the manufacturing sector.

1.3.2 Research Questions

1. How has South Africa's manufacturing sector and its exports performed over the years.
2. What should South Africa focus on producing in order to grow its manufacturing sector exports.
3. What are the major binding constraints to South Africa's manufacturing sector exports and what can be done to alleviate these constraining factors.

1.4 Significance of the Study

This study's examination of the manufacturing sector exports potential and the constraints to the sector with the aid of the GIIF is significant for a number of reasons (i) Knowing the degree of competition of South Africa in international trade is taking note of where the country stands relative to its competitors. (ii) understanding the performance of and opportunities and threats to manufacturing sector competitiveness will aid policy formulation with respect to informing South Africa's positions on economic integration, common markets, bilateral engagements, increasing investment and trade with other countries. (iii) the examination of constraints to the manufacturing sector's export growth is intended to contribute to literature that aids the formulation of solutions to challenges and to the development of the manufacturing sector's export practises. The findings will likely aid policymakers' understanding and enable the appropriate responses to constraints attributed to the country's manufacturing sector's decreasing export competitiveness. Improved performance of manufactured exports has the potential of assisting South Africa in its goal of

economic growth, employment creation, increasing exports, foreign currency generation, improved foreign exchange rate performance, attracting foreign investments, and contribution to physical infrastructure

In addition, the study goes beyond the conclusions of previous studies that analysed competitiveness as either having increased or decreased by utilising the Growth Identification and Facilitation Framework (GIFF). The framework in addition to enumerating the competitiveness of South Africa, also enumerates the competitiveness of selected benchmark countries with the intention to seek out export opportunity by examining the industries where such competitor nations are losing export shares in global trade. The GIFF further compares production costs with South Africa in an effort to seek out policies that have worked in these countries. Through the examination of the structural distinctions between developed and developing economies, the GIFF facilitates a pathway which South Africa can follow in an effort towards manufacturing export advancement. In justifying the use of the Growth Identification and Facilitation Framework (GIFF) in their study, UNIDO (2016) notes that it is vital for policy formulation to estimate where a country aims to be in future. The GIFF is a wholesome comprehensive methodology that facilitates the achievement of the objectives of the study. Lastly, the policy recommendations arising from the study have the potential to result in improved risk management of the challenges affecting the potential export sectors

1.5 Research Design and Methodology

A number of methods exist for determining the export competitiveness and subsequent export potential of a country[2]. This study utilises the Growth Identification and Facilitation Framework (GIFF) as research has shown it to be the best method to address the above stated objectives of this study. UNIDO (2016) states that the GIFF is an approach that entails identifying goods that have been constantly developing for about 20 years, but eventually lost or are starting to lose competitiveness in these relatively faster growing countries (Lin, 2012). The reasoning is that if these countries were able to grow relatively faster than South Africa by manufacturing particular goods, then South Africa is bound to derive some level of success by manufacturing similar goods. The GIFF provides guidance to policy makers on locating and opening up sectors that align with

[2] Some of these measures of competitiveness are reviewed in Chapter 3 of the study.

a nation's latent comparative advantage (Xu & Hager, 2017). This is done so as to highlight those industries in need of support to scale up. To complement trade data, the study compares the minimum wage, cost of capital, and cost of electricity as additional factors to be analysed for the purpose of a country level cost comparison with the chosen benchmark countries. The study further calculated the growth in South Africa's imports to identify imports that have grown the most, but the country has the potential to manufacture locally.

1.6 Data Analysis and Data Sources

The study uses the Normalised Revealed Comparative Advantage (NRCA) to identify manufactured products that have done well in global markets but from which benchmark countries have begun to lose competitiveness. NRCA seeks to measure comparative advantage of a good at a particular moment in time (UNIDO, 2016). In addition, the study uses the NRCA to calculate and characterise South Africa's manufacturing sector export competitiveness. The United Nations (2006) identifies the Standard International Trade Classification - SITC as a more suitable classification of tradable goods into groups for analysis and long-term study of trends in trade compared to the Harmonized System therefore the study utilises the SITC. The annual export or import data of the manufacturing subsectors as defined by Lall (2000) from 1998 to 2018 are extracted from the United Nations Comtrade database and total world merchandise exports for the same time period are obtained from the World Trade Organization (WTO) database. The range of years of study is trade data from 2018 and going back 20 years (to 1998) as recommended by the GIFF. The study focuses on the pre covid period as the trade data for that period is an anomaly. The impact of covid on manufacturing is, a temporary or transitory episode. The pre-covid period avoids the results or analysis being affected by the covid period effects.

In that regard, to enhance the scope of the data analysis, the NRCA for each of the 200 manufacturing subsectors is forecasted for each of the years from 2019 to 2023. The exponential smoothing algorithm in excel was used to forecast NRCA. Smoothing data is done by averaging values over the twenty-year period of study (1998-2018) in a way that reduces unwanted variation but allows for detecting patterns. This forecasting method detects cycles and patterns automatically and if none exists it reverts back to linear forecasting predicting future values using linear regression. The data for the comparison of the minimum wage, cost of capital, and cost of electricity was obtained from international organisations focused on such data collection

(International labour Organisation, World Bank Group -Doing Business Project, and World Bank Data)

1.7 Demarcations and Limits of the Study

There exists a number of methods and measures that can be used to determine the competitiveness and subsequent export potential of a country. No single method or measure can be said to be the most effective in analysing export potential between countries. The study has chosen to analyse the export potential of South Africa using the Growth Identification and Facilitation Framework - (GIFF). This decision is informed by UNIDO (2016) who states that the GIFF provides for the identification of export opportunity for emerging economies by analysis of advanced ones. That is, developed countries provide a blueprint or benchmark for developing ones. Lin and Xu (2016) state that the GIFF helps policy makers develop feasible and sharply focused policies, premised on the idea that in order to unlock their latent comparative advantages, nations should concentrate on what they already have rather than what they lack. In that regard, this study determines countries by which South Africa can benchmark its industrial competitiveness relative to its identified benchmark countries. The study has therefore limited itself to a review and focus on factors within the purview of South Africa to control in an effort to grow its manufactured exports. It focuses on South Africa and its three identified benchmark countries i.e. focussed more on South Africa's internal production capabilities, economic and policy barriers that limit growth of its manufactured exports without regard to given global constraints and given world trade market factors.

One critique of the GIFF is that trade data fails to capture global value chains and that it is bound to be inefficient to select the targeted sector to focus on by means of a mechanical method of selecting benchmark countries and benchmark sectors using trade data and ignoring the importance of global supply chains in global trade. However, to complement trade data which the GIFF predominantly utilises, Lin and Xu (2016), UNIDO (2016) and Lin (2012) advise undertaking a comparison of production costs with those of the benchmark countries, assessing South Africa's feasibility of manufacturing for world markets and selecting products where opportunities exist. In order to identify and prioritize government and private sector support to selected products, a comparative value chain analysis between the benchmark countries and South Africa could be conducted for the identified export potential products. A comprehensive cross-country value chain cost comparison at each product level is however outside the purview of this study. However, this

research uses a macroeconomic level cost comparison of the top factors of production identified for South Africa compared with the identified benchmark countries. The factors compared are labour costs, electricity costs and interest rates.

1.8 Conclusion

The National Development Plan – NDP 2030 and Industrial Policy Action Plans - IPAPs 1 to 9, all identify export growth as a priority focus area for South Africa. The NDP emphasizes that finding and developing new export markets is essential to the industrial sector's long-term viability. To achieve this, it is necessary to evaluate changes in the manufacturing industry's competitiveness. South Africa's exporters have been identified to be losing dynamism and competitiveness, these exporters have grown less adaptive to market changes and products since the global financial crisis.

World Bank (2014) partly attributes the slow growth in manufactured exports as being due to the disappearance of important products from South Africa's export basket without replacements sufficient to improve export performance. UN Comtrade's (2020) export data shows that South African industries are mainly centred on resources, especially minerals, the majority of which are exported in their raw form. The decline in manufacturing contribution to GDP also indicates a sector that is de-industrialising. The significance of economic policy on South Africa's poor manufacturing export competitiveness has also been highlighted. These developments make it imperative for South Africa to increase its manufacturing sector competitiveness and subsequent exports. The study presents the status of South Africa's manufacturing industry together with its exports. In addition, it seeks to contribute to the question of which South African manufactured exports have the potential to perform better. In that regard it is important to further identify manufacturing sector constraints and possible ways to mitigate them.

The study uses the GIFF as its method of analysis since it offers a possibility to best answer the objectives of the study. The GIFF identifies products with export potential, the identified export prospects might direct manufacturing toward more promising export opportunities or provide exporters with alternative possibilities when their present export markets are saturated or experiencing declining growth. The GIFF can guide policy makers on how to identify industries that will lead to dynamic industrial development, structural transformation, sustainable growth,

reduce the income disparity with developed nations, and possess the greatest chance of success in world trade (Xu, 2019; UNIDO, 2016; and Lin and Monga, 2010).

The research extends on the existing literature on South African export competitiveness and the constraints affecting the sector. The study subsequently provides recommendations to mitigate the constraints and inform policymakers on how to adapt to changes in international trade, take up opportunities for trade and assisting the country to respond adequately to development of undesirable terms of trade with trading partners.

1.9 The Structure of the Rest of the Dissertation

Following this introductory chapter, the rest of the dissertation is structured as follows: Chapter two presents an overview of the South African manufacturing sector with respect to its contribution to the economy, employment, and trade. The chapter presents various measures and statistics that highlight the manufacturing sector's performance in South Africa. It further classifies the country's manufactured exports by technological intensity and reviews their export destinations and trade agreements influencing them. The chapter concludes by presenting challenges to and programmes enacted to support the South African manufacturing subsectors.

Chapter three reviews literature on the theoretical underpinnings of the GIFF. The chapter introduces comparative advantage, competitiveness, and export potential and how they inform the GIFF. The chapter presents factors influencing competitiveness, the measures of enumerating comparative advantage and reviews the efficacy of the different measures. Studies on South African competitiveness and on studies utilising the GIFF methodology conclude chapter three.

Chapter four presents the methodology utilised in this study. It presents the steps followed in undertaking the GIFF and highlights the process of identifying the benchmark countries and the method of identifying the tradeable manufactured goods with export potential for South Africa. The chapter presents the methodology for identifying South African manufacturing sectors to scale up and labour-intensive manufactured imports that have the possibility to be manufactured locally. In conclusion the chapter presents the approach to analysing the binding constraints to the manufacturing sector.

The study's results are presented and analysed in chapter five. The chapter discusses the selected benchmark countries and their performance relative to South Africa. It presents the manufactured goods with potential for exports and therefore for South Africa to focus on producing. In looking for opportunity to scale-up South African manufacturers, the chapter presents classifications of the competitiveness of the South African manufacturing subsectors. The chapter identifies labour-intensive manufactured imports with the potential to be produced locally. The chapter also presents the macroeconomic binding constraints of the manufacturing sector. Chapter Six concludes the study with a summary conclusion of the study, the recommendations for South African manufacturing and potential focus areas for further study.

Chapter Two: Overview of South African Manufacturing Sector

2.0 Introduction

The chapter reviews the changes that have occurred in the manufacturing industry in South Africa and its exports mainly for the time period that coincides with the range of years of study of the GIFF methodology. That is, 1998-2018. This is done so as to standardise comparison of measures using the same time frame. The GIFF range of study is mainly focussed on the pre-covid-19 timeframe. The chapter presents background data on the performance of South Africa's manufacturing industry and its exports over those years. The chapter presents an outline of the South African manufacturing sector, its contribution to the economy, employment and trade. Examining the significance of the manufacturing industry and the GDP contributions by its various manufacturing subsectors. The chapter presents various trade competitiveness measures of manufacturing export performance, measuring factors such as global share of South African manufactured exports; number of exported HS6 digit products; manufactured exports per capita; export to output ratio; Furthermore, exports of manufactured goods in South Africa is described in more detail through the revealed comparative advantage (RCA). The chapter classifies the country's manufactured exports by technological intensity and reviews their export destinations and trade agreements influencing them. The chapter concludes by presenting challenges affecting different manufacturing subsectors and government support policies and programmes enacted to support the South African manufacturing sector.

2.1 The Manufacturing Sector's Contribution to the South African Economy

Table 2.1 shows the diminishing proportion of manufacturing to South Africa's GDP. Bhorat and Rooney (2017) and Rodrik (2006) emphasised that the existence of a dynamic and vigorous manufacturing sector is typically a prerequisite for the transition of nations from underdeveloped to developing and subsequently developed nations. Although the tertiary sector dominates in the majority of developed economies, these economies were mostly founded on a robust manufacturing capacity. The South African Department of Trade and Industry (DTI, 2018), notes the diminishing share of manufacturing in GDP as not just a trend in South Africa, but also a feature of developed nations. For example, the DTI (2018) cites a policy shift of bringing manufacturing jobs back to the United States of America (USA) from nations like India, China or

Indonesia. It is suggested that this policy might have an effect on developing nations (like South Africa) in that manufacturing jobs may be lost, as these go back to their original economies. Thornton (2010) and Liu et al. (2017) further state that the global financial crisis made policy makers increasingly aware of the importance of competitive manufacturing. Therefore, policy makers in advanced economies are increasingly arguing for the need to rebalance their economies from an over reliance on services, particularly considering the post-global financial crisis period. There has been a realisation of the critical role manufacturing plays in a country's long-term prosperity.

Table 2.1: Percentage contributions to South Africa's GDP at current prices (1998 to 2018)

Sector/Year	Services	Manufacturing	Mining and quarrying	Agriculture, forestry and fishing
1998	70,0	19,6	6,6	3,8
1999	70,8	18,7	6,9	3,6
2000	70,2	19,2	7,4	3,3
2001	69,1	19,3	8,1	3,5
2002	68,5	19,4	8,4	3,7
2003	70,5	19,0	7,2	3,3
2004	71,4	18,6	6,9	3,1
2005	71,9	18,1	7,3	2,7
2006	72,9	16,4	8,1	2,6
2007	72,6	16,1	8,4	3,0
2008	71,6	16,0	9,2	3,2
2009	73,2	15,0	8,8	3,0
2010	73,8	14,4	9,2	2,6
2011	74,5	13,3	9,6	2,5
2012	75,5	13,0	9,1	2,4
2013	75,6	13,0	9,0	2,3
2014	75,6	13,5	8,4	2,4
2015	76,5	13,4	7,8	2,3
2016	75,9	13,5	8,2	2,5
2017	75,7	13,4	8,2	2,6
2018	76,3	13,2	8,1	2,4
Average	**72,9**	**16,0**	**8,1**	**2,9**

Source: Calculated from Statistics South Africa (2020)

Table 2.2 below, shows South Africa's annual growth rates for its economic sectors (listed in descending order) from 1998 to 2018. The manufacturing sector annual growth was -0.2 % in 1998, peaked at eight percent in 2000. The sector then grew at a decreasing rate until 2006 after which growth declined until the global financial crisis in 2009 when it contracted by -10.5% and

thereafter was on a general downward trend until 2018 when it grew by about one percent. Between 1998 and 2018, the manufacturing industry's growth was an average of two percent per year (StatsSA, 2020). Additionally, Table 2.2 demonstrates that South African manufacturing is not gaining traction. This is problematic as according to DTI (2018) there exists a significant and positive relationship amongst GDP and the development of the manufacturing industry. That is, the advancement of manufacturing impacts the nation's GDP proportionally. In addition, the manufacturing sector's limited growth is especially concerning in terms of assertions from many researchers (including Bhorat and Rooney, 2017) who have emphasised on the presence of a thriving manufacturing base as a requisite for a country to achieve high-income status.

Table 2.2: Growth of South Africa's Economic Sectors, 1998 to 2018 (%)

Year	Services	Agriculture, Forestry and Fishing	Manufacturing	Mining and Quarrying
1998	0,3	-5,3	-0,2	-0,1
1999	2,7	6,2	0,6	-1,4
2000	4,6	4,7	8,1	-1,1
2001	2,6	-3,3	3,2	-0,1
2002	4,3	6,5	2,8	1,0
2003	4,7	0,7	-1,5	3,4
2004	5,3	0,9	4,9	1,5
2005	6,2	2,8	6,2	1,0
2006	6,1	-5,5	6,4	-0,6
2007	7,1	3,0	5,4	-0,6
2008	3,8	19,4	2,3	-5,3
2009	1,3	-1,9	-10,6	-5,1
2010	1,9	-0,3	5,9	5,3
2011	3,0	2,0	3,0	-0,7
2012	2,4	1,8	2,1	-2,9
2013	2,5	4,5	1,0	4,0
2014	2,2	6,8	0,3	-1,7
2015	1,0	-5,9	-0,4	3,3
2016	0,9	-10,1	0,8	-3,9
2017	0,7	21,1	-0,2	4,2
2018	0,8	-4,8	1,0	-1,7
Average	**3,1**	**2,1**	**2,0**	**-0,1**

Source: Calculated from Statistics South Africa (2020)

Table 2.3 below shows the manufacturing sub-sector's contributions to output. Petroleum products, chemicals, rubber, and plastic were the top manufacturing subsector contributors to output with a contribution of an average of 27% annually from 1998 to 2018. Radio, television, instruments, watches and clocks were the least contributor, accounting for one percent in the same

time span. In the 20-year period from 1998 to 2018, the sub-sectoral contributions have changed marginally with little shift in rank by contribution to the overall sector in 2018 relative to 1998. Metals, metal products, machinery and equipment were pushed from second to third position by the food, beverages, and tobacco subsector. Concern was raised by Black et al. (2016) about the decline in the contribution of the labour-intensive metals, metal products, machinery, and equipment subsector (from 19.3% in 1998 to 18.3% in 2018). This is owing to the fact that labour-intensive sectors have the highest potential for reducing South Africa's unemployment rate.

Table 2.3: Manufacturing subsectors as a percentage of total manufacturing sales / output for South Africa (1998 - 2018)

Manufacturing Subsector / Year	Petroleum products, chemicals, rubber and plastic [QSIC 33]	Metals, metal products, machinery and equipment [QSIC 35]	Food, beverages and tobacco [QSIC 30]	Transport equipment [QSIC 38]	Furniture; other manufacturing [QSIC 39]	Wood and paper; publishing and printing [QSIC 32]	Textiles, clothing and leather goods [QSIC 31]	Other non-metal mineral products [QSIC 34]	Electrical machinery and apparatus [QSIC 36]	Radio, TV, instruments, watches and clocks [QSIC 37]
1998	23,6	19,3	16,7	11,3	10,4	7,3	4,9	2,7	2,4	1,3
1999	25,7	18,5	15,7	12,0	9,9	7,3	4,6	2,5	2,5	1,3
2000	28,1	17,5	14,4	13,2	9,3	7,2	4,2	2,3	2,7	1,2
2001	28,5	16,8	14,2	15,0	9,2	6,7	3,8	2,3	2,5	1,0
2002	27,7	18,1	14,4	13,9	8,8	6,7	4,1	2,5	2,5	1,2
2003	27,6	17,0	14,9	14,3	8,9	6,8	4,1	2,7	2,4	1,3
2004	27,6	17,2	15,3	14,3	8,9	6,5	3,7	2,9	2,3	1,3
2005	27,7	17,2	15,5	14,4	8,6	6,6	3,5	3,0	2,2	1,3
2006	27,3	17,4	15,7	14,4	8,9	6,7	3,1	3,0	2,2	1,3
2007	26,8	17,8	16,4	13,9	8,9	6,7	3,0	3,1	2,4	1,2
2008	28,7	18,1	16,0	12,3	8,5	7,1	3,0	2,9	2,3	1,1
2009	28,9	17,5	16,7	12,3	8,3	6,9	3,1	2,9	2,3	1,1
2010	28,6	17,5	17,2	12,1	8,3	6,9	3,1	2,9	2,3	1,1
2011	29,1	17,7	17,1	11,9	8,2	6,8	3,0	2,8	2,3	1,1
2012	28,7	18,0	17,3	11,7	8,2	6,9	3,0	2,8	2,2	1,1
2013	29,1	18,2	17,3	11,3	8,1	6,9	3,1	2,8	2,2	1,1
2014	29,0	18,1	17,4	11,2	8,1	7,0	3,0	2,8	2,1	1,2
2015	26,3	18,6	18,6	11,7	8,3	7,3	3,1	2,7	2,1	1,1
2016	26,5	18,3	18,7	11,6	8,4	7,4	3,2	2,7	2,1	1,2
2017	25,7	18,6	19,1	11,6	8,5	7,5	3,2	2,7	2,0	1,1
2018	26,5	18,3	18,9	11,6	8,6	7,3	3,1	2,6	1,9	1,1
Average	**27,5**	**17,9**	**16,6**	**12,7**	**8,7**	**7,0**	**3,5**	**2,8**	**2,3**	**1,2**

Source: Calculated from Quantec EasyData (2022)

Table 2.4 below, shows further disaggregation of the South African manufacturing industry into its subsectors using 2018 sales data. Each subsector's size is shown as a proportion of overall manufacturing. Trading Economics (2019) also highlights that production within the South African manufacturing industry is gradually concentrating around fewer products. The top 10 subsectors' share of manufacturing as a whole is increasing. For instance, while the top ten subsectors accounted for less than 50% of sales in 1998, their contribution rose to 55% in 2008 and was 59% of total manufacturing in 2018 as shown in table 2.4 (Trading Economics, 2019). Rodrik (2006) in an analysis of the South African manufacturing sector, expressed concern at the lack of dynamism within the manufacturing sector and highlighted that only a few countries have managed to transition from middle income to high-income level without a thriving manufacturing industry. World trade competitiveness is dynamic, it is imperative that South Africa also continuously evaluates its competitive position in its production of goods for exports (Lall, 2000).

Table 2.4: Size of manufacturing subsectors as a percentage of total manufacturing sales for South Africa (2018)

Category	%	Category	%
Meat, fish, fruit etc	7.20	Products of wood	0.92
Coke, petroleum products and nuclear fuel	7.02	Wearing apparel	0.86
Motor vehicles	6.74	Publishing	0.79
Basic iron and steel products	6.45	Rubber products	0.77
Beverages	6.41	Other electrical equipment	0.77
Other chemical products	6.08	Furniture	0.74
Other food products	5.39	Radio, television and communication apparatus	0.74
Non-ferrous metal products	5.29	Household appliances	0.65
Basic chemicals	4.32	Other textile products	0.65
Parts and accessories	3.79	Bodies for motor vehicle, trailers and semi-trailers	0.64
Other fabricated metal products:	3.71	Glass and glass products:	0.57
Paper and paper products:	3.61	Electric motors, generators, transformers	0.57
Grain mill products:	3.11	Sawmilling and plaining of wood	0.56
Other:	3.11	Professional equipment	0.46
Plastic products:	2.96	Insulated wire and cables	0.45
Special purpose machinery	2.48	Electricity distribution and control apparatus	0.43
Non-metallic mineral products	2.41	Textiles	0.36
Dairy products	2.04	Leather and leather products	0.33
General purpose machinery	1.71	Footwear	0.28
Other transport equipment	1.47	Accumulators, primary cells and primary batteries	0.18
Structural metal products	1.38	Electric lamps and lighting equipment	0.15
Printing and Recorded media	1.32		

Source: Trading Economics (2019).

2.2 The Contribution to Employment of the South African Manufacturing Sector

Camel (2018), states that manufacturing creates jobs at respectable pay levels for unskilled and semi-skilled workers. The employment created from the improved manufacturing sector performance is vital for the creation of low-skilled jobs required to significantly lower high rates of youth and overall unemployment and in the increase in wages. However, Manufacturing employment declined at 1,6% per annum from 2008 to 2016 while non-manufacturing employment increased at a 1,9% per year for the same comparable period. As stated by the DTI (2018) manufacturing sector employment accounted for 11% of the total South African workforce in 2016, the percentage having dropped from 14% in 2008.

Table 2.5 below, illustrates the job loss in the manufacturing industry from 1995 to 2020. Overall compensation of employees increased for the period while employment numbers decreased. Draper et al. (2018) have identified South Africa's lacklustre trade performance as a major reason for the country's incapacity to increase employment and a limit in attaining improved growth and productivity. Rankin (2018), on the other hand, states that the manufacturing sector's labour productivity increased significantly from 1994 to 2014. However, Rankin (2018) has raised concern that the increase resulted in reduced low-skilled jobs and low-productivity employees, particularly in smaller firms.

Table 2.5: South African manufacturing sector employment figures from 1995 to 2020

Employment by skill	**1995**		**2000**		**2005**		**2010**		**2015**		**2020**	
	mil	**%**	mil	**%**	Mil	**%**	mil	**%**	mil	**%**	mil	**%**
Informal labour	0,25	14	0,22	14	0,32	19	0,35	23	0,34	22	0,27	19
Formal: skilled	0,24	14	0,22	14	0,23	14	0,21	14	0,22	14	0,22	15
Formal: semi-skilled	0,91	52	0,81	53	0,81	50	0,72	47	0,71	47	0,68	48
Formal: low skilled	0,34	20	0,28	18	0,28	17	0,25	16	0,25	16	0,24	17
Formal labour	1,49	86	1,31	86	1,32	81	1,18	77	1,17	78	1,13	81
Formal + Informal	**1,74**	**100**	**1,53**	**100**	**1,63**	**100**	**1,53**	**100**	**1,51**	**100**	**1,40**	**100**

Source: Quantec EasyData (2022).

Edwards (2020) used the South African Revenue Service (SARS) (2017) export and taxation data on firms and noted that manufacturing exporters were predominantly capital and skill intensive. This is of concern since it is mostly the low-skilled and, the youth who are unemployed in South Africa. Unemployment was 32,6 % as at end of March 2021, according to the quarterly survey of the labour force. Youth unemployment rate was 46,3% for the 15 – 34 age group and 63% for the 15–24 age group (StatsSA, 2021). The DTI (2018) identifies manufacturing as crucial in addressing the rising youth unemployment in South Africa.

The TIPS (2016) concurs with the view that manufacturing is paramount to long-term economic growth. However, the warning is that while manufacturing has focused on labour intensive subsectors, it is unlikely to individually address South Africa's unemployment constraints, especially in light of the growth in employment in sectors like agriculture. South African industrial policy, therefore, has focussed on maximising the employment multipliers from manufacturing. The manufacturing sector is a driver of multiplier effects on other primary (mining and agriculture) and tertiary areas of the economy in South Africa, services acquired from the service sector and inputs acquired from the primary sector are transformed into higher-value products in the manufacturing process. In this way, businesses are supported and employment for both the unskilled and semi-skilled persons is generated through the entire value chain. This makes the sector a major driver of growth in productivity and innovation (DTI, 2017).

Fedderke (2018), asserts that the South African economic growth has been having an increasing relative significance of the service sector, while the primary and secondary industries decline in importance. Labor absorption is therefore concentrated in the low productivity growth sector. This is counterproductive in addressing an unemployment rate of 25 percent (or more). The analysis instead suggests that policies targeting improving South Africa's international competitiveness are likely most effective for raising employment and growth.

2.3 The South African Manufacturing Sector and International Trade

According to Black et al. (2016), manufactured exports have increased at a rate of nearly 6% annually since 1990. Matthee and Santana-Gallego (2017) found that more than 70% of South African export growth was to existing trade partners and the rest diversified in terms of new products, destinations or exporting firms.

Figure 2.1: South African manufacturing sector exports, imports and trade balance from 2000[3] to 2018 in current USD

Source: Calculated from UN Comtrade Data (2020) and manufacturing sector definition by Lall (2000). See Appendix 1.

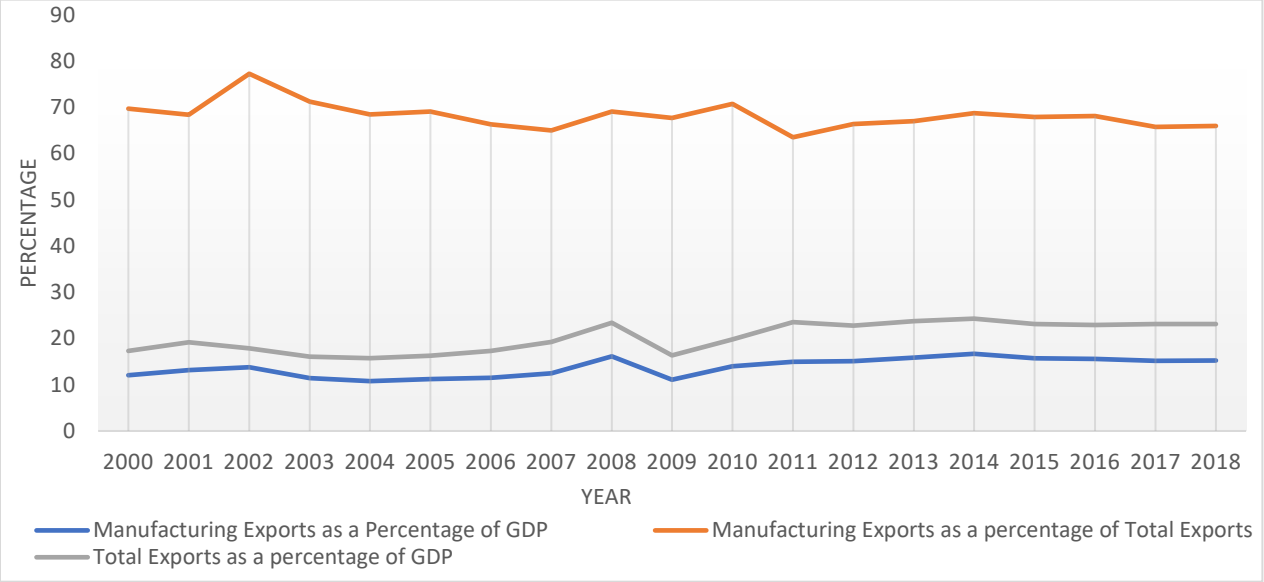
Trade data from the Comtrade database of the United Nations (2020) shows that South African exports and imports of manufactured goods year-on-year, increased and decreased at comparable rates between 2000 and 2018 (see Figure 2.1). Trade flows were stagnant in 2000 and 2001 but started to rise from 2002 up to the advent of the world financial crisis of 2008 when it declined. Trade flows then regained the growth trajectory in 2009, however, the growth declined from 2011 before a slight increase in 2017 and 2018. Between 2000 and 2018, the manufacturing sector consistently ran a trade deficit.

Figure 2.2 shows that the share of 66% (as at 2018) of manufactured exports as a proportion of all exports gives an indication of how important industrial capability is to South Africa's international trade (UNIDO, 2020). Although manufacturing sector exports have not reached their maximum potential, especially the pre-global financial crisis levels, manufacturing has maintained its export dominance in South Africa's economy. In the preceding 20 years, manufacturing sector exports have dominated in total exports as other sectors' exports declined, notably mining. For instance, in 2015, 6% of exports were agricultural products, 33% were in mining, 60% were in manufacturing, and one percent in other products (TIPS - Trade and Industrial Policy Strategies, 2016). Total exports' performance as a proportion of GDP performs similarly to manufactured

[3] Data was not available for 1998 and 1999. Trade values for subsectors listed in Appendix 12

exports' performance as a proportion of GDP, demonstrating the strong influence of manufacturing to total exports (see Figure 2.2).

Figure 2.2: South African Manufacturing exports as a percentage of total exports; manufacturing exports as a percentage of GDP and total exports as a percentage of GDP (2000-2018)



Source: Calculated from UN Comtrade (2020), World Bank (2020b) and Manufacturing sector definition by Lall (2000). See Appendix 1.

From Figure 2.2, total exports were 17% of GDP in 2000 and rose to 23% in 2018. South African manufacturing sector exports as a proportion of GDP were 12% in 2000 and increased marginally to 15% in 2018. According to the South African Reserve Bank (SARB, 2021) this similarity in trends suggests a correlation and causality between trade and GDP growth, and it also indicates that export growth grew GDP, while faster GDP growth grew imports as a result. Thus, South Africa's GDP expansion is deeply impacted by its capability to acquire raw materials competitively and its capability to grow exports in current or new markets.

Table 2.6 lists the total manufacturing sub-sectoral export value in current USD (United States Dollars) shown as a percentage of total manufactured exports for the leading South African manufacturing subsectors from 2000 to 2018. Table 2.6 above confirms that South African manufactured exports have continuously been dominated by metals and its associated products, machinery and equipment (TIPS, 2016).

Table 2.6: South Africa's top manufactured export products (2000 – 2018)

SITC Code	Description	Total Manufacturing Export Value 2000-2018 in $USD	% of Total Manu 2000-2018	Cumulative % Total
781	Motor vehicles for the transport of persons	**$68,496,282,909**	**8.11**	**8.11**
281	Iron ore and concentrates	**$65,803,159,142**	**7.79**	**15.89**
671	Pig iron & spiegeleisen, sponge iron, powder &	**$63,803,808,431**	**7.55**	**23.44**
287	Ores and concentrates of base metals, n.e.s.	**$51,967,856,049**	**6.15**	**29.59**
667	Pearls, precious & semi-precious stones	**$38,376,905,405**	**4.54**	**34.13**
743	Pumps (excluding liquid), gas compressors &	**$36,503,440,558**	**4.32**	**38.45**
334	Petroleum oils or bituminous minerals > 70 % oil	**$36,347,811,904**	**4.30**	**42.76**
782	Motor vehic. for transport of goods, special purpo.	**$31,501,585,223**	**3.73**	**46.48**
112	Alcoholic beverages	**$15,389,731,052**	**1.82**	**48.30**
675	Flat-rolled products of alloy steel	**$14,932,090,342**	**1.77**	**50.07**
784	Parts & accessories of vehicles of 722, 781, 782,	**$13,824,198,572**	**1.64**	**51.71**
251	Pulp and wastepaper	**$11,648,775,382**	**1.38**	**53.09**
522	Inorganic chemical elements, oxides & halogen	**$11,120,822,562**	**1.32**	**54.40**
673	Flat-rolled prod., iron, non-alloy steel, not coated	**$10,759,638,369**	**1.27**	**55.68**
713	Internal combustion piston engines, parts, n.e.s.	**$ 9,228,336,612**	**1.09**	**56.77**
641	Paper and paperboard	**$ 8,820,078,076**	**1.04**	**57.81**
821	Furniture & parts	**$ 8,801,322,178**	**1.04**	**58.85**
728	Other machinery for particular industries, n.e.s.	**$ 7,851,833,079**	**0.93**	**59.78**
723	Civil engineering & contractors' plant &	**$ 7,699,690,899**	**0.91**	**60.69**
512	Alcohols, phenols, halogenat., sulfonat., nitrat.	**$ 7,481,070,079**	**0.89**	**61.58**
792	Aircraft & associated equipment; spacecraft, etc.	**$ 7,010,741,035**	**0.83**	**62.41**
691	Structures & parts, n.e.s., of iron, steel, aluminium	**$ 6,991,428,278**	**0.83**	**63.24**
575	Other plastics, in primary forms	**$ 6,845,694,254**	**0.81**	**64.05**
676	Iron & steel bars, rods, angles, shapes & sections	**$ 6,664,940,012**	**0.79**	**64.83**
289	Ores & concentrates of precious metals; waste,	**$ 6,551,573,632**	**0.78**	**65.61**
764	Telecommunication equipment, n.e.s.; & parts,	**$ 6,524,121,416**	**0.77**	**66.38**
598	Miscellaneous chemical products, n.e.s.	**$ 6,181,001,467**	**0.73**	**67.11**
511	Hydrocarbons, n.e.s., & halogenated, nitr.	**$ 6,158,777,328**	**0.73**	**67.84**
61	Sugar, molasses and honey	**$ 5,953,999,978**	**0.70**	**68.55**
699	Manufactures of base metal, n.e.s.	**$ 5,949,771,251**	**0.70**	**69.25**
288	Non-ferrous base metal waste and scrap, n.e.s.	**$ 5,842,089,266**	**0.69**	**69.94**
335	Residual petroleum products, n.e.s., related mater.	**$ 5,683,454,585**	**0.67**	**70.61**
553	Perfumery, cosmetics or toilet prepar. (excluding	**$ 5,666,587,000**	**0.67**	**71.29**
282	Ferrous waste, scrape; remelting ingots, iron, steel	**$ 5,244,395,390**	**0.62**	**71.91**
98	Edible products and preparations, n.e.s.	**$ 5,075,545,191**	**0.60**	**72.51**
625	Rubber tyres, tyre treads or flaps & inner tubes	**$ 4,923,578,557**	**0.58**	**73.09**
562	Fertilizers (other than those of group 272)	**$ 4,904,877,538**	**0.58**	**73.67**
893	Articles, n.e.s., of plastics	**$ 4,707,349,318**	**0.56**	**74.23**
283	Copper ores and concentrates; copper mattes,	**$ 4,616,941,818**	**0.55**	**74.77**
674	Flat-rolled prod., iron, non-alloy steel, coated, clad	**$ 4,479,125,778**	**0.53**	**75.30**
679	Tubes, pipes & hollow profiles, fittings, iron, steel	**$ 4,406,618,918**	**0.52**	**75.82**

Source: Calculated from UN Comtrade Data (2020) and Manufacturing definition by Lall (2000).

The dominant sub-sector exports include motor vehicles, ferrous and non-ferrous metals. The composition shows that vehicles were the largest manufactured exports from 2000 to 2018 with a cumulative value of US$ 68 billion (8.11%) of total manufactured exports. Iron ore and concentrates were the second largest export (7.79%). 36.2% of goods exported in 2017 were mining and mineral products (SA-IPAP, 2018). It can be seen from Table 2.6 above, mineral exports in various stages of processing feature regularly in the top manufactured export products. The SARB (2021) is of the view that except for a few subcategories, mineral and metal

commodities account for the bulk of South African exports. Pillay (2013) and Viviers et al. (2014) identify manufacturing as the sector likely to enhance South Africa's export competitiveness. Manufacturing offers an avenue for South Africa to reap the full benefits of value adding its exports (NACI, 2003).

Table 2.7: Ranking of South Africa's top manufactured export products[4]

Manufacturing Subsector	2000	2005	2010	2015	2018
Ores and concentrates of base metals, n.e.s.	6	8	4	4	1
Petroleum oils or bituminous minerals > 70 % oil	3	5	5	5	6
Pearls, precious & semi-precious stones	1	3	7	8	7
Pig iron & spiegeleisen, sponge iron, powder & granu	2	1	2	3	4
Pumps (excluding liquid), gas compressors & fans; centr.	5	4	6	7	8
Motor vehicles for the transport of persons	4	2	3	1	2
Inorganic chemical elements, oxides & halogen salts	8	9	15	30	14
Flat-rolled products of alloy steel	9	10	11	17	11
Parts & accessories of vehicles of 722, 781, 782, 783	10	13	10	11	12
Pulp and wastepaper	7	20	13	10	10
Iron ore and concentrates	13	6	1	2	3
Flat-rolled prod., iron, non-alloy steel, not coated	12	7	12	33	16
Alcoholic beverages	17	11	9	9	9
Motor vehicle. for transport of goods, special purpose.	20	15	8	6	5

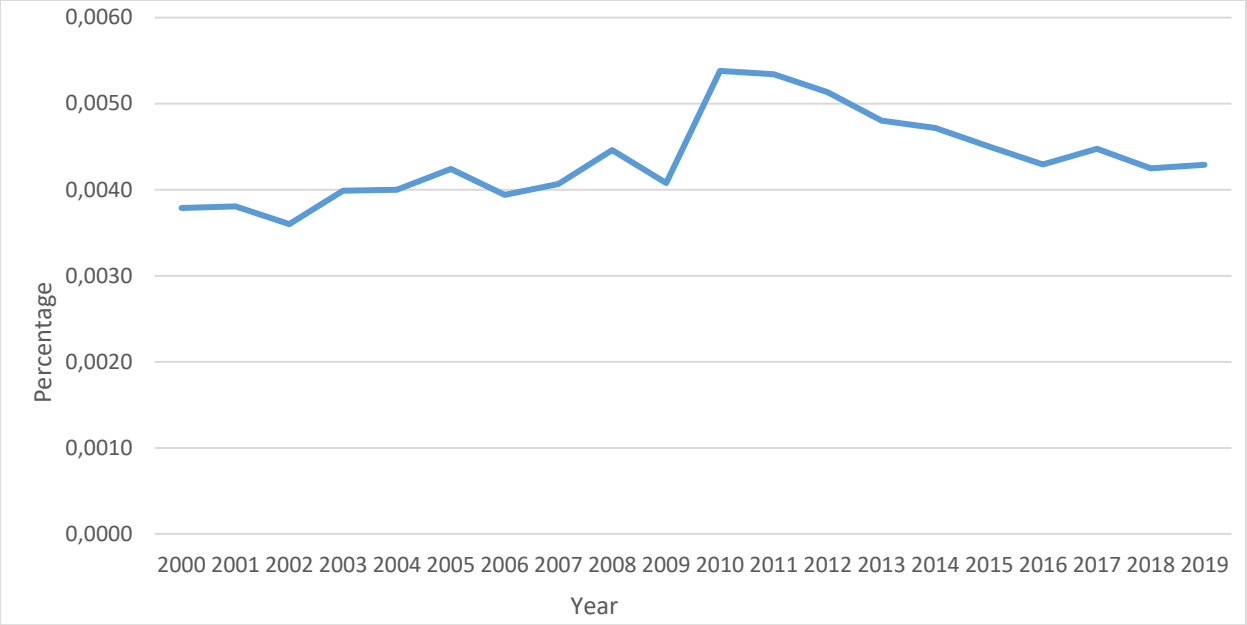
Source: Calculated from UN Comtrade Data (2020) and Manufacturing definition by Lall (2000).

Table 2.7 above also shows the top South African manufacturing subsector exports for the years 2000, 2005, 2010, 2015 and 2018 as listed in decreasing order of rank, with 1 representing the highest manufacturing subsector export by value. The top manufacturing subsectors vary for each year, ranging from pumps, various metal ores and motor vehicles. Draper et al. (2018) have expressed concern about the narrow sectoral concentration of South Africa's exports, providing an example that exports of stone, glass, metals, fuels and minerals totalled 38.6% of exports in 2016, as opposed to 21.5% in 1993.

2.4 Global Share of South African manufactured exports

Figure 2.3: Share of South African Manufacturing in world manufacturing exports (2000-2019)

[4] The ranking is in the decreasing order of value of exports with 1 representing the largest value of exports. The top 10 for the year are highlighted in red.



Source: UNIDO (2022)

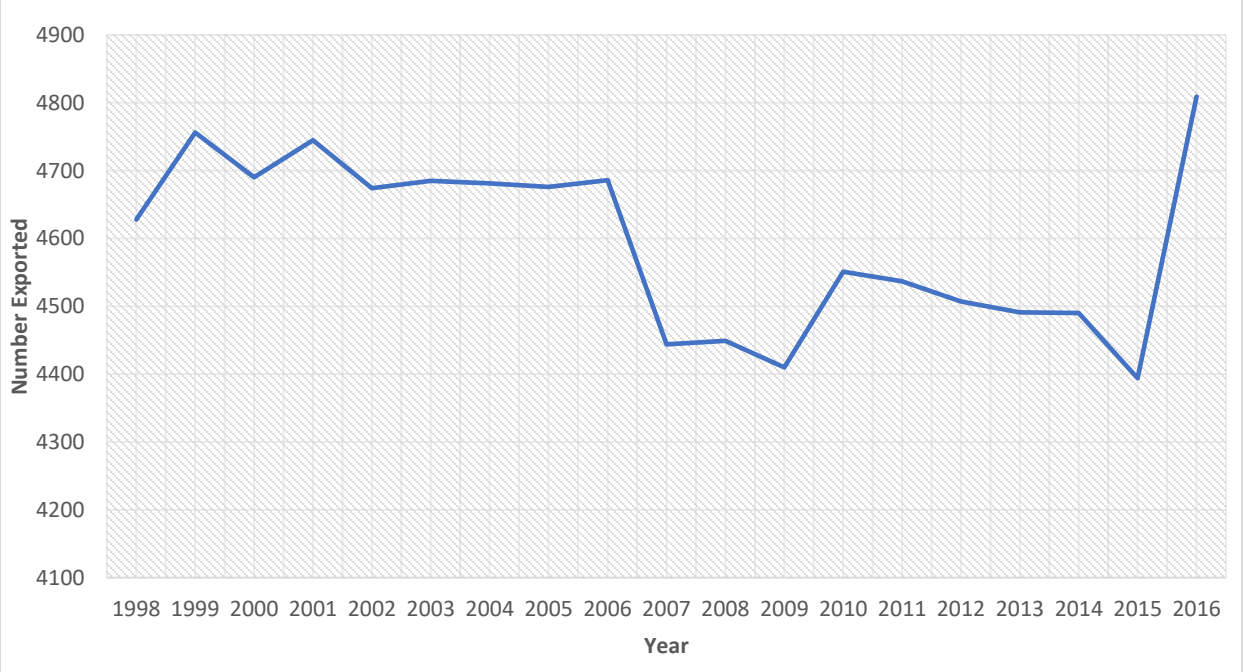
Figure 2.3 shows the random dips and growth in the global percentage of industry exports from South Africa from 2000 to 2009, the percentage of industrial exports in the world market started on a decline from 2010 to 2019. The decline has been consistent since the global financial crisis, however South Africa's manufacturing export share in global manufacturing exports was 0.0043% in 2019, marginally higher than in 2000 when it was 0.0038%. Rodrik (2006) has expressed concern at the South African manufacturing sector's lack of responsiveness to changes in world trade. Liu et al. (2017), states that the state of the manufacturing sector is an effective indication of national economic development and a reflection of a country, therefore a better performing manufacturing sector improves South African international rankings and economic reviews.

2.5 Number of exported HS6 digit products

Hummels and Klenow (2005) deconstructed the shares of world trade of countries into their extensive and intensive margins. Extensive margin was measured as the proportion of South Africa exports in global exports. The extensive margin was enumerated from the number of active export lines which he used to calculate the extent of diversification. The sum of all exported product classifications (with trade values of at least 10,000 USD) by South Africa at the six-digit level Harmonised System of classification is presented in Figure 2.4. The graph displays a general

decline in the total number of exported products from its peak of 4756 products in 1998 to 4394 products in 2015. However, the figure increases to 4809 for the year 2016.

Figure 2.4: Number of Exported Harmonised System - HS6 Digit Products



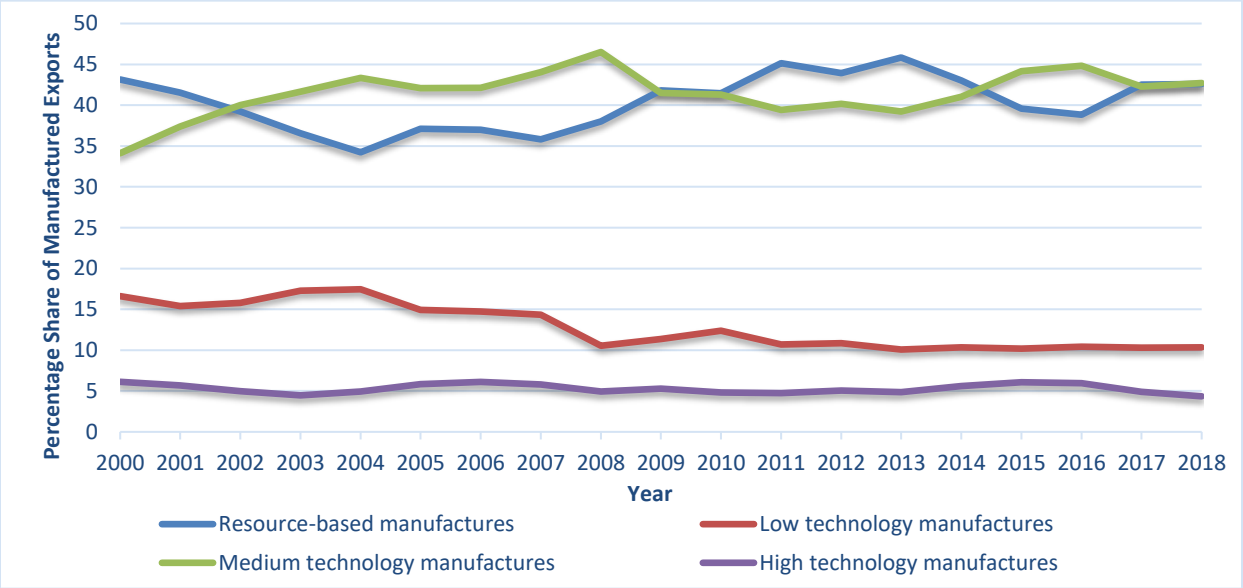
Source: International Trade Centre (2023).

This encompasses more than 83% of the approximately 5 300 different products classified for trade. Fuels, minerals, and metals account for about half of all exports by value but represent a small fraction of South Africa's exported product classifications, the majority being manufactured product classifications. SARB (2021) mentions that if exports are produced mostly by slow-growing exporters, South Africa's ability to expand its exports will be curtailed.

2.6 South Africa's Manufacturing Exports by Technological Classification

The following figure 2.5 displays South Africa's manufactured exports from 1998 to 2018 categorised by technological intensity. High-technological exports, having contributed four percent in 2018, contributed the lowest to total manufactured exports. The variation in yearly percentage contribution to exports by this category was nominal between the year 2000 and 2018, the sector contributed six percent in the year 2000.

Figure 2.5: Manufacturing exports by technological classification for South Africa (1998 - 2018)



Source: Calculated from UN Comtrade Data (2020) and Manufacturing definition by Lall (2000)[5]

According to UNIDO (2019) there is a difference between the determinants of competition between commodities and manufactured exports. Commodities face strong price competition and are affected more by price movements; this effect is however not prominent in manufactured products where technology is a more dominant factor. More technologically intensive manufactured products are less affected by declining prices. Superior manufacturing capability is identified as having been used in structurally transforming developed economies from low productivity primary producers of the agricultural and mining sectors to higher value-added manufactured products. This has seen developed countries command a market premium and realise higher productivity and returns from their economic activities (Dinh & Monga, 2013; NACI, 2003). The increased value-added of manufactured goods provides their producers with a bigger margin of profit, this consequently has a stronger impact on the overall economic performance of the nation. Therefore, a rise in industrial competitiveness indicates that a nation's manufactured exports grow relatively faster than its commodity exports. South African trade policy reiterates the need to upgrade so as to steer the manufacture and subsequent export of increased value-added products (TIPS, 2016).

[5] Constituents of the Manufacturing subcategories are shown in Appendix 1

Flowerday et al. (2017) and Viviers et al. (2014) contend that South Africa needs to make the transition from producing low technology and natural resource focussed goods to producing medium and high technological goods. Matthee et al. (2016) stress the importance of export diversification in growing the economies of developing countries. However, diversification was noted to be growing slowly over time for South Africa, higher price - cost margins and lack of innovation were identified as having led to exports from South Africa growing more concentrated. The Government of South Africa recognises that South Africa's capability to grow competitive value-added exports depends on the manufacturing sector's ability to innovate, grasp cutting-edge technologies, and precisely satisfy consumer demands. Diversification away from primary products builds resilience of the economy against shocks such as commodity price drops (Balchin et al., 2016).

2.7 South Africa's Manufacturing Sector Export Destinations and their Trade Agreements

Table 2.8 shows that exports to Africa encompass a significant proportion of finished and semi manufactured value-added goods. Jenkins and Edwards (2012) have explained that this was in part due to South Africa having a large and most developed industrial sector in Africa.

Table 2.8: South Africa's major manufactured export destination as a percentage by region (1995 to 2020)

	1995	**2000**	**2005**	**2010**	**2015**	**2020**
Southern African Development Community (SADC)	19,61	18,1	14,24	41,94	43,65	41,68
Eastern Asia	17	15,07	18,01	14,78	13,5	12,29
North American Free Trade Agreement (NAFTA) - U.S, Mexico, and Canada	9,6	14,23	11,57	12,65	11,6	10,68
South Asia	7,01	6,68	7,39	6,91	6,36	6,01
Rest of Americas	3,38	2,3	1,75	2,17	2,44	1,81
Western Asia	3,04	3,23	3,73	3,17	3,85	4,39
Sub-Saharan Africa excluding SADC	2,66	2,46	2,68	3,32	2,81	2,45
Rest of Europe	2,01	1,19	1,03	1,93	1,79	1,15
Northern Africa	1,45	2,21	4,02	4,18	3,6	3,66
Total	**65,76**	**65,47**	**64,42**	**91,05**	**89,6**	**84,12**

Source: Quantec EasyData (2022)

According to the DTI (2018) South Africa was ranked third in sub-Saharan Africa (SSA) in a rank of competitiveness. Export prospects for South Africa's manufacturers have been made possible by the continent's expanding consumer and infrastructure demands. The exports comprised mainly industrial and agricultural machinery and equipment, processed foods, chemicals (such as medicines), automobiles and their components, crude and refined petroleum and its byproducts, along with basic iron and steel (IPAP, 2018). The top export markets being primarily in East and Southern Africa predominantly the SADC. Draper et al. (2018) and the SARB (2021) show that exports to SADC countries are the most diverse.

