

An impact analysis of customs risk management processes in South Africa

J Maree



orcid.org/0000-0001-7638-8185

Thesis accepted in fulfilment of the requirements for the degree **Doctor of Philosophy** in **International Trade** at the North-West University

Promoter: Prof S Grater

Co-Promoter: Prof AJ Hoffman

Graduation: May 2020

Student number: 10147578

ACKNOWLEDGEMENTS

It was an absolute privilege to have had the opportunity to conduct this doctoral study. My heart is filled with joy, peace and contentment to acknowledge the following people for their contributions to my achievement of this goal.

Without the guidance and support of many people, I would not have been able to complete this journey. Therefore, I would like to extend my appreciation to the following people:

- To Professor Sonja Grater and Professor Alwyn Hoffman, my supervisors, for extending their knowledge, support and time throughout this journey. I have been privileged to draw upon your great expertise in this field of research and you both transformed my study into a value-added contribution to the bigger trading environment.
- To Jacob van Rensburg and Sjanet Fullarton. Thank you for the encouragement, working together, long hours, late nights, support and guidance throughout this challenging time.
- To Kobus Maree, my husband, you always believed in me and I am still convinced that although you think I am the best, in truth, it is *you* who are the best and who loves me dearly.
- Lastly, and most importantly, to my family and friends who