South Africa is a member of the Southern African Customs Union (SACU), which also includes Namibia, Botswana, Lesotho, Swaziland, the SADC Tripartite Free Trade Area (T-FTA) and the African Continental Free Trade Area (AfCFTA) (Mlumbi-Peter, 2019). These agreements call for a commitment to lowering of impediments to trade that fall under the category of both tariff and non-tariff. According to Kellman et al. (2003), the African market offers South Africa a substitute market for the export of value-added commodities. Therefore, South Africa's manufactured exports market is relatively secure in the SADC and SACU trade areas relative to areas outside Africa.

The concentration of exports in these destinations is in part explained by Matthee and Santana-Gallego (2017) who, in addition to other factors affecting the manufacturing sector, cite the long distances to export markets and accompanying high transport costs. As a nearer market, Africa is the preferred destination of SA exporters. This is highlighted for example by SARB (2021) who identified six of South Africa's immediate neighbours as accounting for nearly 70% of all exports to Africa in 2019. The volatile exchange rate, transport cost and increased competition were ranked top three in a list of 19 constraints to exporting cited in a survey of South African exporters (Rankin, 2013). Rankin (2013) submits that regional markets are ordinarily not a precursor to growing exports outside Africa and suggests this regional export market as an opportunity for take-up by firms currently producing for the domestic market because the manufactured products are more similar in these markets than outside of them.

Between 1995 and 2020 exports to Eastern Asia, South Asia, rest of Americas and the rest of Europe were generally declining while manufactured exports to North American Free Trade

Agreement (NAFTA), Western Asia, and North Africa have increased and stagnated for SSA (excluding the SADC). Primary products have dominated trade between South Africa and the European Free Trade Association (EFTA), whose members include Iceland, Liechtenstein, Switzerland, and Norway. Between 2007 and 2017, shipments of motor vehicles to the EU grew by 26% (Mlumbi-Peter, 2019). South Africa signed the SADC-EU Economic Partnership Agreement (EPA) (Lesotho, Botswana, Namibia, Mozambique, Eswatini and South Africa). Some (80%) of the SADC EPA exports to the EU were from South Africa and they comprised mainly of automobiles used for both passenger and cargo transportation, platinum and centrifuges. The top markets were Germany, United Kingdom and Netherlands (Trade Law Centre, 2018).

South Africa has ratified the following additional agreements:

- Trade between South Africa and the USA is governed by the African Growth and Opportunity Act (AGOA), a one-sided preferential arrangement (Mlumbi-Peter, 2019).
- Agreements supporting trade amongst South Africa and BRICS countries (Brazil, China, India, and Russia) include IBSA Forum which seeks to encourage mutual trade between India, Brazil and South Africa.
- The SACU – MERCOSUR PTA - Mercado Común del Sur (Southern Common Market) Preferential Trade Agreement (PTA), is made up Brazil, Paraguay, Uruguay, and Argentina (Mlumbi-Peter, 2019; Deloitte, 2018).
- SACU and India also signed a Preferential Trade Agreement (PTA) (Mlumbi-Peter, 2019).
- South African industrial goods subject to GSP, or the Generalised System of Preferences are eligible for preferential market access in Russia and a Memorandum of Understanding signed between South Africa and China. This Comprehensive Strategic Partnership Agreement CSPA was signed to encourage value-added exports to China (Deloitte, 2018). Vehicles for the transportation of goods was the major export to Russia. Although relatively smaller, exports to Brazil and Russia were more diverse and included higher value-added products (IDC, 2014).
- In 2016, iron and steel were South Africa’s top export to Brazil. South Africa's exports to the other BRICS countries show how little it diversifies its exports and how much it depends on primary products. For instance, before 2007, the majority of exports to India were made up of manufactured products and chemicals. After that, exports of raw materials and mineral fuels took centre stage. According to the SARB (2021), mineral and metal commodities make up

close to 90% of exports to China. SARB (2021) adds that in 2019, five products (ferroalloys iron, manganese and chromium ores and concentrates) constituted above 75% of exports to China, mainly made up of unprocessed metals or minerals.

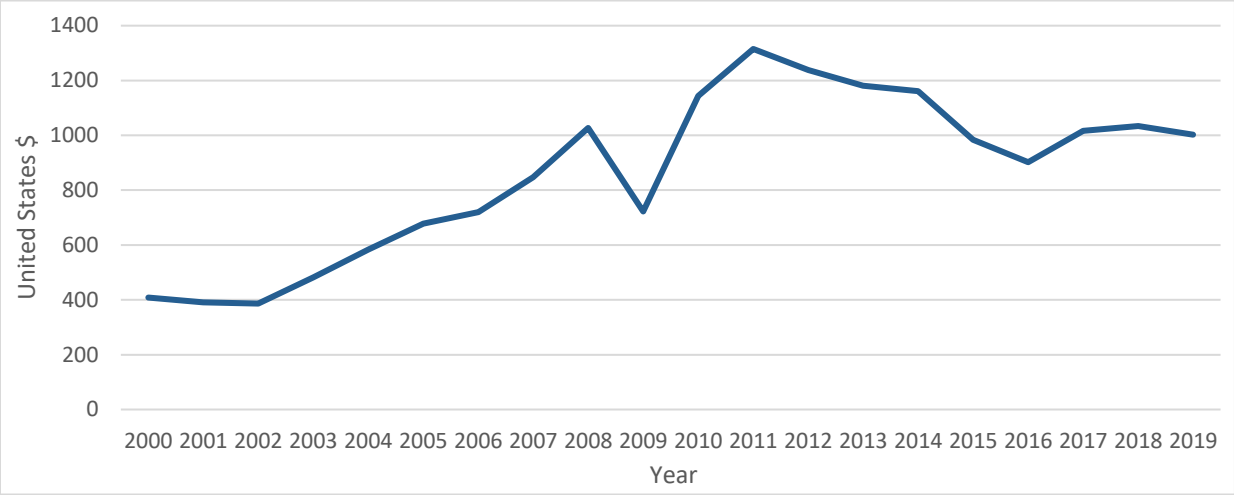
The SARB (2021) explained that stagnating exports to China from 2011 arises from depressed commodity pricing for the top five exports from South Africa, this offset the growth in export volumes to the country. Flowerday et al. (2017) identifies these developments as having depressed export growth. This effect is compounded by an increase in imports subsidised in their source countries. The major items that South Africa supplies to the BRICS nations show how heavily it relies on exporting basic goods. The continued export concentration on primary goods indicates that the export diversification envisioned by the present trade agreements with the BRICS nations has not yet to materialised. South Africa's primary product exports grew from 34% to 70% of total exports to the rest of BRICS from 2001 to 2016, in spite of efforts to lessen the dominance of primary resource exports. In contrast, exports of manufactured goods fell from around 41% to 24% over the same time (Deloitte, 2018).

2.8 South African Trade Indicators

The World Bank (2014 and 2016) draw attention to the fact that the South African production and export markets seem to be very consolidated, with a small number of companies holding the majority of the market share. During 2002 to 2012, the nonmineral export contribution of the top five percent nonmineral exporters increased slightly from 85% to 87%. The World Bank (2014) observes that this consolidated export structure has been a consistent feature over the years. Some of South Africa’s export trade indices are presented below.

2.8.1 Manufacturing Exports Per Capita for South Africa

Figure 2.6: Manufacturing Exports Per Capita for South Africa (2000-2019)



Source: UNIDO (2022)

Figure 2.6 shows South Africa's manufacturing exports per capita from 2000 to 2019 which shows that the exports per capita growth was stagnant from 2000 to 2002. The sector subsequently grew from 2003 until 2009, the time of the worldwide economic downturn. It regained its growth until it peaked in 2011, thereafter it declined until 2019. Manufactured exports per capita provide insight into how export performance is developing (UNIDO, 2022). Despite the fact that the absolute value of manufactured exports has increased during the last 20 years, manufactured exports have failed to keep up with population growth and hence manufactured exports per capita started to show a decline since 2011.

2.8.2 Revealed Comparative Advantage (RCA) for South African manufacturing.

Revealed Comparative Advantage is a Ricardian-based ratio for assessing relative productivity disparities. The revealed comparative advantage (RCA) is an index that shows the relative advantage or disadvantage of a country in exporting a commodity as indicated by actual export patterns relative to those of all other countries in the world[6]. A country is considered a competitive manufacturer and exporter of a good if its RCA is larger than one (RCA >1) in contrast to a country that manufactures and exports that product at or lower than the global average. The higher the RCA, the more the export power that country is ascribed to that product for that country (United

[6] The formulae is shown in chapter 3

Nations Conference on Trade and Development - UNCTAD, 2022). In this context, it will measure how significant manufacturing is in South Africa's exports compared to manufacturing's importance in world trade

Table 2.9: South African Manufacturing Subsectors with Comparative Advantage for the year 2021

SitcRev3Product	SitcRev3Product Label	2021
287	Ores and concentrates of base metals, n.e.s.	52,77
671	Pig iron & spiegeleisen, sponge iron, powder & granu	20,53
281	Iron ore and concentrates	14,37
289	Ores & concentrates of precious metals; waste, scrap	8,03
532	Dyeing & tanning extracts, synth. tanning materials	7,63
251	Pulp and waste paper	4,78
782	Motor vehic. for transport of goods, special purpo.	3,98
743	Pumps (excluding liquid), gas compressors & fans; centr.	3,11
689	Miscellaneous no-ferrous base metals for metallur.	2,99
523	Metallic salts & peroxysalts, of inorganic acids	2,31
47	Other cereal meals and flour	2,31
524	Other inorganic chemicals	2,29
611	Leather	2,26
781	Motor vehicles for the transport of persons	2,16
61	Sugar, molasses and honey	2,13
112	Alcoholic beverages	1,99
667	Pearls, precious & semi-precious stones	1,97
59	Fruit and vegetable juices, unfermented, no spirit	1,83
675	Flat-rolled products of alloy steel	1,80
58	Fruit, preserved, and fruit preparations (no juice)	1,79
431	Animal or veg. oils & fats, processed, n.e.s.; mixt.	1,61
512	Alcohols, phenols, halogenat., sulfonat., nitrat. der.	1,38
522	Inorganic chemical elements, oxides & halogen salts	1,35
335	Residual petroleum products, n.e.s., related mater.	1,32
593	Explosives and pyrotechnic products	1,31
516	Other organic chemicals	1,21
525	Radio-actives and associated materials	1,10
891	Arms & ammunition	1,10
513	Carboxylic acids, anhydrides, halides, per.; derivati.	1,07

United Nations Conference on Trade and Development – UNCTAD (2022)

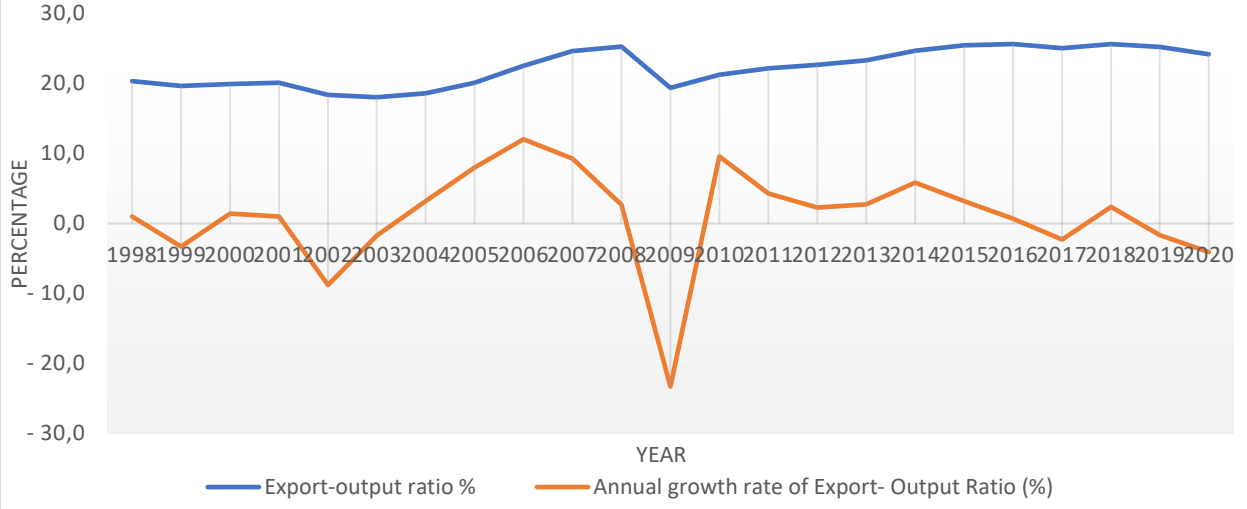
Table 2.9 lists South African manufacturing subsectors exhibiting comparative advantage (RCA>1) in 2021 using the three-digit grouping of the Standard International Trade Classification – SITC. (Full list of subsectors listed in Appendix 2). Draper et al. (2018) expressed concern that the low-skill manufacturing industries with high job creation potential, such as textile, apparel, and footwear, have RCAs well below 1. The concern arises because these are the sectors likely to

employ a large pool of low skilled job seekers. At the SITC three-digit manufactured products grouping (201 subsectors), South Africa had 29 subsectors exhibiting revealed comparative advantage (RCA>1) as shown in Table 2.9.

2.8.3 Export to Output Percentage Ratio for South Africa's Manufacturing Sector

Figure 2.7 below shows South Africa's manufacturing export to output percentage ratio and its growth rate from 1998 to 2020. The ratio was 20% in 1998 and grew marginally over the years to 24% in 2020. The above ratio is computed as exports divided by production. The index shows the overall degree of reliance of South African producers on foreign markets. A higher value means there is a higher tendency of domestic producers to export the product compared to selling it in the domestic market.

Figure 2.7: South Africa's manufacturing export to output percentage ratio and its growth rate (1998-2020)



Source: Quantec EasyData (2022)

2.9 Binding Constraints for South African Manufacturing Subsectors

Various challenges have been highlighted in several studies as constraints to the manufacturing industry across different subsectors. The South African Reserve Bank (SARB, 2016) cited infrastructure deficiencies, electricity supply constraints, increasing cost of water, a sluggish expansion in train and seaport capacity, and a large number of industrial actions. Below is a discussion of some of the factors affecting South Africa's manufacturing subsectors.

2.9.1 Metals, Metal Products, Machinery and Equipment

As a WTO signatory, South Africa adopted a trade liberalisation agenda in 1994 and began signing multilateral trade agreements with various trading partners. The drop in steel import duties forced the South African steel industry to compete with imports from nations such as China and India where such industries are heavily subsidised by their governments. The outcome was an influx of low-cost steel products into South Africa. The Department of Trade and Industry (DTI, 2014) assessment for the iron and steel industry found that South African imports had grown by 17% while exports of iron and steel from South Africa had declined by 21% from their apex in 2007. The steel sectors further along the value chains also experienced this trend. The DTI (2014) report also states that the South African steel and engineering industry helped contribute R335 billion to the national economy in 2013 in which some 48% of the sectoral production was for the local market (R150 billion). R103 billion went toward importing semi - manufactured goods and R91 billion toward importing final products. The DTI's report to parliament in 2018, corroborates the statistics by identification of these imports as making up 60% of the local consumption of steel, The increase in this percentage between 2000 and 2016 was more than 250 percent.

More specifically, China's steel exports to South Africa rose from 12% in 2000 to 54% in 2016. The primary steel business depends on economies of scale to achieve viable margins because of high fixed costs. Accordingly, China produced the largest amount of crude steel in 2018 (928 million tonnes), India produced the second highest at 100 million tonnes, and South Africa produced 6 million tonnes. Consequently, steel prices have lowered globally as a result of the oversupply from China and while imports of steel have gradually increased there is a general oversupply of such products in South Africa owing to this improved manufacturing capability from these major competitors and the relative decrease in sea transport costs.

According to Draper et al. (2018), a few of the top steel manufacturing nations, particularly China and India, extensively subsidise their industry. The contest for a small number of markets is getting more intense due to the ongoing excess production of steel. The DTI (2014) contends that due to the highly competitive imports of steel products from Asia, dominated by China and India, as well as the high-quality steel imported from the European Union and the USA, the domestic industry is growing slowly or stagnantly and some of the subsectors are in decline. Bolts and nuts, railway

materials, and small diameter welded pipe make up the bulk of imported product categories. Additionally, Draper et al. (2018) suggest that South Africa's manufacturing historically evolved mostly by mining, and the sector's downturn had a substantial effect on downstream industries such as the iron and steel subsectors which make up a significant portion of the manufacturing sector. Although South Africa lacks comparative advantage in the value-added value chain further down the steel sector, it enjoys comparatively significant competitiveness in the extraction and exportation of iron ore. Typically, the level of competition increases as product beneficiation is increased.

Tsebe et al. (2021) allege that the six largest South African steel companies when faced with the challenge of competing with imported steel for local clients, were cooperating rather than competing in the face of this oversupply, creating a *de facto* monopoly. Owing to their market dominance and imperfect competition, they were also able to raise prices without losing customers and colluded to set product pricing at import parity. This compounded the local price of steel and contributed to making the downstream manufacturing sectors unsustainable. However, a competition inquiry eventually imposed administrative penalties against these colluding companies.

In the face of challenges affecting the steel industry, primary steel tariffs were reduced from five to zero percent to counter domineering pricing effects on downstream steel manufacturers. However, due to the continued increase in imports from China, the steel tariffs have since been increased to 10%, the maximum rate allowable by the General Agreement on Trade and Tariffs (GATT). South Africa is signatory to this agreement. Additionally, it implemented rebates and increased the tariffs on a number of steel derivative commodities. Bell et al. (2021) mention that tariffs need to be adequately structured in order to assist the expansion of the manufacturing production chain, they provide an example that when steel manufacturers were granted tariff support to help them during a time of depressed international steel prices, this had the effect of increasing the cost of steel for downstream fabricators who did not receive tariff support. However, IPAP (2018) cites government's establishment of a Steel Development Fund of R1.5 billion to support the downstream steel subsectors. However, the South African Revenue Service's tariff schedule lists that incoming waste steel and powder or granulated steel are exempt from import tariffs (Parliamentary Monitoring Group, 2016).

Other compounding factors affecting the South African local iron and steel subsector include power outages, inadequate transport infrastructure, high input costs and lack of investment and maintenance which means obsolete technology and lower quality steel. Additionally, there are not enough employable medium to highly skilled individuals. Welders, patternmakers, toolmakers, machinists, moulders, draughtsmen educated in computer-aided design, fitters, millwrights, turners, boilermakers, cutters, and information technology professionals are some of the occupations in short supply (Van Vuren et al., 2008).

In response to the South African steel industry's downturn and the financial and tax relief support measures, additional policies were enacted to include:

- benefits given to steel plants located in industrial development zones.
- the promotion of bursaries to improve skills and productivity for the sector.
- a 10-year business investor visa to motivate foreign direct investment to the domestic steel industry; and
- Priority was given to steel exports by increasing their access to seaport and train networks (Tsebe et al., 2021).

2.9.2 Clothing, Textiles, Footwear and Leather – The CTFL Subsector

The South African Department of Trade, Industry and Competition (2020a) stated that in 2016, the CTFL retailers spent an estimated R70 billion on CTFL products with an estimated R39 billion (55%) being imported (some 53.9% of clothes, 56% of textiles, and 61.1% of footwear in the retail market are estimated to be imported). International retailers are identified as expanding their market share in South Africa without the corresponding local purchases and/or by under-invoicing imports. The CTFL manufacturers face a number of challenges, such as: strict quality and delivery requirements from retailers, constricting order books, and the replacement of domestic production with low-priced imports. Other shortcomings include their inadequate supply capabilities, obsolete production techniques and equipment, inadequate human capital and associated skills, and misaligned policies. Ballard (2002) has noted that immigration laws also became relatively restrictive in facilitating importation of talented craftspeople.

The meat sector was regulated before it was liberalised in the early 1990s, this made it possible for the footwear manufacturers to source leather at relatively low prices. Prices rose towards global

parity as the economy was liberalised in the middle of the 1990s. However, quality hide prices rose beyond what the footwear industry could bear. This led to the footwear manufacturers importing cheaper leather due to the economic pressures that cheap and illegal imports were putting on the footwear retail sector (Ballard, 2002). Eventually, as a result of the reduction in the manufacture of footwear and the rise in the usage of imported leather many tanneries either shut down or shifted to producing leather for the auto upholstery industry. According to South Africa's Department of Agriculture, Forestry, and Fisheries (2016), the automotive upholstery industry, which produces almost entirely for export, is now the country's largest domestic user of South African leather. South Africa's Department of Agriculture, Forestry, and Fisheries (2016) also observes that prices of hides are relatively higher in South Africa because the automotive upholstery responded favourably to the Motor Industry Development Programme (MIDP) incentive and increased the demand for local hides and skins.

A major determinant of trade to consider for South African firms looking to export is distance to the market. Declining capital, labour productivity, value added, and market share in export markets all indicate that South African footwear manufacturers have not yet reformed their production processes to satisfy the demands of their markets or to rival their competitors. Given the high value of the goods manufactured because of the cost of leather and the fact that foreign markets often order large volumes it is not operationally preferred to ship this footwear to distant markets as it would tie up significant amounts of cash in stock and require significant working capital. Air freight and warehousing alternatives can be used, but these would increase costs. In effect, prospects for exports are reduced because retailers work with very short lead times and therefore mostly prefer local manufacturers who are more responsive to their needs (Ballard, 2002).

2.9.3 The Sugar Sector

South Africa's yearly sugar production dropped from 2.75 million to 2.1 million tonnes, a decline of almost 25% during the last 20 years. The number of sugarcane growers has dropped by 60% in that time period, while jobs in the sugar sector are estimated to have decreased by 45%. Constraints to the sugar sector include decreased sugar demand in the SACU region from 1.65 million to 1.25 million tonnes annually, and this requires more sugar to be exported into global markets whose prices are less than the domestic value of production. Presently, there is an increasing quantity of low-cost, free-trade flow exports coming from eSwatini to the SACU region. The public health

priority goal of reducing human sugar consumption through the South African Department of Health's health promotion levy and internationally will result in a continued drop in domestic sugar consumption and in the world in general (South Africa. Department of Trade, Industry and Competition, 2020b). The South African Farmers Development Association (SAFDA) cited additional constraining factors as including cheap sugar imports regardless of tariff protection, frequent droughts, relatively higher input costs (chemicals and seed) and lack of access to funding (Parliamentary Monitoring Group, 2017).

2.9.4 Wood and Paper; Publishing and Printing

The Department of Trade, Industry and Competition (2020c) cites stakeholders within the sector having collaborations over some challenges and inhibitors that can relieve costs if addressed. The challenges include the following:

- Cross-border migration of pests and diseases from neighbouring countries.
- The potential for goods contamination through lack of upkeep of ship handling infrastructure as well as lengthy ship voyage time.
- Clarified organisational mandates to promote effective fire prevention management to minimise fire-related losses.
- The removal of the prohibitive import regulations on wastepaper.
- A severe lack of technical, entrepreneurial and financial skills among small- and medium-sized businesses and community producers.

2.9.5 Petroleum, Chemicals, Rubber and Plastic Subsector

The "petroleum, chemicals, rubber and plastic" industry is susceptible to climate change policy and fluctuating fossil fuel costs as it is dependent on these for energy and chemical raw materials. Patel (2022) identifies challenges for this sector as follows:

- In the petrochemical sector, energy and raw material inputs account for nearly half of operational costs. About 11% of the energy used by industry in South Africa in 2015 was consumed by this sector.
- In the face of climate change, the industry faces challenges due to its intricate integration with fossil fuels. South Africa's extensive reliance on coal poses a risk as coal emits the most carbon

dioxide when compared to other fossil fuels. This puts the sustainability of development of the sector into question.

- Global trade and climate policies increasingly aim to penalise carbon-intensive nations and value chains. In future, South Africa will face greater risk related to foreign investments, trade, and development if it does not expedite steps to decarbonise the petrochemical value chain.
- Technology lags prevent newer technologies from becoming commercially viable. However, vulnerable stakeholders will suffer worsening socioeconomic conditions as punitive legislation and climate change dangers become more apparent. These include the loss of jobs, environmental damage, and the growing costs of raw materials together with direct fines. This will necessitate changing company models and perhaps downsizing. Given the strong reliance on carbon, averted short-term costs produce long-term policy risk, which exposes the industry to significant expenses from a penalty and investment cost perspective.

2.9.6 Furniture Manufacturing

The South African Department of Trade, Industry and Competition (2021) identifies a number of factors that have constrained furniture manufacturing and diminished some of its traditional advantages over the last ten years. These factors include the following:

- Insufficient investment into the sector.
- Demand that has either remained constant or fluctuated in unanticipated ways.
- Increased imports, in 2019 the import penetration ratio was estimated to be 30%.
- Mirroring export values from furniture source countries with South Africa's own import values shows that furniture imports are under invoiced.
- A few significant manufacturing firms as well as some retail companies have failed. South Africa's ability to produce furniture thus decreased and the industry became more fragmented and import focused.
- Through the internet, customers have access to a large variety of furniture concepts and designs as well as online suppliers, including the option to make direct purchases from foreign markets. This enables customers to be more discerning and also increases their bargaining power as they have a wider selection of products to pick from. This now means that the supply cycle is now shorter, which necessitates shorter lead times, particularly in the premium market. Online

shopping has created a new concern that consumers will get used to buying flat-packed "do it yourself" items from foreign markets.

- In recent years, many bigger manufacturers have gone out of business, leaving smaller firms to fill the gap. Furniture retailers have turned to local producers to supply them with products with a wider variety of designs. The existing medium-sized firms are, however, not always able to provide the volume and variety that large retailers with a national footprint demand. The capital, equipment, computer design and cutting tools, as well as other resources required to develop and improve their operations are often lacking in these small to medium-sized firms.
- For many businesses, working capital is restricted. Large stores typically place the majority of their furniture orders between July and November because the end of the year is when most individuals purchase furniture. This causes cash flow issues for manufacturers, especially smaller businesses.
- Metal spring prices for supply to bedding makers is identified as a cause for concern. Other steel products are similarly identified as being in low supply.
- Skills shortages have been identified with the reason given being that traditional trade skills used in the furniture sector have not been preserved nor adequately replaced.

2.9.7 Food, Beverages and Tobacco Manufacturing Subsectors

- The Department of Agriculture, Forestry and Fisheries (2013) calculated comparative advantage for the agricultural sector using RCA and found that processed food had lost significant ground in its agricultural export competitiveness.
- The South African Department of Agriculture, Forestry and Fisheries (2017) cites high excise duties, droughts, and a stronger rand as some of the factors that pose challenges to the competitiveness of the tobacco subsector. Excise duties have also grown by 470% over the last decade, this has led to the shrinkage of the legal market by nearly 30% while the illegal market has grown rapidly. Fifteen percent of the sector is thought to be illegal, and that percentage is believed to be rising. Infrastructure, access to water, logistical difficulties in rural areas, biosecurity concerns and cross-border trade are other considerations.

2.10 Programmes to Support the South African Manufacturing Sector

South Africa recognising the significance of manufacturing in growing the economy and faced with the requirement to stop the dependence on primary product exports, has committed itself to programmes and policies that encourage the growth of the manufacturing industry (Flowerday et al., 2017). Programmes have been initiated over the years through South Africa's Industrial Policy Action Plans (IPAPs) and its iterations from 2008 to 2018. The programmes have been enacted to help improve export competitiveness and diversification beyond the reliance on traditional commodities. In addition, the development plans are meant to improve employment through promotion of high labour-absorbing tradable products (Small Enterprise Development Agency - SEDA, 2012 and TIPS, 2016). The support initiatives can be categorised into five main groups – 'industrial financing and incentives'; 'developmental trade policy'; 'innovation and technology'; 'special economic zones'; and 'public procurement'. The IPAP has, over the years, identified what it considers key manufacturing subsectors of focus discussed further below (TIPS, 2016).

2.10.1 Industrial Financing and Incentives

Eita and Jordaan (2007) posit that an export led growth strategy should incentivise exporters. In that regard, the largest kind of support provided to the manufacturing industry is industrial financing, particularly through government incentives and lending or shareholding handled through banking institutions. The Department of Trade and Industry (DTI), through the Industrial Development Corporation (IDC) and later IPAP, is the primary incentive provider, according to IPAP (2018). The industries prioritised under IPAP received R91.7 billion (81%) of the total value of IDC's support for South African enterprises from 2007 to 2017. The DTI in IPAP (2018) mentions that it's continuous provision of incentive packages has been the most effective support towards industrial development, economic growth, and job creation.

Table 2.10 shows the funding received by different manufacturing subsectors from 2008 to 2017 from the IDC. This funding was intended for purchases of equipment, machinery, export marketing projects, and corporate development services. Despite the value of these support initiatives, Bell et al. (2021) concluded that there has been inadequate commercial and developmental finance and that existing incentives have not succeeded in promoting higher levels of investment when compared to countries like Brazil where development finance has played a crucial role in

supporting industrial development. Bell et al. (2021) further state that the Industrial Development Corporation's model of support has limited the provision of sufficiently patient and concessional finance, with the result that it has underperformed in its contribution to structural transformation.

Table 2.10: Value of funding approved to IPAP priority industries 2008-2017 from IDC.

Subsector	**Rand' Billion**
Automotive	6.3
Clothing, textiles, leather, and footwear	4.7
Metal fabrication, capital, and rail transport	8.3
Agriculture and agro-processing	4.4
Plastics, pharmaceuticals, chemical	12.5
Primary minerals beneficiation	35.6
Green industries	14.7
Marine manufacturing	0.1
Aerospace	0.4

Source: IPAP (2018)

Kaplan (2019) states that irrespective of the support that the manufacturing sector received, employment has, over the years, been declining for the sector and this infers that manufacturing sector support programmes have not achieved much of their objectives. However, according to IPAP (2018), the programs' industrialisation attempts reduced the rate of employment layoffs and averted a full-scale deindustrialisation.

2.10.2 Developmental Trade Policy

South Africa's industrial trade strategy objective is to achieve sustainable economic growth and global competitiveness. Export promotion (to increase employment and reduce the current account deficit) strategies have, over the years, comprised of focused FDI acquisition, tariff overhaul, export promotion that is more focused, value-added exports and a revised approach to trade negotiations (IPAP, 2018 and TIPS, 2016). DTI introduced the National Exporter Development Programme with the aim of increasing exports that enhance value, create jobs, and advance the green economy. An Integrated National Export Strategy was launched to help advance the global competitiveness of South African exporters. Since the establishment of the Export Marketing and Investment Assistance fund, 5,288 companies have received support worth R738.56 million. These companies have generated R22.5 billion worth of exports (IPAP, 2018)

Policies such as enhancing protection against imports through increasing customs duty have been applied across various manufacturing subsectors, for example, customs duty was increased from 40 to 45 percent in the clothing and textiles subsector. This was done in conjunction with improved enforcement against the smuggling of imports. When challenges affecting the steel industry arose, South Africa increased the general rate of duty on primary steel products to 10 percent, increased the tariff on a range of downstream products and enacted rebates. A Steel Development Fund of R1.5 bn was also established to support downstream steel subsectors (IPAP, 2018).

2.10.3 Innovation and Technology

South Africa's industrial policy stresses skills development that is appropriate for industrialisation, mostly by emphasising tertiary technical skills such as science, technology, engineering, and mathematics (TIPS, 2016). The Department of Science and Technology has also concentrated on developing or enhancing organisations that would act as support systems for product development, transfer of technology, and commercialisation. The objective is to make it possible for an increased number of unique ideas to be turned into industrial and commercial products. The DTI promoted collaboration between government, industry and higher education and attracted university students and small, medium, and micro enterprises, with students developing concepts directly from these enterprise locations, assisting in the development of new goods, procedures, and services. In that regard, focus has been on developing business setting technical skills in servicing, repairing, and refurbishment, with particular emphasis on the transfer of machinery and technical expertise as well as certification and employee training (IPAP, 2018).

2.10.4 Special Economic Zones (SEZ) and Industrial Parks

In the 2012 Budget, a Special Economic Zones programme was promulgated, which aimed to improve infrastructure, in particular the reliability of water and electricity in underdeveloped areas with latent economic potential. The programme was to incentivise the development of groups of firms, improve investment, create employment, human capital development, business start-up support, reduce bureaucracy, improve technology transfer and adaptation, and aid access to markets and transport (Fedderke, 2018; TIPS, 2016). The Special Economic Zones Act (No 16 of 2014) has since improved legislative frameworks beyond the founding Act and has covered all nine provinces. There are now eight officially designated Special Economic Zones. The IPAP

recognizes SEZs as important contributors to economic growth, industrialisation, and employment. There are now 85 operational investors in SEZs, up from 72. (IPAP, 2018). Industrial Development Zones (IDZs), Free Trade Zones, Free Ports, and Sector Development Zones are all considered SEZs according to the SEZ Act of 2014. (TIPS, 2016).

2.10.5 Public Procurement

Expansive government infrastructure programmes and maintenance of the same opens up opportunities for local companies as suppliers. This market can further act as providing a learning platform for gradual improvement of manufacturers with the goal being to achieve exports (TIPS, 2016). The IPAP in all its iterations throughout the years has identified public procurement as an important support system for industrialisation by increasing the local markets through encouraging domestic manufacture. South Africa has the objective of promoting local purchasing of goods, such as power pylons, rail and bus fleets, infrastructure projects, renewable energy, canned vegetables, footwear and leather goods, clothing, textiles, and set top boxes, from domestic manufacturers (Small Enterprise Development Agency, 2012). R60 billion was recorded as the value of domestic production in government procurement contracts between 2015 and 2017. The largest sale involved R49.5 billion of train engines and carriages for cargo and passenger trains. Other procurement programs include "Proudly SA," which has localisation agreements with retailers (including Foschini, Edcon, and Massmart). In addition, the "Buy Back SA" program encourages individuals and companies to choose local suppliers when making purchases (IPAP, 2018).

2.11 Conclusion

The chapter shows that the South African manufacturing sector contribution to GDP has been in decline over the years in which the GIFF seeks to analyse export data (1998-2018). Manufactured exports for the same time period have grown, however not as fast as world export trade or population growth. Hence the share of South African exports as a proportion of world exports has decreased, manufactured exports per capita have also decreased. The exports are also shown to be concentrating around fewer primary or semi manufactured products. Employment contribution of the sector has also decreased during the time of study. These highlighted issues present a challenge

to the general expansion of the South African economy as manufacturing forms a significant component of the economy.

The chapter concludes by presenting challenges to manufacturing subsectors and the government support policies and programmes enacted to support South African manufacturing. The effect of these policies is inconclusive as some researchers argue that they have not achieved what they sought to do hence they are a failure, while some researchers argue that they were a success in that they arrested a full-scale deindustrialisation of manufacturing, and the performance of the sector would have been more severe than currently observed. The chapter also presents the fact that world integration and bilateral arrangements are also opening new markets for exporters. Preferential entry to affluent markets and a sizable enough local market enable up-and-coming producers to develop their skills in rapid prototyping, large-scale manufacturing, and quality assurance in advance of their entry into highly competitive export markets by making use of preferential access to high value markets and a sizable local or regional market.

Chapter Three: Literature Review

3.0 Introduction

Chapter three discusses the evolution of trade theories and the ensuing advancement of the concept of comparative advantage in trade theory. The chapter relates the concept of comparative advantage, competitiveness, and export potential and how they motivate the GIFF in its efforts to identify export opportunities. The chapter presents factors influencing competitiveness in order that South Africa may locate itself concerning such factors. The various measures for enumerating comparative advantage are presented and discussed and the empirical studies reviewing the efficacy of the different measures are presented so as to explain the study's choice of methodology adopted. Following the above, the chapter proceeds to examining the developmental economics approach which motivates the Growth Identification and Facilitation Framework (GIFF). Lastly, Chapter two provides a discussion of the empirical studies that have examined export competitiveness and potential in South African and in general.

3.1 Trade Theories on Competitiveness and Trade.

The main factor necessitating trade amongst countries is the different resource endowments and varying production factors i.e., the inability of a nation to produce all the goods it needs provides a motivator for trade. There are a number of theories explaining the reasons for and the gains from trade. Early trade theory by Mercantilists supported the notion that achieving a surplus in the balance of trade was an underlying factor to achieve gains from trade. Subsequent theories have been developed since then, including by classical economists like Adam Smith and David Ricardo (Sharma, 2013). Adam Smith inferred that countries could benefit from trade by exchanging those commodities for which each is the lowest cost producer i.e., has absolute advantage. David Ricardo further emphasised that differences in the prices of one good relative to another, matter more in determining trade as opposed to prices of individual goods. Ricardo puts forward the idea that for world trade, comparative advantage is more significant than absolute advantage since production is driven by the most efficient use of production factors instead of the lowest production costs. (Strezoska, 2015).

Eli Heckscher and Bertil Ohlin improved Ricardo's comparative advantage idea by putting forward the notion that there are more gains from trade if countries specialise and allocate resources to their most productive use. The Heckscher Ohlin Theory states that trade is expected to occur between countries with factor endowment differences and a country will export commodities whose manufacture is comparatively intense in the factor in which the nation has the greatest endowment. Therefore, it stands to reason that a country with an abundance of land would export products that require extensive land, and a country with an abundance of capital would export products that require extensive capital. Total production and general prosperity can thus improve if each country concentrates on producing products which perform better compared with other nations. (Goldin, 1990; Leishman et al., 1999; Strezoska, 2015).

Maqbool et al. (2019) are of the view that there has been a shift in the classical economic view that a nation's competitiveness can be assessed by concentrating on key factors of production (land, capital, labour, and natural resources) and that these play a significant role in the growth and development and of an economy. Maqbool et al. (2019) state that this view is not as applicable in modern world trade as currently, the policies of an economy make a significant contribution and these policies must adhere to the factors influencing international trade in order to accomplish competitiveness. Leading nations' economies have transformed over the past 20 years into knowledge-based economies, depending less on labour and capital as they create and expand their economies. It is widely acknowledged that advancement in these nations is fuelled by innovation, the discovery of new knowledge, and technical advancement. New knowledge-based economic activity promotes economic growth and enhance these country's competitiveness (Houghton and Sheehan, 2000). These countries have taken advantage of developments in technology to increase their competitiveness in world trade as seen by their relatively larger share of contributions to world trade. These contributions are both in the quality, quantity and diversity of product exported.

Bowen et al. (1987) calculated the ratios of the endowment of 23 countries in relation to their international trade, they found that close to half the factors of production contradicted the prediction that the Heckscher-Ohlin theory would have anticipated. More unfavourable test results for the factor-proportions theory have led economists to search for other theories to account for trade trends. "New Trade Theory" developed by Krugman and Obstfeld, Schumpeter, Williams and others does not dismiss comparative advantage, however it emphasises that factor endowments

are insufficient in and of themselves to explain world trade. They further argue that the trade models are much of a generalisation, critiquing the underlying assumptions of the factor-proportions theory of trade, arguing that in theory, comparative advantage is expressed in static terms whereas it is a fluid idea that shifts together with changes in government regulations, corporate practices, demand dynamics across nations, growth, specialisation, scale of operations, resource endowments, and technology (Strezoska, 2015; Goldin, 1990).

Moreover, the theory of comparative advantage posits, in a contradiction to reality, that all countries have optimal employment and that the factors of production are both locally and globally immobile. Ricardo's model is criticised as restrictive since it is based on two countries trading two goods and is expressed in labour values instead of monetary units. In addition, Ricardo assumes free trade, no government intervention, complete specialisation and ignores demand of goods while focusing on supply (Strezoska, 2015). Maqbool et al. (2019) note that achieving competitiveness is primarily and comprehensively influenced by the political and social factors. Prebisch and Singer, Hirschman and Porter have emphasized import-substitution, developmental strategy, inter-industry linkages and strategic policy as some noteworthy factors to consider in modern trade. However, these ideas have been challenged by classical trade theorists who have shown that the majority of the extra factors presented can be accounted for by the conventional classical idea, therefore, theories pertaining to comparative advantage continue to be crucial ideas in the field of international trade theory (Deb & Basu, 2012). The GIFF utilises this concept of "comparative advantage" to analyse trade performance.

3.2 The Concept of Competitiveness, Comparative Advantage, and Export Potential

Globalisation has led to increased trade between economies, this brings into focus, the increased importance of trade competitiveness between countries. Latruffe (2010), are of the view that there is contention on how to define and quantify competitiveness, which is a vast, diverse concept. Various scholars have sought to define competitiveness with varying definitions having been put forward. According to Naude & O'Neill (2006), at microeconomic level, an organisation achieves sustainable competitive advantage when "an attractive number of buyers prefer its products over the competitors' products and when the basis for this preference is lasting". At macroeconomic level, The Organization for Economic Cooperation and Development (OECD) defines competitiveness as "the degree to which a country is capable of producing, under free market

conditions, goods and services, in line with the needs of international markets, whilst maintaining or increasing the population's real income in the long-term". Comparative advantage is defined as "a margin of superiority in the production of a good or service where the opportunity cost of production is lower" (Strezoska, 2015). Comparative advantage and competitiveness are linked in that a nation that has comparative advantage over others in producing a good or service will typically be able to produce it at a competitive price i.e. possess competitiveness. Being competitive and possessing comparative advantage are taken to portray similar concepts in this study and are used interchangeable.

UNIDO (2016) and Lin (2014) in presenting the GIFF as a methodology, define 'latent' comparative advantage as that economic sector with manageable production factor costs, however, because of the limitations brought about by inadequate infrastructure and a difficult economic environment, the transaction costs are high. The competitiveness of the country will therefore be limited in both national and foreign markets. Once the government assists the businesses in resolving coordination and externality concerns so as to lower risk and industrial weaknesses resulting from the business environment, the firms will be sustainable, and the sectors will be competitive. These sectors therefore possess export potential for the economy in question. The Growth Identification and Facilitation Framework (GIFF) is a way of targeting latent comparative-advantage industries and using them to achieve sustainable industrial development. For example, the comparative advantage of a low-income nation with a low wage rate is likely to be labour-intense industries. The development of labour-intense sectors will likely produce competitive labour-intense exports.

3.3 Measures of Comparative Advantage

There is a significant amount of literature on ways to enumerate comparative advantage. The methods vary and depend on the objective sought (Sanidas and Shin, 2010).

3.3.1 Measures of Comparative Advantage Pre-Trade

Theories of comparative advantage highlight national distinctions in the autarky pre-trade context (Leishman et al., 1999). In this context, the optimum pattern of trade is established by contrasting the price at which a commodity can be imported or exported with the opportunity cost of producing that commodity (Goldin, 1990). The amount and quality of production inputs, exchange rates,

tariffs and quotas, investments in research and development, inflation, and producers' non-price competitiveness are the key factors influencing relative costs of production (Strezoska, 2015). The most preferable method of analysis would therefore be to identify the factors that determine comparative advantage and use the parameters of trade theory to perform calculations.

However, deriving production cost comparisons presents challenges. Difficulties include finding comparable country cost of production data, the question of using shadow or nominal prices, calculation of exchange rates and land valuation, labour, capital and natural resources and their subsequent comparison across countries (Goldin, 1990). An additional challenge is that comparative advantage is by its very nature linked to unobservable autarkic characteristics (Sanidas and Shin, 2010). In the actual world, international trade occurs in all nations, at least in part. This fact raises questions about the accuracy with which comparative advantage under autarky may be seen or quantified.(Leishman et al., 1999).

Various attempts have been made to evade some of the obstacles of determining comparative advantage. One argument suggests that costs are revealed in final product prices, therefore high product prices reflect high costs of production, and these may serve as a sign of competitiveness. However, this measure ignores the distortions brought about by institutional interventions in the market, including taxes, tariffs, quotas, subsidies, and market dominance (Goldin, 1990).

Other additional methods have been used to estimate comparative advantage in autarky. One such measure is the Domestic Resource Cost (DRC) index. The index is a measurable representation of the shadow value of the production factor input ratio per unit of tradable value added, measured as the difference between its marginal revenue and marginal import cost per unit (Dinh and Monga, 2013). Unit Labour Costs have been proposed by the International Labour Organisation (ILO) as an indicator of competitiveness. The gravity model of trade has also been used to analyse the determinants of country competitiveness, some of the determinants that can be analysed include trade policy, distance to markets, transport costs, real effective exchange rates, education, bilateral or regional agreements and economic size of trading countries.

Steenkamp et al. (2009) used the Decision Support Model (DSM) to estimate the export potential of South Africa. They identify a number of country level export potential determining methods, however they ultimately settle for the DSM as the best measure. Other methods considered include

shift share analysis and hybrid combinations of different measures. The DSM screens out nations with less potential for exports using a number of criteria. The first filter selects possible export destinations based on metrics including GDP per capita, growth rate, and national risk ratings. For each country-product combination, filter two takes into account the relative market size and the growth of the export market. The third filter searches for entry obstacles and the market concentration of the importing nations. The factors that determine the potential for an export market are examined in filter four. These factors include distance to markets, transportation costs, logistics performance variables (e.g., effectiveness of customs clearance, quality of logistical and communication infrastructure), and ease, affordability, speed, and tracking ability of exported goods and tariffs.

3.3.2 Measures of Comparative Advantage Post-Trade

Modern empirical concepts on trade begin with the Heckscher-Ohlin (H-O) theory. However, in spite of the influence of trade theories like Heckscher-Ohlin, Since the concept of comparative advantage takes into consideration autarkic factors, it is difficult to measure trade performance using it (Sanidas and Shin, 2010). Indirect methods that use post-trade data are used to "reveal" a nation's comparative advantage because it is difficult to analyse pre-trade prices. In an effort to find solutions to the problem, Liesner presented the idea of “revealed” comparative advantage. Liesner developed an index based on relative export levels and export growth between Britain and the European Community for 60 manufactured products. The index was used as an approximate measure of the bilateral comparative advantage between Britain and European countries (Goldin, 1990; Brakman and Marrewijk, 2016). However, the index was limited in its coverage (Deb & Basu, 2012). Post trade measures of comparative advantage (for example, Leisner’s Index) cannot offer proof about the elements influencing autarkic achievement, however they are better compared to pre-trade measures because they illustrate situations in which competition has occurred. Additional, indicators of post trade competitiveness include classical trade and market share indicators and are discussed further below.

3.3.3 Balassa’s Index of Revealed Comparative Advantage

In light of the difficulties to measure every element that affects an industry's comparative advantage, Balassa contended that comparative advantage is the result of several variables, some

quantifiable and clearly defined, some not so (Brakman and Marrewijk, 2016). Using an alternative approach that draws from the H-O theory, Balassa made the supposition that if a nation possesses a comparative advantage, it is relatively better at producing a product in question than the competing country. He argued that it followed therefore that comparative advantage can be represented by a dichotomous concept, a nation may possess a comparative advantage in that product, or it may not. Balassa proposed that comparative advantage can be "revealed" by trade structures. Instead of figuring out the underlying causes of comparative advantage, Balassa went on to develop an index that aimed to establish if a nation has a "revealed" comparative advantage. By comparing real export patterns to those of every other nation in the world, RCA illustrates the relative advantage or disadvantage that a nation has when exporting a particular good. The Revealed Comparative Advantage Index (RCA) is represented by equation 1 below. (Leishman et al., 1999)

$$\mathrm{RCA} = \left(\frac{X_{ij}}{X_{it}}\right) / \left(\frac{X_{nj}}{X_{nt}}\right) \qquad \ldots\ldots \text{ Equation 1}$$

Where: X is exports, i is the country in question, j is the commodity/industry, n is the world or a set of countries, and t is all product groups. The index is the ratio of one export group to the nation's overall exports divided by the ratio of that export group to global exports. One is the RCA's comparative advantage neutral point. If the RCA is more than 1, a nation has a revealed comparative advantage; if it is less than 1, it has a comparative disadvantage.(UNIDO, 2016; Leishman et al., 1999; Sanidas and Shin, 2010). The numerator in equation 1 is the indicator of comparative advantage put forth by Liesner.

(a) Advantages of the Revealed Comparative Advantage - RCA or Balassa Index

Grančay and Dudáš (2019), Moenius (2006) and Leishman et al. (1999) cite the RCA index as a reliable indicator of competitive advantage across countries and industries since by definition it measures relative export performance and is perfectly correlated with export shares across countries. The RCA can therefore be used as an ordinal ranking metric of competitiveness and a cardinal measure to explore the ratio of differences in comparative advantage or disadvantage in products, sectors and countries. Sanidas and Shin (2010) cite that Balassa's RCA index is to date,

the most popular index in analysing comparative advantage and trade performance. It is the index used by the empirical studies utilising the GIFF methodology reviewed later in the chapter.

(b) Disadvantages of the Revealed Comparative Advantage - RCA or Balassa Index

Leishman et al. (1999) noted how the RCA has been criticised for its non-comparability and inconsistency between space and time, which arises from its asymmetrical nature i.e. for comparative disadvantage, the range is zero to one, while for comparative advantage, it is one to infinite with 1 being the comparative-advantage-neutral point. The index is criticised for having an unstable mean and aggregating effect i.e. the RCA varies depending on the degree of aggregation. Sanidas and Shin, (2010) contend that the RCA only provides the existence or absence of comparative advantage, without providing any other meaningful data.

Hoen and Oosterhaven (2006) concur that the RCA index's distribution is extremely erratic across time, sectors, and nations, raising questions about using the index to compare different nations. Hoen and Oosterhaven (2006) in their analysis found that although an average sector should have a neutral RCA value (equal to one), the mean of a nation's sectoral RCA index is above one, indicating that nations typically have a competitive advantage in their average sector. They also stated that the median of the RCA across countries is significantly less than one and the distribution features a long right tail since the mean is greater than one. Hoen and Oosterhaven (2006) observed that as the level of disaggregation increases, the problem becomes more significant; that is, the mean depends positively and the median negatively on the number of industries. This study uses SITC at the 3-degree level of classification, this results in 201 manufacturing subsectors.

Gnidchenko and Salnikov (2015) further state that the RCA is sensitive to the number of exported products. They go on to explain that the percentage of each product in total exports would be larger for a nation with limited exports than it would be for a nation with a diverse export portfolio. They conclude by warning against comparing disparate nations using the RCA and propose that the index is suitable for comparison of nations having comparable levels of growth and involvement in global trade. For instance, Russia's exports are heavily weighted on gas and oil, which undervalues the RCA for other products. However, the RCA is intended to highlight those sectors or products with higher productivity rather than highlighting industries with greater resource richness. Sanidas and Shin, (2010) and Goldin (1990) state that it is for this reason that Balassa

himself restricted his use of the RCA to analysis of manufactured products based on the fact that trade subsidies in primary products meant that trade in them would not reflect comparative advantage.

Brakman and Marrewijk (2016) after debating the necessary conditions for RCA to be coherent with the classic example of comparative advantage, it was determined that RCA would be appropriate if a nation's exports of a specific good are concurrently neither disproportionately large in relation to its overall exports nor excessively large in relation to all international trade. Maqbool et al. (2019) list another drawback of the RCA index in that a nation's revealed comparative advantage cannot differentiate between the implementation of prudent trade policies and gains in factor endowments. That is, while comparative advantage emphasised the latter, the former has often influenced improvement in trade terms. Different trade policies of nations may have a greater impact on the outcome of their revealed comparative advantage than differences in factor endowments, notwithstanding the possibility that they are linked. Sanidas and Shin (2010) state that a number of researchers have come up with alternative indices in trying to address the inadequacies of the RCA index, these alternatives are discussed below.

3.3.4 Alternative Measures of the Revealed Comparative Advantage Index

Sanidas and Shin (2010) considered the shortcomings of the RCA that need to be overcome and proposed four characteristics that the optimal trading performance metric should ideally possess: 1) a mean or median that is consistent over time and space; 2) symmetrical around the mean or median; 3) independent of categorisations and 4) stable spatial and temporal distribution. Sanidas and Shin (2010) suggested these properties: (1) to satisfy the idea of a zero-sum game incorporated into the idea of comparative advantage; (2) to take into account similar weights on either side of the comparative-advantage-neutral point, particularly when utilising the RCA indices cardinally (Benedictus and Tamberi, 2001, Laursen, 1998) ; (3) to achieve consistency over various levels of aggregation (Hoen and Oosterhaven, 2006; Yu et al., 2009); and (4) to obtain spatial and temporal comparison. The alternative indices are grouped into: Indices accounting for import data; trade-cum-production indices; indices containing export only variables and Indices using a hypothetical situation. There is no consensus as to which alternative index is perfect, they each

possess benefits and drawbacks and the choice of use is dependent on the objectives sought (Sanidas and Shin 2010). The alternative measures are discussed below.

(i) Indices Accounting for Import Data

Trade patterns are influenced by government interventions with imports being the most regulated, thereby leading to an inaccurate portrayal of the underlying comparative advantage, government policies may somewhat skew these metrics. Gnidchenko and Salnikov (2015) stressed that, as it represents the difference between national production and consumption, net export is the appropriate measure of comparative advantage. Sole focus on exports ignores the possibility that a country may import a significant amount of goods that it may later export. They provided the example that the robust position of a nation in certain goods export success may be due to its extensive participation in global value-addition networks. Product differentiation in quality, different varieties of the same product or minor changes may be the reason for re-exporting and this is an important factor in modern-day economies. Gnidchenko and Salnikov (2015) however note that there exists a data challenge to indices that analyse exports and imports jointly. Data on imports and exports are expressed in two different prices: FOB for exports and CIF for imports. FOB prices do not include transportation, freight, and insurance charges, while CIF prices include them. Direct country statistics will differ from mirror statistics. Thus, there is always a minimal amount of error in combined export-import measures.

(ii) Trade-Cum-Production Indices - Containing Both Trade and Production Variables

Sanidas and Shin (2010) and Bielik (2011) pointed out that the impact of macroeconomic factors is eliminated by the Balassa Index. In addition, they suggest that the rationale behind Balassa's decision to include only export variables and exclude import variables also applies to export variables. In other words, while trade performance measures are said to be biased as a result of tariffs and other import-related protective measures (which have, however, decreased through subsequent international agreements), the same argument can be put on the subsidies for exports which in contrast have increased. Sanidas and Shin (2010) state that Lafay (1992) proposed an index that uses import and export variables to reflect intra-industry flows while adjusting for distortions brought on by macroeconomic factors using GDP. Along with the Balassa Index, the International Trade Center adopted the Lafay Index as a measure of trade specialisation. Sanidas

and Shin (2010) add that empirical studies show that trade-only indices offer a comparatively more accurate reflection of comparative advantage than trade-cum-production indices.

(iii) Alternative Measures with Export Only Variables

Laursen (1998) gives warning that Balassa's RCA index ought to be utilised with care in econometric analysis due to its unstable distribution and generation of outlier values. Hoen and Oosterhaven (2006) recognised that the number of products included in the assessment affects how the RCA index is distributed. As classification becomes more detailed the outliers of the RCA distribution change as the index's denominator progressively decreases. The mean of an erratic distribution will also be unstable, making it challenging to compare RCA values across products or nations. Hoen and Oosterhaven (2006) ascribed this issue to the index's multiplicative nature. Hoen and Oosterhaven (2006) proposed an RCA structure that is additive. Alternative measures with export only variables have been proposed by other researchers and these include the; Logarithmic Transformation of Revealed Comparative Advantage (LRCA); Symmetric Revealed Comparative Advantage (SRCA) ; Weighted Revealed Comparative Advantage Index (WRCA) Additive Revealed Comparative Advantage Index (ARCA).

(iv) Indices Using Hypothetical Situation - Normalised Revealed Comparative Advantage (NRCA)

Yu et al. (2009) derived an index that normalises the RCA with the total world exports. The measure calculates the deviations of a nation's export products from its comparative neutral levels, which are then divided by the sum of global exports. NRCA is additive for both products and nations, the degree of data aggregation has no bearing on comparative advantage calculations (Bebeky, 2011). Yu et al. (2009) puts forward the notion that in order for the ideal index to depict comparisons across nations and products, the total of the ideal indices by states and by products should equal zero. As a result, the total of the NRCA indexes for all product categories is zero as a nation cannot have comparative advantage in all of its exportable goods, and neither can all nations exhibit comparative advantage in the same commodity.

3.4 Empirical Review of Comparative Advantage Measures

In a study on the limitations in measuring comparative advantage, Sanidas and Shin (2010) contrasted six indices (RCA, LRCA, SRCA, NRCA, ARCA and WRCA) by examining the advantages and dis-advantages of each, the relationship between them and subsequently made recommendations on how to adequately use them. They compared China, Japan and South Korea using International Trade Centre data from 1995 to 2008 at the 2-digit level of aggregation (98 sub-headings or sectors) of the Harmonised System (HS). Although the indices surmount the limitations of RCA to a certain degree, they found that no individual one can be termed the ideal one, since each one has its own advantage and disadvantage. However, they state that the NRCA seems to have more favourable features than the others. The NRCA possesses a steady mean over time and space and is independent from the level of aggregation, therefore comparable across sectors or nations.

Hoang et al. (2017) used the NRCA and RCA to study the degree of competitiveness of Vietnam's agricultural sector. They carried a further consistency evaluation of the NRCA, RCA, and Relative Trade Advantage - RTA and found that the indices exhibit medium consistency when used as ordinal measures but good consistency when used as cardinal and dichotomous measures. That is to say, the trade performance indicators are consistently strong in determining whether competitiveness exists and in quantifying its level, however they are averagely consistent in ranking it. This indicates that determining the presence or level of competitiveness may not be greatly impacted by including both export and import data in the RTA. however, accounting for imports may alter the competitiveness ranking of the agricultural subsector. Since the NRCA is derived from the RCA's neutral point, the RCA and the NRCA are completely consistent as dichotomous measures.

Deb and Sengupta (2017) evaluated the empirical dispersion of seven indices (RCA, LRCA, SRCA, ARCA, NRCA, RTA and RC- Revealed Competitiveness) and determined the stability of their distributions over sectors, nations and time. The indices' distribution was visually examined for all nations and all industries for the years 1998, 1999, and 2000 using cumulative distribution plots and kernel density plots, as depicted by the associated probability density functions. The NRCA index outperformed the other indices examined, according to sector- and country-specific

results. The index can be applied as an ordinal measure to rank countries according to a certain sector or to rank sectors according to a country. Further, its empirical distribution is stable for time series analysis.

Deb & Basu (2012) empirically evaluated the Heckscher-Ohlin theory's validity using four indices (LRCA, SRCA, ARCA and NRCA). Data was collected for 47 countries for the year 2005, from the 2009 International Trade Statistics Yearbook and COMTRADE database. Empirical analyses based on the four indices was done to test their consistency in line with the Heckscher-Ohlin theory, which divides production into two factors: capital and labour. A country may be deemed labour abundant if the ratio of its labour force to its gross capital formation in relation to the world is larger than one. However, if the ratio is less than one, the nation may be seen as having an abundance of capital. The study revealed that the SRCA index performed empirically well. However, its structural features were said to be not entirely satisfactory. It was established that the NRCA index structurally outperformed the SRCA index, However, in the majority of cases, the data it produced were inconsistent with the trade hypothesis.

These studies conclude that the normalised revealed comparative advantage (NRCA) is a relatively better metric of competitiveness compared to the RCA and other alternatives to the RCA. This study, therefore, uses the NRCA to evaluate the comparative advantage or disadvantage of the manufacturing sector exports of benchmark countries and of South Africa in its effort to seek out export potential for South Africa. The NRCA is covered in length in Chapter four, the examination of the methodology of the study

3.5 Factors Influencing Competitiveness

Effiong and Oti (2012) made a quantitative analysis of the cost and their percentage thereof of inputs for manufacturers; they list raw materials, labour and overhead costs (management salaries, utilities, supplies and other incidental expenses incurred in production) as the three main manufacturing cost categories that have an impact on manufacturing organisations' productivity. Pirolo, Giustiniano and Nenni (2013) in their study of the Italian footwear industry found that labour, raw materials and energy costs make up the primary factors to footwear manufacturing expenses, correspondingly representing 46, 28, and 12% of the overall expenses. The remaining 14% is attributed to depreciation, logistics, quality control, design, modelling, marketing,

communication, and other similar support services. An assessment of the iron and steel sector's production costs in the European Union (EU) and 10 additional non-EU nations is given by Medarac et al. (2020). Energy costs accounted for 17% of production costs, 'other costs' for 27%, and raw material costs for 65%. Raw materials, labour and energy were found to be the main components affecting competitiveness in the subsector. This study will therefore compare the costs of electricity, labour and cost of capital between the benchmark countries and South Africa in an effort to discover how South Africa can compete better.

Deloitte and Touché and the United States Council on Competitiveness produce the Global Manufacturing Competitiveness Index report which is a worldwide study that rates 38 countries according to their level of manufacturing competitiveness. It is conducted among over 550 CEOs and manufacturing executives worldwide. In an attempt to comprehend the causes of South Africa's declining competitiveness, Deloitte South Africa and the Manufacturing Circle undertook a South African manufacturing competitiveness survey in line with the global survey. The objectives being to understand the factors influencing the competitiveness of the manufacturing sector and hence help improve South Africa’s competitiveness.

Table 3.1: South African ranking of the importance of each factor of competitiveness

South African Rank	Competitiveness Driver	Global Rank
1	Cost and availability of labour and materials	3
2	Local market attractiveness	8
3	Energy cost and policies	7
4	Economic, trade, financial and tax system	2
5	Physical infrastructure	6
6	Supplier network	4
7	Talent-driven innovation	1
8	Government investments in Manufacturing	10
9	Legal and regulatory system	5
10	Healthcare system	9

Pillay (2013), Manufacturing Competitiveness Report

The South African Manufacturing Circle member companies rated how important the top ten factors listed by the global manufacturing competitiveness research were to their ability to compete globally. The Manufacturing Circle ranked the drivers of manufacturing competitiveness from a South African viewpoint after reviewing the drivers' global rankings. The outcomes are displayed

in table 3.1 (Pillay, 2013). Cost and availability of labour and raw materials was ranked as the most crucial factor influencing competitiveness in South Africa. Pillay (2013) noted that South Africa's labour costs have grown comparably quicker than its international counterparts. Pillay (2013) puts forward the notion that South Africa's manufacturing industry was established on the back of comparatively inexpensive labour, hence its highest rank by respondents. In addition, respondents also raised concern on the small scale of the national market, the risk of lower-priced imports, high cost of raw materials, rising electricity costs, policy uncertainty, and limited skills base.

Table 3.1 shows that South Africa ranks innovation in seventh position out of ten compared to its world peers who have ranked it in first position in influencing manufacturing sector competitiveness. Blankley and Booyens (2010) reinforce the role of inventiveness in productivity and in growing the economy, they however noted that innovation remains low in most African countries including South Africa. They however expressed hope in that globalisation of technology presents new opportunities. Flowerday et al. (2017) note that the World Bank (2016) South African Economic Update report emphasised innovation as one of the most important factors to focus on in the quest to achieve economic growth. Blankley and Booyens (2010) concluded that government intervention is required to foster innovation and added that investing in human resources, a highly qualified working population, and infrastructure for high-tech firms are necessary for nations to realise their potential as knowledge - based economies. To improve the competitiveness and prospects for international commerce of developing country enterprises. Blankley and Booyens (2010) are of the that it is also necessary to build scientific and technological alliances with industrialised countries.

Lin (2014) in undertaking the GIFF methodology notes that early developmental stage nations often have factor endowments that contrast relative abundance of labour or natural resources with relative scarcity of capital. Their production processes frequently utilise the abundant labour or resources (primarily in the fishing industry, small-scale farming, livestock production, and in mines). Developed nations in contrast typically have a competitive edge in industries that require large amounts of capital. A nation's industry and technology advance along with the sophistication of the technology utilised by its businesses, the amount of capital needed, the volume of production, and the size of the markets. Modern economic development arises from continuous

technological advancement and diversification, upgrading of industries to high capital ones and from improvements in infrastructure and business regulations. Accordingly, in order for businesses in the renewed industries to lower expenses and achieve the limits of their manufacturing potential, it is necessary to simultaneously improve infrastructure and educational, financial, and legal institutions. This will allow for flexible and seamless industrial and technological upgrading

In providing motivation for using the GIFF methodology, UNIDO (2016) presents the view that by copying, licensing, or adapting innovations that have reached maturity in established economies, developing countries can take advantage of their latecomer advantage at a lower cost than developing the technology from the beginning. Thus, given an enabling environment is created, lower-income states will have the capacity to produce similar goods at a price that is substantially lower than developed countries. To improve technologically, industrialised economies must manufacture at the cutting edge of the technology frontier and make ongoing investments in research and development. Therefore, developing nations possess the capacity to experience a superior rate of technical innovation compared to more advanced ones. These latecomers might copy the leaders by following in the steps of carefully chosen lead countries, a growth strategy that has been credited with the success of a number of countries. Therefore, focusing on nations with endowment structures comparable to South Africa's but a few economic steps ahead of it is the ideal course of action for the country to take in order to accomplish quick and steady economic catch-up.

The GIFF as enunciated by the UNIDO (2016), advocates that in the current increasingly globalised economy, capital, goods and services are moving relatively more freely across countries. Production is progressively occurring using global supply chains, whereby components of end products are manufactured in countries where they are most efficiently manufactured. Thus, those countries that are outward-looking, endeavour to prosper in world trade, and make use of FDI and promote world-wide cooperation have better odds of succeeding. Technology is a mobile factor of production and South Africa can prioritise its acquisition to improve on its competitiveness in terms of world trade. Lin (2014) in undertaking the GIFF methodology concurs with the notion by presenting that contemporary economic growth is characterised by a series of ongoing modifications to the industries and technological structures. Growth arises from changes that lead to reduced transaction costs, increase in labour productivity and an improvement in

infrastructure. The GIFF proposes that the best way to achieve such success is for a country to grow its industries in a free-market model and the government as facilitator.

Lin (2012) explaining the need for a refocus on government as facilitator through the GIFF methodology states that innovation creates a first-mover advantage or disadvantage. Externalities are produced by first movers whether they succeed or fail. When first movers succeed, their experience gives other market players valuable information on the industries that can be lucrative in the particular nation. First movers shoulder the cost of failure but in the process generate useful information which provide warning to other firms. The potential profits that the first-mover may receive, however, may be greatly eliminated if new enterprises emerge on a huge scale. In a developed nation, an innovative first mover may be granted a patent and benefit from the rent similar to what an established business generates. A fresh patent might not be obtainable in a developing nation, as the industry might already be existing on the world market. Because the first entrant cannot obtain the intellectual property rights for establishing this industry in its economy, some manner of direct government assistance to pioneering businesses may be justified. The potential for a sustained growth in per capita income will be constrained without this coordination and compensation. In addressing this externality issue, the government takes on a proactive role in enabling export growth (Lin, 2012).

Lin (2012) further makes the point of the need for government as facilitator by noting that it is impossible to rely entirely on the markets to bring the industrial system in accordance with factor endowments. For instance, establishing the targeted industry may be challenging because of absence of a supportive business environment or suitable infrastructure, even if it is compatible with the country's competitive advantage. Individual companies cannot afford to internalise all these changes, and it's frequently impossible for multiple companies to coordinate proactively to handle these new challenges. Collective action is required to change infrastructure, or at the very least collaboration between industrial companies and others who supply infrastructure services. In that regard, the state is crucial in supplying or organising investments in the essential infrastructure and supplementary business environment components. Therefore, it is incumbent upon the state to implement such improvements itself or to actively facilitate their provision.

3.6 The GIFF Approach to Improving Competitiveness and Growing Exports

UNIDO (2016) shares the sentiment that during economic growth, a country's income level rises and while doing so, its comparative advantage changes. UNIDO (2016) states that as a country grows, goods that were suitable for its earlier development slowly diminish as drivers of economic expansion. This is mainly owing to a loss of comparative advantage caused by a rise in wages, diminishing margins and changed expectations due to increased capital accumulation and subsequent production refocus to relatively more advanced sectors. In a freely competitive market this will lead to eventual closure unless companies advance to a more superior level on the value chain, transform to new industries, or relocate. Most firms choose to relocate production and their choice of destination depends highly on their envisaged saving on production costs. The decision typically seems to be influenced by wage costs.

According to Lin (2014), historical lessons suggest that many developing countries are deterred from keeping pace with advanced nations because their policy interventions disregard their competitive advantages. According to Lin (2014), even though the majority of emerging nations were hampered by inadequate capital, many of them tried to imitate the advanced industries found in affluent nations. According to Lin (2014), only a few were successful because they defied their comparative advantages. The GIFF advises against adopting measures to defend businesses that go against a nation's comparative advantage.

Lin (2012) states that any country's industrial development policy that seeks to trail and imitate the industrial development of countries that are significantly more advanced than itself faces the risk of either focusing on industries that are much more advanced and far ahead of its latent competitive advantage, or on sectors of the economy in which the country has already relinquished its competitive edge. In light of this challenge, the GIFF was proposed as a framework to achieve economic transformation of a country through alignment of its economic growth policies with its comparative advantages. The aim of GIFF is to lower the errors of choosing the incorrect industries to adopt or to focus upon.

Lin (2012) states that slower growing countries can take advantage of the industrial benefits that exist for relatively slower industrialising countries. Countries with limited endowments can accomplish their economic aims by being discerning, particular, practical, and always on the

lookout for opportunities where business environments can be improved quickly. This is because slower industrialising countries have the option to identify developed industries in purposely chosen leading countries and facilitate the domestic or international firms' entry into those industries. Lin and Treichel (2011), Dinh and Monga (2013), and Lin (2014) present that an analysis of developing countries has revealed that nations with relatively effective economic growth policies are those that targeted industries present in nations with comparable endowments to themselves, albeit with moderately higher per capita income and relatively faster economic growth.

According to the GIFF, the ideal approach for a nation to follow in order to experience progressive, inclusive, and sustainable economic growth is for its industries to develop in line with the comparative advantage that comes from its endowments in a free-market environment that has a supporting government. By methodically examining the structural distinctions between developed and developing nations (UNIDO, 2016). UNIDO (2016) notes that countries that pursue a development strategy which follows their comparative-advantage in sectors that reflect their prevailing and potential strengths perform relatively better. According to the UNIDO (2016), the GIFF satisfies the purpose of operationalising the optimum industry identification based on latent comparative advantage.

The GIFF views development as a perpetual process that begins with defining the limiting factors that restrict growth, formulating and implementing recommendations to mitigate the limitations, achieving moderate growth, and then restarting the process by highlighting and overcoming the barriers to growth in the changed setting. It views economic advancement as a process involving the constant introduction of improved technology into already-existing industries as well as the transformation of labour- and resource-intensive sectors into new, capital-intensive ones and improving public works in tandem (Lin, 2010 and Lin & Monga, 2010).

3.7 Empirical Literature Review

An analysis of comparative advantage allows for the identification of manufactured products that have shown good performance but have begun to lose competitiveness in the benchmark countries. These subsectors are considered to have led the manufacturing growth and increase in export competitiveness for one year or the other for the benchmark countries but have in time fallen on

the wayside as more lucrative sectors are adopted. The loss in competitiveness points to an opening up of export market space for the goods in question for South Africa. When comparative advantage shifts take place, the manufactured products with a comparative advantage that is diminishing at increased rates in the benchmark nations are arguably the best products for South Africa to start producing or to increase production. These goods might be from sunset industries in the benchmark country but might form sunrise industries for South Africa. The following studies were undertaken utilising the GIFF in an effort to identify export potential for the respective countries.

By using the GIFF on the light manufacturing subsector in Tanzania, Dinh and Monga (2013) made the case that manufacturing's role in the Tanzanian economy was marginal. Manufacturing's contribution to Tanzania's GDP decreased from 13% in the 1970s to 10% in 2010. From 1995 to 2010, manufacturing accounted for about 20% of the nation's exports, which was considerably less than the 40% average for other intermediate income nations. Less than 10% of the workforce had formal jobs. In order to transition the economy away from lower efficiency agriculture and the informal economy to higher efficiency sectors, Dinh and Monga (2013) showed that feasible and focused policy initiatives with minimal cost of implementation that aimed at enhancing private investment could be used to gain competitive light manufacturing sectors for Tanzania.

Dinh and Monga (2013) identified light manufacturing as a labour-intensive sector that allows developing countries the opportunity to use their low labour costs to improve their competitiveness. This was identified as an important first step undertaken by successful developing economies, including China, Mauritius and Vietnam during their initial steps towards developing their economies. According to the study's findings, Tanzania and other nations with comparable economic standing have the components for competitive small-scale manufacturing. This was owing to Tanzania's competitive advantage in low labour cost and availability of primary resources which are enough to counterbalance its relatively low labour productivity when equated to its competitor countries. In addition, African countries were found to have preferential access to high-income export markets, adequate local, and regional markets thereby allowing upcoming manufacturers to nurture speedy reactions, quality control and adequate scale production competencies for entry into the highly competitive export market. South Africa can, therefore, take a lead advantage due to possessing an already developed production system and a diversified export experience across different subsectors of the manufacturing industry.

Lin and Treichel (2011) in their analysis of Nigeria noted that the country's economic expansion was a result of prudent macroeconomic and sectoral policies that promoted investment. These measures fostered investment fuelled by FDI and remittances and helped the Nigerian economy build confidence with investors. However, as opposed to employment-intensive industries, this investment was more concentrated on capital-intensive ones. Consequently, investments were made predominantly in the high-returns petroleum, gas, and telecommunication sectors. Limited efficiency gains have occurred in employment-intensive sectors aligned with the nation's competitive edge, such as manufacturing. These sectors' infrastructure limitations prevented them from improving their efficiency, competitiveness, or capacity to generate employment. Lin and Treichel (2011) applied the GIFF to the Nigerian manufacturing industry in an effort to increase productivity, employment in labour intensive sectors, and improve the sustainability of its economic growth. They used the additional criterion for targeting industries where the private sector in Nigeria has grown more proactive, and successful individual-discovery has already transpired, these were identified as business opportunities with a high success rate for Nigeria.

The 2009 per capita GDP data identified China, India, Indonesia, and Vietnam as Nigeria’s appropriate competitor countries. The study identified enterprises where these nations were losing competitiveness, these include food manufacture, small-scale industrial production, suitcases, footwear, and petroleum products. As a result, they were targeted for takeover by the Nigerian government to fast-track growth in its firms. The study also identified construction, small scale industrial production, food manufacture, wholesale, retail, communications technology, car spares, poultry, cocoa and palm oil as industries with potential for employment creation and growth that could be upgraded for exports. In addition, the study found that Nigeria has the potential to develop low-capital, labour-intensive, basic manufactured goods requiring minimal economies of scale.

Lin (2014) also implemented the GIFF to Ethiopia in a study conducted under the World Bank's initiative on small-scale manufacturing in Africa. The study selected Vietnam and China as Ethiopia's benchmark countries because, thirty years before, Vietnam and China’s per capita GDP were equal to Ethiopia's, but since then, the benchmark economies have grown relatively faster. The study analysed the operating costs of the footwear industries in China, Vietnam, and Ethiopia and determined that while Ethiopia's factor costs were lower, its infrastructure and business climate were its primary obstacles. The study suggested that Ethiopia encourage Chinese

footwear producers to expand their firms to Ethiopia. The firm *Huajian* made its investment in January 2012 with an initial 600 employees and its first exports made in the first quarter of 2012. By mid-2012, *Huajian* had grown to be Ethiopia's top exporter of footwear. In 2012, it was the sole exporter of all Ethiopia's footwear exports, and by the end of 2013, it employed 3 500 workers. Lin (2014) argues that the success of the *Huajian* project produced positive feedback in attracting FDI to Ethiopia.

In 2007, the government of Uganda proposed policies to help Uganda move from a low-income to a competitive country. However, slow economic growth combined with quick population growth had resulted in high unemployment. Uganda exported mainly primary commodities whereas its imports were dominated by high value manufactured products (Lin & Xu, 2016). To help address these challenges Lin and Xu (2016) applied the GIFF and found that Uganda is labour-abundant, with highly endowed natural resources but remains a capital-poor country. The study selected China, Nigeria, India, Vietnam, and Uzbekistan as Uganda's benchmark countries. The study's screening criteria to identify sectors with potential for growth and feasibility of production was performed by analysing the benchmark countries' exports from 1995-2012. The study identified subsectors with declining export shares in the benchmark countries as comprising; clothing, trunks and suitcases, footwear, cotton yarn, audio and video apparatus, vessels, food production, iron and steel, dyes and colouring agents, paper manufacture, print industries, and glass. In order to identify sectors in which Uganda has cost efficiencies, Lin and Xu (2016) recommended conducting a comprehensive financial comparison of the product chains. After gathering further information on sectors that had gained and those that had lost RCA, emerging industries were identified as having competitive advantage and export potential which therefore had reason to be promoted for production. These included agro-processing, paper production, glass, 'dyeing and colouring products,' 'iron and steel,' and print industries.

UNIDO (2016) undertook a Growth Identification and Facilitation for Industrial Upgrading and Diversification (GIFIUD) initiative for Senegal. The objective being to reform the way the Senegalese economy was structured by making it a more competitive player in the globalised market. The aim was to achieve industrialising and export diversification for Senegal by an export-oriented approach and FDI-led industrial sectors were selected based on the nation's latent competitive advantage and world trade opportunities. The focus was to foster industrialisation, job

creation, income generation, and export diversification. The goal was to structurally transform Senegal's economy into a competitive participant in world trade. UNIDO (2016) identified Vietnam, India, China, Bangladesh, and Cambodia as benchmark countries for Senegal and analysed changes in their export shares from 1990-2013.

After analysis of its export sector performance and production cost comparison, UNIDO (2016) concluded that Senegal had achieved satisfactory results in promoting an internationally competitive horticultural sector in the years prior the study. However, its 'wearing apparel, leather and leather products' manufacturing industries were struggling. To further diversify the country's economy and exports, it was recommended to initially target these two sectors for focused support. The GIFIUD analysis suggested that the international market for these sectors is opening due to the declining competitiveness of the currently dominant exporters, such as China and India. The sectors were additionally highlighted as being labour intensive and strongly aligned with Senegal's latent comparative advantage, they all had a long tradition of production in Senegal. The main factors which had helped its horticulture industry to attract foreign investment, listed as; a stable political environment, favourable geographic location and hardworking and fast-learning people was envisaged to help promote the development of the wearing apparel and leather industries.

Economic data from Nepal showed that its manufacturing sector contracted as a percentage of its GDP from 9.57% in 1998 to 6.45% in 2012 and 6.51% in 2015 (Xu and Hager, 2017). Faced with a number of challenges in its manufacturing sector, the Nepalese government decided to invest in structural transformation to join global value chains and promote its exports. By applying the GIFF, Xu and Hager (2017) examined latent comparative advantages and diagnosed constraints for the Nepalese manufacturing industry. By tracking the top 10 exports of its benchmark countries (India, Vietnam, and China) from 1995 to 2015, they observed that a total of 50 top export products had lost their export share. Of these, 46% were in light manufacturing. Light manufactured products, according to Xu and Hager (2017), are frequently labour-intensive and as a result, are most affected by rising wage costs. They identified economic changes in China as having been increasing pressure on wages and predicted that jobs might need to move to new industrial sites. Therefore, the research recommended that Nepal concentrate on improving its competitive advantage in light manufactured products.

A number of studies have examined the nexus in the South African context. For instance, Van Rooyen et al. (2011) explored the South African wine industry's competitiveness using the Relative Trade Advantage (RTA) metric to quantify trade performance. The study calculated the degree to which this industry was able to compete locally and internationally over time with other nations that manufacture wine. As an added measure, the sector's capacity to draw in the necessary limited financial resources by competing with other business prospects was enumerated. The study also determined the main variables influencing the competitiveness of the South African wine sector through the Wine Executive Survey (WES), industry expert interviews, and informed stakeholder surveys. The five biggest obstacles in 2005 were the strong Rand, the burden of crime, the challenge of launching a new business, faith in the political system, and bureaucracy. And the top constraints in 2008 were low confidence in government support and policy, the dependability of power supply and the cost of crime and lowly skilled labour. The RTA measurement showed a declining performance in competitiveness of the wine sector. Executives in the wine sector frequently assessed competition and company strategy, demand and market conditions, and production factor conditions as somewhat restricting in 2005 and more so in 2008.

Jenkins and Edwards (2012) state that South African and Chinese exports competing with one another increased substantially over the past decade and in the process affecting South African labour-intense products such as textiles, furniture and advanced technological subsectors such as electrical and electronic products, moulds and machinery. Jenkins and Edwards (2012) argue that South African producers may face challenges as a result of the rise in Chinese exports. For example, Sub-Saharan Africa (SSA) is a significant export market for goods made in South Africa. The top ten SSA export markets for South Africa in 2010 were Zimbabwe, Zambia, Mozambique, DRC, Kenya, Angola, Nigeria, Tanzania, Malawi and Ghana, in their order of magnitude. Despite a notable growth in the value of South Africa's manufactured exports to these nations during the last ten years, the country's percentage of all exports in the 10 nations has decreased compared with its competitor suppliers. In contrast China’s exports to Sub Saharan Africa has expanded dramatically, especially since joining the World Trade Organisation. Between 2001 and 2011, China's exports to Sub-Saharan Africa climbed from US$4.1 billion to US$53.3 billion. China's exports increased at both the extensive margin, which involved a wider range of products being exported, and the intensive margin, which involved raising the value of already-exported goods

(Jenkins and Edwards, 2012). These developments justify and highlight the need for a holistic approach that analyses how to make South Africa regain its competitiveness.

According to the World Economic Forum's Competitiveness Index for 2012–2013, South Africa's global competitiveness declined. Motivated by the report, Pillay (2013), conducted a South African manufacturing competitiveness survey. The objectives being to understand factors limiting manufacturing competitiveness. The limited size of the domestic market, the possibility of low-cost imports, the unpredictability of policy, the high cost of raw materials, lack of skilled labour, spatial development, community safety, foreign direct investment, local company investments, and constrained power supply and its cost were listed as factors that hindered South Africa's manufacturing sector and its capacity for international competition. The GIFF performs a comparative study of the main factors identified as influencing manufacturing competitiveness so as to discover South Africa's relative performance on competitiveness when compared with its benchmark countries.

In research on the competitiveness of the South African Steel sector conducted by Merchantec Research with support from the South African Department of Trade and Industry (2015), the research noted that traditional export markets are changing, for example, Asia is becoming a bigger source of products for Europe and the USA, as the region has seen significant increases in quality over the past ten years. According to the study's findings, economies that are reliable, flexible, fast-moving, and focused have a higher chance of surviving changes in the market and even creating new markets. The study mentioned core competence, ongoing enhancement, and tighter relations with key partners as some of the sources of competitive advantage. In presenting recommendations to enhance South African manufactured exports, the study through the GIFF will look out for policies enacted in the benchmark countries, identified as having led to the growth of their manufacturing sectors.

In a study conducted under the African Growth Opportunity Act examined South African exports to the United States., Chinembiri, (2015) using a gravity model analysis found that South Africa possesses a comparative advantage in minerals and live animals. Additionally, there seems to be modest comparative advantage in chemicals, complex machines, and prepared foods. There is a significant quantity of unexplored export trade that can be taken up under AGOA, according to the prospective trade study. There is more potential for increased exports to the United States

because 2 295 HS-6 commodity groupings are zero-tariff rated. Base metals and machinery make up the majority of these commodities, however some advanced manufactured goods and automobiles are also included. The remaining categories requiring further analysis, include ores, slag, ash, iron and steel, and precious metals. This study however chose the GIFF methodology as the objective is to seek out a number of manufactured products to increase exports by competing in the world market with South Africa's benchmark countries as compared to seeking opportunity in existing preferential markets.

Matthee et al. (2016), inform that from 1994-2016, South African primary commodities saw the biggest increase in exports from (38 percent), while exports from resource-intensive manufacturers have decreased (around 50 percent). The study ascribed this export performance to the nation's sluggish structural change, which has led to an excessive reliance on resources to accomplish export growth. Furthermore, the majority of South Africa's growth in exports (upwards of 70 percent) has so far been to existing trade partners and the remainder diversified to new destinations. There arises therefore a need to seek opportunities of increasing export diversification in both products and markets. The GIFF is a methodology that seeks to identify the potential of South Africa to achieve this export growth.

Van Zyl and Matswalela (2016) employed the Revealed Comparative Advantage (RCA) to carry out a competitiveness comparison of benchmarked competitors of South Africa's clothing and textile (CAT) sector. The research analysed exports from 1990-2013, sampling 18 dynamically growing economies. According to the RCA, the country's CAT sector exhibits competitive disadvantage in textiles and apparel. According to the research, the country's CAT industry is not as competitive as that of the sample nations (especially India and China). The results indicated that diminishing export market shares and rising labour costs were the two main constraints limiting the competitive edge of the country's CAT sector. The analysis highlighted the CAT industry's impending employment losses and shrinking export share. The research urges appropriate policies from all stakeholders (industry, government, retailers, labour representatives, banks, and developmental finance organisations) in order to re-establish the CAT sector's competitiveness. This study performs similar research, however it is applied to the broader manufacturing industry with the CAT industry as a subcategory within the broader analysis. The GIFF utilises the NRCA as it has been shown to be a better measure of competitiveness than the RCA.

Bathathu and Zimbini, (2017), studied the competitiveness of the South African Citrus Industry, they analysed the citrus market shares of South Africa as a ratio of world citrus trade and estimated an Export Demand Regression model of South Africa's Citrus exports to Netherlands, which in 2015 was the largest importer of South African citrus. It was determined that the growth rate of SA's citrus imports into the Netherlands exceeded the growth rate of SA's citrus exports, thereby indicating a high increasing import demand by Netherlands. This study presents the portion of South Africa's manufactured exports to global exports while providing a background to the manufacturing sector's suboptimal performance and therefore justifying the need for an analysis of how the country can grow its manufactured exports. After identifying potential export products during the GIFF, The Export Demand Regression model used by Bathathu and Zimbini, (2017) offers an opportunity to identify the potential demand of products with potential markets. However, such a study is beyond the scope of this study.

Electricity cost and its availability has been cited as a major concern of manufacturers. Kaziboni (2018) surveyed 105 South African manufacturing firms in which all manufacturing subsectors were represented in the survey. A factor cited by 104 of the 105 companies was "load shedding" or the intermittent power supply that constrained their businesses. In factories where halting and starting machinery is expensive, intermittent power supplies have resulted in higher costs. For instance, in plastics production, it is considered waste when a power outage happens during the moulding process since the polymers cannot be melted and remoulded. Subsequently, 83 firms cited high energy costs, 56 firms cited labour relations or regulations and 54 firms mentioned inadequate skill sets in the workforce as being constraints to their manufacturing operations.

Dlikilili, (2018) also used the Relative Trade Advantage - RTA in measuring the citrus industry's competitive efficiency over time and compared the performance with that of its principal direct competitors. A five-step analytical process was performed on the sector. The steps included defining and measuring competitiveness and determining the elements that impact the South African citrus sector. These elements were ranked through various filtering and ranking methods. The study concluded that various factors such as market development, infrastructural development, trade and employment policies, and administrative restrictions impact this industry's ability to compete. The final step presents strategies to grow the industry's competitiveness. Recommendations include effective marketing of citrus in the local South African market,

development of foreign markets, improved transportation infrastructure; engaging government on trade and labour policies.

The GIFF methodology was chosen as it follows such a similar comprehensive study of the manufacturing sector. These studies quantify the comparative advantage of the subsectors they examine and remark on whether or not their competitiveness is rising or falling. However, the manufacturing industry as a whole will be examined in this study. In addition to listing South Africa's manufacturing competitiveness, the GIFF further lists the competitiveness of manufacturing for a few benchmark nations in an effort to find export opportunities by looking into the sectors in which these trade rival countries are losing export market share. In an attempt to identify strategies that have been successful in these nations, the GIFF further analyses production factors inside these comparator nations and contrasts production costs with those of South Africa. By analysing the structural differences between established and developing countries, the GIFF provides a roadmap for South Africa to pursue in its pursuit of manufacturing export growth. The GIFF is a well-rounded, all-inclusive methodology that makes it easier to accomplish the study's goals when contrasted with the methodologies of other studies. The GIFF steps are presented in detail in chapter four.

The Table 3.2 summarises the reviewed studies.

Table 3.2: Summary of Empirical Studies Reviewed on the GIFF

Author	Data And Sample	Trade Variables	Other Variables	Estimation Technique	Conclusion
Lin and Treichel (2011)	Nigerian manufacturing industry compared with that of China, India, Indonesia, and Vietnam for 2009	Export Shares Import Shares Nigerian Manufacturing Exports World Manufacturing Exports Nigerian Merchandise Trade World Trade	GDP per Capita	Growth Identification and Facilitation Framework	Identified petrochemicals, suitcases, footwear, small scale manufacturing, food manufacture, and automobile spares as those that the Nigerian government should focus on to accelerate its growth. Information and Communications Technology, food manufacture, small scale manufacturing, wholesale, retail, the construction industry, automobile parts, poultry, palm oil, and cocoa have all been named as sectors with considerable job creation and growth capability that may be enhanced for exports. New business opportunities for Nigeria were identified as labour-intensive simple manufacturing sectors having minimal economies of scale, requiring relatively little capital, and are imported.
Lin (2014)	Ethiopia Exports compared with China and Vietnamese Export industry for the period 1991-2011	Export Shares Ethiopian Manufacturing Exports World Manufacturing Exports Ethiopian Merchandise Trade World Trade	GDP per capita Factor cost comparison	Growth Identification and Facilitation Framework	Ethiopia possessed cost saving benefits, and its primary impediments were its infrastructure and business climate. The success of the initial investing firm Huajian produced a snowballing effect on attracting FDI to Ethiopia

Lin and Xu (2016)	Uganda compared with Vietnam, China, India, Nigeria, and Uzbekistan as benchmark countries for the period 1995-2012	Export shares Ugandan Manufacturing Exports World Manufacturing Exports Ugandan Merchandise Trade World Trade	Factor endowment analysis Comparative value chain analysis RCA	Growth Identification and Facilitation Framework	Uganda is a capital-poor, resource-rich, and labour abundant country. Emerging industries identified as having competitive advantage and export potential and therefore reason to be promoted for production included food processing, steel and iron production, paper manufacturing, dyes and colouring agents, print industries, and glass manufacturing.
UNIDO (2016),	Senegal compared with Vietnam, India, China, Bangladesh and Cambodia from 1990-2013	Export Shares Import Shares Sectoral Exports World Sectoral Exports Country Merchandise Trade	Factor endowment analysis Comparative value chain analysis RCA	Growth Identification and Facilitation for Industrial Upgrading and Diversification (GIFIUD)	Senegal had achieved good results in promoting an internationally competitive horticultural sector in the years prior the study. Wearing apparel, leather and leather products were struggling. It was recommended to initially target these two sectors for focused support because the sectors were opening due to declining competitiveness of the currently dominant exporters- China and India
Van Zyl and Matswalela (2016)	South Africa's Clothing and Textile (CAT) sector 18 sample developing nations from 1990 - 2013	South African CAT Exports World CAT Exports South African Trade World Exports		Revealed Comparative Advantage (RCA)	Comparative disadvantages exist for South Africa's CAT in the apparel and textile subsectors. The CAT industry's loss of competitiveness was mostly attributed to the rising unit wage costs and diminishing export shares.

Xu and Hager (2017)	Nepalese Exports and compared with the Top 10 export shares of India, Vietnam, and China from 1995 to 2015	Export Shares Nepalese Manufacturing Exports World Manufacturing Exports Nepalese Merchandise Trade World Trade	GDP per capita	Growth Identification and Facilitation Framework	50 top exports of Nepalese's benchmark countries lost their export share. Of these, 46% were in light manufacturing. The pressure from rising labour costs in their home countries is greatest for light manufactured goods because they are frequently labour intensive. Nepal needs to concentrate on improving its ability to compete in the light manufacturing sector.

Source: Author's summary of reviewed studies.

3.8 Conclusion

Chapter three reviewed literature on the theoretical underpinnings of the GIFF. The chapter introduces theories of comparative advantage in trade, defines competitiveness, and export potential and how they inform the GIFF in its effort to grow exports. The GIFF methodology utilised in the research is motivated by the concept of comparative advantage and hence competitiveness. The main factors identified as influencing manufacturing sector competitiveness for South Africa are listed in their order of rank as; cost and availability of labour and materials; local market attractiveness; energy cost and policies; economic, trade, financial and tax system; and the physical infrastructure of South Africa.

The chapter discussed the measures of enumerating comparative advantage and reviews the efficacy of the different measures. The Revealed Comparative advantage measure comes up as the most widely used measure. However further research showed that there are better measures of comparative advantage borne out of improvements to the limitations of the RCA. After a review of the empirical research evaluating the performance of the different methods of enumerating comparative advantage, discussed in order that they may inform this study to choose the best measure of comparative advantage.

All the GIFF studies reviewed used the RCA as a measure of competitiveness. However, Xu (2019) states that these studies are initial efforts, and that the GIFF analysis does not have to follow procedures or metrics like the RCA. In that regard, studies on the performance of various comparative advantage measures show that there are alternative measures borne out of

improvements to the RCA to overcome its shortcomings. The existence of more improved comparative advantage measures when compared to the RCA warrants the use of such better measures. The NRCA was selected as the most accurate indicator of comparative advantage and will be applied to analyse manufacturing sector competitiveness under the GIFF methodology.

Empirical studies on South African competitiveness and on studies utilising the GIFF methodology from other countries show that the GIFF is more appropriate for achieving the study's goals. The GIFF is of the view that, an economy will be most efficient in both domestic and international markets if it develops its industry based on its comparative advantage. The economy will thus perhaps provide the highest exports and surplus for savings. Additionally, capital investments will yield the highest potential return. An in-depth presentation of the methodology is presented in chapter 4 that follows.

Chapter Four: Methodology

4.0 Introduction

Chapter four presents in depth, the methodology utilised in the study. It highlights the series of steps performed in undertaking the GIFF. The chapter explains the process of identifying the benchmark countries, identified as countries with similar resource endowments as South Africa albeit with moderately higher growth, better performing manufacturing sectors and higher levels of competitiveness in comparison to South Africa. The chapter further describes the process of analysing the export competitiveness of the benchmark countries in an attempt to evaluate export potential for South Africa. The chapter presents the methodology for identifying South African manufacturing sectors to scale up by reviewing South Africa's manufacturing sector export performance. The chapter presents the calculation of labour-intensive manufactured imports that have the potential to be manufactured in South Africa and concludes with the presentation of the approach to analysing the binding constraints to the manufacturing sector.

There are several ways to assess a nation's export competitiveness and, consequently, export potential. Most studies on South African competitiveness quantify the comparative advantage of the subsectors they examine and remark on whether or not their competitiveness is rising or falling. The Growth Identification and Facilitation Framework (GIFF) will be used in this study since research has indicated that it is the most effective approach for achieving the study's goals. The GIFF methodology was chosen as it follows a comprehensive study of the manufacturing sector. In addition to listing South Africa's manufacturing competitiveness, the GIFF further lists the competitiveness of manufacturing for a few benchmark nations in an effort to find export opportunities by looking into the sectors in which these trade rival countries are losing export market share.

According to UNIDO (2016), the GIFF is a methodology that involves identifying products that have been growing for roughly 20 years (1998–20180) but have eventually lost or are beginning to lose their competitiveness in carefully selected benchmarked countries that have been growing at a comparatively faster rate than South Africa. The thinking is that if these nations were able to grow more quickly than South Africa by producing certain commodities, then South Africa will inevitably succeed to some extent by producing comparable products (Lin, 2012). Policy makers

can find and open areas that complement a country's latent comparative advantage with the help of the GIFF (Xu & Hager, 2017). This is done to draw attention to those industries that require assistance in order to grow. In an attempt to identify strategies that have been successful in these nations, the GIFF analyses production factors inside these comparator nations and contrasts production costs with those of South Africa. In addition to trade statistics, the study analyses the cost of labour, capital, and electricity as additional variables that can be compared at the national level in order to compare costs with the selected benchmark nations. To find imports that have increased the most but for which South Africa has the capacity to produce locally, the study computed the growth in these imports. By analysing the structural differences between established and developing countries, the GIFF provides a roadmap for South Africa to pursue in its pursuit of manufacturing export growth. The GIFF is a well-rounded, all-inclusive methodology that makes it easier to accomplish the study's goals.

4.1 Application of the Growth Identification and Facilitation Framework (GIFF)

By applying the GIFF, the research seeks to identify South Africa's potential manufacturing export subsectors by answering the question: "In the face of changes in world trade, what should South Africa focus on producing?" Furthermore, the study seeks to identify the major binding constraints, by answering the question, "What is holding the identified potential export subsectors back?''. Lin (2012) and Lin and Xu (2016) propose the Growth Identification and Facilitation Framework (GIFF) as a model which offers a workable development strategy that would allow underdeveloped nations to use comparative advantage to achieve industrial development. The GIFF seeks to reveal those products that are most realistic as production options. The GIFF as articulated by Lin (2012 and 2014), Lin and Xu (2016) and Xu (2019) is applied as illustrated in the steps below.

4.2 Identifying Benchmark Countries

Empirical data demonstrates that prosperous nations during their developmental catch-up phase employed industrial policies to expedite their industrial advancement. These policies targeted sectors found in rapidly developing nations that shared the same endowment structure as the nation catching up. However, the country that is growing dynamically ought to have a somewhat higher per capita income than the one that is catching up. The reasoning was that nations with comparable endowments ought to have similar comparative advantages. Some of an economy's industries will

lose their comparative advantage as the nation develops and its endowment structure improves. These "sunset" industries will be the "sunrise" industries of the catching up nation. Thus, the relatively successful and dynamic industrialised countries provide a blueprint for the catching up ones (Lin, 2014).

4.2.1 Identifying countries with similar resource endowments as South Africa

The World Bank's statistic of "total natural resource rents as a proportion of GDP'' is used as a proxy for a nation's natural resource endowment and it is subsequently used to rank countries to determine those that can be said to be possessing similar endowments as South Africa. Petroleum, natural gas, coal, mineral, and forest rents combined make up a country's total natural resource rents (World Bank Data, 2020a). The reasoning applied is that comparable advantages are expected to be the same among nations with identical productive resources. This study calculates individual country average annual values for total natural resource rents as a percentage of GDP for the period 1998 to 2018.

In addition to sharing similar natural resource endowments, some researchers have noted that historical trends of manufacturing transitions have shown that, on average, benchmark countries' GDP per capita is between 100 and 300% higher than that of the catching up countries (Xu, 2019; Xu and Hager 2017; UNIDO, 2016; and Lin, 2012). However, this ratio is adaptable, according to Xu (2019), and it guards against too ambitious growth objectives, which frequently lead to the targeting of more developed industries in industrialised nations and in the process defying the inherent competitive advantages of the nation attempting to catch up. Therefore, using 2018 GDP per capita (at purchasing power parity rates-ppp) at constant 2011 prices (World Bank, 2020b), this study calculated the ratio of GDP per capita (ppp) of worldwide countries divided by that of South Africa as a step towards identifying benchmark countries. UNIDO (2016) recommends the use of GDP calculated using the purchasing power parity principle. The World Bank (2018) International Comparison Program (ICP) makes the supposition that due to significant variance in prices across economies, the use of GDP computed using purchasing power parity (PPP) exchange rates is preferred to GDP (market exchange rates). The ICP argues that GDP (PPP) better measures the relative size of economies hence its preference for the study.

4.2.2 Identifying countries from (4.2.1) with moderately higher growth in comparison to South Africa

In addition to the 'similar factor endowments' criteria discussed in 4.2.1, UNIDO (2016) and Xu and Hager (2017) recommend choosing benchmark countries that have experienced growth that is relatively faster than South Africa for the 20-year time span. Using 1997 to 2018 GDP per capita (ppp) at constant 2011 prices (World Bank Data, 2020b), this study calculates and uses as a screening criterion (those countries with an average yearly percentage growth of GDP per capita (ppp) between 3 and 8% for the 20-year period 1998 to 2018). South Africa's average GDP per capita (ppp) growth averaged 1.2 percentage annually for the 20-years from 1998 to 2018. Using World Bank (2020c) data, the study further compared population sizes as a proxy for labour availability (Lin, 2012). Using the world atlas map, this study further filtered those countries with direct access to the sea (similar to South Africa) as this access has been demonstrated to significantly impact a nation's economic performance (UNIDO, 2016).

4.2.3 Selection of benchmark countries with well performing manufacturing sectors

The GIFF studies reviewed in chapter two applied the GIFF methodology to all traded goods at the macroeconomic level. However, this study is focused on the manufacturing sector. To help focus the selection of benchmark countries towards those with better manufacturing sector attributes than that of South Africa, this study uses the average annual percentage growth of manufacturing value added (1998 to 2018) as an additional measure to rank countries (World Bank Data, 2020d)

4.2.4 Selecting benchmark countries by levels of competitiveness.

Sanidas and Shin (2010) have further suggested the need to compute a number of competitiveness metrics concurrently and aggregate them into a single measure to get a complete view of competitiveness. In that regard, this study used UNIDO's Competitive Industrial Performance (CIP) index as a measure for the selection of benchmark countries. Based on eight factors broken down into three aspects, the CIP index rates the competitiveness of each nation's manufacturing industry. The first factor is a country's capacity to produce and export products. The manufacturing

value added (MVA) per capita and the manufactured exports per capita are used to quantify this aspect (UNIDO, 2017).

The second aspect focuses on a nation's degree of innovation in technology. The degree of industrialisation and the grade of exports are two composite variables utilised to assess this. The proportion of MVA in the economy as a whole and the ratio of medium-high and high-technological MVA in overall MVA are used to measure industrialization intensity. The percentage of medium-high and high-technological manufactured exports in total manufactured exports as well as the percentage of manufactured exports in overall exports make up the export quality indicator (UNIDO, 2017).

The nation's contribution to global manufacturing, as determined by its share of global MVA and world manufacturing trade, is the third aspect of competitiveness (UNIDO, 2017). These factors are combined and used in the ranking of the industrial competitiveness of countries. This study uses the 1998 and 2017 country rankings and the country's gain or loss in rank from 1998 to 2017 of the CIP indices to aid in choosing the benchmark countries for South Africa.

4.3 Tradeable manufactured goods of benchmark countries for South African production

The United Nations (2001) identifies export share as one of the statistics used to gauge competitiveness. It further stresses that at the manufacturing sector level, export share is often used as an indicator of a company's capability to acquire new world markets. GIFF studies reviewed (Lin and Treichel, 2011; Lin and Monga, 2014; UNIDO, 2016; Lin and Xu, 2016; and Xu and Hager, 2017) all use the RCA to evaluate competitiveness. The existence of alternative measures arising out of improvements to the RCA warrant use of such better measures. Studies have recommended the normalised revealed comparative advantage (NRCA) as a relatively better metric of competitiveness compared to the RCA and other alternatives to the RCA.

This study, therefore, uses the NRCA to evaluate the comparative advantage or disadvantage of the manufacturing sector exports of benchmark countries for the period 1998 to 2018 using the Standard International Trade Classification (SITC) revision three, 3-digit grouping level. The analysis is done to identify those sectors for South Africa to focus on to grow its exports.

The normalized revealed comparative advantage (NRCA) calculates the deviations of a nation's exports in product from its comparative neutral levels, scaled down by the sum of world exports. The boundary of the index is at 0 and positive values signify comparative advantage while negative deviations signify comparative disadvantage. The amount of data aggregation has no bearing on the evaluation of comparative advantage because NRCA is additive across both goods and nations (Bebeky, 2011).

$$NRCA_j^i = \left(\frac{E_j^i}{E} - \frac{E^i}{E}\frac{E_j}{E}\right) \quad \ldots. \text{ Equation 2}$$

Where $NRCA_j^I$ is the normalised revealed comparative advantage of product j of country i;

E_j^I is exports of product j of country i;

E_j is total world exports of product j;

E^I is total exports of country i

E is total world exports.

The NRCA values range between -0.25 to 0.25. The magnitudes of NRCA are consequently typically very small as it is normalised by total world exports, which is a comparatively large quantity compared to a country's exports on a sector. The NRCA has the remarkable feature of comparing over time and place, making it a reliable tool for comparing between nations. The concept of zero-sum imbedded in comparative advantage is clarified well by the fact that the sum of NRCAs is stable and equal to zero for all product categories. If a country obtains comparative advantage in one area, it loses that advantage in other sectors, and vice versa (Sanidas and Shin, 2010 and Yu et al., 2009).

The annual export figures to calculate the NRCA of the manufacturing subsectors as defined by Lall (2000) (see appendix 1) are extracted from the United Nations Comtrade database (2020) and total world merchandise exports for the period 1998 to 2018 are from the United Nations International Trade Statistics Yearbook (2020). Using the average annual exchange rate, which is produced by weighing the monthly exchange rate with the monthly volume of trade, transaction values are provided in current U.S. dollars. The official daily exchange rates are used as the basis for the monthly exchange rate. The United Nations (2006) identifies the SITC as a more suitable aggregation of traded products into classes for economic analysis and long-term study of trends in

trade compared to the Harmonised System. The SITC classifies manufactured goods into 166 three-digit categories, 36 two-digit divisions, and 4 one-digit sections (United Nations, 2006).

However, in the examination of the distinction in manufactured exports between the developed and underdeveloped nations Lall (2000) proposed a classification that differs from the United Nations (2006) classification as Lall (2000) considers foods that have been processed, such as sugar, cheese, and prepared vegetables as resource-based manufactures rather than as primary goods. Lall's (2000) manufactured category classification is therefore broader than the United Nations' categorisation which places all SITC components classified under categories 0 to 4 into primary rather than manufactured products. Lall's (2000) classification results in 201 subsectors of manufactured products at the SITC 3-digit level, it is at this level of aggregation that this study analyses the manufacturing sector.

The 201 manufacturing subsectors are grouped into 9 subcategories as shown in appendix 1. The NRCA is calculated for 200 3-digit manufacturing sector SITC groups as categorised by Lall (2000) except for ores and concentrates of uranium and thorium (SITC group 286) as this sector was poorly reported and contained many estimates (United Nations, 2020). The study includes Lall's (2000) additional resource-based manufacturers since it has been determined that they were a critical growth step for the majority of prosperous developing nations such as Mauritius, China and Vietnam. The sectors require a great deal of labour, and low-income nations may compete in them owing to their relatively lower labour cost advantage (Dinh and Monga, 2013).

The NRCA facilitates the identification of manufactured goods which have performed well in world trade for the benchmark countries but have since begun to lose competitiveness (UNIDO, 2016). The NRCA for each of the 200 manufacturing subsectors is forecast for each of the years from 2019 to 2023 to enhance data analysis through trend of increase or decrease in the NRCA. Exponential smoothing is used to forecast NRCA using the exponential smoothing algorithm in Excel. Smoothing data is done by averaging values over the twenty-year period of study (1998-2018) in a way that reduces unwanted variation but allows for detecting patterns.

An exponential weighted average of previous measurements is used to create the forecasts. The current measurement is assigned the highest weight, followed by the measurement that immediately precedes it and the observation before that, i.e., the exponential decay of the

significance of earlier data. Similar to predicting using a moving average, exponential smoothing takes the weighted average of all past values, however it scales the weights backward exponentially. This is distinct from moving average forecasting, where prior data is weighted equally. The idea is to give more weight to recent NRCAs but in a way that does not completely ignore older NRCAs. Exponential smoothing has the added advantage over moving averages and regression in that it gives more accurate forecasts by using the error in the last forecast to fine-tune the current forecast and adapts to changes in the series patterns over time (Jibrilla, 2018; Ostertagová and Ostertag, 2011). The method utilises the prior forecast as well as a portion of the forecast error. It evenly diminishes the impact of outlying data. The calculation of the exponential smoothing method is shown as follows (Karmaker, 2017).

$$F_t = F_{t-1} + \alpha\,(F_{t-1} - A_{t-1}) \quad \text{..... Equation 3}$$

Where, F_t = Forecast for time period t;

F_{t-1} = Forecast for the previous period;

A_{t-1} = Actual demand for the previous period;

α= Smoothing constant ($0 \leq \alpha \leq 1$).

The difference between actual demand and projected demand, or forecasting error, is used to quantify the amount of forecasting accuracy. The objective being to find the constant that minimises the forecast error (Karmaker, 2017). As the NRCA changes, SITC subsectors with NRCAs that decline to below zero in the targeted countries are considered to be experiencing declining competitiveness for the benchmark countries. The sub-sectors with rapidly decreasing NRCAs for the benchmark nations are probably the best areas for South Africa to focus on producing.

4.4 Scaling Up South African Manufacturers

Lin (2014) states that in addition to step 4.3's proposal to identify products to focus on producing, the government can look out for manufacturing subsectors with a high employment potential and fast-growth potential and provide those industries with the support to scale up. This is significant because certain nations may possess special resources that enable them to manufacture products that are valued by the market, or because some new technologies or industries may have been invented during the past ten to twenty years. Finding industries where South Africa has been

improving its competitiveness in the export market is one approach to identify these self-discoveries. To identify these sectors the study used the NRCA to analyse the comparative advantage or disadvantage of South Africa's manufactured exports for the time period 2000-2018 at the 3-digit SITC revision 3. The SITC data for South Africa is not available for the years 1998 and 1999. However, this researcher feels that the analysis of a 19-year time series (2000 to 2018) provides a sufficient sample to produce credible analysis and results at acceptable levels of significance since other GIFF studies have recommended a 20-to-30-year range.

4.5 Identifying Labour-Intensive Manufactured Imports with Potential to be Manufactured in South Africa

The UNCTAD identifies 33 SITC subsectors as "labour-intensive and resource-intensive manufactures" (see classification shown in Appendix 3). For these subsectors the study calculated the average annual percentage change in the value of imports for South Africa from 2000 to 2018 (using current USD at SITC level 3 classification). The total value of imports is subsequently stated as a proportion of total South African manufactured imports for that period. The export competitiveness for the subsectors as calculated by NRCA is also presented with these statistics in an effort to identify imports that have grown the most, but which South Africa has the potential to manufacture domestically.

4.6 Removing Binding Constraints

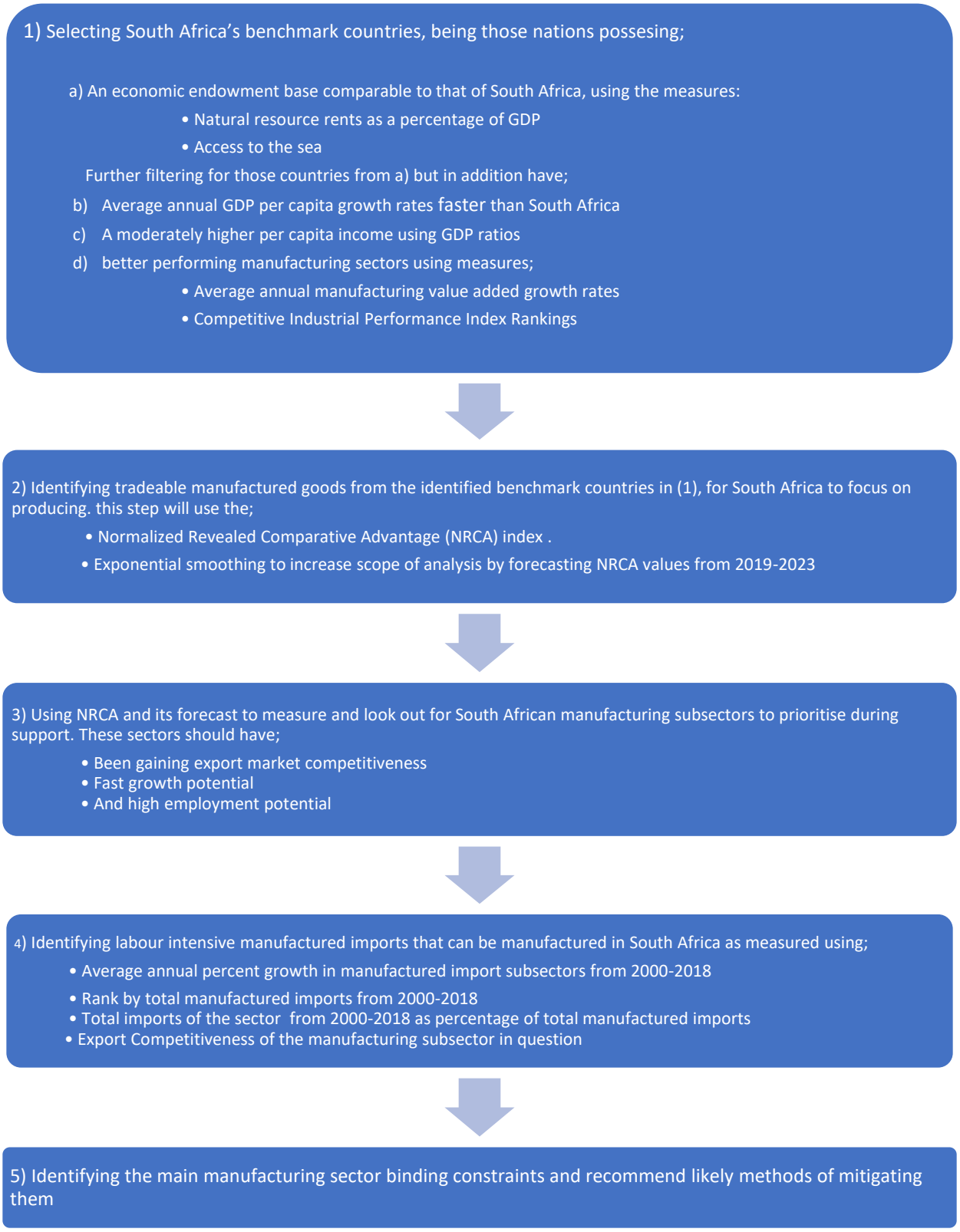
To complement trade data, Lin and Xu (2016), UNIDO (2016) and Lin (2012) advise undertaking a comparison of production costs with those of the benchmark countries, assessing South Africa's feasibility of manufacturing for world markets and subsequently selecting industries where opportunities exist. Surveys can be undertaken to further analyse, at the product level, the constraints along the production chain. A comparative value chain analysis might be carried out in the specified industries to determine and rank the government and private sector support needed to overcome constraints in specific sectors. Comparative value chain analysis can provide irrefutable proof of the costs and productivity differences in the identified sectors.

A comprehensive cross-country value chain cost comparison at each product level is however outside the purview of this study. However, this research uses a macroeconomic level cost

comparison of the top factors of production identified for South Africa. Lakshmanan et al. (2007) have argued that the most crucial component in manufacturing is labour and that its cost can be used to rate competitiveness and thus this study compares the cost of labour between South Africa and the benchmark countries. In addition to labour, the study uses the cost of capital as measured by real interest rates charged to firms, and the cost of electricity as additional factors analysed relative to the benchmark countries (UNIDO, 2016). These are factors identified as major constraints to manufacturing competitiveness as presented by empirical studies on South Africa's competitiveness in chapter two of the study.

Free trade and affordable global logistics have provided an option for companies to consider worldwide factory locations. Hence companies have used global manufacturing as a source of acquiring competitive advantage by internationalising their operations through establishing a presence around the world. Factors that have necessitated this change of perception include a growing world population that has created emerging economies, differences in labour costs and productivity, developed world logistics systems, free-trade agreements, and reliable and low-cost global communication systems (OECD, 2007). Production costs are also an important consideration of investors in their decision-making for investment destinations. In a globalised economy, investors have various alternative locations for their investment and low-income nations in Africa, South Asia, and other regions are increasingly offering better investment environments to outcompete others for the world market and foreign direct investment (FDI). Given these improved opportunity developments, South Africa needs to continually improve on its competitiveness factors in order that it may grow its exports using both local and foreign investors. The GIFF approach as used in the study is summarised in Figure 4.1 below,

Figure 4.1: Summary of GIFF steps as utilised in the study



4.7 Conclusion

The chapter presented the methodology to be used to identify South Africa's potential manufacturing sector export products. NRCA was identified as a better measure than RCA and therefore NRCA was selected as the measure of choice. The study uses the Growth Identification and Facilitation Framework (GIFF), an industrial development approach that entails identifying countries with similar economic endowments as South Africa and whose manufacturing sectors and exports that have been growing relatively faster than South Africa for the past 20 years (1998 to 2018) but have now lost that export competitiveness. If the benchmark countries were able to grow and increase manufacturing export competitiveness relatively faster than South Africa by exporting certain products, then South Africa may by trailing the benchmark countries also realise similar success by targeting similar goods for export.

South Africa's export competitiveness of its manufactured products was analysed by the NRCA measure, this was done to identify subsectors to assist with scaling up. The competitiveness of South Africa's manufacturing subsectors calculated by NRCA together with the calculation of change in value of imports are statistics used to identify imports that have grown the most but for which South Africa has the capability of manufacturing. South Africa must be aware of its respective advantages and disadvantages as a production destination and in the process seek to enhance its strengths and mitigate its weaknesses. To further complement the cost comparison data, the study also presents factors that have been identified as the major constraints for the manufacturing subsectors identified as potential export subsectors for South Africa. The analysis's findings are presented in chapter five.

Chapter Five: Presentation and Analysis of Results

5.0 Introduction

Chapter five reviews and outlines the research findings. It discusses the selected benchmark countries and their performance relative to South Africa. In particular it shows the progression in the number of competitive manufacturing subsectors of the benchmark countries from 1998 to 2018. The chapter analyses the dynamism within these subsectors as some subsectors have since lost while others have gained competitiveness. The chapter centres on the subsectors of the benchmark countries that have lost competitiveness to identify opportunities for South Africa's manufactured exports. These are the manufacturing sector goods with potential for exports and therefore for South Africa to focus on producing. In looking for opportunity to scale-up South African manufacturers, the chapter further groups South Africa's manufacturing subsectors according to their competitiveness in international trade. The chapter further identifies labour-intensive manufactured imports with the capacity to be produced in South Africa. Finally, the chapter presents the general macroeconomic binding constraints identified as influential in determining the manufacturing sector's level of competitiveness and the recommendations of the study. The study's findings are presented in the section below.

5.1 Selected Benchmark Countries

Each of the variables listed in Table 5.1 below were calculated for all the 195 countries of the world and sorted in ascending order. A series of iterations and filters are used to eliminate outliers for each variable, and countries with variables deviating significantly from South Africa are dropped from the list in an effort to choose those that are deemed to be closest to South Africa in comparison. The shortlisted benchmark countries are shown in Table 5.1. There are no countries that satisfy all the recommended criteria of the GIFF in its entirety. Variables of the potential benchmark countries that satisfy the recommendations of the GIFF are highlighted in green. The countries selected as benchmark countries for South Africa are Vietnam, India and China. Motivations for the selection of the benchmark countries are further discussed below.

(a) Vietnam

Vietnam has the largest country gain in rank in the Competitive Industrial Performance (CIP index) between 1998 and 2017 having gained 47 places. It is currently ranked 43 from a possible 150 countries while South Africa is ranked number 45 in terms of manufacturing competitiveness. Vietnam's average total natural resource rents as a proportion of GDP from 1998 to 2018 is 7.61% and is comparable to South Africa's 5.71%.

Table 5.1: Shortlisted Benchmark Countries and their Sorting Variables

Country Name	GDP (2018) Divided by South Africa's as %	Average Annual % GDP Per Capita Growth Rate 1998-2018 (PPP)	Average Total Population 1998-2018	Average Total Population 1998-2018 Divided by South Africa's as %	Population Density (People Per sq. km) 2018	Avg Annual % Manufacturing Value Added Growth 1998-2018	Avg Total Natural Resource Rents (% of GDP) 1998-2018	Country's Competitive Industrial Performance Index Rank 2017	Gain / Loss in Competitive Industrial Index Rank Between 1998 – 2017
Brazil	117.60	1.15	191144687	380.43	25	0.72	3.87	35	-6
Italy	295.01	0.24	58753163	116.94	205	0.41	0.11	9	-5
France	325.70	1.08	64059875	127.50	122	1.31	0.05	11	-5
Mexico	149.31	0.98	110973310	220.87	65	1.92	4.40	22	-2
South Africa	**100.00**	**1.21**	**50244203**	**100.00**	**48**	**1.96**	**5.71**	**45**	**-1**
Malaysia	232.21	2.68	27057768	53.85	96	4.48	10.24	21	0
Japan	323.55	0.76	127399448	253.56	347	1.36	0.02	2	0
Singapore	741.82	3.00	4782235	9.52	7953	5.64	0.00	12	1
Belgium	358.86	1.25	10765149	21.43	377	1.67	0.02	8	1
Thailand	139.19	2.88	66202629	131.76	136	3.55	2.24	27	1
Austria	380.91	1.32	8337632	16.59	107	2.83	0.18	14	3
Indonesia	95.56	2.82	236090061	469.89	148	3.87	7.56	38	4
Hungary	234.38	2.86	10020880	19.94	108	3.58	0.47	26	5
Turkey	208.80	3.05	71077830	141.46	107	5.04	0.36	28	5
Russian Federation	204.13	3.57	144292026	287.18	9	2.57	15.23	31	5
Belarus	146.09	5.15	9647830	19.20	47	6.98	1.56	46	8
Czech Republic	275.31	2.51	10384230	20.67	138	5.61	0.64	15	12
Poland	237.02	3.97	38156346	75.94	124	6.05	1.16	23	12
Romania	202.05	4.27	20835097	41.47	85	4.02	1.94	32	15
India	56.72	5.20	1194810666	2378.01	455	7.27	3.29	39	16
Slovak Republic	257.12	3.64	5396814	10.74	113	8.24	0.35	24	17
China	133.24	8.36	1322179524	2631.51	148		3.82	3	20
Vietnam	54.42	5.26	86546259	172.25	308	9.15	7.61	43	47

Source: Calculated from World Bank (2020, 2023) and UNIDO (2020). Variables closest to those recommended by the GIFF are highlighted in green.

Vietnam's average annual percentage manufacturing value added growth from 1998 to 2018 is 9.15% representing better manufacturing performance when compared to South Africa's 1.96%. Vietnam's average annual GDP per capita (ppp) growth rate for the same time span is 5.2% while

South Africa's rate is 1.2%. This aggregate economic performance falls within the parameters of selecting benchmark countries using the GIFF. Vietnam's GDP per capita is 0.54 times that of South Africa. However, considering that Vietnam's population is 1,72 times more than South Africa potentially negates the smaller relative GDP per capita criteria.

(b) India

India's GDP per capita from 1998 to 2018 has grown by an average 5.2%. Examining how India achieved its high growth rate for a relatively larger population can inform South Africa's manufacturing sector trade policies. Furthermore, India's average annual percentage manufacturing value added growth from 1998 to 2018 is 7.28% and higher than South Africa's 1.96% while its average total natural resource rents as a percentage of GDP is 3.29% and less than South Africa's 5.7%. South Africa can benefit from India's industrial policy since India's economy has relatively less of its GDP contribution from natural resources from 1998 to 2018 while its manufacturing performed relatively better than that of South Africa during the comparable period. India's industrial competitiveness gained 16 places from 1998 to be ranked number 39 in 2017 out of a total of 150 countries. It is noted that India's GDP per capita in 2018 was 0.57 times that of South Africa's. However, its population is 24 times more than South Africa and this potentially negates the effect of India's lower GDP per capita.

(c) China

China is now among the world's leading manufacturers, and its economy heavily depends on the manufacturing sector (Morrison, 2019). China's total manufacturing MVA accounted for 29% of its GDP in 2016. In the same year, China was named the most competitive manufacturer in the world according to a survey of executives in the global manufacturing sector (out of 40 countries) by the Global Manufacturing Competitiveness Index (Morrison, 2019). China's CIP index has risen 20 places since 1998 to number 3 in the world in 2017. It satisfies the majority of the GIFF criteria that allows it to be chosen as South Africa's benchmark country. China's average population is 26 times larger than that of South Africa's for the comparable time from 1998 to 2018. However, this study is of the view that analysing China's growth achieved in such a record time period will likely offer lessons for South Africa's industrial growth. Lin (2012) notes that China's fast growth, large domestic market, its fast ascent in technological value addition

and production processes might be suitable for emulation considering that it might be experiencing a decline in its cost advantage over competitors in some of the sectors that previously propelled its growth.

The three chosen benchmark countries can be said to present statistics that justifies them to be chosen as benchmark countries. China, India and Vietnam have shown dynamic and consistent growth in the past two decades. All targeted countries had GDP per capita (at constant 2011 international dollars) less than South Africa in 1997, China's GDP per individual was US$3006, while that of India and Vietnam was US$2383 and US$ 2253 respectively. South Africa had the largest GDP per capita (ppp) of US$9462 and was 3 times larger than that of China, the highest of the benchmark countries at the time. However, the benchmark countries have achieved growth rates averaging higher than that of South Africa for the 20-year term of study. For the year 2018, China's GDP per capita was US$16181 and had surpassed South Africa's US$12144. India and Vietnam have grown to US$6888 and US$6608 respectively (World Bank, 2020b).

The percentage of manufacturing value added in GDP from 1998 to 2018 for South Africa, Vietnam, India and China shows that these benchmark countries' development and gain in manufactured exports comparative advantage has outpaced that of South Africa. Manufacturing's contribution to South Africa's GDP has consistently remained the lowest relative to these benchmark countries. Its manufacturing sector growth rate has also been outperformed for the period 1998 to 2018. South Africa also has the lowest rate of manufactured exports in merchandise exports having been overtaken by Vietnam in 2007, which up to 2007 had the lowest proportion of manufactured exports in merchandise exports. In 2018, 48% of South Africa's merchandise exports were manufactured products compared with 93% for China, 84% for Vietnam and 70% for India (World Bank Data, 2020e).

5.2 Performance of the Benchmark Countries Relative to South Africa

South Africa has the least proportion of high technological exports in total manufactured exports. For the year 2018, five percent of South African manufactured exports were high technological goods while that of India, China and Vietnam was nine percent, 31% and 40% respectively for the same year. South Africa, China and India's percentages have not changed significantly since 2007, however, Vietnam's high technological export component in manufactured exports increased

dramatically from 8.7% in 2008 to 40.1% in 2018 (World Bank Data, 2020f). For the same year (2018), 47% of South Africa's manufactured exports were classified as 'medium and high-technological' exports while India, China and Vietnam had 35, 61 and 55% respectively. Although South Africa has the second lowest component of "medium and high-technological" exports to manufactured exports compared with its benchmark countries, the growth rate of this component is comparable to China and India, with these countries showing modest growth between 1998 and 2018. Vietnam experienced modest growth of medium and high technological exports in manufactured exports from 1998 to 2008, after which it grew relatively faster from 2009 to 2018 (World Bank Data, 2020g).

Coincidentally, the benchmark countries have been identified as countries that have risen to be South Africa's major competitors in global trade. Bhorat and Rooney (2017) and Draper et al. (2018) identify China's admittance to the World Trade Organisation (WTO), and its emergence as a manufacturing superpower as having had a profound consequence on South Africa's manufacturing sector. They conclude that South Africa is experiencing sizeable displacement in its manufacturing subsectors due to the benchmark countries. Chinese imports, according to Draper et al. (2018), rose quickly from the year 2000 onward, replacing both domestic output and imports from other South African trading partners, making China South Africa's top source of imports overall and in 27 out of 45 manufacturing subsectors. The competitive export sectors of South Africa are significantly impacted by this.

According to calculations by Draper et al. (2018), China's proportion of total imports to South Africa increased from 10 to over 18% between 2007 and 2016, which is a reflection of China's improvement in export competitiveness. Jenkins and Edwards (2012) have shown that, South Africa has a sizable and growing trade deficit with China. These researchers (Jenkins & Edwards 2012) further raise the concern that the majority of South Africa's exports to China are primary and resource-focused goods, while the majority of imports from China's are manufactured products, mostly consumer products with an increasing number of value-added products. Draper et al. (2018) have identified the top 10 import sources to include five South and East Asian countries (up from three in 2007). The study is also of the view that analysis of the export competitiveness of China, India and Vietnam and the factors that contributed to it will offer

valuable lessons for South Africa as the benchmark countries are competitors to South Africa in the international market and in attracting manufacturers to their respective countries.

5.3 Manufacturing Subsectors Identified as Possessing Export Potential for South Africa

Listed below in Table 5.2, is a summary of the competitive manufacturing subsectors (NRCA > 0) for each of the years from 1998 to 2018 for Vietnam, India, China, and South Africa from the 200 SITC manufacturing[7] subsectors.

Table 5.2: Number of Competitive Manufacturing Subsectors for Vietnam, India, China, and South Africa from 1998 to 2018[8]

Country /Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Vietnam	21	25	26	32	29	27	30	35	40	46	48	44	53	54	50	50	54	51	47	47	50
India	51	54	60	59	63	68	66	64	66	64	69	53	59	59	61	62	64	66	67	72	72
China	73	74	78	78	78	72	75	79	83	86	93	85	91	99	98	97	98	96	96	95	98
South Africa	-	-	51	53	59	52	49	49	47	46	47	53	60	50	54	53	59	56	51	49	47

Source: Calculated from UN Comtrade Data (2020)

By following the steps of benchmark countries, the GIFF proposes an industrial development path of trailing the sectoral development and targeting, adopting, and promoting those sectors in which benchmark countries have lost competitiveness. Table 5.2 above also shows that all the benchmark countries have a rising trend in the number of competitive manufacturing subsectors for the period 1998 to 2018. From a possible 200 subsectors, China's competitive manufacturing subsectors increased from 73 in 1998 to 98 in 2018, whereas India and Vietnam's competitive subsectors increased from 51 to 72 and from 21 to 50 respectively for the same time frame. The information therefore shows gains in the number of competitive export subsectors in the benchmark countries. South Africa's competitive manufacturing subsectors increased from 51 in 2000 to a peak of 60 in 2010 and thereafter generally declined to 47 subsectors by 2018. The number of manufacturing

[7] Manufacturing subsectors as defined by Lall (2000). See Appendix 1

[8] Data at the SITC level for South Africa was not available for 1998 and 1999.

subsectors possessing a comparative advantage in exports, therefore, decreased from 51 sectors in 2000 to 47 sectors in 2018.

An examination of the manufacturing sector's comparative advantage in exports of the benchmark nations is used to identify the manufacturing subsectors in which South Africa needs to focus its production. Table 5.2 above shows that the number of competitive manufacturing subsectors increased in absolute terms for each of the benchmark countries. However, analysis of the NRCAs shows that there have been changes within the 200 manufacturing subsectors over the years of study with some sectors losing and others gaining competitiveness. Appendix 4 (Vietnam), 5 (India) and 6 (China) show the NRCAs values which provide a partial view of the export competitiveness adjustments that have taken place during the period of study for the benchmark countries. NRCAs highlighted in colour are those which the subsector exhibited competitiveness (NRCA>0) during the corresponding year.

Results for Vietnam, India, and China are summarised in Tables 5.3, 5.4, and 5.5 below. The tables show the manufacturing export subsectors that exhibited comparative advantage (NRCA>0) during any of the years between 1998 and 2017 but had lost it at the end of the study period (2018) or were still competitive in 2018 but were projected to lose competitiveness during the forecast years (2019 to 2023). These subsectors are likely to be facing a sunset moment in the benchmark countries, however, they might become sunrise subsectors for South Africa. Comparative advantage is calculated using NRCA for the years 1998 to 2018 and forecast from 2019 to 2023. The total number of years for which the subsectors exhibited comparative advantage during this period for each of the benchmark countries is shown in column 3 of Tables 5.3; 5.4; and 5.5.

For each of the benchmark country's subsector identified as having lost or projected to lose competitiveness, the comparative advantage of the corresponding South African manufacturing subsector was computed using NRCA. The comparative advantage of South Africa in the corresponding subsector for the years 2000 to 2018 and forecasted from 2019 to 2023 is represented summarily in column 4 in the tables 5.3; 5.4; and 5.5. South Africa's NRCA values are in Appendix 7, 8, 9 and 10 depending on the subsector's allocated group of competitiveness, NRCAs highlighted in colour are those which the subsector exhibited competitiveness (NRCA>0) during the corresponding year. In order to put into perspective, South Africa's own manufacturing comparative advantage trend in the identified potential subsectors. To understand the summary

representation, the total number of years the sector is competitive from 2000 to 2017 is represented by the first number in column 4. To place emphasis on the later periods of the study, the 3 years prior to 2018 (2015, 2016 and 2017) are analysed and if the sector is competitive for all three years, it is written as C and if competitive for 0, 1 or 2 years it is written as N, this is represented by the first letter in the summary. The final year of study 2018 is considered an important deciding year and is represented by the second letter with C meaning competitive and N meaning not competitive for the year. To further improve the scope of the data analysis, the NRCAs are forecasted from 2019 to 2023 using the exponential smoothing method and the competitiveness is analysed as at the end of the forecast year to determine whether the subsector is competitive (C) or not competitive (N).

Using the first 3 subsectors in Table 5.3 as examples, "cereal preparations, flour of fruits or vegetables" has a comparative advantage recorded summarily as 0-N-N-N. This means that (i) exports for the subsector had no comparative advantage for all 18 years from 2000-2017. (ii) The subsector was not competitive (N) for at least 1 year for the years (2015, 2016 and 2017) (iii) The subsector was again not competitive (N) in 2018 and (iv) South African export competitiveness of "cereal preparations, flour of fruits or vegetables" is such that it is forecasted to remain uncompetitive (N) by 2023.

"Fruit and vegetable juices, unfermented, no spirit" has a comparative advantage represented summarily as 18-C-C-C. This means that (i) exports for the subsector had comparative advantage for all 18 years from 2000-2017. (ii) The subsector was competitive (C) for all the last 3 recent years (2015, 2016 and 2017) of the study (iii) The subsector exhibited comparative advantage (C) in 2018 and (iv) South African export competitiveness of "fruit and vegetable juices, unfermented, no spirit" is such that it is forecasted to maintain comparative advantage (C) by 2023.

"Sugar, molasses and honey" has a comparative advantage recorded summarily as 17-N-C-C. This means that (i) exports for the subsector had comparative advantage for 17 out of a possible 18 years from 2000-2017. (ii) The subsector was not competitive (N) for at least 1 year in the recent years (2015, 2016 and 2017) (iii) The subsector exhibited comparative advantage (C) in 2018 and (iv) South African export competitiveness of "Sugar, molasses and honey" is forecasted to remain competitive (C) as at end of 2023.

Table 5.3: Vietnam's manufacturing subsectors that lost competitiveness between 1998 and 2018 or are projected to lose competitiveness from 2019 to 2023.

SITC Code	Description	Number of Competitive Years 1998-2023	South-African Competitiveness 2000-2023	Subcategory (Total Sectors in Subcategory)
48	Cereal preparations, flour of fruits or vegetables	3	0-N-N-N	Resource-based manufactures: agro-based (12)
59	Fruit and vegetable juices, unfermented, no spirit	1	18-C-C-C	
61	Sugar, molasses and honey	4	17-N-C-C	
62	Sugar confectionery	9	11-C-C-C	
98	Edible products and preparations, n.e.s.	7	8-C-C-C	
122	Tobacco, manufactured	13	16-C-C-C	
247	Wood in the rough or roughly squared	1	1-N-C-N	
248	Wood simply worked, and railway sleepers of wood	2	0-N-N-N	
264	Jute, other textile bast fibre, n.e.s., not spun; tow	6	0-N-N-N	
422	Fixed vegetable fats & oils, crude, refined, fract.	2	0-N-N-N	
621	Materials of rubber (pastes, plates, sheets, etc.)	8	0-N-N-N	
629	Articles of rubber, n.e.s.	15	0-N-N-N	
284	Nickel ores & concentrates; nickel mattes, etc.	2	10-N-N-N	Resource-based manufactures: other (8)
287	Ores and concentrates of base metals, n.e.s.	8	18-C-C-C	
325	Coke & semi-cokes of coal, lign., peat; retort carbon	1	1-N-N-C	
411	Animal oils and fats	7	0-N-N-N	
524	Other inorganic chemicals	1	18-C-C-C	
662	Clay construction, refracto. construction materials	6	0-N-N-N	
663	Mineral manufactures, n.e.s.	13	2-N-N-N	
664	Glass	4	0-N-N-N	
612	Manufactures of leather, n.e.s.; saddlery & harness	20	7-C-N-C	Low technology manufactures: textile, garment and footwear (2)
659	Floor coverings, etc.	1	0-N-N-N	
642	Paper & paperboard, cut to shape or size, articles	3	1-N-N-C	Low technology manufactures: other products (10)
666	Pottery	8	0-N-N-N	
673	Flat-rolled prod., iron, non-alloy steel, not coated	3	18-C-C-N	
676	Iron & steel bars, rods, angles, shapes & sections	1	10-N-N-N	
694	Nails, screws, nuts, bolts, rivets & the like, of metal	7	0-N-N-N	
697	Household equipment of base metal, n.e.s.	5	0-N-N-N	
893	Articles, n.e.s., of plastics	16	0-N-N-N	
895	Office & stationery supplies, n.e.s.	1	0-N-N-N	
897	Jewellery & articles of precious materia., n.e.s.	5	0-N-N-N	
899	Miscellaneous manufactured articles, n.e.s.	17	0-N-N-N	
554	Soaps, cleansing and polishing preparations	4	11-C-C-C	Medium technology
562	Fertilizers (other than those of group 272)	2	14-C-C-N	

671	Pig iron & spiegeleisen, sponge iron, powder & granu	2	18-C-C-C	manufactures; process (4)
653	Fabrics, woven, of man-made fabrics	9	0-N-N-N	
772	Apparatus for electrical circuits; board, panels	1	0-N-N-N	Medium technology manufactures: engineering (2)
793	Ships, boats & floating structures	1	0-N-N-N	
716	Rotating electric plant & parts thereof, n.e.s.	18	0-N-N-N	High technology manufactures: electronic and electrical (2)
751	Office machines	15	0-N-N-N	

Source: Calculations from UN Comtrade Data (2020)

As measured by the NRCA, Vietnam is shown to have lost comparative advantage in 12 resource-based manufacturing subsectors of the agricultural sector(as shown in brackets in the tables). See Appendix 4 for the NRCA values, NRCAs highlighted in colour are those which the subsector exhibited competitiveness (NRCA>0) during the corresponding year. South Africa is currently competitive and projected to maintain competitiveness in five of the 12 subsectors. South Africa had previously gained (before the year in 2018) but has since lost competitiveness in 'wood in the rough or roughly squared form'. Additionally, Vietnam has lost comparative advantage in eight subsectors of the ''other'' resource-based manufactures. South Africa is currently competitive and projected to maintain competitiveness in two of these subsectors. South Africa had, at one time, gained comparative advantage in ('nickel ores & concentrates, nickel mattes, etc'; 'coke & semi-cokes of coal, lignite, peat, retort carbon'; and 'mineral manufactures, n.e.s.'), however, the three subsectors have since lost comparative advantage, 'coke & semi-cokes of coal, lignite, peat, retort carbon' is however forecast to regain competitiveness over the forecast period.

Vietnam has lost comparative advantage in 10 low-technology manufacturing subsectors (other than textile, garment, and footwear). While South Africa is currently competitive in one subsector in the category (flat-rolled prod., iron, non-alloy steel, not coated), its competitiveness is projected to be lost by 2023. In the same category, South Africa is projected to attain competitiveness in the "paper & paperboard, cut to shape or size, articles" subsector.

Vietnam has lost comparative advantage in four subsectors of the medium technology subcategory of the process manufactures, South Africa is currently competitive in three; of the three, the ''fertilizers (other than those of group 272)'' subsector is projected to lose its competitiveness in the next five years. Vietnam also lost comparative advantage in two subsectors each in the medium technology manufactures of the engineering subcategory and in the high technology manufactures

subcategory of ‘electronic and electrical goods’. However, South Africa does not exhibit comparative advantage in any of these subsectors for the period of study.

Table 5.4: India’s manufacturing subsectors that lost competitiveness between 1998 and 2018 or are projected to lose competitiveness from 2019 to 2023.

SITC Code	Description	No" of Competitive	South-African Competitiveness 2000-2023	Subcategory and (Total Sectors in Subcategory)
37	Fish, aqua. invertebrates, prepared, preserved, n.e.s.	3	0-N-N-N	Resource-based manufactures: agro-based (4)
56	Vegetables, roots, tubers, prepared, preserved, n.e.s.	1	0-N-N-N	
629	Articles of rubber, n.e.s.	16	0-N-N-N	
635	Wood manufacture, n.e.s.	1	5-N-C-C	
281	Iron ore and concentrates	16	18-C-C-C	Resource-based manufactures: other (8)
287	Ores and concentrates of base metals, n.e.s.	13	18-C-C-C	
289	Ores & concentrates of precious metals; waste, scrap	15	18-C-C-C	
325	Coke & semi-cokes of coal, lign., peat; retort carbon	4	1-N-N-C	
335	Residual petroleum products, n.e.s., related mater.	12	18-C-C-C	
522	Inorganic chemical elements, oxides & halogen salts	1	18-C-C-N	
524	Other inorganic chemicals	1	18-C-C-C	
592	Starch, wheat gluten; albuminoidal substances; glues	2	0-N-N-N	
674	Flat-rolled prod., iron, non-alloy steel, coated, clad	23	13-N-N-N	Low technology manufactures: other products (10)
675	Flat-rolled products of alloy steel	6	18-C-C-C	
677	Rails & railway track construction mat., iron, steel	3	2-N-N-N	
691	Structures & parts, n.e.s., of iron, steel, aluminium	4	18-C-C-C	
694	Nails, screws, nuts, bolts, rivets & the like, of metal	8	0-N-N-N	
695	Tools for use in the hand or in machine	8	3-N-N-N	
696	Cutlery	8	0-N-N-N	
697	Household equipment of base metal, n.e.s.	23	0-N-N-N	
895	Office & stationery supplies, n.e.s.	13	0-N-N-N	
898	Musical instruments, parts; records, tapes & similar	4	0-N-N-N	

571	Polymers of ethylene, in primary forms	2	0-N-N-N	Medium technology manufactures: process (5)
575	Other plastics, in primary forms	2	4-N-N-C	
579	Waste, parings and scrap, of plastics	1	0-N-N-N	
583	Monofilaments, of plastics, cross-section > 1mm	1	0-N-N-N	
593	Explosives and pyrotechnic products	2	18-C-C-C	
727	Food-processing machines (excluding domestic)	1	11-N-N-N	Medium technology manufactures: engineering (4)
735	Parts, n.e.s., & accessories for machines of 731, 733	4	0-N-N-N	
737	Metalworking machinery (excluding machine-tools) & parts	2	0-N-N-N	
873	Meters & counters, n.e.s.	1	12-N-N-C	
716	Rotating electric plant & parts thereof, n.e.s.	1	0-N-N-N	High technology manufactures: electronic and electrical (3)
771	Electric power machinery, and parts thereof	2	0-N-N-N	
774	Electro-diagnostic appa. for medical sciences, etc.	4	0-N-N-N	
792	Aircraft & associated equipment; spacecraft, etc.	3	1-N-N-N	High technology manufactures: other (2)
541	Medicinal and pharmaceutical products, excluding 542	6	0-N-N-N	

Source: Calculated from UN Comtrade Data (2020).

As shown in Appendix 5 and presented in Table 5.4 above, India has lost comparative advantage in four natural resource manufactured products in the agricultural sector. Of these four, South Africa showed competitive advantage in 'wood manufacture, n.e.s.' in 2018 and is projected to maintain this lead until 2023. India further lost comparative advantage in eight natural resource manufacturing subsectors other than those of the agricultural sector. South Africa is currently competitive in six of the subsectors with five being forecast to maintain that comparative advantage while 'inorganic chemical elements, oxides & halogen salts' are expected to lose their advantage in the next five years. The 'coke & semi-cokes of coal, lignite, peat, retort carbon' subsector is currently not competitive, it is however, forecast to regain competitiveness during the years 2019 to 2023.

India lost comparative advantage in 10 low technology manufactured goods other than those of the textile, garment and footwear sub-category, six of the 10 subsectors are in the mining industry,

and most are in iron and its value-added products. From the 10 subsectors, South Africa is currently competitive in 2 subsectors and at one time had an additional three of which it has however since lost. India lost further advantage in five medium technology manufactured products of the process subcategory of which South Africa is currently competitive and is projected to maintain competitiveness in one subsector (i.e., explosives and pyrotechnic products). "Other plastics, in primary forms" had at one time shown competitiveness for four years earlier in the study. However, while it has not shown comparative advantage for the past recent three years (2015 to 2017) nor has it been competitive as at 2018, it is forecast to attain competitiveness by 2023.

India also lost competitiveness in four subsectors in the medium technology manufactures of the engineering subcategory with South Africa currently not competitive in any of them. However, 'meters & counters, n.e.s.' are forecast to gain comparative advantage by 2023. It is noted that South Africa exhibited competitiveness for 11 of the 18 years from 2000 to 2017 for the "food-processing machines (excluding domestic)" subsector. The sector has since lost this competitiveness.

Appendix 6 and Table 5.5 show that China has lost comparative advantage as measured by NRCA in four natural resource manufactures of the agricultural sector. South Africa is currently competitive and forecast to maintain competitiveness in two of these subsectors; "fruit and vegetable juices, unfermented, no spirit" and "non-alcoholic beverages, n.e.s.". In addition, China has lost comparative advantage in two natural resource manufactures other than those of the agricultural subcategory. South Africa is currently competitive and forecast to maintain comparative advantage in two of these subsectors (residual petroleum products, n.e.s., related mater) and (other organic chemicals).

China has lost comparative advantage in two low technology manufactures of the "textile, garment and footwear" subcategory. South Africa is competitive and expected to maintain competitiveness in one of the two (the "leather subsector"). China further lost advantage in four low-technology manufacturing subsectors other than those of the textile, garment and footwear subcategory. South Africa was competitive as at 2018 in 'flat-rolled prod., iron, non-alloy steel, not coated', however, its competitiveness is currently reducing and is forecast to be lost by 2023.

Table 5.5: China's manufacturing subsectors that lost competitiveness between 1998 and 2018 or are projected to lose competitiveness from 2019 to 2023.

SITC Code	Description	Number of Competitive Years 1998-2023	South-African Competitiveness 2000-2023	Subcategory and (Total Sectors in Subcategory)
17	Meat, edible meat offal, prepared, preserved, n.e.s.	10	0-N-N-N	Resource-based manufactures: agro-based (4)
35	Fish, dried, salted or in brine; smoked fish	1	0-N-N-N	
59	Fruit and vegetable juices, unfermented, no spirit	1	18-C-C-C	
111	Non-alcoholic beverages, n.e.s.	5	10-C-C-C	
335	Residual petroleum products, n.e.s., related mater.	4	18-C-C-C	Resource-based manufactures: other (2)
516	Other organic chemicals	1	18-C-C-C	
611	Leather	5	14-C-C-C	Low technology manufactures: textile, garment and footwear (2)
613	Fur skins, tanned or dressed, excluding those of 8483	18	0-N-N-N	
673	Flat-rolled prod., iron, non-alloy steel, not coated	3	18-C-C-N	Low technology manufactures: other products (4)
677	Rails & railway track construction mat., iron, steel	6	2-N-N-N	
897	Jewellery & articles of precious materia., n.e.s.	18	0-N-N-N	
898	Musical instruments, parts; records, tapes & similar	7	0-N-N-N	
873	Meters & counters, n.e.s.	17	12-N-N-C	Medium technology manufactures: engineering (3)
885	Watches & clocks	8	0-N-N-N	
891	Arms & ammunition	1	10-C-N-C	
562	Fertilizers (other than those of group 272)	11	14-C-C-N	Medium technology manufactures: process (5)
591	Insecticides & similar products, for retail sale	9	18-C-C-C	
671	Pig iron & spiegeleisen, sponge iron, powder & granu	11	18-C-C-C	
672	Ingots, primary forms, of iron or steel; semi-finished.	7	8-N-N-N	
791	Railway vehicles & associated equipment	2	1-N-N-N	
881	Photographic apparatus & equipment, n.e.s.	10	0-N-N-N	High technology manufactures: other (3)
525	Radio-actives and associated materials	6	17-C-N-C	
541	Medicinal and pharmaceutical products, excluding 542	4	0-N-N-N	

Source: Calculated from UN Comtrade Data (2020)

China has lost competitiveness in three medium-technology manufacturing subsectors of the engineering subcategory with South Africa currently not competitive in any of them. However, “meters & counters, n.e.s” and “arms & ammunition” are forecast to gain comparative advantage during the years 2019 to 2023. China lost competitiveness in five medium technology manufactures of the process subcategory of which South Africa is currently competitive and projected to maintain competitiveness in two (‘insecticides & similar products, for retail sale’) and (‘pig iron & spiegeleisen, sponge iron, powder & granular’) with “fertilizers (other than those of group 272)” exhibiting comparative advantage as at 2018 but forecast to lose competitiveness in the next five years. “Ingots, primary forms, of iron or steel; semi-finished” and “railway vehicles & associated equipment” showed some competitiveness during the period of the study, however, this competitiveness has since been lost. The loss did not occur in recent years. In the high technology manufacturing subcategory of products other than those of the electronic and electrical goods, China is shown to have lost advantage in three subsectors with South Africa not having any comparative advantage (as at 2018) in these subsectors. However, it is projected to attain competitiveness from 2019 to 2023 in the export of (radio-actives and associated materials).

Vietnam, India and China have lost or are projected to lose competitiveness at end of the year 2023 in a total of 40, 36 and 23 manufacturing subsectors respectively. Table 5.6 below shows that the benchmark countries’ export performance is diverse, as the benchmark countries have lost competitiveness in subsectors that are predominantly different from each other. From a possible 200 subsectors, “China and India” and “China and Vietnam” lost comparative advantage in five similar manufacturing subsectors while “India and Vietnam” lost comparative advantage in eight similar subsectors. There is no common subsector in which all three countries simultaneously lost competitiveness. This suggests that the countries are major trade competitors of each other and in time they have specialised in the production and exporting of their unique set of manufactured goods. This widens the number of manufactured goods for South Africa to choose from. This is because the need to pay attention to subsectors with simultaneous loss in competitiveness in multiple benchmark countries does not arise as they have since specialised in the export of products that differ from each other.

Table 5.6: Common Subsectors that lost competitiveness among the benchmark countries between 1998 and 2018 or are projected to lose competitiveness from 2019 to 2023.

China & India (5)	335	Residual petroleum products, n.e.s., related mater.
	677	Rails & railway track construction mat., iron, steel
	898	Musical instruments, parts; records, tapes & similar
	873	Meters & counters, n.e.s.
	541	Medicinal and pharmaceutical products, excluding 542
China & Vietnam (5)	59	Fruit and vegetable juices, unfermented, no spirit
	673	Flat-rolled prod., iron, non-alloy steel, not coated
	897	Jewellery & articles of precious materia., n.e.s.
	562	Fertilizers (other than those of group 272)
	671	Pig iron & spiegeleisen, sponge iron, powder & granu
India & Vietnam (8)	629	Articles of rubber, n.e.s.
	287	Ores and concentrates of base metals, n.e.s.
	325	Coke & semi-cokes of coal, lign., peat; retort carbon
	524	Other inorganic chemicals
	694	Nails, screws, nuts, bolts, rivets & the like, of metal
	697	Household equipment of base metal, n.e.s.
	895	Office & stationery supplies, n.e.s.
	716	Rotating electric plant & parts thereof, n.e.s.
China & India &Vietnam (0)		No subsector was found to have lost competitiveness across all three benchmark countries

Source: Analysis from Comtrade Data (2020)

Changes in the export competitiveness of the manufacturing subsectors of Vietnam, India and China vary by country. However, it is observed from Table 5.7 below that the benchmark countries as at 2018 had lost or are projected (between 2019 and 2023) to lose competitiveness in a significant number of resource-based manufactured products in both agricultural and 'other' resource-based manufacturing subsectors.

Table 5.7: Summary of subsectors that lost competitiveness amongst the benchmark countries between 1998 and 2018 or are projected to lose it from 2019 to 2023.

SITC Rev. 3 Products by Technological Categories	Vietnam	India	China
Resource-based manufactures: agro-based	12	4	4
Resource-based manufactures: other	8	8	2
Low technology manufactures: textile, garment and footwear	2	0	2
Low technology manufactures: other products	10	10	4
Medium technology manufactures: automotive	0	0	0
Medium technology manufactures: process	4	5	5
Medium technology manufactures: engineering	2	4	3
High technology manufactures: electronic and electrical	2	3	0
High technology manufactures: other	0	2	3
Total	**40**	**36**	**23**

Source: Analysis from Comtrade Data (2020)

The number of sectors that have lost competitiveness or which are projected to lose competitiveness for the benchmark countries decrease in number as one moves from natural resource-intensive manufactures to minimal technology (textile, garment and footwear and other), moderate technology and finally to high-technology products. There seems to be developing a trend toward items that require more skilled human capital than unskilled labour. The Chinese government, according to Morrison (2019), has made it apparent that it wants to abandon its economic paradigm of aggressive growth at all costs, reducing dependence on high-energy consuming and highly environmentally damaging industries, and enhance reliance on advanced technology, renewable energy, and service sectors.

To further filter the potential subsectors for South Africa, sectors which South Africa has not shown any capability to export competitively during any of the years of study were dropped from the list of potential sectors.

Table 5.8: Manufactured Goods identified from the Benchmark Countries as Possessing Export Potential for South Africa

SITC Code	Description	Number of Competitive Years 1998-2023 for Benchmark Country	South-African Competitiveness 2000-2023	Subcategory and (Total Sectors in Subcategory)
111	Non-alcoholic beverages, n.e.s.	5	10-C-C-C	Resource-based manufactures: agro-based (5)
61	Sugar, molasses and honey	4	17-N-C-C	
62	Sugar confectionery	9	11-C-C-C	
98	Edible products and preparations, n.e.s.	7	8-C-C-C	
122	Tobacco, manufacture	13	16-C-C-C	
287	Ores and concentrates of base metals, n.e.s.	8	18-C-C-C	Resource-based manufactures: other (5)
281	Iron ore and concentrates	16	18-C-C-C	
289	Ores & concentrates of precious metals;	15	18-C-C-C	
663	Mineral manufactures, n.e.s.	13	2-N-N-N	
335	Residual petroleum products, n.e.s.,	12	18-C-C-C	
611	Leather	5	14-C-C-C	Low technology manufactures: textile, garment and footwear (2)
612	Manufactures of leather, n.e.s.; saddlery	20	7-C-N-C	
675	Flat-rolled products of alloy steel	6	18-C-C-C	Low technology manufactures: other products (7)
642	Paper & paperboard, cut to shape or size,	3	1-N-N-C	
673	Flat-rolled prod., iron, non-alloy steel,	3	18-C-C-N	
674	Flat-rolled prod., iron, non-alloy steel,	23	13-N-N-N	
677	Rails & railway track construction mat.,	3	2-N-N-N	
691	Structures & parts, n.e.s., of iron, steel,	4	18-C-C-C	
695	Tools for use in the hand or in machine	8	3-N-N-N	
591	Insecticides & similar products, for retail sale	9	18-C-C-C	Medium technology manufactures: process (3)
554	Soaps, cleansing and polishing	4	11-C-C-C	
672	Ingots, primary forms, of iron or steel; semi-finis.	7	8-N-N-N	
792	Aircraft & associated equipment; spacecraft, etc.	3	1-N-N-N	High technology manufactures: other (2)
525	Radio-actives and associated materials	6	17-C-N-C	

Source: Summarised potential export products for South Africa

In addition, subsectors with a low number of comparative advantage years represent less contribution to the growth in exports for the benchmark countries. Also dropped from the list of potential subsectors were those showing comparative advantage for less than three years for the benchmark country. This, however, does not exclude their potential use as components or raw materials in related subsectors which subsequently registered significant export growth. The combined list of potential sectors from the three benchmark countries is shown in Table 5.8 above.

A total of 24 manufacturing subsectors are filtered from the benchmark countries for South Africa to focus on producing. Ten of the 24 subsectors are in the "agro-based" and "other" resource-based manufactures subcategory. Nine of the 10 subsectors are currently export competitive (as at 2018) and forecast (2019-2023) to remain as such for South Africa. This demonstrates South Africa's significant competitive edge in resource-based and agricultural manufacturing.

Nine of the 24 identified subsectors are in the low technology manufactures of (textile, garment and footwear) and (other products) subcategories. (Leather), (flat-rolled products of alloy steel) and (structures & parts, n.e.s., of iron, steel, aluminium), three of the nine subsectors are shown to be currently competitive and are forecast to maintain that competitiveness. South Africa possesses comparative advantage in the exporting of (flat-rolled prod., iron, non-alloy steel, not coated), this competitiveness has, however, been reducing over the years such that it is projected to be lost by 2023. South Africa is shown to have lost comparative advantage in ("leather, n.e.s.; saddlery and harnesses") and ("paper & paperboard, cut to shape or size, articles"). However, this loss is for the year 2018, South Africa is projected to regain this comparative advantage by 2023.

Three of the 24 potential subsectors are in the medium technology manufactures of the process subcategory with South Africa currently competitive in two (i.e., 'insecticides & similar products, for retail sale') and ('soaps, cleansing and polishing reparations'). This competitiveness is forecast to be maintained until 2023. Two of the 24 identified potential subsectors are in the high-technology manufactures subcategory. "Radio-actives and associated materials" has been competitive from 2000 to 2017, but it lost its competitiveness in 2018 and it is forecast to regain it between 2019 and 2023.

Six of the 24 potential export manufacturing subsectors have their South African competitive summary with -N-N-N. This means that the subsector was not competitive (N) for at least one year for the recent years of study (2015, 2016 and 2017) (ii) was again not competitive (N) in 2018 the

final year of analysis and (iii) that it is forecast to remain uncompetitive (N) by 2023. These are (mineral manufactures, n.e.s.), ("flat-rolled prod., iron, non-alloy steel, coated, clad"), ("rails & railway track construction mat., iron, steel"), ("tools for use in the hand or in machine"), ("ingots, primary forms, of iron or steel; semi-finished") and ("aircraft & associated equipment; spacecraft, etc"). These subsectors had gained in the years before 2018 but have since lost export competitiveness.

5.4 Scaling-Up South African Manufacturers

Lin (2012) suggests that in identifying export opportunities using the GIFF, South Africa can in addition to the identification of potential sectors from benchmark countries, look out for scaling up subsectors that exhibit fast export growth potential. One way of identifying such self-discoveries is to find sectors where South Africa has been gaining competitiveness in the export market. This study calculated the NRCA for the 199 out of a total 201[9] manufacturing subsectors to determine South Africa's export comparative advantage in each subsector in an effort to identify export opportunities for South Africa. Listed below is the competitiveness grouping of South Africa's manufacturing subsectors.

5.4.1 South African manufacturing subsectors competitive as at 2018 and forecast to maintain competitiveness from 2019 to 2023

Table 5.9 and Table 5.10 below categorise the manufacturing subsectors in which South Africa was shown to possess comparative advantage as per the Normalised Revealed Comparative Advantage (NRCA) Index in 2018 and also forecast to maintain that comparative advantage as at the end of the year 2023.

A total of 37 of the 199 South African manufacturing subsectors were revealed to be competitive as at 2018 and are forecast to remain competitive in the next five years (2019 to 2023). Resource based manufactures make up 59% (22 of the 37) of the subsectors, of these 22, agro-based resource

[9] 'Arms & ammunition' and 'ores and concentrates of uranium and thorium' were dropped from the study because export values were not recorded for 6 years for the former while data was poorly reported and contains many estimates for the latter (United Nations, 2020).

manufactures make up 32% (12 out of 22) and other resource-based manufacturing subsectors make up the remaining 27% (10 out of 22).

Table 5.9: South African manufacturing subsectors competitive as at 2018 and forecast to maintain competitiveness from 2019 to 2023

SITC Code	Description
46	Meal and flour of wheat and flour of meslin
47	Other cereal meals and flour
58	Fruit, preserved, and fruit preparations (no juice)
59	Fruit and vegetable juices, unfermented, no spirit
61	Sugar, molasses and honey
62	Sugar confectionery
111	Non-alcoholic beverages, n.e.s.
112	Alcoholic beverages
122	Tobacco, manufactured
251	Pulp and waste paper
266	Synthetic fibres suitable for spinning
281	Iron ore and concentrates
287	Ores and concentrates of base metals, n.e.s.
289	Ores & concentrates of precious metals; waste, scrap
335	Residual petroleum products, n.e.s., related mater.
431	Animal or veg. oils & fats, processed, n.e.s.; mixt.
512	Alcohols, phenols, halogenat., sulfonat., nitrat. der.
516	Other organic chemicals
522	Inorganic chemical elements, oxides & halogen salts
523	Metallic salts & peroxysalts, of inorganic acids
524	Other inorganic chemicals
554	Soaps, cleansing and polishing preparations
591	Insectides & similar products, for retail sale
635	Wood manufacture, n.e.s.
667	Pearls, precious & semi-precious stones
671	Pig iron & spiegeleisen, sponge iron, powder & granu
673	Flat-rolled prod., iron, non-alloy steel, not coated
675	Flat-rolled products of alloy steel
689	Miscellaneous no-ferrous base metals for metallur.
691	Structures & parts, n.e.s., of iron, steel, aluminium
693	Wire products (excluding electrical) and fencing grills
723	Civil engineering & contractors' plant & equipment
743	Pumps (excluding liquid), gas compressors & fans; centr.
781	Motor vehicles for the transport of persons
782	Motor vehic. for transport of goods, special purpo.
786	Trailers & semi-trailers
811	Prefabricated buildings

Source: Calculated from Comtrade Data (2020), Manufacturing Sector definition by Lall (2000). Appendix 7 shows the corresponding NRCA values.

The colour coding key and the summary grouping of the competitive subsectors is shown in Table 5.10. below

Table 5.10: Summary of South African sectors competitive as at 2018 and forecast to maintain competitiveness between 2019 and 2023

Products by SITC Technological Categories	Quantity	Percentage of Total
Resource-based manufactures: agro-based	12	32
Resource-based manufactures: other	10	27
Low technology manufactures: textile, garment and footwear	0	0
Low technology manufactures: other products	4	11
Medium technology manufactures: automotive	2	5
Medium technology manufactures: process	6	16
Medium technology manufactures: engineering	3	8
High technology manufactures: electronic and electrical	0	0
High technology manufactures: other	0	0
Total Competitive Sectors	**37**	**100**

Source: Calculated from Comtrade Data (2020)

Medium technology manufactures consist of 11 of the 37 subsectors (29%). The 11 subsectors comprise the automotive category consisting of manufactured automobiles used for special functions, as well as the transportation of people, commodities, and other things. Those of the process subcategory comprise the manufacture of trailers & semi-trailers and those of the engineering subcategory comprise prefabricated buildings. Low-technology manufactures contributed 4 competitive sectors (11%) comprising mainly (flat-rolled iron; non-alloy steel, not coated); (Flat-rolled products of alloy steel); (structures & parts, n.e.s., of iron, steel, aluminium) and (wire products (excluding electrical) and fencing grills). 'Low technology manufactures of textile, garment and footwear products' and 'high technology manufactures' did not possess any competitive subsectors.

It is equally important that South Africa safeguards and further strengthens those factors that have contributed to its currently competitive subsectors by identifying and addressing factors which may arise with the potential to reduce this comparative advantage. These factors which may arise (if any) with potential to reduce competitiveness of these subsectors need to be mitigated against. South Africa can, in addition, work to raise its competitiveness by further developing downstream industries along the value chain of subsectors in which it already has comparative advantage. For

example, the low technology manufactures with four competitive subsectors (11%) comprises products from the processing of iron, which shows there is potential export competitiveness in other iron and steel subsectors. The manufactured exports from South Africa to Africa were demonstrated to have increased dramatically during the study period. South Africa can exploit its sources of comparative advantage and establish regionally integrated value chains.

5.4.2 Uncompetitive South African Manufacturing subsectors as at 2018, but forecast to gain competitiveness between 2019 and 2023

Table 5.11 below lists the subsectors in which South Africa was not competitive (NRCA<0) as at the year 2018. However, these subsectors have been gaining competitiveness and are now forecast to achieve competitiveness within the next five years (2019 to 2023).

Table 5.11: Uncompetitive South African manufacturing subsectors as at 2018, forecast to attain competitiveness between 2019 and 2023

Code	Description
288	Non-ferrous base metal waste and scrap, n.e.s.
325	Coke & semi-cokes of coal, lign., peat; retort carbon
525	Radio-actives and associated materials
533	Pigments, paints, varnishes and related materials
553	Perfumery, cosmetics or toilet prepar. (excluding soaps)
581	Tubes, pipes and hoses of plastics
612	Manufactures of leather, n.e.s.; saddlery & harness
642	Paper & paperboard, cut to shape or size, articles
672	Ingots, primary forms, of iron or steel; semi-finis.
674	Flat-rolled prod., iron, non-alloy steel, coated, clad
679	Tubes, pipes & hollow profiles, fittings, iron, steel
711	Vapour generating boilers, auxiliary plant; parts
726	Printing & bookbinding machinery, & parts thereof
727	Food-processing machines (excluding domestic)
891	Arms & ammunition

Source: Calculated from UN Comtrade Data (2020).

Table 5.12 below provides the color-coding and summary grouping of the subsectors.

Table 5.12: Summary of Uncompetitive South African sectors as at 2018 but forecast to attain competitiveness between 2019 and 2023

SITC Rev. 3 Products by Technological Categories	Quantity	Percentage
Resource-based manufactures: agro-based	0	0
Resource-based manufactures: other	2	13
Low technology manufactures: textile, garment and footwear	1	7
Low technology manufactures: other products	2	13
Medium technology manufactures: automotive	0	0
Medium technology manufactures: process	5	33
Medium technology manufactures: engineering	4	27
High technology manufactures: electronic and electrical	0	0
High technology manufactures: other	1	7
Total Competitive Sectors	**15**	100

Source: Calculated from UN Comtrade Data (2020).

As at the end of 2018, fifteen manufacturing subsectors were uncompetitive but their NRCA has been increasing such that they are forecast to attain competitiveness within the next five years (2019 to 2023). Appendix 8 shows the NRCA values. No agro-based natural resource manufactured products are forecast to gain comparative advantage. However, two sectors in the natural resource manufactures other than those of the agricultural subcategory are projected to gain competitiveness, they are, "non-ferrous base metal waste and scrap, n.e.s." and "coke & semi-cokes of coal, lign., peat; retort carbon".

In addition, South Africa is expected to gain one competitive sector (leather, n.e.s.; saddlery & harness) in the low-technology manufactures of the "textile, garment and footwear" subcategory. Two sectors are forecast to gain competitiveness in the low technology manufacturing sector other than those of the "textile, garment and footwear"; they are "paper & paperboard, cut to shape or size, articles" and "flat-rolled prod., iron, non-alloy steel, coated, clad".

Medium-technology manufactured products are projected to gain competitiveness in 9 of the 15 subsectors (60%). This shows a projected advance of South African development in the value chain to manufacture products that are in the medium-technology sectors, compared to the resource-based and low-technology manufacturing subsector. South Africa is expected to gain competitiveness in the export of "radioactives and associated materials" in the high-technology manufactured subcategory. This is forecast to be the first high-technology export to gain comparative advantage. It is, therefore, important that South Africa safeguards the comparative

advantage growth trajectory in these subsectors by alleviating factors with potential to reduce their competitiveness.

5.4.3 South African manufacturing subsectors, competitive as at 2018 but are forecast to lose competitiveness between 2019 and 2023

Table 5.13: South African competitive subsectors as at 2018 but are forecast to lose competitiveness between 2019 and 2023

Code	Description
98	Edible products and preparations, n.e.s.
247	Wood in the rough or roughly squared
532	Dyeing & tanning extracts, synth. tanning materials
562	Fertilizers (other than those of group 272)
593	Explosives and pyrotechnic products
611	Leather
661	Lime, cement, fabrica. constr. mat. (excluding glass, clay)
678	Wire of iron or steel
692	Metal containers for storage or transport
742	Pumps for liquids

Source: Calculated from UN Comtrade Data (2020)

The colour coding and the summary grouping of the subsectors is explained in Table 5.14 below. Appendix 9 lists the NRCAs for the sectors

Table 5.14: Summary for South African competitive subsectors as at 2018 but forecasted to lose competitiveness between 2019 and 2023

SITC Rev. 3 Products by Technological Categories	Quantity	Percentage
Resource-based manufactures: agro-based	2	20
Resource-based manufactures: other	2	20
Low technology manufactures: textile, garment and footwear	1	10
Low technology manufactures: other products	2	20
Medium technology manufactures: automotive	0	0
Medium technology manufactures: process	2	20
Medium technology manufactures: engineering	1	10
High technology manufactures: electronic and electrical	0	0
High technology manufactures: other	0	0
Total Competitive Sectors	**10**	100

Source: Calculated from UN Comtrade Data (2020).

South Africa was competitive as at 2018, however, it is forecast to lose comparative advantage in the export of 10 manufacturing subsectors. Four of the 10 are in the agricultural and non-

agricultural subsectors of the natural resource manufacturing category. Low and medium technology manufactured products are forecast to lose 3 competitive subsectors each.

5.4.4 Sectors that had lost competitiveness as at 2018 and projected to remain uncompetitive as at 2023

Table 5.15: South African subsectors not competitive as at 2018 and forecast to remain uncompetitive as at 2023

Code	Description
232	Synthetic rubber
282	Ferrous waste, scrape; remelting ingots, iron, steel
283	Copper ores and concentrates; copper mattes, cement
284	Nickel ores & concentrates; nickel mattes, etc.
322	Briquettes, lignites and peat
334	Petroleum oils or bituminous minerals > 70 % oil
421	Fixed vegetable fats & oils, crude, refined, fractio.
511	Hydrocarbons, n.e.s., & halogenated, nitr. Derivative
513	Carboxylic acids, anhydrides, halides, per.; derivati.
551	Essential oils, perfume & flavour materials
575	Other plastics, in primary forms
598	Miscellaneous chemical products, n.e.s.
625	Rubber tyres, tyre treads or flaps & inner tubes
641	Paper and paperboard
663	Mineral manufactures, n.e.s.
676	Iron & steel bars, rods, angles, shapes & sections
677	Rails & railway track construction mat., iron, steel
695	Tools for use in the hand or in machine
712	Steam turbines & other vapour turbin., parts, n.e.s.
713	Internal combustion piston engines, parts, n.e.s.
762	Radio-broadcast receivers, whether or not combined
783	Road motor vehicles, n.e.s.
791	Railway vehicles & associated equipment
792	Aircraft & associated equipment; spacecraft, etc.
821	Furniture & parts
873	Meters & counters, n.e.s.
881	Photographic apparatus & equipment, n.e.s.

Source: Calculated from UN Comtrade Data (2020).

The colour coding and the summary grouping of the subsectors is explained in Table 5.16 below. Appendix 10 lists subsectors that had lost competitiveness as of the year 2018 and are forecast to remain uncompetitive between 2019 and 2023 as measured by NRCA.

Table 5.16: Summary of South African subsectors that lost competitiveness in 2018 and are forecast to remain uncompetitive between 2019 and 2023.

SITC Rev. 3 Products by Technological Categories	Quantity	Percentage
Resource-based manufactures: agro-based	4	15
Resource-based manufactures: other	8	30
Low technology manufactures: textile, garment and footwear	0	0
Low technology manufactures: other products	4	15
Medium technology manufactures: automotive	1	4
Medium technology manufactures: process	4	15
Medium technology manufactures: engineering	3	11
High technology manufactures: electronic and electrical	0	0
High technology manufactures: other	3	11
Total Competitive Sectors	**27**	100

Source: Calculated from Comtrade Data (2020).

Tables 5.15 and 5.16 list subsectors that achieved comparative advantage during the years between 2000 and 2017. However, by 2018 they had lost competitiveness and are now forecast to remain uncompetitive between 2019 and 2023, NRCA values are shown in Appendix 10. Twelve out of the 27 (45%) subsectors that lost competitiveness are from the natural resource manufactures subcategory of both the agro-based (4) and other (8) resource-based manufactures. Low technology manufactures have lost competitiveness in four subsectors (15%). Medium technology manufactures have lost a combined 8 sectors out of 27 (30%). South Africa currently does not have any competitive manufactures of the high technology category, having lost competitiveness in all three subsectors ('steam turbines & other vapour turbine., parts, n.e.s.'; 'aircraft & associated equipment; spacecraft, etc.'; and 'photographic apparatus & equipment, n.e.s.'). South Africa should, therefore, continue to address the factors that have reduced the competitiveness of its manufacturing subsectors over the years to bring the subsectors back to competitiveness. In doing so, it must be dynamic enough to enact policies quickly that address the needs and threats affecting the subsectors.

According to Lin (2012), the government may prioritise industries where some local private companies spontaneously emerged in an effort to attempt to understand the challenges limiting these companies from improving the quality of their output or the impediments preventing new companies from entering. For such sectors, government can take special action to promote FDI from high-income countries to invest in these sectors.

5.5 Labour-Intensive Manufactured Imports with Potential for South African Production

The United Nations Conference on Trade and Development - UNCTAD identifies 33 of the 199[10] SITC manufacturing subsectors as "labour-intensive and resource-intensive manufactures" (see Appendix 3). Table 5.17 below presents the average annual percentage change in the value of imports of the 33 manufacturing subsectors for South Africa from 2000 to 2018 (using current USD at SITC level 3 classification). Appendix 11 lists the 199 manufacturing subsectors' average annual percentage change in the value of imports. The total value of the subsectors' imports is calculated and expressed as a percentage of total South African manufactured imports for that period. The export competitiveness for the subsectors as calculated by NRCA are also presented alongside these statistics. The provision of these statistics is to help identify imports that have grown the most, but South Africa has the potential to manufacture domestically.

Table 5.17 below also shows a general increase in imports of natural resource manufactures. Imports of "fur skins, tanned or dressed, excluding those of 8483" and its subsequent value-added products are part of products that have increased relatively higher than other manufactured imports. "Cork manufacture" is the only such categorised subsector that shows a decrease of 1.73% in imports in 2018 compared to 2000. The sub-sectors listed in Table 5.17 are identified as labour-intensive and therefore have the capability to employ a significant proportion of the workforce to reduce unemployment in South Africa.

Twenty five of the 33 subsectors do not show any export competitiveness for any of the years from 2000 to 2018 and neither are they forecast to gain it. Of the remaining eight subsectors that have, gained comparative advantage during any of the years of study, three were competitive as at 2018 and two of these three ("leather" and "wood manufacture, n.e.s") are projected to maintain their competitiveness until 2023.

[10] Arms and ammunition were dropped from the list as the subsector did not have consistent data reported throughout the period of study.

Table 5.17: Average annual percentage change in value of manufactured imports for South Africa's Labour-Intensive Manufactured Imports from 2000-2018 (current USD).

SITC Code	Description	Average Annual % Growth Rate	Total Imports in US$ 2000-2018	Ranked[11] by Total Import Value 2000-2018	% of Total Manufactured Imports	Export Competitiveness
611	Leather	1,92	1562523344	134	0,16	14-C-C-C
612	Manufactures of leather, n.e.s.; saddlery & harness	10,16	146685582	189	0,01	7-C-N-C
613	Fur skins, tanned or dressed, excluding those of 8483	25,32	8505475	198	0,00	0-N-N-N
633	Cork manufactures	-1,73	374241726	177	0,04	0-N-N-N
634	Veneers, plywood, and other wood, worked, n.e.s.	8,96	1770276517	126	0,18	0-N-N-N
635	Wood manufacture, n.e.s.	6,29	1261079676	144	0,13	5-N-C-C
641	Paper and paperboard	7,45	12014314384	17	1,22	9-N-N-N
642	Paper & paperboard, cut to shape or size, articles	9,50	3810308710	78	0,39	1-N-N-C
651	Textile yarn	3,87	3011773749	91	0,31	0-N-N-N
652	Cotton fabrics, woven	5,10	1882960437	122	0,19	0-N-N-N
653	Fabrics, woven, of man-made fabrics	2,75	4235947389	69	0,43	0-N-N-N
654	Other textile fabrics, woven	4,19	564034746	170	0,06	0-N-N-N
655	Knitted or crocheted fabrics, n.e.s.	9,10	1981385601	119	0,20	0-N-N-N
656	Tulles, trimmings, lace, ribbons & other small wares	6,59	464488851	173	0,05	0-N-N-N
657	Special yarn, special textile fabrics & related	6,88	3831957582	76	0,39	0-N-N-N
658	Made-up articles, of textile materials, n.e.s.	13,40	2973999208	92	0,30	0-N-N-N
659	Floor coverings, etc.	6,28	736250547	166	0,07	0-N-N-N
661	Lime, cement, fabrica. constr. mat. (excluding glass, clay)	12,80	1669481832	131	0,17	16-C-C-N
662	Clay construction, refracto. construction materials	6,83	3913099030	73	0,40	0-N-N-N
663	Mineral manufactures, n.e.s.	8,06	6188620049	42	0,63	2-N-N-N
664	Glass	8,29	1711417553	128	0,17	0-N-N-N
665	Glassware	7,97	1954096878	120	0,20	0-N-N-N
666	Pottery	7,68	808499167	161	0,08	0-N-N-N
821	Furniture & parts	11,14	8005531233	30	0,81	8-N-N-N
831	Travel goods, handbags & similar containers	11,69	2755809348	96	0,28	0-N-N-N
841	Men's clothing of textile fabrics, not knitted	14,47	5238446177	55	0,53	0-N-N-N
842	Women's clothing, of textile fabrics	19,47	4490791914	65	0,46	0-N-N-N
843	Men's or boy's clothing, of textile, knitted, croche.	17,50	1815250156	125	0,18	0-N-N-N
844	Women's clothing, of textile, knitted or crocheted	22,94	2153237793	115	0,22	0-N-N-N
845	Articles of apparel, of textile fabrics, n.e.s.	16,00	6611416994	37	0,67	0-N-N-N

[11] Rank position from a list of 199 manufacturing subsectors listed in increasing magnitude of value of imports. Rank of 1 representing the lowest and 199 the highest value of imports

846	Clothing accessories, of textile fabrics	13,36	952426676	154	0,10	0-N-N-N
848	Articles of apparel, clothing access., excluding textile	10,11	1871783591	123	0,19	0-N-N-N
851	Footwear	10,05	12284460476	16	1,25	0-N-N-N

Source: Calculated from UN Comtrade Data (2020).

The lack of export competitiveness of these sectors may justify their importation as necessary raw materials for South Africa. However, there are products in the list that have the capability to be produced locally. Opportunity for localisation can be identified in those subsectors where such imports have grown, for example "fur skins, tanned or dressed, excluding those of 8483" which have increased by 25%.

5.6 Macroeconomic Binding Constraints across South African Manufacturing Subsectors

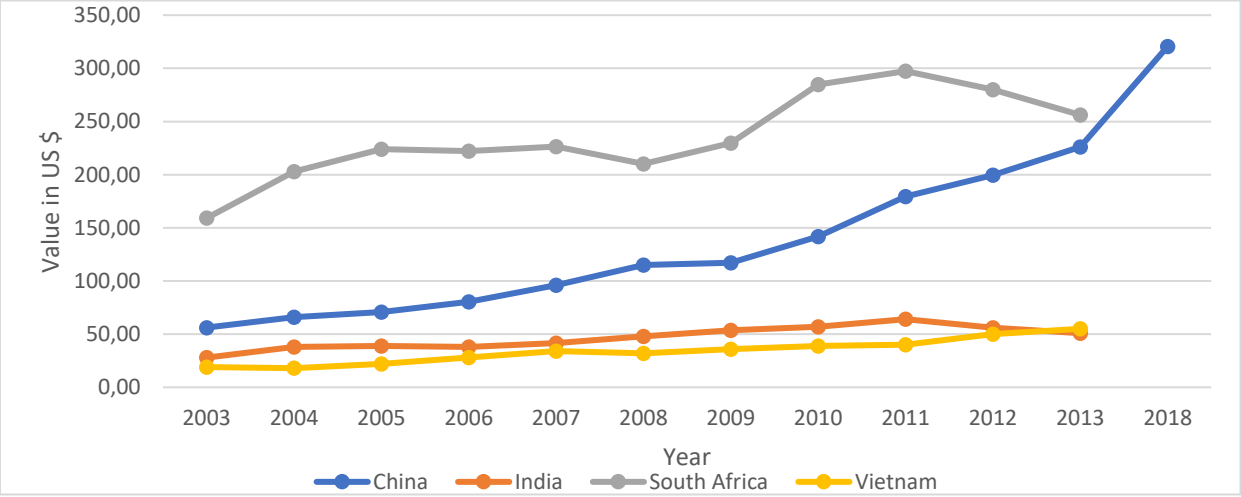
To surmount the initial challenges of manufacturing growth and be able to harness latent comparative advantage into a current competitive advantage, policymakers must implement efficient manufacturing sector policies in conjunction with private enterprises. After identifying the benchmark countries, it is important to look at when and to where industries in these countries choose to move their manufacturing plants (Xu, 2019). Some of the factors that have been cited by benchmark countries as important for comparative advantage in manufactured exports are discussed below with reference or comparison to South Africa.

5.6.1 Labour

Globalisation has increased trade between economies, this has brought into focus the increased importance of trade competitiveness between countries. The international mobility of the factors of production and technology has resulted in manufacturing technology being increasingly shared throughout the world. The differences in the cost of labour will therefore be the decisive factor influencing the competitiveness of goods manufactured from those similar technologies (OECD, 2007). Labour costs have been one of the important aspects of global manufacturing focus. Low labour cost countries have taken a sizable share of labour-intensive sectors. The share of manufacturing has therefore increased in many low-cost countries because of attractive labour costs. The more expensive labour cost countries, however, still undertake robust manufacturing due to their higher productivity or output per unit of labour cost. The higher productivity in these countries is driven by higher capabilities and skills, hence reduced costs.

Lack of skills is among the obstacles restricting South Africa's industrial sector's ability to compete. DTI (2018b) indicates that in South Africa, there is one engineer for every 3,200 people, which is a lower ratio than China's 1:130, Australia's 1:450, and Europe's 1:270. Owing to the inadequate state of public education, it has become challenging to find skilled labour. Technical and professional positions are hard to fill despite a steadily increasing unemployment rate. According to the Global Competitiveness Report 2017–18, South Africa is positioned 114th out of 138 nations on the basis of the quality of its educational institutions. Although the ranking is worrying, it represents an improvement from the 138th place out of 138 countries in the 2016–2017 rankings. The rankings for "math and science education" and "availability of scientists and engineers," was 128 and 100, respectively, in 2017, which is up from an alarming 138 and 112 out of 138 countries ranked in 2016. However, in terms of "availability of current technology," South Africa was ranked number 45 out of 137 nations in 2017, highlighting the sector's potential to boost the country's manufacturing competitiveness.

Figure 5.1: Statutory nominal gross monthly minimum wage for China, India, Vietnam and South Africa from 1998-2013 (U.S. dollars).



Source: International labour Organisation (2020).

Figure 5.1 above shows the statutory nominal gross monthly minimum wage for China, India, Vietnam, and South Africa from 2003-2013 in U.S. dollars. The data reveals that the minimum legislated wage for South Africa has consistently been higher compared with its competitors. In 2013 the minimum legislated monthly wage for South Africa (US$256) was 5 times higher than that of India (US$51) and Vietnam (US$55) and was marginally higher than China (US$226)

(International labour Organisation, 2020). Golub (2000) states labour prices in South Africa are competitive in comparison to developed countries, however they are comparatively expensive in comparison to the majority of developing nations, especially the nation's benchmark competitors (China, India and Vietnam). The challenge facing South African firms in assuming the competitiveness of sectors facing declining NRCA in benchmark countries is to develop strategies for competing with companies in countries like Cambodia, Bangladesh, the Lao People's Democratic Republic, and Nepal, which have significant populations of unskilled labour and relatively low labour costs.

A significant labour population of 57.5 million workers and cheaper labour costs are some of the key factors which have led to Vietnam's economic development, according to Morrison (2019). Vietnamese production employees earn approximately US$216 monthly, which is half of what Chinese labourers make (Maini, 2019). Sincavage et al. (2010) identifies India as a potential world manufacturing giant due to its low labour cost and large population. On the other hand, Rankin (2018), claims that over the first twenty years after 1994, labour productivity increased significantly in the manufacturing sector. Given the lack of skilled labour in the nation, skilled labour in turn demands high wages. In addition, collective bargaining raises salaries for union members, and living expenses are high. Therefore, wages must be over a specific threshold to attract workers. Rankin (2018) contends that reduced employment possibilities for lowly-skilled and low-productivity individuals, particularly in smaller firms, appear to be the cause of the productivity growth. This is concerning because the majority of South Africa's unemployed are low-skilled workers, and the country needs to produce more of these kinds of jobs to significantly lower its unemployment rate.

In the worldwide marketplaces for labour-intensive industrial products, the ability of companies in China's coastal regions to outperform its competitors in low-income nations in terms of cost and quality is dwindling. As the job market takes up China's substantial number of unskilled employees and wages increase quickly, coastal exporting manufacturers in China risk getting pushed out of the international markets for an increasing range of labour-intensive manufactured goods. A portion of the output that was displaced has moved to China's interior areas. Although their infrastructure and distribution network agreements do not equal the optimum environment

provided by coastal areas of China, new production centres are emerging in Cambodia and Bangladesh where wages are lower (Dinh et al., 2013).

Dinh et al. (2013) identify China's attempts to restrain the currency's upward movement to have fuelled inflation, that is in turn motivating requests for salary increases and hastening the loss of economic advantage in the labour-intensive industry, this presents an opportunity for other low-wage countries, if they can figure out how to compete. However, Rankin (2018), states that The low percentage of unskilled labour-intensive exports in the country's overall exports indicates that South Africa is not effectively leveraging the comparative advantage that comes with a plentiful labour supply. Low income Asian, Middle Eastern, and North African nations may present serious competition to South Africa for the newly available export market. Xu and Hager (2017) and Lin (2012) state that China's competitiveness in exporting labour-intensive products will continually erode as a result of rising wages and stricter enforcement of labour regulations. They forecast that 85 million industrial jobs can be transferred to new production sites. There is possibility for South Africa to capture a portion of this outgoing production facilities. Xu and Hager (2017) are of the view that intermediate manufactured products are frequently labour-intensive and are hence under the most strain from increasing labour costs. Furthermore, labour-intensive sectors frequently need low or simple skill sets, even for reasonably advanced goods.

5.6.2 Electricity

Power supply systems and other quality infrastructure are necessary for the industrial sector. A competitively priced and reliable power supply is therefore vital for manufacturing competitiveness as energy forms a significant input in production costs. This is corroborated by Eskom (2017), which noted that although the manufacturing and mining industries' share of the country's GDP decreased from 31% in 1995 to 21% in 2015, the two accounted for roughly 60% of South Africa's electricity consumption. Efficient power supply is needed to prevent interruptions in production. Electrical outages result in a reduction in revenue, idle time and capacity, material wastage, damage to machinery, additional servicing and repair expenses, and an ultimate rise in manufacturing costs (Costa, 2006).

Electricity's significance for South Africa and its impact on production is underscored by Xu and Hager (2017), who posit that the frequent load shedding and power outages are reported as being

a current strain on manufacturing in South Africa. The World Bank (2022) enterprise surveys records South Africa as having experienced an average of 7.7 power outages per month during the year 2020 and that the affected firms lost an average of 5,5% of value of total annual sales due to electrical outages for that year. None of the three benchmark countries have recorded power outages for the same comparable period.

According to Eskom (2017), the South African government permitted energy costs to decrease gradually following substantial investments in power production in the 1970s and 1980s. The real average cost of electricity decreased by more than 40% between 1978 and 2004. However, from 2008, prices started on an upward trend. Real electricity prices increased by 114% between 2008 and 2013. Real average prices were determined by dividing the sum of inflation adjusted revenue collected by Eskom by the overall amount of kWh generated for the time period (Eskom, 2017).

Table 5.18: Price of electricity (US cents per kWh) for Vietnam, South Africa, India and China from 2015 to 2020

	2015	2016	2017	2018	2019	2020
Vietnam	12	11.6	11.6	12	12.3	12.5
South Africa	9.9	9.3	15.4	15.1	14.8	16.1
India	22.9	22	20.6	17.6	17	18.2
China	14.3	14.5	14.3	15.4	15.5	14.6

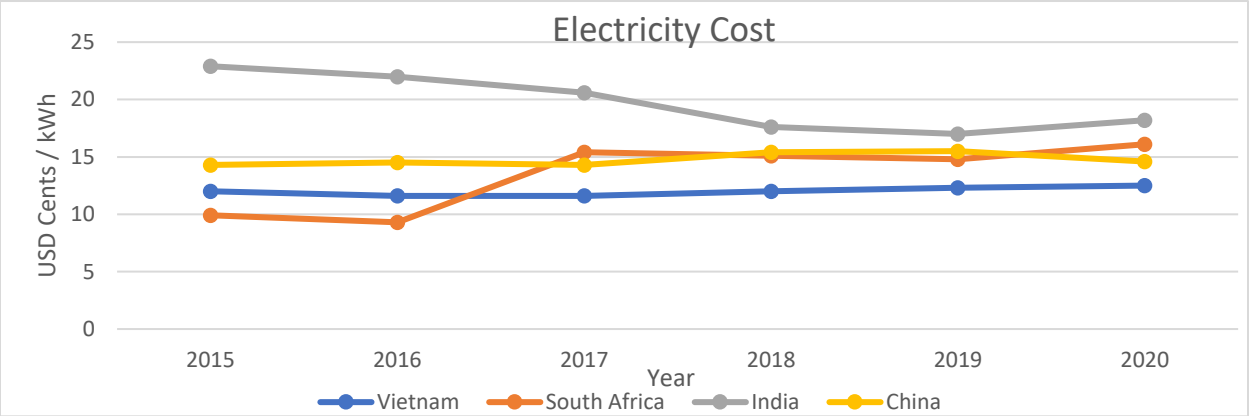
Source: World Bank Group, Doing Business Project (2023c)

Table 5.18 above and Figure 5.2 below show the price of electricity (US cents per kWh) for South Africa, India, Vietnam and China from 2015 to 2020. The World Bank (2023c) notes that as of 2018, electricity costs for South Africa were the second highest at 15.1 US cents per kilowatt hour, while costs in India, China and Vietnam were 17.6, 15.4 and 12 US cents per kilowatt hour respectively. Figure 5.2, however, shows that South Africa had the lowest electricity costs prior to 2017, which suggests that other constraining factors may have limited the improvement of manufacturing competitiveness. Data from the International Energy Agency[12] corroborates that

[12] The International Energy Agency compares the industrial electricity rates in 30 to 33 developed and developing countries that are OECD members.

Eskom continued to have the least industrial electricity rates among the 30 nations examined in 2014.

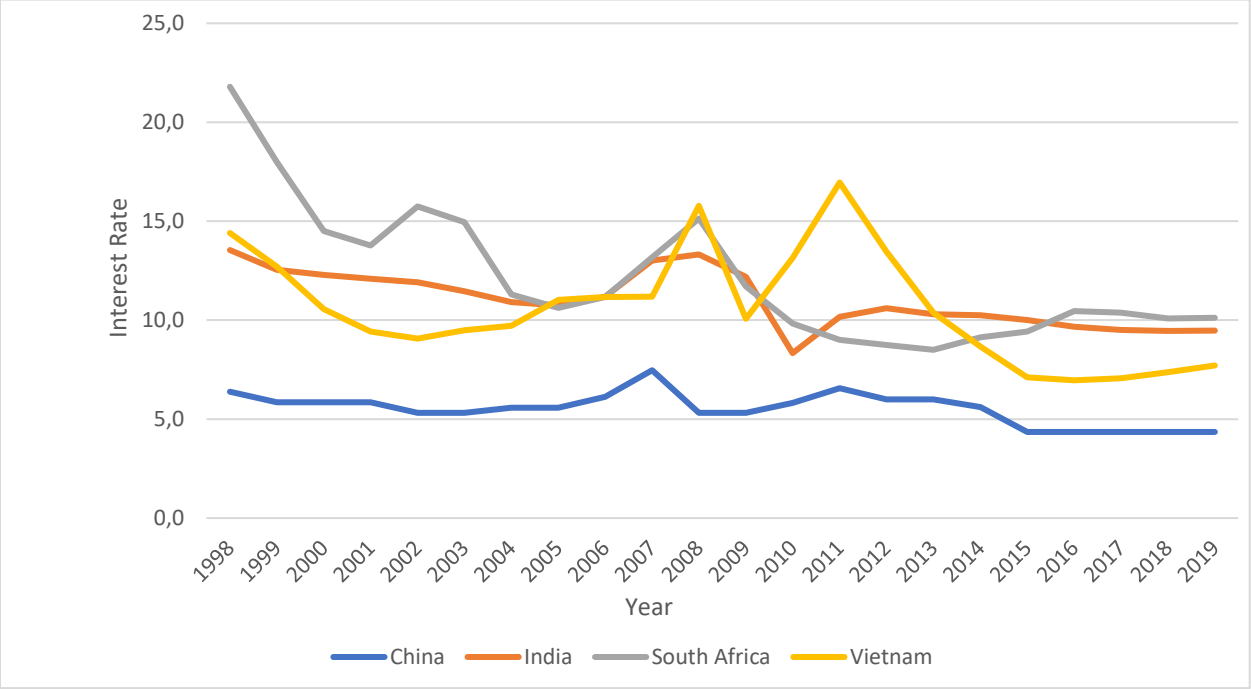
Figure 5.2: Price of electricity (US cents per kWh) for Vietnam, South Africa, India and China from 2015 to 2020



Source: World Bank Group, Doing Business project (2023c)

5.6.3 Interest Rates

Figure 5.3: Lending interest rates (%) for Vietnam, India, China and South Africa from 1998-2018



Source: Analysis from World Bank Data (2020h)

The cost and availability of capital is considered one of the major factors needed for manufacturing and capital's relative availability and cost between countries is considered to be a major determinant of manufacturing competitiveness, especially for highly capital-intensive manufacturing sectors such as those of the high technology industry. Rankin (2013) indicates that the capital intensity of exporters is comparatively higher than that of non-exporters as echoed by exporters' higher output per worker since there is more capital equipment per worker. The cost of capital is measured by real interest rates. Bank lending often satisfies the financing requirements of the manufacturers.

Figure 5.3 above shows that much has been done in lowering real interest rates in South Africa since 1998 when it was 21.8% and the highest amongst the benchmark countries. At the time China, Vietnam and India had real interest rates of 6.4%; 14.4%t and 13.5%. South Africa's real interest rate has decreased to 10.1% as at 2019 representing a reduction in the cost of borrowing for manufacturers compared to the beginning of the study in 1998. However, the rate has also been decreasing for benchmark countries such that South Africa still had the highest real interest rate compared to China, Vietnam and India's rates which were 4.4%; 7.7%; and 9.5% in 2019.

5.7 Conclusion

This section presents the conclusion to the results. A total of 24 manufacturing subsectors are identified from the benchmark countries for a new South African production focus. Ten of these 24 potential subsectors are in the "agro-based" and "other" resource-based manufactures subcategory. Nine are in the low technology manufactures of (textile, garment, and footwear) and (other products) subcategories. Three of the 24 potential subsectors are in the medium technology manufacturing process subcategory and two are in the high technology manufacturing subcategory. To scale up those subsectors where South Africa exhibits fast export growth potential through gaining competitiveness in the export market, a total of 37 of the 199 South African manufacturing subsectors were found to be competitive as at 2018 and are forecast to remain competitive in the next five years (2019 to 2023). Resource-based manufacturing subsectors make up 59% (22 of the 37) of these subsectors. In addition, by 2018, there were 15 uncompetitive manufacturing subsectors, but their NRCA has been increasing such that they are forecast to attain competitiveness within the next five years (2019 to 2023).

In terms of the labour-intensive manufactured imports that can be produced in South Africa, the study found a general increase in imports of natural resource manufactures of the 33 SITC subsectors identified as "labour-intensive and resource-intensive manufactures" by the UNCTAD. For the years 2000 to 2018 there were 25 of 33 subsectors which did not show any export competitiveness and are not forecast to gain competitiveness. However, the remaining eight subsectors that have in one or more years gained comparative advantage during the years of study, three were competitive as at 2018 and of these three, two were projected to maintain the competitiveness until 2023. The lack of export competitiveness of these sectors may justify their imports as necessary raw materials for South Africa. However, there exists within the list, products which South Africa has the capability to produce locally. The manufacturing subsectors identified as potential focus areas face various challenges, at the macro-economic level, costs of labour, electricity and interest rates were compared for South Africa and its benchmark countries. The study's findings and recommendations are discussed further in chapter six below.

Chapter Six: Conclusion and Recommendations

6.1 Conclusion of Study

The chapter presents a conclusion to the study and proffers recommendations with a possibility to be used to grow South Africa's manufacturing exports. A number of measures are presented that point to the poor performance of the manufacturing sector. Exports from the sector have not grown fast enough to match world export growth nor population growth. The result is a decrease in South Africa's share of world exports, a trade deficit for the sector, a decrease in manufactured exports per capita and a drop in the contribution of manufacturing to employment and GDP. A number of constraining factors are identified for specific manufacturing subsectors. Factors identified as affecting the manufacturing sector as a whole include the availability and cost of electricity, rail and port capacity and costs, costs of labour and raw materials and various factors grouped under policy environment. According to Viviers et al. (2014), creating and actioning successful export marketing strategies is another challenge constraining South Africa. Bell et al. (2021) add that South African economic policy has failed to refocus manufacturers towards industrialisation. According to the World Bank (2014), South Africa's minimal diversification in the manufacture of value-added products, has meant that export growth has not lived up to the country's potential.

The importance of South African manufacturing and its exports to the economy is highlighted in that the sector is noted as a source of foreign currency through exports, possessing multiplier effects to the economy and a source of employment. In that regard, to arrest the poor performance of the sector and direct it to a growth path, various government initiatives and support programmes have been enacted to help grow the sector. The measures include financing, policy considerations to meet the needs of manufacturers, provision of infrastructure and its pricing. The effect of the support programmes has been inconclusive, some researchers argue that the interventions did not achieve much as the sector is underperforming, however other researchers argue that in the absence of these interventions the manufacturing sector performance would have been worse off.

Understanding where South Africa has gained, or lost export competitiveness is important for efficient policy formulation for the manufacturing sector. In the face of the above, the study sought to answer the following questions. How has South Africa's manufacturing sector and its exports performed over the years, what should South Africa focus on producing in order to grow its

manufacturing sector exports and what are the major binding constraints holding back South Africa's manufacturing sector exports and what can be done to alleviate the constraining factors. The goal was to identify South Africa's manufacturing sector export potential using the Growth Identification and Facilitation Framework (GIFF). The GIFF was identified as the best method to answer the questions holistically. UNIDO (2016) in justifying the use of the Growth Identification and Facilitation Framework (GIFF), presented that it is vital for policy formulation to estimate where a country aims to be in future. By aiming too high, South Africa can have unrealistic expectations not supported by its endowments, but setting targets too low also can deter the country from achieving its maximum potential. UNIDO (2016) states that the GIFF facilitates a pathway that maximises the efficiency of choosing the optimum industries to focus on.

This study, therefore, sought to assist in the ideals of the manufacturing sector's export growth for South Africa. In addition, countries are increasingly moving towards import substitution, and diversification of their economies. It is therefore important that South Africa keeps abreast of all these changes and how they affect its exports. Lall (2000), emphasizes that in a world moving towards free trade, achieving export growth has taken a more prominent role in economic performance than before. There is therefore a need to study ways of improving manufactured exports in the face of the above changes. By using the GIFF to analyse the distinctions among advanced and emerging economies, this study revealed those products with the potential to grow exports for South Africa. This is done by proposing an industrial development path that follows the steps of the benchmark countries and then adopting those subsectors in which benchmark countries have lost competitiveness.

Identification and utilisation of its manufacturing sector export potential with as many potential export markets as possible through identification of new export market potentials or intensification of existing ones, has potential to help policy makers and manufacturing firms understand how to better compete and likely improve South Africa's manufacturing sector exports, assisting South African firms to move towards manufacturing competitive products in a trade environment devoid of protection or preferential trade treaties.

The study finds that the number of manufacturing subsectors in the categories in which Vietnam, India and China lost competitiveness decreased as the categories advance from natural resource intensive manufactured goods to high technological product categories. Thus, there seems to be a

trend of the benchmark countries shifting from poorly skilled labour-intensive goods towards high skill - capital intensive goods. The study also found that, until 2013, the minimum legislated wage for South Africa has consistently been higher than its benchmark countries. However, as at 2018 Chinese labour costs have overtaken South Africa's labour costs, which now represents an opportunity for South Africa to attract labour-intensive manufacturing. From 2018, the electricity costs for South Africa were the second highest although prior to 2017 South Africa had the lowest electricity costs. This suggests that other constraining factors may have limited the improvement of manufacturing competitiveness. South Africa's real interest rate has decreased to 10.1% as at 2019 representing a reduction in the cost of borrowing for manufacturers compared to the beginning of the study in 1998. However, South Africa still has the highest real interest rate and remains outcompeted by its benchmark countries since China's, Vietnam's and India's rates were 4.4%; 7.7%; and 9.5% respectively in 2019.

When shifts in comparative advantage occur, firms in benchmark countries are inclined to migrate to sites that will continue to deliver competitive conditions. South Africa is therefore presented with the opportunity to trail China, India, and Vietnam's current sunset industries as they have potential to be South Africa's sunrise industries and thus improve manufactured exports and create employment for a sizable percentage of South Africa's workforce. Rising wages in the benchmark countries present the opportunity for labour-intensive firms to seek new, low-cost production locations. South Africa can benefit from this by increasing its integration in global value chains.

The state through its developmental plans, the National Industrial Policy Framework (NIPF) as enunciated by its Industrial Policy Action Plans (IPAPs 1 to 9) together with the National Development Plan NDP-2030 (2011) all affirm the need for more labour-absorbing growth to create employment for an unemployed and poorly skilled workforce (IPAP, 2018). South Africa will have to gain sustainable competitive advantage in more labour-intensive products if it wants to transition to a growth path that will absorb a significant proportion of its labour force. The required production factors for a thriving industrial sector are present in South Africa, including a competitiveness in a low-cost labour force and ample natural resources to make up for the country's lower labour productivity relative to its rivals. The study concludes with various recommendations with the potential to assist South Africa towards its ideals of manufacturing sector performance and export growth from the sector.

6.2 Recommendations for the General South African Manufacturing Sector

Trade competitiveness is increasingly taking on a holistic approach of not only managing imports and exports but also about international capital movements, investments, innovation and competitive services. It considers government decisions on revenue collection and expenditure, quality of policy formulation and strength of institutions. World trade is increasingly being dynamic in nature due to changes in factors of production, technology, financial sector e.g. exchange rates, improvements in economies, geo-political alliances, bipartite negotiations and increased trade in intellectual property.

Vietnamese, Indian, and Chinese manufacturers are rapidly expanding their manufactured exports and improving the quality of those exports, switching from low-tech, labour-intensive, and low-skill products to high-tech, high-skill ones (National Advisory Council on Innovation, 2003). The common factors identified as having led to India, Vietnam and China's rise in manufacturing competitiveness in world trade is a reform process that sought to change the approach of government intervention in markets. The factors include decentralisation of economic decisions, elimination of price controls, adoption of free markets across various support sectors, trade liberalisation, reforms to attract FDI, SEZs, research and technological advancement, incentives to the sector, selective government policies, superior infrastructure, well-developed provision of technical and tertiary education and quality human capital. (Costa et al., 2006; Harris et al., 2007; Trinh, 2010; Nguyen Thi Tue Anh et al., 2012; Xu & Hager, 2017; Doanh, 2018).

South Africa should keep abreast of factors through policies and actions that improve the business environment. This entails influencing its production costs and striving to keep them competitive with world developments. For South African manufactured products to maintain or improve their competitiveness in world trade, policies must be regularly appraised and altered to improve their implementation. Therefore, South Africa's developmental strategy, encompassing economics, trade, financial, and tax policies must conform with determinants of global trade to accomplish manufacturing sector competitiveness. To do this, South Africa needs to identify and understand the strengths, weaknesses, opportunities, and threats (SWOT) to its manufacturing sector and its exports. Recommendations that can be taken up by the South African manufacturing subsectors to help improve their export competitiveness are presented below.

(a) Trade Policy

- South Africa is limited in enacting protectionist trade policies due to its commitments to trade agreements. In that regard, South Africa can raise import duty to the maximum allowable by its trade agreements for those sectors undergoing intense competition from cheaper imports. The protection of identified sectors should be time bound and done in conjunction with improved enforcement against the smuggling of imports, imports sold informally and or do not adhere to national manufacturing and material standards. Government can in conjunction with the above enhance quality control standards to prevent low quality imports.
- Edwards (2020) urges a cautious response to the increase in tariffs as he found that over 50% of exporting South African manufacturing firms also import intermediate inputs and that the percentage increases if indirect imports are included. Edwards (2020) urges care in the utilisation of tariff and non-tariff import barriers as this may hinder export growth if used with no regard to imports which are inputs for manufactured exports. Increases in tariffs should therefore be done while considering the need to acquire raw materials but at the same time promoting local production and improving its competitiveness. The resulting relatively higher prices faced by the downstream import users can be offset by subsidies. Pricing of products for the local market should be conscious of the need to keep the downstream industries competitive
- Government can also levy export duties on non-value-added exports. This should be met with the required investment in local processing capacity.

(b) Trade Facilitation Measures

- The competitive reach of export promotion councils and export organisations can be strengthened. These organisations aid the coordination of trade programmes, such as trade facilitation, certifications, processing times, enhancing export market access, as well as the mobilisation of financing to aid in export promotion. Trade commissions can improve support to manufacturers with the goal to improve efficiency in processes and systems, for example, support to meet quality and or regulatory requirements and testing to meet global standards
- Government can work with competition commissions to establish methodologies for the pricing to increase competition amongst producers and reduce instances of collusion. Competition breeds innovation which in turn increases competitiveness.

- Firm aggregation models can be impressed upon the small-scale manufacturers in order that they can gain economies of scale needed to export. This entails offering such incentives as manufacturing and warehousing space, government leading in agglomeration both permanently or short term for purposes of meeting orders, obtaining advanced technologies at affordable prices, receiving export financing and export insurance. Export finance and export insurance state guarantees have worked effectively in promoting exports in some of the benchmark countries where they have been used.

(c) Infrastructure

- For competitive exports to be supported, accompanying infrastructure must be developed and serviced e.g., train and road networks, docks, seaports, water and power provision, manufacturing and warehousing facilities, marketplaces, quality educational institutions, and efficient communications networks.
- South Africa has to keep progressing forward with measures to expedite improvement in public works such as rail, road and ports as they are significant in trade. Pricing of these services should bear in mind the need to match or surpass competitiveness of South Africa's benchmark countries. Pricing can be preferential and differentiated according to the extent of the challenges constraining the identified manufacturing subsectors.

(d) Research and Technology

- South Africa can continue to take steps to upgrade its manufacturing technology to the most modern technologies that meet world standards and improve comparative advantage of the sector. Modernisation reduces costs, helps diversify products and improves productivity and quality for the export market.
- Manufacturers can be incentivised to modernise to cost effective and higher efficiency modern technology. This can be achieved through government support in sourcing and allowing duty free importation of modern capital equipment, tax breaks, and subsidies especially for capital-intensive technologies.
- Government can assist export growth through increased translation of research into practice. Strengthening partnerships between government, industry and academia can benefit the

manufacturing sector through fostering its adoption of modern technologies and diversification of its products.

(e) Sectoral Policies

- Factor endowments are, by themself, inadequate for attaining manufacturing competitiveness in international trade. Business operating environments play a critical role in accomplishing this success. Government carries the responsibility for creating an enabling environment that promotes competitiveness.
- Government can be sector focused and be targeted in improving efficiency in administrative support to manufacturers through improving processes, regulations, licences, skills training etc. Each sector according to its need.

6.3 Recommendations for the South African Major Binding Constraints Analysed

Recommendations are presented below to improve the factors identified as major binding constrains for the South African manufacturing sector. The study recommends the need for South Africa to improve the quality and policies governing exports, working on the competitiveness of interest rates, labour, and electricity costs (amongst other factors) to address constraints that have taken away the competitiveness of or to safeguard and strengthen elements that have played a part in South Africa's competitive subsectors.

(a) Recommendations on Labour

- It is increasingly difficult to compete for manufacturing FDI with competitor countries, most of whom are improving labour-related efficiencies as a competitive advantage. More stringent labour laws may make manufacturing less competitive due to increased overheads. South Africa can reduce rigidity in its hiring and firing legislation to surpass that of its competitors especially for cyclical or seasonal manufacturing, this will reduce redundant costs during off peak periods.
- Trust-based engagement between government, labour and industry will raise the manufacturing sector's level of competition. Improved flexibility in labour laws presents areas of agreement for government, business, and labour to concur on the balance between wages,

job creation and the need to improve the manufacturing sector's competitiveness. In that regard, control of administered prices such as the minimum wage needs to continuously consider the competitiveness of the manufacturing sector. Current employment tax incentives can be directed at the most labour-intensive exporting firms.

- South Africa can work to improve the quality of labour to gain from loss of competitiveness in benchmark countries. Human capital forms an important factor in this sector. Investment in primary and tertiary education has been determined to be vital in the promotion of economic development and exports and this can be done in conjunction with policies to limit brain drain by attracting and retaining innovative and talented individuals. During this process South Africa can work towards aligning its human resources to address the mismatch of its skills demand against supply.

(b) Recommendations on Electricity

The current uncertainty of electricity supply increases costs through a firm's investment in the infrastructure to switch to alternative power sources.

- The South African government could strive for production of low-cost green electricity, as this is a significant factor in the competitiveness of the industry and is in line with the global decarbonisation goals of climate change. This can be achieved through incentive-based policies for undertaking hydro, wind, and solar electricity generation by the industry. Part of the success in China's energy programme is that incentives were offered to facilitate importation of electrical generation technology that had not yet taken root in its existing electricity production technology.
- South Africa needs to continue its efforts in reducing power cuts and by improving alternative methods of acquiring and distributing electricity. Modalities for independent power producers for a firm's use and/or selling to the national grid need to be expedited. Green energy sources of solar, wind, hydro and biogas can be better promoted at government level through various incentives, for example, duty free importation of products needed for this goal.
- The Indian government, one of South Africa's benchmark countries, is strengthening its infrastructure through special economic zones. This follows China's lead in creating preferential access to transportation and the electricity grid as a means of increasing investment in manufacturing. Vietnam has also followed the same steps. South Africa's capacity to

improve infrastructure in and polices governing SEZs should maintain and maximise infrastructure benefits and policies governing the Special Economic Zones (SEZs) to outcompete countries competing for the same Foreign Direct Investment using SEZs.

- For a country to be an attractive investment destination, the production costs should be at least equivalent to, or less than, the overall manufacturing costs in the nation of origin, including some room for added risk incurred in the investment transfer. The infrastructure in the proposed location such as electricity and transport must also meet or exceed minimum standards for production.
- Government can enhance power saving initiatives through promoting energy efficient systems. This will reduce demand and alleviate pressure on electricity demand.

(c) Recommendations on Cost of Capital

- South African manufacturing competes with countries providing relatively more incentives that range from financial, tax, regulatory and funding benefits. For example, benchmark countries have made it a point to provide capital funding at affordable interest rates to their manufacturers. South Africa's interventions through industrial and fiscal policies, therefore, can be enhanced through improving the funding programmes for manufacturers. Preferential credit lines can be purposely made more competitive than those of benchmark countries for South African sectors identified as having export potential.
- Equity investment into some of the struggling firms can be done by government if constraints affecting the sector are anticipated to be surmounted, thus ensuring their viability and sustainability. Investment has to be done with due regard to their long-term sustainability. This is to prevent unnecessary pressure on the fiscus through investment in firms that will close down ultimately.
- For those products hampered by capital constraints for local manufacture, regulations on entry and exit of FDI need to be continually reviewed to increase FDI inflows and entry of new firms. By exposing its domestic markets to foreign competition, South Africa will encourage the entry of new, relatively efficient companies and therefore impose costs on prevailing high markups if any. This will also incentivise exports by reducing returns obtained from local markets. Increased competition inspires innovation and helps companies adapt by attaining the competitiveness needed to enter and survive global markets.

- Foreign Direct Investment empowers countries like South Africa to spur industries possessing latent comparative advantage, thus making the country better able to take up new opportunities that arise in world trade. The sunset industries relocating from emerging markets offer an opportunity for countries to attract investment from these benchmark countries and in the process develop them as their sunrise industries.

6.4 Areas for Further Research

While a stable macro-economic environment, supportive polices, judicial and institutional environments is a basis for the promotion of South African manufacturing subsectors with latent comparative advantage, there is also need to adequately identify the needs, risks, potential and costs of the subsectors such as labour costs and legislation. The approaches to mitigate the risks form part of the crucial factors that investors look out for (UNIDO, 2016). To complement trade data analysis, Lin and Xu (2016) advise that surveys at firm-level be undertaken to further analyse the limitations along the supply chain at the level of the product. The UNIDO (2016) advise that conversations with think tanks, industry executives, ministries, and the financial sector are further undertaken for insight on the subsectors South Africa might target for adoption. All such information assists in gaining the multi-faceted perspectives for decision making.

List of References

Anand, R., Perrelli, R. & Zhang, B. (2016). South Africa's Exports Performance: Any Role for Structural Factors: International Monetary Fund African Department and Strategy, Policy, and Review Department. Working Paper WP/16/24.

Balchin, N. Gelb, S. Kennan, J. Martin, H. Willem te Velde, D. and Williams, C. (2016). Developing Export-Based Manufacturing in Sub-Saharan Africa. Supporting Economic Transformation- UK Department for International Development.

Ballard, R. (2002). Exporting and Upgrading in South African Leather Industries. Industrial Restructuring Project. School of Development Studies - Research Report no. 55. University of Natal.

Bathathu, P. and Zimbini, C, (2017). Trade Performance and the Competitiveness of South Africa's Citrus fruits Exports to Netherlands. Conference Paper. 2nd Annual Economic Research Advisory Network – ERAN, 2017 Conference.

Bebeky, U. G. (2011). Robustness of the Proposed Measures of Revealed Comparative Advantage, School of Economics Discussion Papers No. 1121, University of Kent School of Economics, Canterbury

Bell, J.F., Goga, S. and Robb, N. (2021). Emerging issues for industrial policy in South Africa. The Centre for Competition, Regulation and Economic Development, Working Paper 2021/06. July 2021. School of Economics at the University of Johannesburg's College of Business and Economics.

Benedictis, L. and Tamberi, M. (2001). A Note on the Balassa Index of Comparative Advantage, Unpublished.

Bhorat, H. and Rooney, C. (2017). State of Manufacturing in South Africa. University of Cape Town Development Policy Research Unit Working Paper 201702. Unpublished.

Bielik, P. Luboš, S. Horská, E. Maitah, M. (2011). Analysis of the Mutual Trade between the EU and Indonesia. Jurnal Ilmiah Ekonomi Bisnis, Vol 16, No 1 (2011). Available from:< https://ejournal.gunadarma.ac.id/index.php/ekbis/article/view/495 > [Accessed 12 May 2020]

Black, A., Craig, S., and Dunne, P. (2016). Capital intensity, industrial policy and employment in the South African manufacturing sector. Research Project on Employment, Income Distribution and Inclusive Growth, REDI3x3 Working paper 23 November 2016.

Blankley, W. and Booyens, I. (2010). Building a knowledge economy in South Africa. *South African Journal of Science*. 106. (11/12), Article No" 373

Bowen, H., Leamer, E., and Sveikauskas, L. (1987). Multicountry, Multifactor Tests of the Factor Abundance Theory. The American Economic Review, 77(5), 791-809.
Available from:< http://www.jstor.org/stable/1810209> [Accessed October 12, 2020

Brakman, S and Van Marrewijk, C. (2016). A Closer Look at Revealed Comparative Advantage: Gross-Versus Value-Added Trade Flows. Papers in Regional Science, Volume 96 Number 1.

Camel, R. (2018). The Impact of Manufacturing and Its Sub-Sectors on GDP and Employment in South Africa: A Time-Series Analysis. Master of Commerce in Economics. North-West University Vaal Triangle Campus.

Chinembiri, E. (2015). An analysis of South African exports to the United States under the African Growth Opportunity Act. University of Cape Town.

Costa, P., Guntupalli, M., Rana, V. and Trieu, H. (2006). China and India: A Comparative Study of the Manufacturing and Services Industries. Prepared for the International Economic Development Program, Ford School of Public Policy, University of Michigan

Deb, K. & Basu, P. (2012). Consistency of the Revealed Comparative Advantage Indices with the Heckscher-Ohlin Theory. Conference papers, Knowledge Globalization Institute, Pune, India, 2012.

Deb, K. and Sengupta, B. (2017). On Empirical Distribution of RCA Indices, Indian Institute of Management Kozhikode, IIM Kozhikode Society & Management Review (2017) 6(1) 23–41. SAGE Publications

Deloitte for the Department of Trade and Industry. (2018). A Review of South Africa's Trade and Investment Relationship with BRIC. The BRICS Business Forum, 10th BRICS Summit. Johannesburg.

Dlikilili, X. (2018), An analysis of the competitive performance of the South African citrus industry. Stellenbosch University

Dinh, H. T. and Monga, C. (2013). Light Manufacturing in Tanzania: A Reform Agenda for Job Creation and Prosperity. Directions in Development. Washington DC: World Bank.

Doanh, L. D. (2018). Industrialization for Inclusive Development in Tanzania: Reform and Industrialization in Vietnam. Economic Society of Tanzania Annual Congress. Dar es Salaam

Draper, P., Engel, J., Krogman, H., Ngarachu, A. And Wentworth. L. (2018). Gatekeeper and Gateway: Taking Advantage of Global Value Chains by addressing barriers to South Africa's trade competitiveness. Macroeconomics, Trade, and Investment - Global Practice of the World Bank. Discussion Paper - MTI Global Practice. The International Bank for Reconstruction and Development / The World Bank. No. 7

Edwards, L. (2020). Exports, Growth and Employment in South Africa. CBPEP Colloquium 2020 Panel 2: Microeconomic Constraints.

Effiong, S. A and Oti, P. A. (2012). Analytical Evaluation of Cost Elements and Their Influence on Productivity of Manufacturing Firms. Journal of Finance and Investment Analysis, Vol.1, No.3, 2012, 171-180. Scienpress Ltd.

Eita, J. H. And Jordaan, A. C. (2007) South Africa Exports of Metal and Articles of Base Metal: A Gravity Model Approach. J.Stud.Econ.Econometrics, 31(3).

Eskom Holdings SOC Ltd. (2017). An Overview of Electricity Consumption and Pricing in South Africa - An Analysis of the Historical Trends and Policies, Key Issues and Outlook in 2017. Report prepared by Deloitte Consulting Pty (Ltd).

Fedderke, J. (2018). 'South African Growth: Context, Cause and Consequence', The Journal of The Helen Suzman Foundation, Issue 82: 5-14.

Flowerday, W., Goddard, J.G., Steenkamp, A. (2017). The Technological Structure and Performance of South African Manufactured Exports, (2010 – 2014). Are South African manufactured goods becoming more sophisticated?. World Bank Working Paper

Goldin, I. (1990). Comparative Advantage: Theory and Application to Developing Country Agriculture, OECD Development Centre. Research Programme On: Changing Comparative Advantage in Food and Agriculture. Working Paper No. 16.

Golub, S.S. (2000). South Africa's International Cost Competitiveness. Trade and Industrial Policy Secretariat - TIPS Working Paper 14_2000. Prepared for the South African Finance Department under USAID/Nathan Associates SEGA Project

Gnidchenko, A.A and Salnikov, V.A. (2015). Net Comparative Advantage Index: Overcoming the Drawbacks of the Existing Indices. National Research University Higher School of Economics Annual Thematic Plan for Basic and Applied Research. Basic Research Program Working Papers Series: Economics WP BRP 119/EC/2015

Grančay, M. and Dudáš, T. (2019). Bilateral Trade Flows and Comparative Advantage: Does the Size Matter?. Society and Economy 41 (2019) 4, pp. 397–413.

Harris, R. G, Robertson P. E. and Wong. M. (2007). Analysing Economy Wide Effects of Trade Liberalisation on Vietnam using a Dynamic Computable General Equilibrium Model. University of New South Wales. School of Economics Discussion Paper: 2007/24.

Hausmann, R. and Klinger, B. (2006). South Africa's Export Predicament. Center for International Development - CID Working Paper No. 129. Harvard University.

Hoang, V. V. Tran, K. T. Tu, B. V. Nguyen, V. N. and Nguyen, A. Q. (2017). Agricultural Competitiveness of Vietnam by the RCA and the NRCA Indices and Consistency of Competitiveness Indices, AGRIS on-line Papers in Economics and Informatics, Vol. 9, No. 4, pp. 53-67.

Hoen, A. R. and Oosterhaven, J. (2006). On the Measurement of Comparative Advantage. Unpublished

Houghton, J, Sheehan, P 2000, *A primer on the knowledge economy*, CSES Working Paper, Centre for Strategic Economic Studies, Victoria University of Technology.

Hummels, D. and Klenow, P. J. (2005). The Variety and Quality of a Nation's Exports. *American Economic Review*. Vol. 95, No. 3, June 2005 (pp. 704-723).

Industrial Development Cooperation. (2014). Trade report; Export opportunities for South Africa in other BRICS economies. Gauteng: Industrial Development Corporation of South Africa Department of Research and Information. South Africa. May 2014

International Labour Organisation. (2020).
Available from:< https://ilostat.ilo.org/topics/labour-costs/ > [Accessed May 2020]

International Trade Centre. (2023). Number of Exported Products. Available from: <https://tradecompetitivenessmap.intracen.org/TP_EP_CI.aspx?RP=710&YR=2016> [Accessed 2023]

Jenkins, R. and Edwards, L. (2012). Chinese Competition and the Restructuring of South African Manufacturing. Research Paper Is Based on the Project Funded by the ESRC Pathfinder Research Projects

Jibrilla, A. (2018). 'Forecasting FDI Inflows from the United States to Nigeria over Ten Years Period', International Journal of Economics and Financial Management Vol. 3 No. 3 2018.

Kaplan, D. (2007). The constraints and institutional challenges facing industrial policy in South Africa: a way forward. Transformation 64 (2007).

Kaplan, D. (2019). South Africa's Industrial Policy: Time for A Review and A Rethink. VIEWPOINTS No 8.

Karmaker, C. L. (2017). Determination of Optimum Smoothing Constant of Single Exponential Smoothing Method: A Case Study. International Journal of Research in Industrial Engineering. Vol. 6, No. 3 (2017) 184–192

Kellman, M., Roxo, T. and Shachmurove, Y. (2003). South Africa's International Competitiveness: A Product Level Analysis. Penn Institute for Economic Research (PIER) Working Paper 03-020. University of Pennsylvania Department of Economics

Kaziboni. L. (2018). The economic performance and competitiveness of manufacturing firms in Johannesburg, South Africa. Southern Africa – Towards Inclusive Economic Development – SA TIED Working Paper 14 | May 2018

Lakshmanan, L., Chinngaihlian, S. and Raj, R. (2007). Competitiveness of India's Manufacturing Sector: An Assessment of Related Issues. Reserve Bank of India Occasional Papers Vol. 28, No. 1, Summer 2007.

Lall, S. (2000). The Technological Structure and Performance of Developing Country Manufactured Exports 1985-1998. QEH Working Paper. Unpublished. QEHWPS44.

Latruffe, L. (2010). Competitiveness, Productivity and Efficiency in the Agricultural and Agri-Food Sectors. OECD, Directorate for Food, Agriculture and Fisheries, OECD Food, Agriculture and Fisheries Working Papers No" 30, OECD Publishing

Laursen, K. (1998). Revealed Comparative Advantage and the Alternatives as Measures of International Specialisation, Danish Research Unit for Industrial Dynamics DRUID, Working Paper No. 98-30

Leishman, D. Menkhaus, D. J. and Whipple D. G. (1999). Revealed Comparative Advantage and the Measurement of International Competitiveness for Agriculture Commodities: An Empirical Analysis of Wool Exporters. Western Agricultural Economics Association Annual Meeting. July 11-13 1999

Lin, J. Y. and Monga, C. (2010). Growth Identification and Facilitation: The Role of the State in the Dynamics of Structural Change. The World Bank. Development Economics. Policy Research Working Paper 5313. WPS5313

Lin, J. Y. and Treichel, V. (2011). Applying the Growth Identification and Facilitation Framework the Case of Nigeria. World Bank. Policy Research Working Paper WPS5776.

Lin, J. Y. (2012). New Structural Economics - A Framework for Rethinking Development and Policy. Washington DC: The World Bank.

Lin, J. Y. (2014). Growth Identification and Facilitation: The New Industrial Policy for Inclusive and Sustainable Industrial Development, National School of Development. Peking University: UNIDO Presentation. Unpublished.

Lin, J. Y. and Xu, J. (2016). Applying the Growth Identification and Facilitation Framework to the Least Developed Countries: The Case of Uganda. New York: United Nations Secretariat Department of Economic and Social Affairs. CDP Background Paper No. 32, ST/ESA/2016/CDP/3.

Maini, T. S. (2019). The US-Vietnam Economic Relationship: Why Beijing Is Watching. FDI Visiting Fellow, Strategic Analysis Paper, Future Directions International. Independent strategic Analysis of Australia's Global Interests

Maqbool, M. S., Rehman, H., Bashir, F. and Ahmad, R. (2019) Investigating Pakistan's Revealed Comparative Advantage and competitiveness in Cotton Sector. Center for Sustainability Research and Consultancy. Review of Economics and Development Studies Vol. 5, No 1, March 2019

Marshall, B (2009), Terms of Trade Effects: Theory and Measurement, Reinsdorf Marshall.Reinsdorf@BEA.gov Revised version of Working Paper 2009-01 October.

Matthee, M., Idsardi, E. and Krugell, W. (2016). 'Can South Africa sustain and diversify its exports?', South African Journal of Economic and Management Sciences, NS19 (2):249-263.

Matthee, M. and Santana-Gallego, M. (2017). 'Identifying the determinants of South Africa's extensive and intensive trade margins: A gravity model approach', *South African Journal of Economic and Management Sciences* 20(1), a1554.

Medarac, H., Moya, J.A. and Somers, J. (2020). Production costs from iron and steel industry in the EU and third countries. Technical report - Joint Research Centre, European Commission, Westerduinweg, Netherlands.

Mlumbi-Peter, X. (2019). Update on South Africa's Trade Agreements. Presentation to the Parliamentary Portfolio Committee on Trade and Industry. International Trade and Economic Development Division 27 February 2019, Department of Trade and Industry

Moenius, J. (2006). Measuring Comparative Advantage: A Ricardian Approach, University of Redlands. California.

Morrison, W. M. (2019). China's Economic Rise: History, Trends, Challenges, and Implications for the United States, Congressional Research Service. CRS report Prepared for members and committees of congress
Available from:< http:// www.crs.gov > [Accessed 10 May 2019

Naude, M.J & O'Neill, C. (2006), Beyond Survival: Challenges Facing South African Automotive Component Exporters

Nguyen Thi Tue Anh, Luu Minh Duc, and Trinh Duc Chieu. (2012). The Evolution of Vietnamese industry. Learning to Compete - Working Paper No 19. Research program of the Africa Growth Initiative at Brookings (AGI), the African Development Bank, (AfDB), and the United Nations University World Institute for Development Economics Research (UNU-WIDER)

Organization for Economic Cooperation and Development – OECD. (2007). Moving Up the Value Chain: Staying Competitive in the Global Economy - Main Findings. The Committee on Industry, Innovation and Entrepreneurship (CIIE). Presentation to the OECD's 2007 Ministerial Council meeting.

Ostertagová, E. and Ostertag, O. (2011). The Simple Exponential Smoothing Model. The 4th International Conference. Modelling Of Mechanical and Mechatronic Systems 2011. Faculty of Mechanical engineering. Technical university of Košice. September 20 – 22, 2011 Herľany. Slovak Republic.

Parliamentary Monitoring Group. (2016). Steel Industry interventions: Minister of Trade and Industry briefing. Trade, Industry and Competition. Chairperson: Ms J Fubbs and Ms E Coleman.

Parliamentary Monitoring Group. (2017). SA Farmers Development Association challenges with sugar industry & Department response. Trade, Industry and Competition. Ms J Fubbs

Patel, M. (2022). Mitigation options for South Africa's petrochemical value chain. Trade & Industrial Policy Strategies (TIPS).

Pillay, K. (2013). Enhancing Manufacturing competitiveness in South Africa. Deloitte Touche Tohmatsu Limited Manufacturing Competitiveness Report. Unpublished.

Pirolo, L., Giustiniano, L. and Nenni, M. L. (2013). The Italian Footwear Industry: An Empirical Analysis. International Journal of Engineering Business Management Special Issue on Innovations in Fashion Industry. 34:2013. Vol. 5.

Quantec EasyData. (2022). South African EasyData Macroeconomic Service [online].
Available from < https://www.quantec.co.za/easydata/api-tools/ > [Accessed May 2022]

Rankin, N. (2013). Exporting and export dynamics among South African firms. South African Institute of International Affairs (SAIIA). Economic Diplomacy Programme. Occasional Paper Number 149.

Rankin, N. (2018). Is the growth of labour productivity in manufacturing a good thing [online].
South Africa: Econ3x3
Available from: < http://www.econ3x3.org/ > [Accessed 10 September 2019]

Rodrik, D. (2006). Understanding South Africa's economic Puzzles. Paper prepared for the Harvard University Center for International Development Project on South Africa. Cambridge:Harvard University John F. Kennedy School of Government.

Sanidas, E. and Shin, Y. (2010). Comparison of Revealed Comparative Advantage Indices with Application to Trade Tendencies of East Asian Countries, Seoul National University. South Korea.

Sharma, K. (2013). India's Export Performance under the WTO Regime, University of Lucknow. India

Siddique, S. N. and Ganguly, S.K. (2019). Critical Success Factors for Manufacturing Industries in India: A Case Study Analysis. International Journal of Applied Engineering Research, Volume 14, Number 8 (2019) pp. 1898-1905. Research India Publications

Sincavage, J.R. Haub, C. and Sharma, O.P. (2010). Labour costs in India's organized manufacturing sector. Monthly Labour Review. May 2010. Manufacturing in India

Small Enterprise Development Agency - SEDA. (2012). Research on the performance of the manufacturing sector. Um Jwali Market Research for SEDA. A member of the South African Department of Trade and Industry.

South Africa. Department of Agriculture, Forestry and Fisheries - Directorate for International Trade and National Agricultural Marketing Council - Market and Economic Research Division (2013). South Africa's Agricultural Trade Competitiveness - Desktop Diagnostics of South Africa's Agricultural Trade Competitiveness. Trade Research Niche Area, Faculty of Economic and Management Sciences, North-West University, Potchefstroom Campus. South Africa.

South African. Department of Agriculture, Forestry and Fisheries. (2016). A profile of the South African Hides, Skins and Leather Market Value Chain. Directorate Marketing

South Africa. Department of Agriculture, Forestry and Fisheries. (2017). Profile Of the South African Tobacco Market Value Chain.

South Africa. Department of Trade and Industry. (2015). Industry Challenges and Opportunities Analysis: Deliverable 3 Ferrous Metals Downstream Sector, Merchantec Research.

South Africa. Department of Trade and Industry. (2017). Facts And Figures on Skills In Manufacturing, Information Brief No. 4. December 2016. Compiled by: Vass JR and Raidani P. Pretoria. South Africa

South Africa. Department of Trade and Industry. (2018). Annual Report 2016/17. Pretoria: Department of Trade and Industry.

South Africa. Department of Trade and Industry. (2018b). Facts And Figures on Skills In Manufacturing, Information Brief No. 5. February 2018. Compiled by: Vass JR and Raidani P. Pretoria. South Africa

South Africa. Department of Trade, Industry and Competition. (2020a). South African R-CTFL Value Chain Master Plan to 2030

South Africa. Department of Trade, Industry and Competition. (2020b). South African Sugar Value Chain Master Plan 2030.

South Africa. Department of Trade, Industry and Competition. (2020c). Master Plan for the Commercial Forestry Sector in South Africa 2020-2025

South Africa. Department of Trade, Industry and Competition. (2021). Masterplan for the South African Furniture Industry

South Africa. Industrial Policy Action Plan – IPAP 2018/2019 – 2020/2021. (2018). Department of Trade and Industry.

South Africa. National Advisory Council on Innovation (NACI). (2003). National Advanced Manufacturing Technology Strategy (AMTS) for South Africa. Volume 1. Minister of Science and Technology

South Africa. National Planning Commission. (2011). National Development Plan 2030. Our Future-make it work. Pretoria: Department of the Presidency.

South Africa. South African Reserve Bank. (2016). The South African situation: Opportunities and challenges, Francois G, Standard Bank Africa Investor Conference, London, 30 June 2016

South African Reserve Bank. (2021). Understanding South Africa's trade policy and performance. Matthew Stern and Yash Ramkolowan. Authorised for distribution by Christopher Loewald. Working Paper Series - WP/20/17.

South African Revenue Service. (2017). Customs External Policy Trade Statistics Effective 13 December 2017. Revision 3. Pretoria: South African Revenue Service.

Statistics South Africa. (2016). South African manufacturing production and the rand - an update. Pretoria: Statistics South Africa.

Statistics South Africa. (2019). [online]. Statistics by theme / Economy
Pretoria: Department of Statistics South Africa.
Available from:< http://www.statssa.gov.za/?page_id=735&id=1> [Accessed 10 May 2019]

Statistics South Africa. (2020). [online]. South African Gross Domestic Product. Pretoria: Department of Statistics South Africa.
Available from:< http://www.statssa.gov.za/publications/P0441/GDPp%202q20%20previous%20format.xls> [Accessed Dec 2020]

Statistics South Africa. (2021). Quarterly Labour Force Survey, Quarter 1: 2021. Statistical Release, P0211, Pretoria: South Africa

Steenkamp, E., Rossouw, R., Viviers, W. and Cuyvers, L. (2009). Export Market Selection Methods and the Identification of Realistic Export Opportunities for South Africa using a Decision Support Model. Trade & Industrial Policy Strategies - TIPS. Working Paper Series 2009-03

Strezoska, Z. (2015). Competitiveness of Agro-Food Trade of Balkan countries in the World market. CORVINUS University of Budapest.

Trade & Industrial Policy Strategies - TIPS. (2016). Analysis of existing industrial policies and the state of implementation in South Africa. Prepared by TIPS for the Friedrich Ebert Stiftung.

Trade Law Centre – TRALAC. (2018). Southern African Development Community (SADC) – European Union (EU) Economic Partnership Agreement (EPA). Cape Town and Western Cape Tourism Trade and Investment – WESGRO.

Trading Economics. (2019). South Africa Imports of Goods and Services Percent of GDP. [online]: Trading Economics. Available From:< https://tradingeconomics.com/south-africa/indicators > [Accessed 8 May 2019]

Trinh, B. (2010). Measuring the effective rate of protection in Vietnam's economy with emphasis on the manufacturing industry: an input-output approach. DEPOCEN. Working Paper Series No. 2010/12

Tsebe, A,. De Villiers, D. and Strydom, J. (2021). Evaluation of relative effectiveness of business Vol. X, Issue VII – July 2021 rescue strategies for declining and distressed industries. PM World Journal (ISSN: 2330-4480) www.pmworldjournal.com

United Nations Conference on Trade and Development - UNCTAD. (2022). Trade and Biodiversity – Revealed Comparative Advantage – Annual.
Available from:< https://unctadstat.unctad.org/7zip/US_RCA.csv.7z > [Accessed 15 Sep 2022]

United Nations Department of Economic and Social Affairs Statistics Division. (2020). 2019 International Trade Statistics Yearbook. Volume II. Trade by Product. ST/ESA/STAT/SER.G/68 (Vol. II). New York,

United Nations Industrial Development Organization - UNIDO. (2016). Senegal, A GIFIUD Pilot towards Quick Wins in Inclusive and Sustainable Industrialization. Vienna: United Nations Industrial Development Organization.

United Nations Industrial Development Organization. (2017). Industrial Development Report 2018. Demand for Manufacturing: Driving Inclusive and Sustainable Industrial Development. Vienna.

United Nations Industrial Development Organization. (2019). Competitive Industrial Performance Report 2018. Biennial CIP report, edition 2018.

United Nations Industrial Development Organization - UNIDO. (2020). African industrial competitiveness report: An overview of the manufacturing industry in the region.

United Nations Industrial Development Organization - UNIDO. (2022). [online]. Available from:<https://stat.unido.org/database/CIP%20%20Competitive%20Industrial%20Performance%20Index/ > [Accessed December 2022]

United Nations. (2001). Economic and Social Commission for Western Asia: Methodology for the Assessment of Competitiveness of Selected Existing Industries. New York: United Nations. E/ESCWA/ID/2001/7.

United Nations. (2006). Standard International Trade Classification Revision 4. United Nations Department of Economic and Social Affairs Statistics Division, ST/ESA/STAT/SER.M/34/Rev.4

United Nations. (2020). UN Comtrade Analytics – South Africa: UN Comtrade Database. [online]. Available from:< https://comtrade.un.org/data/ > [Accessed 8 May 2020]

Van Rooyen Esterhuizen, J. and Stroebelc, L. (2011) *Analysing the Competitive Performance of the South African Wine Industry* International Food and Agribusiness Management Review, Volume 14, Issue 4, 2011

Van Vuren, L., Grobler, W. and Pelupessy, W. (2008). Globalization And Local Development: The Sedibeng Steel Industry in South Africa, African Studies Centre (ASC) – Leiden University (The Netherlands) Seminar on 17 April 2008

Van Zyl, G. and Matswalela, K. (2016). 'A comparative analysis of the level of competitiveness of the South African clothing and textile industry', Journal of Economic and Financial Sciences, 9 (2): 370-391.

Viljoen, W. (2016). South Africa's competitiveness and the role of declining international trade: Comments on South Africa's performance in the IMD World Competitiveness Yearbook 2016. Unpublished.

Viviers, W. Cuyvers, L. Steenkamp, E. Grater, S. Matthee, M. and Krugell, W. (2014). Identifying New Product and Service Export Opportunities for South Africa Using a Decision Support Model. International Business & Economics Research Journal, November/December 2014 Volume 13, Number 6. The Clute Institute

World Economic Forum. (2012). The future of manufacturing to drive economic growth.

World Bank. (2014). South Africa Economic Update. Focus on Export Competitiveness. Washington DC: World Bank.

World Bank. (2016). South Africa Economic Update: Promoting Faster Growth and Poverty Alleviation Through Competition South Africa Economic Update No. 8.

World Bank. (2017). South Africa Economic Update. Innovation for Productivity and Inclusiveness. Pretoria: World Bank.

World Bank (2018), Fundamentals of Purchasing Power Parities, International Comparison Program (ICP), Development Economics Data Group. [online] Available from:< https://www.worldbank.org/en/programs/icp/data> [Accessed May 2018]

World Bank. (2020a). Total Natural Resources Rents (% of GDP) - South Africa. [online] Available on <

https://data.worldbank.org/indicator/NY.GDP.TOTL.RT.ZS?end=2018&locations=ZA&start=1998> [Accessed Dec 2020

World Bank. (2020b). South Africa GDP per capita, PPP, in constant 2011 international $ 1998-2018. World Integrated Trade Solution. [online] Available on < https://wits.worldbank.org/CountryProfile/en/Country/ZAF/StartYear/1998/EndYear/2018/Indicator/NY-GDP-PCAP-PP-KD> [Accessed Dec 2020]

World Bank. (2020c). Total Population. [online] Available on < https://data.worldbank.org/indicator/SP.POP.TOTL > [Accessed Dec 2020]

World Bank. (2020d). Manufacturing, value added (annual % growth) - South Africa. [online] Available on < https://data.worldbank.org/indicator/NV.IND.MANF.KD.ZG?end=2019&locations=ZA&start=1997 > [Accessed Dec 2020]

World Bank. (2020e). Manufactures exports (% of merchandise exports). [online] Available on < https://data.worldbank.org/indicator/TX.VAL.MANF.ZS.UN1997 > [Accessed Dec 2020]

World Bank. (2020f). High-technology exports (% of manufactured exports).). [online] Available on < https://data.worldbank.org/indicator/TX.VAL.TECH.MF.ZS > [Accessed Dec 2020]

World Bank. (2020g). Medium and High – Tech Exports 9% of manufactured exports). [online] Available from:< https://data.worldbank.org/indicator/TX.MNF.TECH.ZS.UN> Accessed [Dec 2020]

World Bank. (2020h). Real Interest rates. [online] Available from:< https://data.worldbank.org/indicator/FR.INR.RINR> Accessed [Dec 2020]

World Bank. (2022). Power outages in firms in a typical month (number). Enterprise Surveys. Africa [online]. Available from:< (http://www.enterprisesurveys.org/) > [Accessed February 2022]

World Bank. (2023a). Manufacturing, value added (% of GDP) - South Africa [online]. Available from:< https://data.worldbank.org/indicator/NV.IND.MANF.ZS?end=2021&locations=ZA&start=2020 > [Accessed February 2023]

World Bank. (2023b). High Technology Exports (% of Manufactured Exports) – South Africa. [online] Available from:< https://data.worldbank.org/indicator/TX.VAL.TECH.MF.ZS?locations=ZA > Accessed [Dec 2023]

World Bank. (2023c). Doing Business Project Data. World Bank Group. [online]. Available from: < http://www.doingbusiness.org/en/data> [Accessed Feb 2023]

Xu, J. and Hager, S. (2017). Applying the Growth Identification and Facilitation Framework to Nepal. CDP Background Paper Number 35. Department of Economic & Social Affairs ST/ESA/2017/CDP/35. United Nations Department of Economic and Social Affairs.

Xu, J. (2019). [online]. Growth Identification and Facilitation Framework - A Pragmatic Approach for Promoting Economic Structural Transformation. Beijing: Center for New Structural Economics at Peking University.
Available from:< http://www.nse.pku.edu.cn/en/ywsy/news/245659.htm > [Accessed 10 May 2019]

Yu, R., Cai, J. and Leung, P. (2009) The normalized revealed comparative advantage index. The *Annals of Regional Science* **43**, 267–282. Available on < https://doi.org/10.1007/s00168-008-0213-3>

Appendices

Appendix 1: SITC Rev.3 Products, By Technological Categories (Lall (2000)

	Label
LDC02	Resource-based manufactures: agro-
16	Meat, edible meat offal, salted, dried;
17	Meat, edible meat offal, prepared,
23	Butter and other fats and oils derived
24	Cheese and curd
35	Fish, dried, salted or in brine; smoked
37	Fish, aqua. invertebrates, prepared,
46	Meal and flour of wheat and flour of
47	Other cereal meals and flour
48	Cereal preparations, flour of fruits or
56	Vegetables, roots, tubers, prepared,
58	Fruit, preserved, and fruit preparations
59	Fruit and vegetable juices, unfermented,
61	Sugar, molasses and honey
62	Sugar confectionery
73	Chocolate, food preparations with
98	Edible products and preparations, n.e.s.
111	Non-alcoholic beverages, n.e.s.
112	Alcoholic beverages
122	Tobacco, manufactured
232	Synthetic rubber
247	Wood in the rough or roughly squared
248	Wood simply worked, and railway
251	Pulp and waste paper
264	Jute, other textile bast fibre, n.e.s., not
265	Vegetable textile fibres, not spun; waste
269	Worn clothing and other worn textile articles
421	Fixed vegetable fats & oils, crude,
422	Fixed vegetable fats & oils, crude,
431	Animal or veg. oils & fats, processed,
621	Materials of rubber (pastes, plates,
625	Rubber tyres, tyre treads or flaps &
629	Articles of rubber, n.e.s.
633	Cork manufactures
634	Veneers, plywood, and other wood,
635	Wood manufacture, n.e.s.
641	Paper and paperboard

Code	Label
LDC03	Resource-based manufactures: other
281	Iron ore and concentrates
282	Ferrous waste, scrape; remelting ingots, iron,
283	Copper ores and concentrates; copper mattes,
284	Nickel ores & concentrates; nickel mattes,
285	Aluminium ores and concentrates (incl.
286	Ores and concentrates of uranium or thorium
287	Ores and concentrates of base metals, n.e.s.
288	Non-ferrous base metal waste and scrap, n.e.s.
289	Ores & concentrates of precious metals;
322	Briquettes, lignites and peat
325	Coke & semi-cokes of coal, lign., peat; retort
334	Petroleum oils or bituminous minerals > 70 %
335	Residual petroleum products, n.e.s., related
411	Animals oils and fats
511	Hydrocarbons, n.e.s., & halogenated, nitr.
514	Nitrogen-function compounds
515	Organo-inorganic, heterocycl. compounds,
516	Other organic chemicals
522	Inorganic chemical elements, oxides &
523	Metallic salts & peroxysalts, of inorganic
524	Other inorganic chemicals
531	Synth. organic colouring matter & colouring
532	Dyeing & tanning extracts, synth. tanning
551	Essential oils, perfume & flavour materials
592	Starche, wheat gluten; albuminoidal
661	Lime, cement, fabrica. constr. mat. (excluding glass, clay)
662	Clay construction, refracto. construction
663	Mineral manufactures, n.e.s.
664	Glass
667	Pearls, precious & semi-precious stones
689	Miscellaneous no-ferrous base metals for

Code	Label
LDC04	Low technology manufactures: textile,
611	Leather

Code	Label
LDC05	Low technology manufactures: other products
642	Paper & paperboard, cut to shape or size,

612	Manufactures of leather, n.e.s.; saddlery
613	Furskins, tanned or dressed, excluding
651	Textile yarn
652	Cotton fabrics, woven
654	Other textile fabrics, woven
655	Knitted or crocheted fabrics, n.e.s.
656	Tulles, trimmings, lace, ribbons & other
657	Special yarn, special textile fabrics &
658	Made-up articles, of textile materials,
659	Floor coverings, etc.
831	Travel goods, handbags & similar
841	Men's clothing of textile fabrics, not
842	Women's clothing, of textile fabrics
843	Men's or boy's clothing, of textile,
844	Women's clothing, of textile, knitted or
845	Articles of apparel, of textile fabrics,
846	Clothing accessories, of textile fabrics
848	Articles of apparel, clothing access.,
851	Footwear

665	Glassware
666	Pottery
673	Flat-rolled prod., iron, non-alloy steel, not
674	Flat-rolled prod., iron, non-alloy steel, coated,
675	Flat-rolled products of alloy steel
676	Iron & steel bars, rods, angles, shapes &
677	Rails & railway track construction mat., iron,
678	Wire of iron or steel
691	Structures & parts, n.e.s., of iron, steel,
692	Metal containers for storage or transport
693	Wire products (excluding electrical) and
694	Nails, screws, nuts, bolts, rivets & the like, of
695	Tools for use in the hand or in machine
696	Cutlery
697	Household equipment of base metal, n.e.s.
699	Manufactures of base metal, n.e.s.
821	Furniture & parts
893	Articles, n.e.s., of plastics
894	Baby carriages, toys, games & sporting goods
895	Office & stationery supplies, n.e.s.
897	Jewellery & articles of precious materia., n.e.s.
898	Musical instruments, parts; records, tapes &
899	Miscellaneous manufactured articles, n.e.s.

LDC06	Medium technology manufactures:
781	Motor vehicles for the transport of persons
782	Motor vehic. for transport of goods, special
783	Road motor vehicles, n.e.s.
784	Parts & accessories of vehicles of 722, 781,
785	Motorcycles & cycles
LDC07	Medium technology manufactures: process
266	Synthetic fibres suitable for spinning
267	Other man-made fibres suitable for
512	Alcohols, phenols, halogenat., sulfonat.,
513	Carboxylic acids, anhydrides, halides, per.;
533	Pigments, paints, varnishes and related
553	Perfumery, cosmetics or toilet prepar.
554	Soaps, cleansing and polishing preparations
562	Fertilizers (other than those of group 272)
571	Polymers of ethylene, in primary forms
572	Polymers of styrene, in primary forms
573	Polymers of vinyl chloride or halogenated
574	Polyethers, epoxide resins; polycarbonat.,
575	Other plastics, in primary forms
579	Waste, parings and scrap, of plastics

LDC08	Medium technology manufactures:
711	Vapour generating boilers, auxiliary
713	Internal combustion piston engines, parts,
714	Engines & motors, non-electric; parts,
721	Agricultural machinery (excluding
722	Tractors (excluding those of 71414 &
723	Civil engineering & contractors' plant &
724	Textile & leather machinery, & parts
725	Paper mill, pulp mill machinery; paper
726	Printing & bookbinding machinery, &
727	Food-processing machines (excluding
728	Other machinery for particular industries,
731	Machine-tools working by removing
733	Mach.-tools for working metal, excluding
735	Parts, n.e.s., & accessories for machines
737	Metalworking machinery (excluding
741	Heating & cooling equipment & parts
742	Pumps for liquids
743	Pumps (excluding liquid), gas
744	Mechanical handling equipment, & parts,
745	Other non-electr. machinery, tools &

581	Tubes, pipes and hoses of plastics
582	Plates, sheets, films, foil & strip, of plastics
583	Monofilaments, of plastics, cross-section >
591	Insectides & similar products, for retail sale
593	Explosives and pyrotechnic products
597	Prepared addit. for miner. oils; lubricat.,
598	Miscellaneous chemical products, n.e.s.
653	Fabrics, woven, of man-made fabrics
671	Pig iron & spiegeleisen, sponge iron,
672	Ingots, primary forms, of iron or steel;
679	Tubes, pipes & hollow profiles, fittings,
786	Trailers & semi-trailers
791	Railway vehicles & associated equipment
882	Cinematographic & photographic supplies

Code	Label
LDC09	High technology manufactures: electronic
716	Rotating electric plant & parts thereof,
718	Other power generating machinery & parts,
751	Office machines
752	Automatic data processing machines, n.e.s.
759	Parts, accessories for machines of groups
761	Television receivers, whether or not
764	Telecommunication equipment, n.e.s.; &
771	Electric power machinery, and parts
774	Electro-diagnostic appa. for medical
776	Cathode valves & tubes
778	Electrical machinery & apparatus, n.e.s.

Source: Lall (2000)

746	Ball or roller bearings
747	Appliances for pipes, boiler shells, tanks,
748	Transmis. shafts
749	Non-electric parts & accessor. of
762	Radio-broadcast receivers, whether or not
763	Sound recorders or reproducers
772	Apparatus for electrical circuits; board,
773	Equipment for distributing electricity,
775	Household type equipment, electrical or
793	Ships, boats & floating structures
811	Prefabricated buildings
812	Sanitary, plumbing, heating fixtures,
813	Lighting fixtures & fittings, n.e.s.
872	Instruments & appliances, n.e.s., for
873	Meters & counters, n.e.s.
884	Optical goods, n.e.s.
885	Watches & clocks
891	Arms & ammunition

Code	Label
LDC10	High technology manufactures: other
525	Radio-actives and associated materials
541	Medicinal and pharmaceutical products,
542	Medicaments (incl. veterinary
712	Steam turbines & other vapour turbin.,
792	Aircraft & associated equipment;
871	Optical instruments & apparatus, n.e.s.
874	Measuring, analysing & controlling
881	Photographic apparatus & equipment,

Appendix 2: Revealed Comparative Advantage for South Africa's Competitive Manufacturing Subsectors as at 2021

SITC	SITC Rev3 Product Label	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
287	Ores and concentrates of base metals, n.e.s.	15,79	16,89	15,33	17,80	19,25	27,13	24,83	31,62	26,28	14,66	10,55	13,74	12,53	24,93	25,28	23,40	21,81	23,90	29,47	28,04	29,80	33,27	37,21	38,43	41,25	39,51	52,77
671	Pig iron & spiegeleisen, sponge iron, powder & granu	18,11	19,67	21,37	22,66	26,62	34,88	27,33	34,84	34,41	28,86	24,00	21,86	22,82	26,07	29,56	24,89	18,87	18,02	22,44	24,76	26,75	29,07	22,32	20,01	19,26	16,83	20,53
281	Iron ore and concentrates	8,32	8,26	7,76	7,78	9,65	8,45	10,50	11,66	9,73	7,57	7,29	7,97	8,49	7,77	12,89	9,33	9,89	11,39	11,95	11,74	12,22	10,49	10,19	9,46	9,82	8,65	14,37
289	Ores & concentrates of precious metals; waste, scrap	34,72	30,82	32,20	30,31	23,88	29,06	21,43	17,55	3,92	2,20	15,92	17,74	14,33	11,75	9,35	3,59	3,06	2,12	2,07	3,95	7,11	5,44	6,02	5,74	6,57	9,40	8,03
532	Dyeing & tanning extracts, synth. tanning materials	7,22	6,66	6,69	7,00	7,66	10,62	9,64	12,31	9,20	8,64	9,34	10,62	9,61	8,67	9,51	8,45	6,29	7,67	8,91	8,20	8,63	8,59	7,99	7,60	7,08	4,96	7,63
251	Pulp and waste paper	2,22	3,41	3,85	3,75	3,55	4,90	3,80	4,04	4,04	3,49	3,43	3,23	2,91	2,96	3,79	3,16	3,27	2,89	3,06	3,58	3,83	4,23	4,01	3,47	2,57	3,92	4,78
782	Motor vehic. for transport of goods, special purpo.	0,98	0,95	0,87	0,85	0,98	0,86	0,81	1,07	0,99	0,71	1,31	2,40	2,25	2,63	2,57	2,79	2,94	4,19	4,38	4,58	3,99	4,54	4,20	4,80	4,93	4,65	3,98
743	Pumps (excluding liquid), gas compressors & fans; centr.	4,40	4,35	4,35	4,48	4,52	4,49	6,11	6,13	5,48	5,02	5,44	7,02	7,35	6,38	4,36	3,98	4,03	3,41	3,29	3,01	2,91	2,83	2,46	2,49	2,47	2,55	3,11
689	Miscellaneous no-ferrous base metals for metallur.	2,69	2,71	2,55	2,70	3,05	2,26	0,33	1,48	2,52	2,56	1,85	3,82	2,22	2,74	3,20	1,97	2,05	2,64	3,58	2,24	2,20	2,34	1,91	2,10	3,05	1,88	2,99
523	Metallic salts & peroxysalts, of inorganic acids	1,73	1,73	1,79	1,82	1,81	3,87	2,62	2,60	2,31	1,61	1,41	1,50	1,43	1,32	1,55	1,28	1,49	1,79	1,62	1,84	2,98	2,32	3,12	3,31	3,28	3,87	2,31
47	Other cereal meals and flour	8,13	7,19	7,44	8,12	10,42	5,93	5,28	14,25	6,68	2,39	36,56	3,48	2,07	10,64	13,46	14,11	12,04	15,31	17,85	16,35	15,86	18,38	14,27	12,63	16,47	19,47	2,31
524	Other inorganic chemicals	4,00	4,07	4,21	4,02	4,21	2,63	2,81	3,60	3,83	5,36	7,09	5,99	5,27	3,94	4,39	2,72	3,32	2,78	2,26	2,52	3,24	3,31	3,44	3,52	2,98	1,41	2,29
611	Leather	1,29	1,29	1,41	1,43	1,47	2,46	1,60	1,37	1,04	1,03	0,99	1,09	1,09	0,90	0,98	0,75	0,98	1,11	1,33	1,56	1,49	1,64	1,65	1,75	1,65	1,73	2,26
781	Motor vehicles for the transport of persons	0,96	0,95	0,89	0,85	0,91	0,83	1,13	1,31	1,26	1,23	1,31	1,17	0,93	1,55	1,62	1,52	1,26	1,16	1,08	1,27	1,69	1,60	1,53	1,66	1,87	1,49	2,16
61	Sugar, molasses and honey	3,10	3,15	3,55	4,08	4,55	6,41	6,08	5,01	4,14	3,63	3,59	3,72	2,72	2,00	3,14	1,95	1,26	1,51	2,21	2,44	1,14	0,95	1,55	2,65	3,71	2,39	2,13
112	Alcoholic beverages	2,08	2,09	2,12	2,05	2,18	2,37	2,36	2,94	3,12	3,20	3,14	2,63	2,67	2,85	3,33	3,09	2,52	2,60	2,98	2,84	2,74	2,52	2,47	2,55	2,31	2,17	1,99
667	Pearls, precious & semi-precious stones	7,46	7,43	8,05	7,59	6,75	7,75	7,85	7,29	6,55	5,91	6,12	6,20	5,25	4,35	3,31	2,64	2,12	2,58	2,44	2,91	2,47	2,73	2,49	2,91	2,56	3,21	1,97
59	Fruit and vegetable juices, unfermented, no spirit	2,76	2,50	3,04	2,62	2,61	3,48	2,98	3,83	3,18	2,67	3,08	2,93	2,00	2,33	2,98	4,04	3,21	3,48	3,69	4,20	4,04	3,61	3,31	4,10	3,82	3,71	1,83
675	Flat-rolled products of alloy steel	3,01	3,41	3,63	3,38	3,73	5,02	4,00	5,10	5,29	5,63	3,82	6,02	4,94	3,38	4,47	2,42	1,71	2,14	2,23	1,97	1,75	2,37	2,26	1,97	1,80	1,56	1,80
58	Fruit, preserved, and fruit preparations (no juice)	3,60	3,54	3,89	3,73	3,92	5,13	4,47	5,44	5,42	5,01	4,14	3,47	2,81	2,34	3,08	2,94	2,02	2,12	2,13	2,11	2,09	2,17	1,87	1,94	1,96	1,62	1,79
431	Animal or veg. oils & fats, processed, n.e.s.; mixt.	0,42	0,56	0,61	0,51	0,64	0,72	0,56	0,50	0,42	0,32	0,25	0,22	0,27	0,22	0,33	0,21	0,24	0,26	0,29	0,41	0,52	0,37	1,55	1,61	1,87	2,03	1,61
512	Alcohols, phenols, halogenat., sulfonat., nitrat. der.	1,47	1,65	1,53	1,77	1,94	1,88	1,96	2,46	2,17	2,65	2,96	3,02	2,95	2,33	2,29	1,94	1,29	1,93	1,64	1,81	1,68	1,95	1,55	1,41	1,70	1,62	1,38
522	Inorganic chemical elements, oxides & halogen salts	3,56	3,70	3,72	3,89	4,10	6,37	5,74	7,64	4,72	6,10	6,21	4,47	3,48	4,90	3,61	2,67	2,45	1,93	1,90	1,62	1,52	1,37	1,22	1,94	1,65	1,08	1,35
335	Residual petroleum products, n.e.s., related mater.	3,33	3,18	2,99	3,43	3,38	3,28	3,10	3,48	2,74	2,45	2,03	2,32	2,26	1,87	2,58	1,96	1,24	1,39	1,61	1,77	2,08	2,06	1,68	1,51	1,51	1,62	1,32
593	Explosives and pyrotechnic products	6,34	5,84	6,27	6,54	6,69	12,81	5,74	6,76	7,33	9,52	6,13	5,72	5,98	7,88	6,91	6,40	5,97	7,08	6,87	6,15	5,14	5,24	6,04	5,89	5,84	5,43	1,31
516	Other organic chemicals	1,40	1,45	1,37	1,40	1,40	1,47	1,56	1,97	1,53	1,86	1,76	1,29	1,27	1,32	1,21	1,10	1,07	1,43	1,28	1,32	1,08	1,06	1,31	1,13	0,93	1,12	1,21
525	Radio-actives and associated materials	1,33	1,34	1,34	1,48	1,61	1,50	1,77	1,77	1,69	1,84	2,22	2,36	2,06	1,87	1,97	1,53	1,32	1,25	0,85	1,79	1,61	1,84	1,66	0,92	0,89	1,06	1,10
891	Arms & ammunition	0,68	0,66	0,87	0,78	0,91	0,28		0,35	1,27	1,29						7,34	5,10	6,14	4,62	4,39	4,87	5,14	3,47	3,78	1,69	0,71	1,10
513	Carboxylic acids, anhydrides, halides, per.; derivati.	0,20	0,24	0,23	0,25	0,28	0,21	0,29	0,38	0,49	0,82	1,02	1,04	1,02	1,22	1,01	1,07	0,72	1,17	0,92	0,99	0,84	0,78	0,77	0,73	0,80	0,73	1,07

Source: United Nations Conference on Trade and Development - UNCTAD (2022)

Appendix 3: Manufactured goods by degree of manufacturing groups (SITC Rev. 3)

Code	Label	Weight
TDRA	**MANUFACTURED GOODS BY DEGREE OF MANUFACTURING**	
TDRB	**Labour-intensive and resource-intensive manufactures**	
611	Leather	1
612	Manufactures of leather, n.e.s.; saddlery & harness	1
613	Furskins, tanned or dressed, excluding those of 8483	1
633	Cork manufactures	1
634	Veneers, plywood, and other wood, worked, n.e.s.v	1
635	Wood manufacture, n.e.s.	1
641	Paper and paperboard	1
642	Paper & paperboard, cut to shape or size, articles	1
651	Textile yarn	1
652	Cotton fabrics, woven	1
653	Fabrics, woven, of man-made fabrics	1
654	Other textile fabrics, woven	1
655	Knitted or crocheted fabrics, n.e.s.	1
656	Tulles, trimmings, lace, ribbons & other small wares	1
657	Special yarn, special textile fabrics & related	1
658	Made-up articles, of textile materials, n.e.s.	1
659	Floor coverings, etc.	1
661	Lime, cement, fabrica. constr. mat. (excluding glass, clay)	1
662	Clay construction, refracto. construction materials	1
663	Mineral manufactures, n.e.s.	1
664	Glass	1
665	Glassware	1
666	Pottery	1
821	Furniture & parts	1
831	Travel goods, handbags & similar containers	1
841	Men's clothing of textile fabrics, not knitted	1
842	Women's clothing, of textile fabrics	1
843	Men's or boy's clothing, of textile, knitted, croche.	1
844	Women's clothing, of textile, knitted or crocheted	1
845	Articles of apparel, of textile fabrics, n.e.s.	1
846	Clothing accessories, of textile fabrics	1
848	Articles of apparel, clothing access., excluding textile	1
851	Footwear	1
TDRC	**Low-skill and technology-intensive manufactures**	**1**
671	Pig iron & spiegeleisen, sponge iron, powder & granu	1
672	Ingots, primary forms, of iron or steel; semi-finis.	1
673	Flat-rolled prod., iron, non-alloy steel, not coated	1
674	Flat-rolled prod., iron, non-alloy steel, coated, clad	1
675	Flat-rolled products of alloy steel	1
676	Iron & steel bars, rods, angles, shapes & sections	1
677	Rails & railway track construction mat., iron, steel	1
678	Wire of iron or steel	1
679	Tubes, pipes & hollow profiles, fittings, iron, steel	1
691	Structures & parts, n.e.s., of iron, steel, aluminium	1

692	Metal containers for storage or transport	1
693	Wire products (excluding electrical) and fencing grills	1
694	Nails, screws, nuts, bolts, rivets & the like, of metal	1
695	Tools for use in the hand or in machine	1
696	Cutlery	1
697	Household equipment of base metal, n.e.s.	1
699	Manufactures of base metal, n.e.s.	1
785	Motorcycles & cycles	1
786	Trailers & semi-trailers	1
791	Railway vehicles & associated equipment	1
793	Ships, boats & floating structures	1
895	Office & stationery supplies, n.e.s.	1
899	Miscellaneous manufactured articles, n.e.s.	1
TDRD	**Medium-skill and technology-intensive manufactures**	1
TDRD1	**Medium-skill: Electronics (excluding parts and components) (SITC 775)**	1
775	Household type equipment, electrical or not, n.e.s.	1
TDRD2	**Medium-skill: Parts and components for electrical and electronic goods (SITC 772)**	1
772	Apparatus for electrical circuits; board, panels	1
TDRD3	**Medium-skill: Other, excluding electronics**	1
621	Materials of rubber (pastes, plates, sheets, etc.)	1
625	Rubber tyres, tyre treads or flaps & inner tubes	1
629	Articles of rubber, n.e.s.	1
711	Vapour generating boilers, auxiliary plant; parts	1
712	Steam turbines & other vapour turbin., parts, n.e.s.	1
713	Internal combustion piston engines, parts, n.e.s.	1
714	Engines & motors, non-electric; parts, n.e.s.	1
716	Rotating electric plant & parts thereof, n.e.s.	1
718	Other power generating machinery & parts, n.e.s.	1
721	Agricultural machinery (excluding tractors) & parts	1
722	Tractors (excluding those of 71414 & 74415)	1
723	Civil engineering & contractors' plant & equipment	1
724	Textile & leather machinery, & parts thereof, n.e.s.	1
725	Paper mill, pulp mill machinery; paper articles man.	1
726	Printing & bookbinding machinery, & parts thereof	1
727	Food-processing machines (excluding domestic)	1
728	Other machinery for particular industries, n.e.s.	1
731	Machine-tools working by removing material	1
733	Mach.-tools for working metal, excluding removing mate.	1
735	Parts, n.e.s., & accessories for machines of 731, 733	1
737	Metalworking machinery (excludingmachine-tools) & parts	1
741	Heating & cooling equipment & parts thereof, n.e.s.	1
742	Pumps for liquids	1
743	Pumps (excluding liquid), gas compressors & fans; centr.	1
744	Mechanical handling equipment, & parts, n.e.s.	1
745	Other non-electr. machinery, tools & mechan. appar.	1
746	Ball or roller bearings	1
747	Appliances for pipes, boiler shells, tanks, vats, etc.	1
748	Transmis. shafts	1

749	Non-electric parts & accessor. of machinery, n.e.s.	1
771	Electric power machinery, and parts thereof	1
773	Equipment for distributing electricity, n.e.s.	1
774	Electro-diagnostic appa. for medical sciences, etc.	1
778	Electrical machinery & apparatus, n.e.s.	1
781	Motor vehicles for the transport of persons	1
782	Motor vehic. for transport of goods, special purpo.	1
783	Road motor vehicles, n.e.s.	1
784	Parts & accessories of vehicles of 722, 781, 782, 783	1
811	Prefabricated buildings	1
812	Sanitary, plumbing, heating fixtures, fittings, n.e.s.	1
813	Lighting fixtures & fittings, n.e.s.	1
893	Articles, n.e.s., of plastics	1
894	Baby carriages, toys, games & sporting goods	1
TDRE	**High-skill and technology-intensive manufactures**	1
TDRE1	**High-skill: Electronics (excluding parts and components) (SITC 751 + 752 + 761 + 762 + 763)**	1
751	Office machines	1
752	Automatic data processing machines, n.e.s.	1
761	Television receivers, whether or not combined	1
762	Radio-broadcast receivers, whether or not combined	1
763	Sound recorders or reproducers	1
TDRE2	**High-skill: Parts and components for electrical and electronic goods (SITC 759 + 764 + 776)**	1
759	Parts, accessories for machines of groups 751, 752	1
764	Telecommunication equipment, n.e.s.; & parts, n.e.s.	1
776	Cathode valves & tubes	1
TDRE3	**High-skill: Other, excluding electronics**	1
511	Hydrocarbons, n.e.s., & halogenated, nitr. derivative	1
512	Alcohols, phenols, halogenat., sulfonat., nitrat. der.	1
513	Carboxylic acids, anhydrides, halides, per.; derivati.	1
514	Nitrogen-function compounds	1
515	Organo-inorganic, heterocycl. compounds, nucl. acids	1
516	Other organic chemicals	1
522	Inorganic chemical elements, oxides & halogen salts	1
523	Metallic salts & peroxysalts, of inorganic acids	1
524	Other inorganic chemicals	1
525	Radio-actives and associated materials	1
531	Synth. organic colouring matter & colouring lakes	1
532	Dyeing & tanning extracts, synth. tanning materials	1
533	Pigments, paints, varnishes and related materials	1
541	Medicinal and pharmaceutical products, excluding 542	1
542	Medicaments (incl. veterinary medicaments)	1
551	Essential oils, perfume & flavour materials	1
553	Perfumery, cosmetics or toilet prepar. (excluding soaps)	1
554	Soaps, cleansing and polishing preparations	1
562	Fertilizers (other than those of group 272)	1
571	Polymers of ethylene, in primary forms	1
572	Polymers of styrene, in primary forms	1

573	Polymers of vinyl chloride or halogenated olefins	1
574	Polyethers, epoxide resins; polycarbonat., polyesters	1
575	Other plastics, in primary forms	1
579	Waste, parings and scrap, of plastics	1
581	Tubes, pipes and hoses of plastics	1
582	Plates, sheets, films, foil & strip, of plastics	1
583	Monofilaments, of plastics, cross-section > 1mm	1
591	Insectides & similar products, for retail sale	1
592	Starche, wheat gluten; albuminoidal substances; glues	1
593	Explosives and pyrotechnic products	1
597	Prepared addit. for miner. oils; lubricat., de-icing	1
598	Miscellaneous chemical products, n.e.s.	1
792	Aircraft & associated equipment; spacecraft, etc.	1
871	Optical instruments & apparatus, n.e.s.	1
872	Instruments & appliances, n.e.s., for medical, etc.	1
873	Meters & counters, n.e.s.	1
874	Measuring, analysing & controlling apparatus, n.e.s.	1
881	Photographic apparatus & equipment, n.e.s.	1
882	Cinematographic & photographic supplies	1
883	Cinematograph films, exposed & developed	1
884	Optical goods, n.e.s.	1
885	Watches & clocks	1
891	Arms & ammunition	1
892	Printed matter	1
896	Works of art, collectors' pieces & antiques	1
897	Jewellery & articles of precious materia., n.e.s.	1
898	Musical instruments, parts; records, tapes & similar	1

Source: United Nations Conference on Trade and Development - UNCTAD

Appendix 4: Vietnams NRCAs for subsectors that exhibited competitiveness during the study but were not competitive as at 2018 or were competitive but projected to lose competitiveness by end of 2023[13]

Code/ Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	No" of Comp Years
59	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	0.00000	0.00002	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	1
247	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	1
325	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	1
524	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	1
659	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	1
672	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	0.00001	-0.00001	-0.00001	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00001	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	1
676	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00002	-0.00002	-0.00002	-0.00001	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	1
772	-0.00002	-0.00002	-0.00001	-0.00002	-0.00002	-0.00002	-0.00002	-0.00003	-0.00003	0.00000	-0.00003	-0.00003	-0.00004	-0.00004	-0.00004	-0.00005	-0.00005	-0.00007	-0.00006	-0.00006	-0.00006	-0.00007	-0.00007	-0.00007	-0.00006	-0.00006	1
793	-0.00001	-0.00001	-0.00001	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00001	-0.00001	-0.00003	-0.00002	-0.00001	0.00000	-0.00001	0.00000	-0.00002	-0.00004	-0.00005	-0.00003	-0.00003	-0.00004	-0.00004	-0.00004	-0.00004	1
895	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	1
248	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00002	-0.00003	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	2
284	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	2
422	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00002	-0.00002	-0.00003	-0.00002	-0.00003	-0.00003	-0.00003	-0.00003	-0.00004	2
562	0.00000	-0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	0.00000	0.00000	0.00000	-0.00001	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00003	2
671	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	0.00000	0.00000	0.00000	0.00001	0.00001	-0.00001	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	2
48	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00001	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00003	3
642	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00002	-0.00001	-0.00002	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	3
673	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00002	-0.00002	-0.00002	-0.00002	0.00001	-0.00002	0.00001	0.00000	-0.00001	-0.00001	-0.00001	-0.00002	-0.00001	-0.00002	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	3
61	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	0.00000	-0.00001	0.00000	0.00000	-0.00001	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	4
554	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00001	-0.00002	-0.00002	-0.00002	-0.00001	-0.00002	-0.00002	-0.00002	-0.00002	4
664	0.00000	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	0.00000	0.00000	0.00000	0.00001	0.00000	-0.00001	0.00000	-0.00001	-0.00001	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	4
697	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	5
897	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001	0.00013	0.00016	0.00011	-0.00003	-0.00004	-0.00005	-0.00006	-0.00004	-0.00006	-0.00006	-0.00003	-0.00003	-0.00003	-0.00003	-0.00004	5
264	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	6
662	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	6
98	0.00001	0.00001	0.00000	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00002	-0.00002	-0.00003	-0.00002	-0.00002	-0.00002	-0.00003	-0.00003	7
411	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	7
694	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	7
287	0.00000	0.00000	0.00000	0.00001	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00001	-0.00002	-0.00002	-0.00002	-0.00003	-0.00003	-0.00003	-0.00004	8
621	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001	0.00001	0.00001	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00001	0.00000	0.00000	0.00000	0.00000	-0.00001	8
666	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	8
62	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	9
653	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001	0.00001	0.00001	0.00000	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	9
122	-0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001	0.00001	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	13
663	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00002	-0.00002	-0.00002	13
629	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	15
751	0.00000	-0.00001	0.00000	-0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	0.00007	0.00008	0.00009	0.00008	0.00010	0.00010	0.00010	0.00011	0.00011	0.00015	-0.00001	0.00011	0.00011	0.00012	0.00013	0.00013	15
893	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	0.00000	0.00000	0.00000	0.00001	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00001	0.00000	0.00000	0.00000	0.00001	0.00002	0.00002	0.00002	0.00002	16
899	0.00000	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00000	0.00000	-0.00001	-0.00002	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	17
716	-0.00001	-0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001	0.00001	0.00001	0.00001	0.00002	0.00003	0.00003	0.00002	0.00002	0.00001	0.00000	0.00001	0.00000	0.00002	0.00002	0.00002	0.00002	0.00002	18
612	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	20

Source: Calculated from UN Comtrade Data (2020). Subsectors sorted in ascending order of competitiveness as measured by the 2018 NRCA

[13] Competitive values are highlighted in colour.

Appendix 5; India's NRCAs for subsectors that exhibited competitiveness during the study but were not competitive as at 2018 or were competitive but projected to lose competitiveness by end of 2023

Code/ Yr	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	No" of Comp Years
56	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00001	0.00000	-0.00001	-0.00001	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	1
522	-0.00001	-0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00002	0.00000	-0.00003	-0.00003	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00003	-0.00003	-0.00003	1
524	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	1
579	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	0.00000	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	1
583	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	1
635	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00002	-0.00002	-0.00002	-0.00001	-0.00001	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00001	-0.00001	-0.00001	-0.00002	0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	1
716	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00001	-0.00001	0.00002	-0.00001	-0.00003	-0.00004	-0.00004	-0.00004	-0.00004	-0.00003	-0.00003	-0.00003	-0.00001	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	1
727	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	1
873	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	0.00000	-0.00001	0.00000	-0.00001	-0.00001	-0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	1
571	-0.00002	-0.00002	-0.00001	-0.00001	0.00000	-0.00001	0.00001	0.00000	-0.00001	-0.00002	-0.00003	-0.00005	-0.00005	-0.00004	-0.00005	-0.00006	-0.00006	-0.00006	-0.00006	-0.00005	-0.00001	-0.00001	-0.00002	-0.00002	-0.00002	-0.00002	2
575	-0.00003	-0.00003	-0.00001	0.00000	0.00000	0.00000	0.00001	-0.00002	-0.00001	-0.00002	-0.00004	-0.00004	-0.00002	-0.00002	-0.00002	0.00000	-0.00001	-0.00002	-0.00003	-0.00005	-0.00003	-0.00003	-0.00004	-0.00004	-0.00004	-0.00004	2
592	-0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	2
593	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	2
737	-0.00001	-0.00001	-0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	2
771	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00001	0.00000	0.00000	0.00001	-0.00001	-0.00002	-0.00003	-0.00003	-0.00004	-0.00003	-0.00002	-0.00002	-0.00002	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	2
37	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	0.00000	-0.00002	-0.00002	-0.00002	-0.00002	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	3
677	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	3
792	-0.00013	-0.00012	-0.00009	-0.00011	-0.00011	-0.00010	-0.00010	-0.00011	-0.00013	-0.00011	-0.00004	-0.00006	-0.00003	-0.00002	-0.00005	0.00004	0.00017	0.00002	-0.00003	-0.00007	-0.00007	-0.00006	-0.00005	-0.00005	-0.00004	-0.00003	3
325	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	0.00000	-0.00001	-0.00001	0.00000	0.00000	0.00001	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	4
691	0.00000	0.00000	0.00000	-0.00001	-0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001	-0.00002	-0.00001	-0.00001	0.00000	-0.00001	-0.00001	0.00000	-0.00001	0.00000	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	4
735	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	4
774	-0.00001	0.00000	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00002	-0.00001	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	4
898	0.00000	0.00000	0.00002	0.00001	0.00000	0.00001	-0.00001	-0.00001	-0.00001	-0.00002	-0.00003	-0.00001	-0.00003	-0.00002	-0.00001	-0.00003	-0.00003	-0.00004	-0.00004	-0.00002	-0.00002	-0.00004	-0.00004	-0.00004	-0.00005	-0.00005	4
541	0.00001	0.00001	0.00002	0.00002	0.00002	0.00002	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00004	-0.00004	-0.00004	-0.00004	-0.00005	-0.00005	-0.00003	-0.00004	-0.00006	-0.00007	-0.00007	-0.00007	-0.00008	-0.00008	-0.00009	6
675	-0.00001	0.00001	0.00001	0.00000	0.00001	0.00007	0.00004	0.00002	-0.00001	-0.00002	-0.00004	-0.00003	-0.00004	-0.00004	-0.00002	-0.00001	-0.00002	-0.00002	-0.00002	-0.00002	-0.00003	-0.00003	-0.00003	-0.00003	-0.00004	-0.00004	6
694	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	0.00000	0.00000	0.00001	0.00002	0.00000	-0.00001	-0.00001	-0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	8
695	0.00000	0.00000	0.00001	0.00001	0.00000	0.00001	0.00001	0.00001	0.00001	0.00000	0.00000	-0.00001	-0.00001	-0.00001	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	8
696	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	8
335	-0.00001	-0.00001	0.00000	-0.00001	0.00000	0.00001	-0.00001	0.00001	0.00001	0.00002	0.00003	0.00001	0.00002	0.00002	0.00002	0.00006	0.00001	-0.00001	0.00000	-0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	12
287	0.00001	0.00001	0.00000	0.00001	0.00001	0.00001	0.00000	0.00003	0.00003	0.00004	0.00001	0.00001	0.00001	-0.00001	0.00000	-0.00001	-0.00002	-0.00002	-0.00001	-0.00002	-0.00002	-0.00002	-0.00003	-0.00003	-0.00003	-0.00003	13
895	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	13
289	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001	0.00000	-0.00001	0.00000	0.00001	0.00001	0.00000	0.00001	0.00001	0.00001	0.00001	0.00000	0.00001	0.00001	0.00001	0.00001	0.00001	15
281	0.00006	0.00004	0.00005	0.00005	0.00011	0.00009	0.00023	0.00037	0.00028	0.00030	0.00030	0.00036	0.00030	0.00009	0.00002	-0.00005	-0.00006	-0.00006	-0.00001	0.00001	-0.00002	-0.00002	-0.00003	-0.00004	-0.00004	-0.00005	16
629	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	16
674	0.00001	0.00001	0.00002	0.00002	0.00004	0.00003	0.00009	0.00009	0.00011	0.00007	0.00008	0.00006	0.00005	0.00003	0.00004	0.00007	0.00006	0.00004	0.00004	0.00004	0.00001	0.00001	0.00000	0.00000	-0.00001	-0.00002	23
697	0.00002	0.00003	0.00004	0.00005	0.00004	0.00005	0.00004	0.00004	0.00003	0.00003	0.00002	0.00002	0.00002	0.00001	0.00001	0.00001	0.00002	0.00001	0.00001	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	23

Source: Calculated from UN Comtrade Data (2020)

Appendix 6: China's NRCAs for subsectors that exhibited competitiveness during the study but were not competitive as at 2018 or were competitive but projected to lose competitiveness by end of 2023

Code/ Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	No" of Comp Years
35	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	1
59	-0.00002	-0.00002	-0.00002	-0.00001	-0.00002	-0.00002	-0.00002	-0.00001	-0.00002	0.00001	-0.00001	-0.00004	-0.00004	-0.00003	-0.00003	-0.00005	-0.00007	-0.00009	-0.00008	-0.00007	-0.00007	-0.00007	-0.00008	-0.00008	-0.00008	-0.00008	1
516	0.00001	-0.00001	-0.00001	-0.00002	-0.00002	-0.00003	-0.00002	-0.00001	-0.00005	-0.00005	-0.00004	-0.00006	-0.00006	-0.00004	-0.00008	-0.00010	-0.00010	-0.00009	-0.00007	-0.00006	-0.00004	-0.00006	-0.00006	-0.00007	-0.00007	-0.00008	1
891	0.00001	-0.00004	-0.00003	-0.00003	-0.00004	-0.00005	-0.00005	-0.00005	-0.00005	-0.00006	-0.00005	-0.00008	-0.00008	-0.00006	-0.00007	-0.00008	-0.00008	-0.00012	-0.00013	-0.00012	-0.00012	-0.00013	-0.00014	-0.00014	-0.00015	-0.00015	1
791	-0.00002	-0.00003	-0.00002	-0.00005	-0.00004	-0.00007	-0.00007	-0.00006	-0.00007	-0.00008	-0.00007	-0.00010	-0.00006	-0.00001	0.00004	-0.00002	-0.00001	0.00005	-0.00005	-0.00005	-0.00004	-0.00004	-0.00003	-0.00003	-0.00003	-0.00003	2
673	-0.00010	-0.00008	-0.00004	-0.00011	-0.00016	-0.00022	-0.00013	-0.00009	0.00015	0.00029	0.00041	-0.00014	-0.00001	-0.00032	-0.00033	-0.00035	-0.00031	-0.00032	-0.00034	-0.00037	-0.00036	-0.00037	-0.00039	-0.00041	-0.00042	-0.00044	3
335	0.00003	0.00002	0.00001	0.00001	-0.00001	-0.00003	-0.00004	-0.00003	-0.00005	-0.00008	-0.00010	-0.00013	-0.00015	-0.00017	-0.00019	-0.00022	-0.00025	-0.00021	-0.00018	-0.00025	-0.00025	-0.00026	-0.00028	-0.00029	-0.00031	-0.00032	4
541	0.00008	0.00006	0.00005	0.00003	0.00000	-0.00005	-0.00011	-0.00014	-0.00016	-0.00021	-0.00018	-0.00037	-0.00032	-0.00036	-0.00051	-0.00062	-0.00072	-0.00092	-0.00093	-0.00082	-0.00087	-0.00096	-0.00102	-0.00107	-0.00112	-0.00118	4
111	0.00003	0.00003	0.00002	0.00002	0.00000	-0.00002	-0.00002	-0.00004	-0.00005	-0.00006	-0.00007	-0.00009	-0.00008	-0.00008	-0.00008	-0.00010	-0.00011	-0.00013	-0.00013	-0.00012	-0.00012	-0.00013	-0.00013	-0.00014	-0.00014	-0.00014	5
611	-0.00003	-0.00002	-0.00001	0.00003	0.00002	0.00001	0.00001	0.00001	-0.00001	-0.00007	-0.00010	-0.00011	-0.00013	-0.00012	-0.00012	-0.00014	-0.00015	-0.00016	-0.00013	-0.00015	-0.00012	-0.00015	-0.00016	-0.00017	-0.00018	-0.00019	5
525	0.00002	0.00002	0.00000	0.00001	0.00000	-0.00001	-0.00001	-0.00002	-0.00003	-0.00006	-0.00005	-0.00008	-0.00005	0.00002	-0.00005	-0.00004	-0.00004	-0.00006	-0.00005	-0.00003	-0.00002	-0.00002	-0.00003	-0.00003	-0.00003	-0.00004	6
677	0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	0.00000	0.00001	0.00001	0.00000	0.00000	0.00000	-0.00001	0.00000	0.00001	0.00000	-0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	6
672	0.00004	0.00002	0.00008	0.00001	-0.00005	-0.00006	0.00007	0.00006	0.00008	-0.00003	-0.00021	-0.00019	-0.00023	-0.00025	-0.00024	-0.00022	-0.00021	-0.00018	-0.00017	-0.00022	-0.00024	-0.00029	-0.00030	-0.00032	-0.00034	-0.00035	7
898	-0.00007	-0.00009	-0.00009	-0.00009	-0.00008	-0.00009	-0.00004	-0.00006	-0.00007	0.00013	0.00019	0.00016	0.00009	0.00006	0.00007	0.00002	-0.00001	-0.00003	-0.00006	-0.00009	-0.00005	-0.00004	-0.00004	-0.00004	-0.00003	-0.00003	7
885	0.00024	0.00021	0.00016	0.00013	0.00011	0.00009	0.00005	0.00002	-0.00002	-0.00002	-0.00003	-0.00003	-0.00005	-0.00007	-0.00005	-0.00005	-0.00010	-0.00012	-0.00008	-0.00011	-0.00011	-0.00012	-0.00014	-0.00016	-0.00017	-0.00019	8
591	-0.00001	0.00001	0.00001	0.00002	0.00001	0.00000	0.00002	0.00002	-0.00002	-0.00002	-0.00001	-0.00005	-0.00004	-0.00003	-0.00002	-0.00001	-0.00001	-0.00005	-0.00002	0.00001	0.00002	-0.00002	-0.00002	-0.00002	-0.00002	-0.00002	9
17	0.00002	0.00003	0.00004	0.00006	0.00006	0.00004	0.00004	0.00004	0.00003	0.00001	-0.00002	-0.00003	-0.00002	-0.00001	0.00000	-0.00002	-0.00003	-0.00005	-0.00006	-0.00004	-0.00005	-0.00005	-0.00005	-0.00006	-0.00006	-0.00007	10
881	0.00013	0.00012	0.00011	0.00009	0.00004	0.00002	-0.00003	-0.00005	-0.00007	-0.00001	0.00000	0.00000	0.00000	0.00001	0.00000	0.00001	0.00000	-0.00001	0.00000	-0.00001	-0.00001	-0.00001	-0.00002	-0.00002	-0.00003	-0.00003	10
562	-0.00007	-0.00005	-0.00003	-0.00002	-0.00004	-0.00001	0.00001	-0.00007	-0.00007	0.00004	-0.00013	-0.00010	0.00000	0.00002	-0.00005	-0.00006	0.00007	0.00015	0.00000	-0.00003	0.00000	0.00001	0.00001	0.00002	0.00002	0.00002	11
671	0.00014	0.00010	0.00013	0.00007	0.00006	0.00008	0.00020	0.00015	0.00007	0.00009	0.00012	-0.00006	-0.00007	-0.00002	-0.00011	-0.00014	-0.00017	-0.00018	-0.00016	-0.00019	-0.00017	-0.00020	-0.00022	-0.00023	-0.00025	-0.00027	11
873	-0.00001	-0.00001	-0.00001	-0.00001	0.00002	0.00000	-0.00001	0.00000	0.00000	0.00001	0.00001	0.00001	0.00001	0.00002	0.00003	0.00003	0.00003	0.00001	-0.00001	-0.00001	-0.00001	0.00000	0.00000	0.00001	0.00001	0.00001	17
613	0.00001	0.00001	0.00001	0.00002	0.00001	0.00001	0.00002	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00002	0.00003	0.00002	0.00001	-0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00001	18
897	0.00017	0.00022	0.00014	0.00008	0.00006	0.00001	0.00000	-0.00001	-0.00006	-0.00009	-0.00012	-0.00020	0.00006	0.00058	0.00135	0.00153	0.00199	0.00044	0.00007	-0.00008	0.00000	0.00078	0.00080	0.00083	0.00086	0.00089	18

Source: Calculated from UN Comtrade Data (2020)

Appendix 7[14]: South African manufacturing subsectors competitive as at 2018 and forecasted to maintain competitiveness between 2018 and 2023

SITC/Yr	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
46	0.000002	0.000001	0.000002	0.000001	0.000000	0.000000	0.000000	-0.000001	-0.000001	0.000001	0.000002	0.000002	0.000002	0.000003	0.000002	0.000002	0.000001	0.000000	0.000000	0.000005	0.000006	0.000006	0.000006	0.000007	
811	-0.000001	-0.000001	0.000000	0.000000	0.000000	0.000000	0.000000	0.000001	0.000001	0.000000	0.000001	0.000001	0.000001	0.000000	0.000000	0.000000	-0.000001	0.000000	0.000000	0.000005	0.000006	0.000006	0.000007	0.000007	
266	0.000001	0.000002	0.000001	-0.000001	-0.000001	-0.000001	-0.000001	-0.000001	-0.000001	-0.000001	-0.000002	-0.000002	-0.000002	-0.000002	-0.000001	-0.000001	0.000000	0.000000	0.000000	0.000001	0.000001	0.000001	0.000001	0.000001	
62	0.000001	0.000001	0.000000	-0.000001	-0.000002	-0.000001	-0.000001	-0.000002	-0.000002	-0.000001	0.000002	0.000002	0.000002	0.000001	0.000001	0.000001	0.000002	0.000001	0.000001	0.000000	0.000000	0.000001	0.000001	0.000001	
516	0.000005	0.000006	0.000008	0.000006	0.000009	0.000009	0.000004	0.000004	0.000004	0.000002	0.000002	0.000002	0.000005	0.000003	0.000003	0.000001	0.000000	0.000003	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	
122	0.000002	0.000002	0.000000	-0.000002	0.000001	0.000005	0.000006	0.000002	0.000000	0.000006	0.000012	0.000007	0.000009	0.000007	0.000005	0.000006	0.000004	0.000004	0.000001	0.000010	0.000011	0.000012	0.000013	0.000014	
111	0.000003	0.000002	0.000004	0.000006	0.000002	-0.000001	-0.000002	-0.000001	-0.000001	0.000000	0.000000	-0.000001	-0.000001	-0.000001	0.000001	0.000003	0.000004	0.000002	0.000002	0.000000	0.000000	0.000000	0.000000	0.000000	
431	0.000000	-0.000001	-0.000001	-0.000001	-0.000002	-0.000002	-0.000002	-0.000002	-0.000002	-0.000002	-0.000003	-0.000004	-0.000003	-0.000003	-0.000002	-0.000001	-0.000002	0.000003	0.000003	0.000000	0.000000	0.000000	0.000000	0.000000	
693	0.000003	0.000003	0.000004	0.000004	0.000005	0.000003	0.000002	0.000002	0.000003	0.000003	0.000005	0.000003	0.000004	0.000004	0.000003	0.000003	0.000003	0.000002	0.000003	0.000002	0.000002	0.000001	0.000003	0.000006	
689	0.000003	-0.000002	0.000001	0.000003	0.000005	0.000003	0.000009	0.000004	0.000006	0.000004	0.000003	0.000004	0.000004	0.000006	0.000003	0.000003	0.000003	0.000003	0.000004	0.000004	0.000004	0.000004	0.000004	0.000004	
591	0.000010	0.000013	0.000010	0.000011	0.000010	0.000007	0.000005	0.000004	0.000001	0.000004	0.000003	0.000003	0.000007	0.000008	0.000006	0.000006	0.000004	0.000004	0.000005	0.000001	0.000001	0.000002	0.000002	0.000002	
47	0.000001	0.000001	0.000004	0.000002	0.000000	0.000011	0.000001	0.000000	0.000003	0.000005	0.000005	0.000005	0.000006	0.000007	0.000006	0.000006	0.000008	0.000006	0.000005	0.000173	0.000186	0.000175	0.000181	0.000195	
691	0.000016	0.000009	0.000010	0.000010	0.000016	0.000017	0.000014	0.000014	0.000020	0.000012	0.000022	0.000013	0.000015	0.000012	0.000011	0.000005	0.000006	0.000002	0.000005	0.000007	0.000007	0.000007	0.000007	0.000008	
635	0.000003	0.000002	0.000004	0.000003	0.000001	-0.000001	-0.000005	-0.000005	-0.000003	-0.000005	-0.000003	-0.000003	-0.000003	-0.000004	-0.000002	-0.000003	-0.000003	-0.000004	0.000005	0.000080	0.000069	0.000031	0.000138	0.000134	
786	0.000014	0.000009	0.000011	0.000013	0.000008	0.000004	0.000005	0.000006	0.000005	0.000011	0.000007	0.000004	0.000008	0.000008	0.000006	0.000009	0.000009	0.000006	0.000006	0.000005	0.000005	0.000005	0.000005	0.000005	
58	0.000015	0.000015	0.000016	0.000019	0.000017	0.000014	0.000010	0.000008	0.000006	0.000010	0.000011	0.000006	0.000006	0.000006	0.000006	0.000007	0.000008	0.000007	0.000006	0.000007	0.000007	0.000007	0.000008	0.000008	
335	0.000014	0.000014	0.000014	0.000013	0.000011	0.000008	0.000012	0.000013	0.000010	0.000015	0.000013	0.000003	0.000007	0.000009	0.000011	0.000014	0.000011	0.000010	0.000008	0.000003	0.000002	0.000002	0.000001	0.000000	
512	0.000009	0.000011	0.000013	0.000016	0.000022	0.000028	0.000027	0.000029	0.000020	0.000016	0.000018	0.000008	0.000018	0.000012	0.000013	0.000011	0.000013	0.000009	0.000008	0.000012	0.000013	0.000013	0.000013	0.000013	
723	-0.000009	-0.000010	-0.000008	-0.000013	-0.000015	-0.000014	-0.000014	-0.000015	-0.000013	-0.000004	0.000001	-0.000002	0.000015	0.000008	0.000010	0.000011	0.000013	0.000004	0.000008	0.000039	0.000041	0.000052	0.000052	0.000046	
673	0.000032	0.000036	0.000029	0.000062	0.000055	0.000057	0.000030	0.000026	0.000006	0.000010	0.000022	0.000019	0.000021	0.000007	0.000013	0.000004	0.000004	0.000000	0.000009	0.000034	0.000034	0.000033	0.000033	0.000033	
554	-0.000001	0.000000	0.000001	-0.000002	-0.000003	-0.000004	-0.000002	-0.000004	-0.000002	0.000001	0.000011	0.000010	0.000010	0.000011	0.000009	0.000011	0.000010	0.000009	0.000009	0.000363	0.000379	0.000396	0.000413	0.000429	
524	0.000005	0.000006	0.000005	0.000006	0.000011	0.000017	0.000015	0.000014	0.000010	0.000009	0.000007	0.000011	0.000006	0.000004	0.000005	0.000007	0.000006	0.000008	0.000011	0.000306	0.000319	0.000332	0.000345	0.000357	
59	0.000010	0.000008	0.000010	0.000010	0.000007	0.000008	0.000008	0.000005	0.000006	0.000009	0.000014	0.000012	0.000012	0.000012	0.000013	0.000014	0.000012	0.000010	0.000012	0.000019	0.000018	0.000017	0.000016	0.000015	
61	0.000035	0.000044	0.000028	0.000024	0.000019	0.000020	0.000024	0.000013	0.000008	0.000021	0.000013	0.000004	0.000007	0.000014	0.000014	0.000002	0.000000	0.000006	0.000013	0.000011	0.000009	0.000011	0.000010	0.000006	
523	0.000014	0.000009	0.000007	0.000007	0.000003	0.000002	0.000003	0.000002	0.000002	0.000003	0.000002	0.000003	0.000005	0.000003	0.000005	0.000012	0.000008	0.000014	0.000015	0.000008	0.000008	0.000007	0.000007	0.000006	
522	0.000057	0.000057	0.000060	0.000040	0.000059	0.000067	0.000042	0.000032	0.000065	0.000033	0.000029	0.000030	0.000016	0.000013	0.000009	0.000008	0.000005	0.000004	0.000017	0.000015	0.000016	0.000016	0.000016	0.000016	
675	0.000054	0.000038	0.000048	0.000066	0.000086	0.000053	0.000101	0.000093	0.000050	0.000052	0.000030	0.000017	0.000022	0.000020	0.000018	0.000014	0.000024	0.000025	0.000018	0.000010	0.000010	0.000010	0.000010	0.000010	
289	0.000048	0.000039	0.000023	0.000003	0.000002	0.000025	0.000039	0.000043	0.000044	0.000032	0.000016	0.000012	0.000006	0.000005	0.000012	0.000026	0.000019	0.000021	0.000019	0.000004	0.000004	0.000004	0.000004	0.000004	
251	0.000061	0.000037	0.000032	0.000037	0.000030	0.000028	0.000024	0.000024	0.000023	0.000030	0.000034	0.000037	0.000024	0.000025	0.000031	0.000036	0.000040	0.000040	0.000033	0.000004	0.000004	0.000003	0.000003	0.000003	
112	0.000026	0.000028	0.000035	0.000045	0.000045	0.000042	0.000030	0.000033	0.000035	0.000047	0.000049	0.000037	0.000036	0.000043	0.000039	0.000039	0.000035	0.000035	0.000034	0.000006	0.000004	0.000004	0.000004	0.000005	
743	0.000093	0.000150	0.000126	0.000131	0.000125	0.000133	0.000174	0.000201	0.000166	0.000105	0.000113	0.000123	0.000088	0.000081	0.000073	0.000073	0.000070	0.000056	0.000054	0.000065	0.000054	0.000044	0.000034	0.000024	
667	0.000237	0.000222	0.000205	0.000197	0.000182	0.000207	0.000171	0.000147	0.000112	0.000074	0.000082	0.000065	0.000069	0.000069	0.000087	0.000068	0.000082	0.000067	0.000075	0.000234	0.000235	0.000236	0.000237	0.000238	
781	-0.000029	0.000032	0.000061	0.000061	0.000051	0.000065	0.000032	-0.000015	0.000101	0.000093	0.000102	0.000050	0.000028	0.000011	0.000047	0.000135	0.000126	0.000106	0.000124	0.000014	0.000011	0.000008	0.000005	0.000002	
782	-0.000005	-0.000007	0.000003	0.000000	-0.000011	0.000012	0.000052	0.000053	0.000063	0.000044	0.000067	0.000081	0.000129	0.000125	0.000130	0.000114	0.000138	0.000130	0.000144	0.000008	0.000007	0.000007	0.000006	0.000006	
671	0.000196	0.000143	0.000165	0.000219	0.000291	0.000266	0.000198	0.000266	0.000354	0.000227	0.000316	0.000261	0.000202	0.000203	0.000233	0.000220	0.000222	0.000219	0.000199	0.000003	0.000003	0.000003	0.000003	0.000003	
281	0.000044	0.000059	0.000059	0.000056	0.000054	0.000078	0.000084	0.000101	0.000129	0.000233	0.000322	0.000447	0.000387	0.000415	0.000336	0.000232	0.000206	0.000248	0.000200	0.000049	0.000044	0.000040	0.000035	0.000030	
287	0.000091	0.000085	0.000085	0.000082	0.000073	0.000077	0.000108	0.000114	0.000213	0.000155	0.000227	0.000228	0.000209	0.000219	0.000207	0.000195	0.000213	0.000318	0.000332	0.000007	0.000007	0.000006	0.000006	0.000005	

Source: Calculated from UN Comtrade Data (2020)

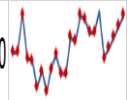
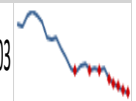
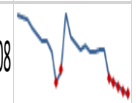
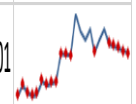
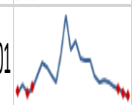
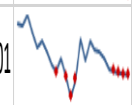
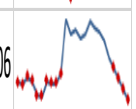
[14] Listed in order of increasing magnitude of NRCA for the year 2018.

Appendix 8: South African sectors not competitive as at 2018 but forecasted to attain competitiveness by 2023

SITC/Yr	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
533	-0.0000037	-0.0000030	0.0000003	-0.0000021	-0.0000034	-0.0000024	-0.0000057	-0.0000009	0.0000011	0.0000020	0.0000017	-0.0000031	-0.0000018	-0.0000006	0.0000001	-0.0000007	-0.0000040	-0.0000048	-0.0000042	-0.0000008	-0.0000005	-0.0000002	0.0000001	0.0000004	
679	-0.0000002	-0.0000025	0.0000009	-0.0000010	-0.0000013	-0.0000039	-0.0000055	-0.0000114	-0.0000124	-0.0000117	-0.0000053	-0.0000113	-0.0000094	-0.0000080	-0.0000062	-0.0000071	-0.0000078	-0.0000052	-0.0000030	-0.0000009	-0.0000004	0.0000001	0.0000006	0.0000011	
553	-0.0000054	-0.0000061	0.0000001	-0.0000023	-0.0000053	-0.0000045	-0.0000034	-0.0000068	-0.0000061	-0.0000058	0.0000025	0.0000008	0.0000029	0.0000042	0.0000050	0.0000041	0.0000012	-0.0000021	-0.0000025	-0.0000006	-0.0000002	0.0000002	0.0000006	0.0000010	
288	0.0000081	0.0000082	0.0000094	0.0000089	0.0000064	0.0000118	0.0000255	0.0000261	0.0000255	0.0000242	0.0000190	0.0000213	0.0000184	0.0000189	0.0000050	0.0000019	0.0000032	-0.0000021	-0.0000021	0.0000003	0.0000004	0.0000004	0.0000005	0.0000006	
726	-0.0000069	-0.0000070	-0.0000047	-0.0000055	-0.0000058	-0.0000061	-0.0000046	-0.0000052	-0.0000043	-0.0000033	-0.0000037	-0.0000029	-0.0000020	-0.0000021	-0.0000018	-0.0000017	-0.0000020	-0.0000022	-0.0000017	-0.0000009	-0.0000005	0.0000000	0.0000005	0.0000010	
672	0.0000141	0.0000121	0.0000141	0.0000261	0.0000186	0.0000166	-0.0000008	-0.0000052	-0.0000102	0.0000045	-0.0000040	-0.0000076	-0.0000079	-0.0000082	-0.0000066	-0.0000035	-0.0000031	0.0000001	-0.0000012	0.0000006	0.0000010	0.0000015	0.0000019	0.0000023	
711	0.0000001	0.0000020	-0.0000004	-0.0000009	-0.0000006	-0.0000012	-0.0000012	-0.0000014	-0.0000018	-0.0000025	-0.0000017	-0.0000025	-0.0000020	-0.0000014	-0.0000011	-0.0000006	-0.0000012	-0.0000011	-0.0000008	-0.0000004	-0.0000001	0.0000002	0.0000005	0.0000008	
642	-0.0000057	-0.0000048	-0.0000057	-0.0000075	-0.0000087	-0.0000086	-0.0000079	-0.0000095	-0.0000085	-0.0000086	0.0000002	-0.0000029	-0.0000022	-0.0000023	-0.0000017	-0.0000019	-0.0000024	-0.0000018	-0.0000007	0.0000008	0.0000010	0.0000012	0.0000015	0.0000017	
891	-0.0000024	-0.0000033	-0.0000020	0.0000010	0.0000010	-0.0000031	-0.0000029	-0.0000032	-0.0000029	-0.0000040	0.0000203	0.0000107	0.0000124	0.0000075	0.0000014	0.0000015	0.0000033	0.0000007	-0.0000006	0.0000051	0.0000049	0.0000047	0.0000045	0.0000043	
581	-0.0000025	-0.0000027	-0.0000018	-0.0000026	-0.0000020	-0.0000024	-0.0000023	-0.0000021	-0.0000014	-0.0000019	0.0000007	0.0000005	0.0000022	0.0000016	0.0000017	0.0000006	-0.0000001	-0.0000008	-0.0000005	0.0000015	0.0000019	0.0000024	0.0000028	0.0000032	
325	-0.0000014	-0.0000013	-0.0000013	-0.0000019	-0.0000036	-0.0000022	-0.0000021	-0.0000012	-0.0000022	-0.0000005	-0.0000026	-0.0000025	-0.0000016	-0.0000013	0.0000004	-0.0000006	-0.0000010	-0.0000010	-0.0000005	0.0000007	0.0000008	0.0000008	0.0000009	0.0000009	
612	-0.0000004	-0.0000003	-0.0000003	-0.0000003	-0.0000005	0.0000000	0.0000000	-0.0000001	0.0000003	-0.0000004	-0.0000004	0.0000002	-0.0000001	-0.0000001	0.0000007	0.0000016	0.0000011	0.0000004	-0.0000002	0.0000024	0.0000028	0.0000032	0.0000036	0.0000041	
674	0.0000093	0.0000102	0.0000072	0.0000057	0.0000076	0.0000101	0.0000023	0.0000061	0.0000045	0.0000042	0.0000039	-0.0000019	-0.0000012	-0.0000032	-0.0000003	-0.0000007	0.0000029	0.0000013	-0.0000001	0.0000099	0.0000115	0.0000131	0.0000147	0.0000162	
727	0.0000016	0.0000006	0.0000005	0.0000001	-0.0000007	-0.0000002	-0.0000007	-0.0000013	-0.0000005	0.0000014	0.0000015	0.0000001	0.0000011	0.0000001	0.0000011	0.0000004	-0.0000002	-0.0000003	-0.0000001	0.0000064	0.0000071	0.0000077	0.0000083	0.0000090	
525	0.0000018	0.0000022	0.0000023	0.0000024	0.0000027	0.0000041	0.0000050	0.0000054	0.0000040	0.0000047	0.0000032	0.0000023	0.0000013	-0.0000004	0.0000025	0.0000024	0.0000027	0.0000018	0.0000000	0.0000014	0.0000015	0.0000016	0.0000017	0.0000018	

Source: Calculated from UN Comtrade Data (2020)

Appendix 9: South African sectors competitive as at 2018 but forecasted to lose competitiveness by 2023

SITC/Yr	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
247	-0.000002	-0.000002	0.000000	-0.000002	-0.000002	-0.000003	-0.000003	-0.000003	-0.000002	-0.000002	-0.000003	-0.000003	-0.000001	-0.000001	0.000000	0.000000	-0.000001	-0.000001	0.000000	-0.000002	-0.000002	-0.000001	-0.000001	0.000000	
678	0.000005	0.000005	0.000006	0.000007	0.000006	0.000005	0.000004	0.000003	0.000004	0.000002	0.000001	0.000000	0.000000	0.000001	0.000001	0.000000	0.000000	0.000000	0.000000	-0.000001	-0.000002	-0.000002	-0.000002	-0.000003	
661	0.000008	0.000007	0.000007	0.000005	0.000004	0.000003	0.000003	0.000000	-0.000006	-0.000003	0.000008	0.000003	0.000002	0.000001	0.000002	0.000000	0.000000	0.000001	0.000001	-0.000005	-0.000006	-0.000006	-0.000007	-0.000008	
742	-0.000006	-0.000005	-0.000006	-0.000006	-0.000006	-0.000004	-0.000005	-0.000004	-0.000004	-0.000001	-0.000001	-0.000002	0.000003	0.000001	0.000000	0.000001	-0.000001	0.000000	0.000001	0.000000	-0.000001	-0.000001	-0.000001	-0.000001	
692	0.000000	0.000000	-0.000001	0.000000	0.000002	0.000003	0.000003	0.000001	0.000001	0.000004	0.000009	0.000005	0.000006	0.000004	0.000003	0.000004	0.000002	0.000001	0.000001	0.000001	0.000000	0.000000	-0.000001	-0.000001	
562	0.000012	0.000012	0.000015	0.000010	0.000006	0.000008	0.000005	0.000001	0.000000	0.000003	-0.000001	-0.000007	-0.000002	0.000008	0.000003	0.000008	0.000006	0.000005	0.000003	0.000000	0.000000	0.000000	-0.000001	-0.000001	
98	-0.000003	-0.000003	-0.000002	-0.000003	-0.000005	-0.000005	-0.000003	-0.000003	-0.000003	-0.000002	0.000007	0.000004	0.000005	0.000004	0.000004	0.000006	0.000005	0.000005	0.000003	0.000001	-0.000001	-0.000003	-0.000004	-0.000006	
532	0.000006	0.000005	0.000006	0.000005	0.000005	0.000005	0.000005	0.000004	0.000003	0.000005	0.000005	0.000004	0.000004	0.000005	0.000004	0.000005	0.000005	0.000005	0.000004	-0.000005	0.000001	-0.000009	-0.000015	-0.000009	
611	0.000016	0.000008	0.000004	0.000001	0.000000	0.000000	0.000001	0.000001	-0.000001	0.000000	-0.000003	0.000000	0.000001	0.000002	0.000004	0.000003	0.000004	0.000005	0.000004	0.000001	0.000000	0.000000	-0.000001	-0.000001	
593	0.000009	0.000004	0.000004	0.000005	0.000007	0.000004	0.000004	0.000004	0.000005	0.000005	0.000006	0.000006	0.000007	0.000006	0.000005	0.000005	0.000004	0.000005	0.000005	0.000005	0.000003	0.000000	-0.000002	-0.000005	

Source: Calculated from UN Comtrade Data (2020)

Appendix 10: South African sectors that had lost competitiveness as at 2018 and forecast to remain uncompetitive between 2019 - 2023

SITC/Yr	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
334	0.000078	0.000075	0.000043	0.000053	-0.000010	-0.000029	-0.000073	-0.000103	-0.000125	-0.000087	-0.000089	-0.000142	-0.000106	-0.000106	-0.000093	-0.000025	-0.000027	-0.000054	-0.000067	-0.000001	-0.000001	0.000000	0.000000	0.000000	
792	-0.000016	-0.000038	-0.000044	-0.000045	-0.000034	0.000007	-0.000010	-0.000021	-0.000022	-0.000028	-0.000028	-0.000030	-0.000028	-0.000033	-0.000033	-0.000030	-0.000034	-0.000042	-0.000036	-0.000001	-0.000001	-0.000001	0.000000	0.000000	
821	0.000025	0.000022	0.000033	0.000030	0.000027	0.000011	0.000001	-0.000003	-0.000008	-0.000008	0.000001	-0.000014	-0.000019	-0.000021	-0.000024	-0.000029	-0.000031	-0.000034	-0.000032	-0.000002	-0.000002	-0.000002	-0.000002	-0.000002	
713	-0.000029	-0.000024	-0.000004	-0.000013	0.000001	-0.000005	0.000000	-0.000005	0.000006	-0.000004	-0.000009	-0.000021	-0.000014	-0.000011	-0.000010	-0.000013	-0.000013	-0.000014	-0.000017	-0.000006	-0.000006	-0.000006	-0.000006	-0.000006	
641	0.000006	0.000013	0.000001	0.000005	0.000001	-0.000001	0.000000	0.000012	0.000006	0.000006	-0.000001	-0.000008	-0.000005	-0.000006	-0.000006	-0.000005	-0.000004	-0.000008	-0.000007	-0.000003	-0.000004	-0.000004	-0.000004	-0.000005	
598	-0.000008	-0.000008	-0.000002	-0.000009	-0.000010	-0.000008	-0.000009	-0.000011	-0.000015	-0.000014	-0.000018	-0.000019	-0.000013	-0.000014	-0.000003	0.000001	-0.000006	-0.000002	-0.000007	-0.000001	-0.000001	-0.000002	-0.000002	-0.000002	
625	0.000005	0.000004	0.000009	0.000008	0.000006	0.000001	-0.000001	-0.000005	-0.000003	-0.000004	-0.000005	-0.000007	-0.000004	-0.000005	-0.000005	-0.000004	-0.000005	-0.000006	-0.000007	-0.000003	-0.000003	-0.000003	-0.000002	-0.000002	
575	-0.000012	-0.000006	-0.000004	-0.000007	-0.000008	-0.000008	-0.000008	-0.000014	-0.000001	0.000001	-0.000003	-0.000005	0.000008	0.000001	0.000004	-0.000004	0.000000	-0.000005	-0.000006	-0.000005	-0.000005	-0.000005	-0.000005	-0.000005	
232	-0.000001	-0.000001	0.000000	0.000000	0.000000	0.000000	-0.000001	0.000000	-0.000001	-0.000002	-0.000003	-0.000005	-0.000003	-0.000004	-0.000003	-0.000003	-0.000003	-0.000005	-0.000006	-0.000037	-0.000037	-0.000038	-0.000039	-0.000039	
695	-0.000001	-0.000003	0.000000	0.000000	-0.000004	-0.000003	-0.000004	-0.000001	-0.000005	-0.000002	0.000001	-0.000003	-0.000001	-0.000003	-0.000004	-0.000005	-0.000006	-0.000005	-0.000005	-0.000005	-0.000005	-0.000006	-0.000006	-0.000006	
791	-0.000002	-0.000002	-0.000001	-0.000004	-0.000005	-0.000003	-0.000002	-0.000003	-0.000004	-0.000004	-0.000005	-0.000004	-0.000003	0.000001	-0.000001	-0.000001	-0.000003	-0.000003	-0.000005	-0.000005	-0.000005	-0.000005	-0.000005	-0.000005	
783	-0.000008	-0.000008	-0.000005	-0.000007	-0.000010	-0.000010	-0.000011	-0.000010	-0.000003	0.000014	0.000002	-0.000010	-0.000008	-0.000007	-0.000006	-0.000006	-0.000005	-0.000005	-0.000005	0.000000	0.000000	0.000000	0.000000	0.000000	
283	-0.000004	-0.000002	-0.000002	-0.000003	-0.000002	0.000003	0.000000	0.000007	0.000012	0.000014	0.000012	0.000018	0.000014	0.000011	0.000011	0.000003	-0.000007	-0.000004	-0.000004	-0.000002	-0.000002	-0.000002	-0.000002	-0.000002	
663	-0.000005	-0.000005	-0.000003	-0.000003	0.000001	0.000000	-0.000001	-0.000002	-0.000002	-0.000004	-0.000004	-0.000005	-0.000004	-0.000004	-0.000004	-0.000004	-0.000004	-0.000005	-0.000004	-0.000016	-0.000016	-0.000016	-0.000016	-0.000016	
513	-0.000008	-0.000008	-0.000006	-0.000006	-0.000002	0.000001	0.000001	0.000000	0.000003	0.000000	0.000001	-0.000005	0.000002	-0.000002	-0.000001	-0.000002	-0.000002	-0.000003	-0.000003	-0.000004	-0.000004	-0.000004	-0.000003	-0.000003	
762	-0.000009	-0.000008	-0.000005	-0.000003	-0.000003	-0.000003	-0.000002	0.000000	-0.000004	-0.000004	-0.000004	-0.000004	-0.000004	-0.000004	-0.000004	-0.000004	-0.000004	-0.000003	-0.000003	-0.000005	-0.000005	-0.000005	-0.000005	-0.000006	
282	0.000000	0.000001	0.000003	0.000001	-0.000002	0.000001	-0.000001	0.000007	0.000016	0.000016	0.000014	0.000017	0.000025	0.000019	0.000018	0.000011	0.000001	-0.000003	-0.000002	-0.000008	-0.000007	-0.000005	-0.000003	-0.000002	
511	0.000009	0.000007	0.000006	0.000003	-0.000004	-0.000001	0.000003	-0.000002	0.000004	0.000009	0.000001	-0.000004	0.000002	-0.000003	0.000001	0.000003	0.000005	0.000001	-0.000002	-0.000004	-0.000004	-0.000004	-0.000004	-0.000004	
551	-0.000002	-0.000003	0.000001	-0.000004	-0.000004	-0.000002	-0.000002	-0.000003	-0.000003	-0.000004	-0.000002	-0.000003	-0.000003	-0.000002	-0.000002	-0.000002	-0.000002	-0.000003	-0.000002	-0.000010	-0.000011	-0.000011	-0.000012	-0.000013	
284	-0.000001	-0.000001	-0.000001	-0.000001	0.000008	0.000004	0.000006	0.000012	0.000001	0.000013	0.000006	-0.000002	-0.000002	0.000005	-0.000001	0.000008	0.000003	-0.000002	-0.000002	-0.000003	-0.000003	-0.000002	-0.000002	-0.000002	
421	-0.000001	-0.000003	-0.000003	-0.000005	-0.000006	-0.000005	-0.000006	-0.000007	-0.000004	-0.000003	0.000003	0.000002	0.000004	0.000001	0.000001	0.000000	0.000001	-0.000002	-0.000002	-0.000012	-0.000013	-0.000014	-0.000016	-0.000017	
881	-0.000011	-0.000009	-0.000006	-0.000007	-0.000008	-0.000006	-0.000005	-0.000002	-0.000002	-0.000002	-0.000001	-0.000001	-0.000001	-0.000001	-0.000001	-0.000002	-0.000001	-0.000002	-0.000001	-0.000037	-0.000041	-0.000045	-0.000049	-0.000052	
873	-0.000001	-0.000001	0.000000	0.000001	0.000001	0.000001	0.000000	0.000002	0.000001	0.000002	0.000003	0.000004	0.000001	0.000000	0.000001	0.000000	-0.000001	-0.000001	-0.000001	-0.000009	-0.000010	-0.000011	-0.000012	-0.000012	
712	-0.000001	-0.000001	0.000001	-0.000001	-0.000001	-0.000001	-0.000001	0.000000	-0.000001	-0.000003	-0.000003	-0.000002	-0.000002	-0.000001	-0.000002	-0.000002	-0.000001	0.000000	-0.000001	-0.000001	-0.000001	-0.000001	-0.000001	-0.000001	
322	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000001	-0.000001	0.000002	0.000005	0.000003	0.000002	0.000001	0.000000	0.000001	0.000000	-0.000001	-0.000011	-0.000012	-0.000014	-0.000016	-0.000018	
677	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-0.000001	0.000000	0.000000	-0.000001	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-0.000001	0.000000	0.000000	0.000000	0.000000	0.000000	
676	0.000028	0.000020	0.000021	0.000023	0.000021	0.000020	0.000004	0.000000	-0.000011	0.000013	0.000014	-0.000008	-0.000001	-0.000001	-0.000006	-0.000006	-0.000005	-0.000003	0.000000	-0.000002	-0.000003	-0.000003	-0.000004	-0.000005	

Source: Calculated from UN Comtrade Data (2020)

Appendix 11: Average Annual Percentage Change in Value of Manufactured Imports for South Africa from 2000-2018 (current USD)

SITC Code	Description	Total Annual % Growth Rate 2000-2018	Average Annual % Growth Rate	Total Imports in US$ 2000-2018	Ranked by Total Import Value 2000-2018	% of Total Manufactured Imports	Export Competitiveness
284	Nickel ores & concentrates; nickel mattes, etc.	23427154.9	1301508.61	2466815343	107	0.25	10-N-N-N
283	Copper ores and concentrates; copper mattes, cemen	56060.32	3114.46	444566179	175	0.05	10-N-N-C
281	Iron ore and concentrates	22401.04	1244.50	795158190	162	0.08	18-C-C-C
264	Jute, other textile bast fibre, n.e.s., not spun; tow	18530.62	1029.48	2257785	199	0.00	0-N-N-N
289	Ores & concentrates of precious metals; waste, scrap	4038.67	224.37	835783158	159	0.08	18-C-C-C
793	Ships, boats & floating structures	2805.30	155.85	2518776398	105	0.26	0-N-N-N
47	Other cereal meals and flour	1993.90	110.77	83466087	193	0.01	18-C-C-C
672	Ingots, primary forms, of iron or steel; semi-finis.	1393.57	77.42	422340305	176	0.04	8-N-N-N
282	Ferrous waste, scrape; remelting ingots, iron, steel	1154.75	64.15	307839838	179	0.03	15-N-N-N
711	Vapour generating boilers, auxiliary plant; parts	1013.89	56.33	243831680	183	0.02	2-N-N-N
17	Meat, edible meat offal, prepared, preserved, n.e.s.	795.73	44.21	168112175	187	0.02	0-N-N-N
325	Coke & semi-cokes of coal, lign., peat; retort carbon	690.87	38.38	3067102130	90	0.31	1-N-N-N
16	Meat, edible meat offal, salted, dried; flours, meals	662.62	36.81	56503652	196	0.01	0-N-N-N
524	Other inorganic chemicals	634.92	35.27	1088141138	150	0.11	18-C-C-C
61	Sugar, molasses and honey	604.26	33.57	4014016172	71	0.41	17-N-C-N
712	Steam turbines & other vapour turbin., parts, n.e.s.	581.29	32.29	5166497604	57	0.53	1-N-N-N
334	Petroleum oils or bituminous minerals > 70 % oil	576.70	32.04	57719102490	2	5.87	4-N-N-N
59	Fruit and vegetable juices, unfermented, no spirit	518.99	28.83	1053512791	151	0.11	18-C-C-C
46	Meal and flour of wheat and flour of meslin	502.89	27.94	163734365	188	0.02	12-N-C-C
23	Butter and other fats and oils derived from milk	495.63	27.53	243403390	184	0.02	0-N-N-N
322	Briquettes, lignites and peat	488.99	27.17	93083023	192	0.01	9-C-N-C
791	Railway vehicles & associated equipment	480.15	26.68	3072473738	88	0.31	1-N-N-N
677	Rails & railway track construction mat., iron, steel	478.25	26.57	752906622	164	0.08	2-N-N-N
613	Furskins, tanned or dressed, excluding those of 8483	455.78	25.32	8505475	198	0.00	0-N-N-N
122	Tobacco, manufactured	441.04	24.50	781091110	163	0.08	16-C-C-C
287	Ores and concentrates of base metals, n.e.s.	435.81	24.21	1386299079	140	0.14	18-C-C-C
691	Structures & parts, n.e.s., of iron, steel, aluminium	416.90	23.16	1435121220	139	0.15	18-C-C-C
844	Women's clothing, of textile, knitted or crocheted	412.89	22.94	2153237793	115	0.22	0-N-N-N
725	Paper mill, pulp mill machinery; paper articles man.	408.53	22.70	2317508944	110	0.24	0-N-N-N
265	Vegetable textile fibres, not spun; waste of them	388.59	21.59	60747428	195	0.01	0-N-N-N
579	Waste, parings and scrap, of plastics	382.07	21.23	32153162	197	0.00	0-N-N-N
411	Animals oils and fats	363.27	20.18	267409099	180	0.03	0-N-N-N
671	Pig iron & spiegeleisen, sponge iron, powder & granu	354.26	19.68	2677575223	101	0.27	18-C-C-C
73	Chocolate, food preparations with cocoa, n.e.s.	352.72	19.60	1155933339	148	0.12	0-N-N-N
842	Women's clothing, of textile fabrics	350.46	19.47	4490791914	65	0.46	0-N-N-N
782	Motor vehic. for transport of goods, special purpo.	350.22	19.46	15741350788	10	1.60	15-C-C-C
562	Fertilizers (other than those of group 272)	344.37	19.13	7921144914	31	0.80	14-C-C-N
62	Sugar confectionery	340.87	18.94	1010920313	152	0.10	11-C-C-C
714	Engines & motors, non-electric; parts, n.e.s.	335.48	18.64	6203575686	41	0.63	0-N-N-N
288	Non-ferrous base metal waste and scrap, n.e.s.	319.43	17.75	506861034	172	0.05	17-N-N-N
843	Men's or boy's clothing, of textile, knitted, croche.	314.92	17.50	1815250156	125	0.18	0-N-N-N
786	Trailers & semi-trailers	310.39	17.24	1695245084	130	0.17	18-C-C-C

722	Tractors (excluding those of 71414 & 74415)	307.11	17.06	4260721406	68	0.43	0-N-N-N
37	Fish, aqua. invertebrates, prepared, preserved, n.e.s.	301.30	16.74	2190560709	113	0.22	0-N-N-N
571	Polymers of ethylene, in primary forms	300.90	16.72	5120494492	59	0.52	0-N-N-N
845	Articles of apparel, of textile fabrics, n.e.s.	287.97	16.00	6611416994	37	0.67	0-N-N-N
551	Essential oils, perfume & flavour materials	283.09	15.73	5225901586	56	0.53	1-N-N-N
716	Rotating electric plant & parts thereof, n.e.s.	281.28	15.63	9299677954	23	0.95	0-N-N-N
674	Flat-rolled prod., iron, non-alloy steel, coated, clad	278.79	15.49	3837741121	75	0.39	13-N-N-N
676	Iron & steel bars, rods, angles, shapes & sections	267.01	14.83	2694036352	99	0.27	10-N-N-N
841	Men's clothing of textile fabrics, not knitted	260.37	14.47	5238446177	55	0.53	0-N-N-N
421	Fixed vegetable fats & oils, crude, refined, fractio.	259.93	14.44	5154047724	58	0.52	7-N-N-C
675	Flat-rolled products of alloy steel	258.48	14.36	4314832561	67	0.44	18-C-C-C
723	Civil engineering & contractors' plant & equipment	256.95	14.28	22926189229	6	2.33	7-C-C-C
58	Fruit, preserved, and fruit preparations (no juice)	255.64	14.20	730348815	167	0.07	18-C-C-C
783	Road motor vehicles, n.e.s.	250.41	13.91	3753489638	80	0.38	2-N-N-N
673	Flat-rolled prod., iron, non-alloy steel, not coated	245.77	13.65	1917299779	121	0.19	18-C-C-N
658	Made-up articles, of textile materials, n.e.s.	241.16	13.40	2973999208	92	0.30	0-N-N-N
846	Clothing accessories, of textile fabrics	240.54	13.36	952426676	154	0.10	0-N-N-N
689	Miscellaneous no-ferrous base metals for metallur.	240.37	13.35	524174624	171	0.05	17-C-C-C
422	Fixed vegetable fats & oils, crude, refined, fract.	231.89	12.88	5030258252	60	0.51	0-N-N-N
781	Motor vehicles for the transport of persons	230.70	12.82	64070955913	1	6.51	16-C-C-C
661	Lime, cement, fabrica. constr. mat. (excluding glass, clay)	230.33	12.80	1669481832	131	0.17	16-C-C-N
247	Wood in the rough or roughly squared	226.67	12.59	108284371	191	0.01	0-N-C-N
24	Cheese and curd	226.39	12.58	629828375	169	0.06	0-N-N-N
112	Alcoholic beverages	226.05	12.56	6407049524	40	0.65	18-C-C-C
56	Vegetables, roots, tubers, prepared, preserved, n.e.s.	222.16	12.34	1318185036	141	0.13	0-N-N-N
812	Sanitary, plumbing, heating fixtures, fittings, n.e.s.	221.68	12.32	309081117	178	0.03	0-N-N-N
553	Perfumery, cosmetics or toilet prepar. (excluding soaps)	213.27	11.85	5504425278	48	0.56	8-N-N-C
831	Travel goods, handbags & similar containers	210.48	11.69	2755809348	96	0.28	0-N-N-N
721	Agricultural machinery (excluding tractors) & parts	210.36	11.69	4522991221	64	0.46	0-N-N-N
813	Lighting fixtures & fittings, n.e.s.	209.91	11.66	2222938562	112	0.23	0-N-N-N
625	Rubber tyres, tyre treads or flaps & inner tubes	209.64	11.65	9087419450	24	0.92	6-N-N-N
522	Inorganic chemical elements, oxides & halogen salts	208.52	11.58	4418990505	66	0.45	18-C-C-N
111	Non-alcoholic beverages, n.e.s.	207.27	11.51	934129121	156	0.09	10-C-C-C
525	Radio-actives and associated materials	206.22	11.46	266719338	181	0.03	17-C-N-N
897	Jewellery & articles of precious materia., n.e.s.	206.20	11.46	1817821488	124	0.18	0-N-N-N
251	Pulp and waste paper	206.07	11.45	1317667025	142	0.13	18-C-C-C
771	Electric power machinery, and parts thereof	204.01	11.33	6473456445	39	0.66	0-N-N-N
759	Parts, accessories for machines of groups 751, 752	202.61	11.26	15786179567	9	1.60	0-N-N-N
811	Prefabricated buildings	202.49	11.25	217507742	186	0.02	10-N-C-C
821	Furniture & parts	200.55	11.14	8005531233	30	0.81	8-N-N-N
692	Metal containers for storage or transport	199.97	11.11	1296605580	143	0.13	15-C-C-C
593	Explosives and pyrotechnic products	198.88	11.05	709610297	168	0.07	18-C-C-C
773	Equipment for distributing electricity, n.e.s.	198.37	11.02	5478176206	49	0.56	0-N-N-N
718	Other power generating machinery & parts, n.e.s.	197.78	10.99	2897113261	93	0.29	0-N-N-N
523	Metallic salts & peroxysalts, of inorganic acids	194.36	10.80	4712919058	62	0.48	18-C-C-C
573	Polymers of vinyl chloride or halogenated olefins	193.05	10.73	826109413	160	0.08	0-N-N-N
232	Synthetic rubber	192.20	10.68	1206985352	146	0.12	2-N-N-N
581	Tubes, pipes and hoses of plastics	191.16	10.62	1640241478	132	0.17	6-N-N-C
893	Articles, n.e.s., of plastics	189.36	10.52	6500443030	38	0.66	0-N-N-N
48	Cereal preparations, flour of fruits or vegetables	189.02	10.50	2188976163	114	0.22	0-N-N-N
697	Household equipment of base metal, n.e.s.	188.69	10.48	2086945931	117	0.21	0-N-N-N
744	Mechanical handling equipment, & parts, n.e.s.	185.50	10.31	10279755984	21	1.04	0-N-N-N
612	Manufactures of leather, n.e.s.; saddlery & harness	182.83	10.16	146685582	189	0.01	7-C-N-C
848	Articles of apparel, clothing access., excluding textile	182.03	10.11	1871783591	123	0.19	0-N-N-N
554	Soaps, cleansing and polishing preparations	181.71	10.10	2699524267	98	0.27	11-C-C-C
851	Footwear	180.94	10.05	12284460476	16	1.25	0-N-N-N
784	Parts & accessories of vehicles of 722, 781, 782, 783	180.12	10.01	19514701651	8	1.98	0-N-N-N
679	Tubes, pipes & hollow profiles, fittings, iron, steel	178.35	9.91	4659889077	63	0.47	1-N-N-N
591	Insectides & similar products, for retail sale	176.85	9.82	4891583002	61	0.50	18-C-C-C
583	Monofilaments, of plastics, cross-section > 1mm	172.52	9.58	262685010	182	0.03	0-N-N-N
727	Food-processing machines (excluding domestic)	172.19	9.57	2567620057	104	0.26	11-N-N-N
899	Miscellaneous manufactured articles, n.e.s.	171.61	9.53	5871860739	45	0.60	0-N-N-N
598	Miscellaneous chemical products, n.e.s.	171.42	9.52	11930611430	18	1.21	1-N-N-N
761	Television receivers, whether or not combined	171.37	9.52	3399407873	84	0.35	0-N-N-N

642	Paper & paperboard, cut to shape or size, articles	171.08	9.50	3810308710	78	0.39	1-N-N-C
98	Edible products and preparations, n.e.s.	169.93	9.44	3771382676	79	0.38	8-C-C-C
699	Manufactures of base metal, n.e.s.	169.25	9.40	9043798991	25	0.92	0-N-N-N
728	Other machinery for particular industries, n.e.s.	167.36	9.30	14450057600	13	1.47	0-N-N-N
574	Polyethers, epoxide resins; polycarbonat., polyesters	164.82	9.16	3662403389	82	0.37	0-N-N-N
873	Meters & counters, n.e.s.	164.13	9.12	1180482872	147	0.12	12-N-N-C
871	Optical instruments & apparatus, n.e.s.	164.11	9.12	847408097	158	0.09	0-N-N-N
741	Heating & cooling equipment & parts thereof, n.e.s.	164.09	9.12	11172271130	20	1.14	0-N-N-N
655	Knitted or crocheted fabrics, n.e.s.	163.77	9.10	1981385601	119	0.20	0-N-N-N
742	Pumps for liquids	163.57	9.09	5637486104	47	0.57	5-N-C-C
778	Electrical machinery & apparatus, n.e.s.	163.52	9.08	14553175239	12	1.48	0-N-N-N
513	Carboxylic acids, anhydrides, halides, per.; derivati.	162.38	9.02	5380387689	52	0.55	7-N-N-N
541	Medicinal and pharmaceutical products, excluding 542	161.54	8.97	7274588218	35	0.74	0-N-N-N
634	Veneers, plywood, and other wood, worked, n.e.s.	161.23	8.96	1770276517	126	0.18	0-N-N-N
775	Household type equipment, electrical or not, n.e.s.	159.93	8.88	7723336932	32	0.78	0-N-N-N
512	Alcohols, phenols, halogenat., sulfonat., nitrat. der.	158.97	8.83	2688172956	100	0.27	18-C-C-C
582	Plates, sheets, films, foil & strip, of plastics	155.86	8.66	7288072785	34	0.74	0-N-N-N
747	Appliances for pipes, boiler shells, tanks, vats, etc.	153.81	8.55	6099498770	44	0.62	0-N-N-N
542	Medicaments (incl. veterinary medicaments)	153.64	8.54	24810604708	5	2.52	0-N-N-N
694	Nails, screws, nuts, bolts, rivets & the like, of metal	151.42	8.41	3075440421	87	0.31	0-N-N-N
678	Wire of iron or steel	150.91	8.38	995522064	153	0.10	15-N-C-N
664	Glass	149.15	8.29	1711417553	128	0.17	0-N-N-N
285	Aluminium ores and concentrates (incl. alumina)	149.07	8.28	8759901673	26	0.89	0-N-N-N
516	Other organic chemicals	148.41	8.24	2033779238	118	0.21	18-C-C-N
592	Starche, wheat gluten; albuminoidal substances; glues	145.84	8.10	2632948120	103	0.27	0-N-N-N
663	Mineral manufactures, n.e.s.	145.06	8.06	6188620049	42	0.63	2-N-N-N
665	Glassware	143.38	7.97	1954096878	120	0.20	0-N-N-N
792	Aircraft & associated equipment; spacecraft, etc.	142.26	7.90	20634708397	7	2.10	1-N-N-N
533	Pigments, paints, varnishes and related materials	141.65	7.87	5317649371	54	0.54	5-N-N-N
872	Instruments & appliances, n.e.s., for medical, etc.	141.55	7.86	8720634612	27	0.89	0-N-N-N
621	Materials of rubber (pastes, plates, sheets, etc.)	141.27	7.85	1447676533	138	0.15	0-N-N-N
743	Pumps (excluding liquid), gas compressors & fans; centr.	141.18	7.84	11605038394	19	1.18	18-C-C-C
666	Pottery	138.19	7.68	808499167	161	0.08	0-N-N-N
695	Tools for use in the hand or in machine	136.95	7.61	5477134359	50	0.56	3-N-N-N
629	Articles of rubber, n.e.s.	134.81	7.49	3820039070	77	0.39	0-N-N-N
752	Automatic data processing machines, n.e.s.	134.49	7.47	29032484562	4	2.95	0-N-N-N
641	Paper and paperboard	134.07	7.45	12014314384	17	1.22	9-N-N-N
776	Cathode valves & tubes	133.88	7.44	8200767706	28	0.83	0-N-N-N
785	Motorcycles & cycles	133.41	7.41	3685699028	81	0.37	0-N-N-N
515	Organo-inorganic, heterocycl. compounds, nucl. acids	133.34	7.41	5365270173	53	0.55	0-N-N-N
335	Residual petroleum products, n.e.s., related mater.	131.37	7.30	3069303141	89	0.31	18-C-C-C
35	Fish, dried, salted or in brine; smoked fish	130.28	7.24	66254786	194	0.01	0-N-N-N
748	Transmis. shafts	127.52	7.08	6140631519	43	0.62	0-N-N-N
532	Dyeing & tanning extracts, synth. tanning materials	125.84	6.99	220347226	185	0.02	18-C-C-C
572	Polymers of styrene, in primary forms	125.32	6.96	2089511429	116	0.21	0-N-N-N
749	Non-electric parts & accessor. of machinery, n.e.s.	125.09	6.95	2751339522	97	0.28	0-N-N-N
657	Special yarn, special textile fabrics & related	123.90	6.88	3831957582	76	0.39	0-N-N-N
894	Baby carriages, toys, games & sporting goods	123.17	6.84	7602529246	33	0.77	0-N-N-N
662	Clay construction, refracto. construction materials	122.91	6.83	3913099030	73	0.40	0-N-N-N
745	Other non-electr. machinery, tools & mechan. appar.	121.85	6.77	8169853553	29	0.83	0-N-N-N
774	Electro-diagnostic appa. for medical sciences, etc.	120.48	6.69	2871283529	94	0.29	0-N-N-N
656	Tulles, trimmings, lace, ribbons & other small wares	118.58	6.59	464488851	173	0.05	0-N-N-N
733	Mach.-tools for working metal, excluding removing mate.	117.66	6.54	1622725970	133	0.16	0-N-N-N
511	Hydrocarbons, n.e.s., & halogenated, nitr. derivative	116.09	6.45	3393960271	85	0.34	13-C-N-C
885	Watches & clocks	115.86	6.44	1744329248	127	0.18	0-N-N-N
696	Cutlery	113.98	6.33	1101354068	149	0.11	0-N-N-N
635	Wood manufacture, n.e.s.	113.21	6.29	1261079676	144	0.13	5-N-C-C
659	Floor coverings, etc.	112.96	6.28	736250547	166	0.07	0-N-N-N
713	Internal combustion piston engines, parts, n.e.s.	112.43	6.25	9331752068	22	0.95	2-N-N-N
772	Apparatus for electrical circuits; board, panels	112.43	6.25	12509256509	15	1.27	0-N-N-N
693	Wire products (excluding electrical) and fencing grills	104.51	5.81	1546655286	135	0.16	18-C-C-C
751	Office machines	103.33	5.74	5746185644	46	0.58	0-N-N-N
575	Other plastics, in primary forms	103.14	5.73	7022413294	36	0.71	4-N-N-C
737	Metalworking machinery (excluding machine-tools) & parts	100.97	5.61	2673375308	102	0.27	0-N-N-N

874	Measuring, analysing & controlling apparatus, n.e.s.	100.72	5.60	14820177174	11	1.51	0-N-N-N
764	Telecommunication equipment, n.e.s.; & parts, n.e.s.	100.51	5.58	55884507889	3	5.68	0-N-N-N
884	Optical goods, n.e.s.	99.21	5.51	2492008490	106	0.25	0-N-N-N
597	Prepared addit. for miner. oils; lubricat., de-icing	97.64	5.42	4137644418	70	0.42	0-N-N-N
735	Parts, n.e.s., & accessories for machines of 731, 733	92.77	5.15	945949065	155	0.10	0-N-N-N
652	Cotton fabrics, woven	91.83	5.10	1882960437	122	0.19	0-N-N-N
248	Wood simply worked, and railway sleepers of wood	91.63	5.09	2396372184	108	0.24	0-N-N-N
431	Animal or veg. oils & fats, processed, n.e.s.; mixt.	90.43	5.02	1231472374	145	0.13	1-N-C-C
763	Sound recorders or reproducers	87.47	4.86	3907807321	74	0.40	0-N-N-N
667	Pearls, precious & semi-precious stones	86.48	4.80	12509357663	14	1.27	18-C-C-C
514	Nitrogen-function compounds	86.06	4.78	3950641956	72	0.40	0-N-N-N
731	Machine-tools working by removing material	83.23	4.62	2277516402	111	0.23	0-N-N-N
746	Ball or roller bearings	81.55	4.53	3468343431	83	0.35	0-N-N-N
654	Other textile fabrics, woven	75.39	4.19	564034746	170	0.06	0-N-N-N
651	Textile yarn	69.61	3.87	3011773749	91	0.31	0-N-N-N
895	Office & stationery supplies, n.e.s.	68.33	3.80	1496668757	137	0.15	0-N-N-N
269	Worn clothing and other worn textile articles	62.81	3.49	138369089	190	0.01	0-N-N-N
724	Textile & leather machinery, & parts thereof, n.e.s.	60.55	3.36	2820124380	95	0.29	0-N-N-N
267	Other man-made fibres suitable for spinning	52.23	2.90	462787833	174	0.05	0-N-N-N
266	Synthetic fibres suitable for spinning	50.72	2.82	856249109	157	0.09	3-N-C-C
653	Fabrics, woven, of man-made fabrics	49.43	2.75	4235947389	69	0.43	0-N-N-N
611	Leather	34.63	1.92	1562523344	134	0.16	14-C-C-C
531	Synth. organic colouring matter & colouring lakes	29.26	1.63	1513012018	136	0.15	0-N-N-N
762	Radio-broadcast receivers, whether or not combined	10.97	0.61	2328168118	109	0.24	1-N-N-N
881	Photographic apparatus & equipment, n.e.s.	4.29	0.24	736905135	165	0.07	0-N-N-C
898	Musical instruments, parts; records, tapes & similar	-15.17	-0.84	5398980637	51	0.55	0-N-N-N
882	Cinematographic & photographic supplies	-18.76	-1.04	1709021572	129	0.17	0-N-N-N
726	Printing & bookbinding machinery, & parts thereof	-27.65	-1.54	3183566821	86	0.32	0-N-N-C
633	Cork manufactures	-31.07	-1.73	374241726	177	0.04	0-N-N-N

Source: Calculated from Comtrade Data (2020)

Appendix 12: South Africa Manufacturing Sector Trade from 2000-2018 (current USD).

SITC Code	Description	Total Exports 2000-2018	Total Imports 2000-2018	Exports - Imports 2000-2018	Imports/Exports 2000-2018
285	Aluminium ores and concentrates (incl. alumina)	$ 20,082,824	$ 8,759,901,673	$ -8,739,818,849	436.19
712	Steam turbines & other vapour turbin., parts, n.e.s.	$ 158,459,994	$ 5,166,497,604	$ -5,008,037,610	32.60
422	Fixed vegetable fats & oils, crude, refined, fract.	$ 198,927,042	$ 5,030,258,252	$ -4,831,331,210	25.29
265	Vegetable textile fibres, not spun; waste of them	$ 2,686,405	$ 60,747,428	$ -58,061,023	22.61
572	Polymers of styrene, in primary forms	$ 110,954,404	$ 2,089,511,429	$ -1,978,557,025	18.83
267	Other man-made fibres suitable for spinning	$ 28,027,185	$ 462,787,833	$ -434,760,648	16.51
633	Cork manufactures	$ 24,045,806	$ 374,241,726	$ -350,195,920	15.56
325	Coke & semi-cokes of coal, lign., peat; retort carbon	$ 228,055,599	$ 3,067,102,130	$ -2,839,046,531	13.45
725	Paper mill, pulp mill machinery; paper articles man.	$ 187,676,817	$ 2,317,508,944	$ -2,129,832,127	12.35
752	Automatic data processing machines, n.e.s.	$ 2,868,429,398	$ 29,032,484,562	$ -26,164,055,164	10.12
733	Mach.-tools for working metal, excluding removing mate.	$ 163,860,006	$ 1,622,725,970	$ -1,458,865,964	9.90
763	Sound recorders or reproducers	$ 409,616,060	$ 3,907,807,321	$ -3,498,191,261	9.54
751	Office machines	$ 631,644,131	$ 5,746,185,644	$ -5,114,541,513	9.10
898	Musical instruments, parts; records, tapes & similar	$ 594,095,656	$ 5,398,980,637	$ -4,804,884,981	9.09
894	Baby carriages, toys, games & sporting goods	$ 839,724,624	$ 7,602,529,246	$ -6,762,804,622	9.05
884	Optical goods, n.e.s.	$ 277,241,784	$ 2,492,008,490	$ -2,214,766,706	8.99
885	Watches & clocks	$ 200,185,673	$ 1,744,329,248	$ -1,544,143,575	8.71
764	Telecommunication equipment, n.e.s.; & parts, n.e.s.	$ 6,524,121,416	$ 55,884,507,889	$ -49,360,386,473	8.57
724	Textile & leather machinery, & parts thereof, n.e.s.	$ 337,709,279	$ 2,820,124,380	$ -2,482,415,101	8.35
731	Machine-tools working by removing material	$ 273,850,585	$ 2,277,516,402	$ -2,003,665,817	8.32
583	Monofilaments, of plastics, cross-section > 1mm	$ 34,080,892	$ 262,685,010	$ -228,604,118	7.71
759	Parts, accessories for machines of groups 751, 752	$ 2,100,711,267	$ 15,786,179,567	$ -13,685,468,300	7.51
872	Instruments & appliances, n.e.s., for medical, etc.	$ 1,166,937,322	$ 8,720,634,612	$ -7,553,697,290	7.47
653	Fabrics, woven, of man-made fabrics	$ 573,437,285	$ 4,235,947,389	$ -3,662,510,104	7.39
785	Motorcycles & cycles	$ 503,734,353	$ 3,685,699,028	$ -3,181,964,675	7.32
531	Synth. organic colouring matter & colouring lakes	$ 208,410,077	$ 1,513,012,018	$ -1,304,601,941	7.26
714	Engines & motors, non-electric; parts, n.e.s.	$ 916,307,717	$ 6,203,575,686	$ -5,287,267,969	6.77
726	Printing & bookbinding machinery, & parts thereof	$ 474,270,891	$ 3,183,566,821	$ -2,709,295,930	6.71
851	Footwear	$ 1,836,267,694	$ 12,284,460,476	$ -10,448,192,782	6.69
831	Travel goods, handbags & similar containers	$ 414,078,308	$ 2,755,809,348	$ -2,341,731,040	6.66

514	Nitrogen-function compounds	$ 604,874,005	$ 3,950,641,956	$ -3,345,767,951	6.53
655	Knitted or crocheted fabrics, n.e.s.	$ 309,420,077	$ 1,981,385,601	$ -1,671,965,524	6.40
542	Medicaments (incl. veterinary medicaments)	$ 3,915,180,320	$ 24,810,604,708	$ -20,895,424,388	6.34
597	Prepared addit. for miner. oils; lubricat., de-icing	$ 733,063,217	$ 4,137,644,418	$ -3,404,581,201	5.64
735	Parts, n.e.s., & accessories for machines of 731, 733	$ 170,572,731	$ 945,949,065	$ -775,376,334	5.55
722	Tractors (excluding those of 71414 & 74415)	$ 781,531,235	$ 4,260,721,406	$ -3,479,190,171	5.45
842	Women's clothing, of textile fabrics	$ 843,169,193	$ 4,490,791,914	$ -3,647,622,721	5.33
582	Plates, sheets, films, foil & strip, of plastics	$ 1,412,326,576	$ 7,288,072,785	$ -5,875,746,209	5.16
696	Cutlery	$ 215,868,268	$ 1,101,354,068	$ -885,485,800	5.10
541	Medicinal and pharmaceutical products, excluding 542	$ 1,475,899,836	$ 7,274,588,218	$ -5,798,688,382	4.93
515	Organo-inorganic, heterocycl. compounds, nucl. acids	$ 1,110,224,314	$ 5,365,270,173	$ -4,255,045,859	4.83
718	Other power generating machinery & parts, n.e.s.	$ 623,996,784	$ 2,897,113,261	$ -2,273,116,477	4.64
652	Cotton fabrics, woven	$ 407,656,481	$ 1,882,960,437	$ -1,475,303,956	4.62
882	Cinematographic & photographic supplies	$ 378,162,277	$ 1,709,021,572	$ -1,330,859,295	4.52
762	Radio-broadcast receivers, whether or not combined	$ 525,262,529	$ 2,328,168,118	$ -1,802,905,589	4.43
666	Pottery	$ 184,165,880	$ 808,499,167	$ -624,333,287	4.39
571	Polymers of ethylene, in primary forms	$ 1,179,445,244	$ 5,120,494,492	$ -3,941,049,248	4.34
654	Other textile fabrics, woven	$ 130,164,032	$ 564,034,746	$ -433,870,714	4.33
845	Articles of apparel, of textile fabrics, n.e.s.	$ 1,557,593,887	$ 6,611,416,994	$ -5,053,823,107	4.24
551	Essential oils, perfume & flavour materials	$ 1,236,802,730	$ 5,225,901,586	$ -3,989,098,856	4.23
749	Non-electric parts & accessor. of machinery, n.e.s.	$ 664,175,950	$ 2,751,339,522	$ -2,087,163,572	4.14
774	Electro-diagnostic appa. for medical sciences, etc.	$ 698,746,641	$ 2,871,283,529	$ -2,172,536,888	4.11
746	Ball or roller bearings	$ 849,066,195	$ 3,468,343,431	$ -2,619,277,236	4.08
716	Rotating electric plant & parts thereof, n.e.s.	$ 2,289,647,978	$ 9,299,677,954	$ -7,010,029,976	4.06
721	Agricultural machinery (excluding tractors) & parts	$ 1,119,587,368	$ 4,522,991,221	$ -3,403,403,853	4.04
871	Optical instruments & apparatus, n.e.s.	$ 212,448,738	$ 847,408,097	$ -634,959,359	3.99
848	Articles of apparel, clothing access., excluding textile	$ 472,809,671	$ 1,871,783,591	$ -1,398,973,920	3.96
776	Cathode valves & tubes	$ 2,083,717,981	$ 8,200,767,706	$ -6,117,049,725	3.94
745	Other non-electr. machinery, tools & mechan. appar.	$ 2,108,948,996	$ 8,169,853,553	$ -6,060,904,557	3.87
841	Men's clothing of textile fabrics, not knitted	$ 1,398,038,138	$ 5,238,446,177	$ -3,840,408,039	3.75
737	Metalworking machinery (excluding machine-tools) & parts	$ 720,893,852	$ 2,673,375,308	$ -1,952,481,456	3.71
771	Electric power machinery, and parts thereof	$ 1,746,694,914	$ 6,473,456,445	$ -4,726,761,531	3.71
899	Miscellaneous manufactured articles, n.e.s.	$ 1,586,613,161	$ 5,871,860,739	$ -4,285,247,578	3.70
677	Rails & railway track construction mat., iron, steel	$ 203,533,508	$ 752,906,622	$ -549,373,114	3.70
592	Starche, wheat gluten; albuminoidal substances; glues	$ 711,947,103	$ 2,632,948,120	$ -1,921,001,017	3.70

248	Wood simply worked, and railway sleepers of wood	$ 659,589,566	$ 2,396,372,184	$ -1,736,782,618	3.63
874	Measuring, analysing & controlling apparatus, n.e.s.	$ 4,133,073,649	$ 14,820,177,174	$ -10,687,103,525	3.59
662	Clay construction, refracto. construction materials	$ 1,095,117,360	$ 3,913,099,030	$ -2,817,981,670	3.57
775	Household type equipment, electrical or not, n.e.s.	$ 2,168,174,204	$ 7,723,336,932	$ -5,555,162,728	3.56
741	Heating & cooling equipment & parts thereof, n.e.s.	$ 3,184,668,876	$ 11,172,271,130	$ -7,987,602,254	3.51
574	Polyethers, epoxide resins; polycarbonat., polyesters	$ 1,054,467,960	$ 3,662,403,389	$ -2,607,935,429	3.47
663	Mineral manufactures, n.e.s.	$ 1,819,505,831	$ 6,188,620,049	$ -4,369,114,218	3.40
778	Electrical machinery & apparatus, n.e.s.	$ 4,358,000,483	$ 14,553,175,239	$ -10,195,174,756	3.34
844	Women's clothing, of textile, knitted or crocheted	$ 651,684,824	$ 2,153,237,793	$ -1,501,552,969	3.30
747	Appliances for pipes, boiler shells, tanks, vats, etc.	$ 1,880,305,272	$ 6,099,498,770	$ -4,219,193,498	3.24
881	Photographic apparatus & equipment, n.e.s.	$ 232,021,595	$ 736,905,135	$ -504,883,540	3.18
657	Special yarn, special textile fabrics & related	$ 1,217,195,140	$ 3,831,957,582	$ -2,614,762,442	3.15
744	Mechanical handling equipment, & parts, n.e.s.	$ 3,273,764,341	$ 10,279,755,984	$ -7,005,991,643	3.14
629	Articles of rubber, n.e.s.	$ 1,266,842,357	$ 3,820,039,070	$ -2,553,196,713	3.02
723	Civil engineering & contractors' plant & equipment	$ 7,699,690,899	$ 22,926,189,229	$ -15,226,498,330	2.98
772	Apparatus for electrical circuits; board, panels	$ 4,203,063,407	$ 12,509,256,509	$ -8,306,193,102	2.98
792	Aircraft & associated equipment; spacecraft, etc.	$ 7,010,741,035	$ 20,634,708,397	$ -13,623,967,362	2.94
813	Lighting fixtures & fittings, n.e.s.	$ 792,262,169	$ 2,222,938,562	$ -1,430,676,393	2.81
843	Men's or boy's clothing, of textile, knitted, croche.	$ 663,885,555	$ 1,815,250,156	$ -1,151,364,601	2.73
651	Textile yarn	$ 1,122,268,851	$ 3,011,773,749	$ -1,889,504,898	2.68
694	Nails, screws, nuts, bolts, rivets & the like, of metal	$ 1,147,852,672	$ 3,075,440,421	$ -1,927,587,749	2.68
697	Household equipment of base metal, n.e.s.	$ 793,406,610	$ 2,086,945,931	$ -1,293,539,321	2.63
269	Worn clothing and other worn textile articles	$ 53,833,533	$ 138,369,089	$ -84,535,556	2.57
748	Transmis. shafts	$ 2,407,927,292	$ 6,140,631,519	$ -3,732,704,227	2.55
895	Office & stationery supplies, n.e.s.	$ 601,196,483	$ 1,496,668,757	$ -895,472,274	2.49
431	Animal or veg. oils & fats, processed, n.e.s.; mixt.	$ 496,236,276	$ 1,231,472,374	$ -735,236,098	2.48
421	Fixed vegetable fats & oils, crude, refined, fractio.	$ 2,090,139,748	$ 5,154,047,724	$ -3,063,907,976	2.47
791	Railway vehicles & associated equipment	$ 1,256,011,784	$ 3,072,473,738	$ -1,816,461,954	2.45
266	Synthetic fibres suitable for spinning	$ 360,942,756	$ 856,249,109	$ -495,306,353	2.37
37	Fish, aqua. invertebrates, prepared, preserved, n.e.s.	$ 938,002,675	$ 2,190,560,709	$ -1,252,558,034	2.34
665	Glassware	$ 854,978,535	$ 1,954,096,878	$ -1,099,118,343	2.29
761	Television receivers, whether or not combined	$ 1,518,874,030	$ 3,399,407,873	$ -1,880,533,843	2.24
727	Food-processing machines (excluding domestic)	$ 1,157,831,380	$ 2,567,620,057	$ -1,409,788,677	2.22
411	Animals oils and fats	$ 127,654,392	$ 267,409,099	$ -139,754,707	2.09
621	Materials of rubber (pastes, plates, sheets, etc.)	$ 700,842,183	$ 1,447,676,533	$ -746,834,350	2.07
695	Tools for use in the hand or in machine	$ 2,752,538,542	$ 5,477,134,359	$ -2,724,595,817	1.99
783	Road motor vehicles, n.e.s.	$ 1,923,362,798	$ 3,753,489,638	$ -1,830,126,840	1.95

598	Miscellaneous chemical products, n.e.s.	$ 6,181,001,467	$ 11,930,611,430	$ -5,749,609,963	1.93
513	Carboxylic acids, anhydrides, halides, per.; derivati.	$ 2,875,138,512	$ 5,380,387,689	$ -2,505,249,177	1.87
625	Rubber tyres, tyre treads or flaps & inner tubes	$ 4,923,578,557	$ 9,087,419,450	$ -4,163,840,893	1.85
728	Other machinery for particular industries, n.e.s.	$ 7,851,833,079	$ 14,450,057,600	$ -6,598,224,521	1.84
23	Butter and other fats and oils derived from milk	$ 133,646,321	$ 243,403,390	$ -109,757,069	1.82
284	Nickel ores & concentrates; nickel mattes, etc.	$ 1,360,553,129	$ 2,466,815,343	$ -1,106,262,214	1.81
846	Clothing accessories, of textile fabrics	$ 540,549,741	$ 952,426,676	$ -411,876,935	1.76
24	Cheese and curd	$ 365,052,490	$ 629,828,375	$ -264,775,885	1.73
264	Jute, other textile bast fibre, n.e.s., not spun; tow	$ 1,312,656	$ 2,257,785	$ -945,129	1.72
656	Tulles, trimmings, lace, ribbons & other small wares	$ 275,739,847	$ 464,488,851	$ -188,749,004	1.68
773	Equipment for distributing electricity, n.e.s.	$ 3,268,627,478	$ 5,478,176,206	$ -2,209,548,728	1.68
658	Made-up articles, of textile materials, n.e.s.	$ 1,787,319,023	$ 2,973,999,208	$ -1,186,680,185	1.66
562	Fertilizers (other than those of group 272)	$ 4,904,877,538	$ 7,921,144,914	$ -3,016,267,376	1.61
16	Meat, edible meat offal, salted, dried; flours, meals	$ 35,097,219	$ 56,503,652	$ -21,406,433	1.61
334	Petroleum oils or bituminous minerals > 70 % oil	$ 36,347,811,904	$ 57,719,102,490	$ -21,371,290,586	1.59
634	Veneers, plywood, and other wood, worked, n.e.s.	$ 1,149,390,885	$ 1,770,276,517	$ -620,885,632	1.54
699	Manufactures of base metal, n.e.s.	$ 5,949,771,251	$ 9,043,798,991	$ -3,094,027,740	1.52
523	Metallic salts & peroxysalts, of inorganic acids	$ 3,152,866,425	$ 4,712,919,058	$ -1,560,052,633	1.49
742	Pumps for liquids	$ 3,872,313,534	$ 5,637,486,104	$ -1,765,172,570	1.46
784	Parts & accessories of vehicles of 722, 781, 782, 783	$ 13,824,198,572	$ 19,514,701,651	$ -5,690,503,079	1.41
591	Insectides & similar products, for retail sale	$ 3,525,708,690	$ 4,891,583,002	$ -1,365,874,312	1.39
893	Articles, n.e.s., of plastics	$ 4,707,349,318	$ 6,500,443,030	$ -1,793,093,712	1.38
533	Pigments, paints, varnishes and related materials	$ 3,879,553,196	$ 5,317,649,371	$ -1,438,096,175	1.37
641	Paper and paperboard	$ 8,820,078,076	$ 12,014,314,384	$ -3,194,236,308	1.36
232	Synthetic rubber	$ 893,817,702	$ 1,206,985,352	$ -313,167,650	1.35
73	Chocolate, food preparations with cocoa, n.e.s.	$ 865,426,870	$ 1,155,933,339	$ -290,506,469	1.34
659	Floor coverings, etc.	$ 584,318,205	$ 736,250,547	$ -151,932,342	1.26
793	Ships, boats & floating structures	$ 2,137,190,249	$ 2,518,776,398	$ -381,586,149	1.18
56	Vegetables, roots, tubers, prepared, preserved, n.e.s.	$ 1,125,709,406	$ 1,318,185,036	$ -192,475,630	1.17
642	Paper & paperboard, cut to shape or size, articles	$ 3,367,287,338	$ 3,810,308,710	$ -443,021,372	1.13
581	Tubes, pipes and hoses of plastics	$ 1,453,356,300	$ 1,640,241,478	$ -186,885,178	1.13
62	Sugar confectionery	$ 913,787,751	$ 1,010,920,313	$ -97,132,562	1.11
573	Polymers of vinyl chloride or halogenated olefins	$ 755,266,719	$ 826,109,413	$ -70,842,694	1.09
897	Jewellery & articles of precious materia., n.e.s.	$ 1,667,368,082	$ 1,817,821,488	$ -150,453,406	1.09
48	Cereal preparations, flour of fruits or vegetables	$ 2,019,652,009	$ 2,188,976,163	$ -169,324,154	1.08
873	Meters & counters, n.e.s.	$ 1,114,389,196	$ 1,180,482,872	$ -66,093,676	1.06
679	Tubes, pipes & hollow profiles, fittings, iron, steel	$ 4,406,618,918	$ 4,659,889,077	$ -253,270,159	1.06
664	Glass	$ 1,635,314,489	$ 1,711,417,553	$ -76,103,064	1.05
575	Other plastics, in primary forms	$ 6,845,694,254	$ 7,022,413,294	$ -176,719,040	1.03
713	Internal combustion piston engines, parts, n.e.s.	$ 9,228,336,612	$ 9,331,752,068	$ -103,415,456	1.01

711	Vapour generating boilers, auxiliary plant; parts	$ 243,733,876	$ 243,831,680	$ -97,804	1.00
553	Perfumery, cosmetics or toilet prepar. (excluding soaps)	$ 5,666,587,000	$ 5,504,425,278	$ 162,161,722	0.97
812	Sanitary, plumbing, heating fixtures, fittings, n.e.s.	$ 320,787,406	$ 309,081,117	$ 11,706,289	0.96
781	Motor vehicles for the transport of persons	$ 68,496,282,909	$ 64,070,955,913	$ 4,425,326,996	0.94
821	Furniture & parts	$ 8,801,322,178	$ 8,005,531,233	$ 795,790,945	0.91
674	Flat-rolled prod., iron, non-alloy steel, coated, clad	$ 4,479,125,778	$ 3,837,741,121	$ 641,384,657	0.86
635	Wood manufacture, n.e.s.	$ 1,536,824,026	$ 1,261,079,676	$ 275,744,350	0.82
693	Wire products (excluding electrical) and fencing grills	$ 1,908,269,921	$ 1,546,655,286	$ 361,614,635	0.81
98	Edible products and preparations, n.e.s.	$ 5,075,545,191	$ 3,771,382,676	$ 1,304,162,515	0.74
678	Wire of iron or steel	$ 1,345,008,597	$ 995,522,064	$ 349,486,533	0.74
61	Sugar, molasses and honey	$ 5,953,999,978	$ 4,014,016,172	$ 1,939,983,806	0.67
554	Soaps, cleansing and polishing preparations	$ 4,232,929,849	$ 2,699,524,267	$ 1,533,405,582	0.64
661	Lime, cement, fabrica. constr. mat. (excluding glass, clay)	$ 2,644,344,593	$ 1,669,481,832	$ 974,862,761	0.63
611	Leather	$ 2,520,383,249	$ 1,562,523,344	$ 957,859,905	0.62
692	Metal containers for storage or transport	$ 2,152,873,382	$ 1,296,605,580	$ 856,267,802	0.60
516	Other organic chemicals	$ 3,596,452,402	$ 2,033,779,238	$ 1,562,673,164	0.57
111	Non-alcoholic beverages, n.e.s.	$ 1,657,291,654	$ 934,129,121	$ 723,162,533	0.56
511	Hydrocarbons, n.e.s., & halogenated, nitr. derivative	$ 6,158,777,328	$ 3,393,960,271	$ 2,764,817,057	0.55
335	Residual petroleum products, n.e.s., related mater.	$ 5,683,454,585	$ 3,069,303,141	$ 2,614,151,444	0.54
782	Motor vehic. for transport of goods, special purpo.	$ 31,501,585,223	$ 15,741,350,788	$ 15,760,234,435	0.50
35	Fish, dried, salted or in brine; smoked fish	$ 149,693,982	$ 66,254,786	$ 83,439,196	0.44
593	Explosives and pyrotechnic products	$ 1,637,974,461	$ 709,610,297	$ 928,364,164	0.43
112	Alcoholic beverages	$ 15,389,731,052	$ 6,407,049,524	$ 8,982,681,528	0.42
612	Manufactures of leather, n.e.s.; saddlery & harness	$ 354,011,690	$ 146,685,582	$ 207,326,108	0.41
579	Waste, parings and scrap, of plastics	$ 78,775,238	$ 32,153,162	$ 46,622,076	0.41
676	Iron & steel bars, rods, angles, shapes & sections	$ 6,664,940,012	$ 2,694,036,352	$ 3,970,903,660	0.40
522	Inorganic chemical elements, oxides & halogen salts	$ 11,120,822,562	$ 4,418,990,505	$ 6,701,832,057	0.40
786	Trailers & semi-trailers	$ 4,389,787,490	$ 1,695,245,084	$ 2,694,542,406	0.39
512	Alcohols, phenols, halogenat., sulfonat., nitrat. der.	$ 7,481,070,079	$ 2,688,172,956	$ 4,792,897,123	0.36
524	Other inorganic chemicals	$ 3,126,133,751	$ 1,088,141,138	$ 2,037,992,613	0.35
667	Pearls, precious & semi-precious stones	$ 38,376,905,405	$ 12,509,357,663	$ 25,867,547,742	0.33
743	Pumps (excluding liquid), gas compressors & fans; centr.	$ 36,503,440,558	$ 11,605,038,394	$ 24,898,402,164	0.32
689	Miscellaneous no-ferrous base metals for metallur.	$ 1,699,475,518	$ 524,174,624	$ 1,175,300,894	0.31
811	Prefabricated buildings	$ 718,661,460	$ 217,507,742	$ 501,153,718	0.30
17	Meat, edible meat offal, prepared, preserved, n.e.s.	$ 577,805,576	$ 168,112,175	$ 409,693,401	0.29
675	Flat-rolled products of alloy steel	$ 14,932,090,342	$ 4,314,832,561	$ 10,617,257,781	0.29
46	Meal and flour of wheat and flour of meslin	$ 600,848,318	$ 163,734,365	$ 437,113,953	0.27

59	Fruit and vegetable juices, unfermented, no spirit	$ 3,878,253,072	$ 1,053,512,791	$ 2,824,740,281	0.27
122	Tobacco, manufactured	$ 3,354,413,646	$ 781,091,110	$ 2,573,322,536	0.23
322	Briquettes, lignites and peat	$ 431,582,074	$ 93,083,023	$ 338,499,051	0.22
691	Structures & parts, n.e.s., of iron, steel, aluminium	$ 6,991,428,278	$ 1,435,121,220	$ 5,556,307,058	0.21
58	Fruit, preserved, and fruit preparations (no juice)	$ 3,744,021,686	$ 730,348,815	$ 3,013,672,871	0.20
673	Flat-rolled prod., iron, non-alloy steel, not coated	$ 10,759,638,369	$ 1,917,299,779	$ 8,842,338,590	0.18
672	Ingots, primary forms, of iron or steel; semi-finis.	$ 2,489,151,057	$ 422,340,305	$ 2,066,810,752	0.17
525	Radio-actives and associated materials	$ 1,594,230,349	$ 266,719,338	$ 1,327,511,011	0.17
247	Wood in the rough or roughly squared	$ 665,255,716	$ 108,284,371	$ 556,971,345	0.16
613	Furskins, tanned or dressed, excluding those of 8483	$ 52,680,853	$ 8,505,475	$ 44,175,378	0.16
532	Dyeing & tanning extracts, synth. tanning materials	$ 1,365,945,917	$ 220,347,226	$ 1,145,598,691	0.16
891	Arms & ammunition	$ 1,729,556,612	$ 232,156,692	$ 1,497,399,920	0.13
289	Ores & concentrates of precious metals; waste, scrap	$ 6,551,573,632	$ 835,783,158	$ 5,715,790,474	0.13
251	Pulp and waste paper	$ 11,648,775,382	$ 1,317,667,025	$ 10,331,108,357	0.11
283	Copper ores and concentrates; copper mattes, cemen	$ 4,616,941,818	$ 444,566,179	$ 4,172,375,639	0.10
288	Non-ferrous base metal waste and scrap, n.e.s.	$ 5,842,089,266	$ 506,861,034	$ 5,335,228,232	0.09
47	Other cereal meals and flour	$ 1,330,663,508	$ 83,466,087	$ 1,247,197,421	0.06
282	Ferrous waste, scrape; remelting ingots, iron, steel	$ 5,244,395,390	$ 307,839,838	$ 4,936,555,552	0.06
671	Pig iron & spiegeleisen, sponge iron, powder & granu	$ 63,803,808,431	$ 2,677,575,223	$ 61,126,233,208	0.04
287	Ores and concentrates of base metals, n.e.s.	$ 51,967,856,049	$ 1,386,299,079	$ 50,581,556,970	0.03
281	Iron ore and concentrates	$ 65,803,159,142	$ 795,158,190	$ 65,008,000,952	0.01

Source: Calculated from Comtrade Data (2020)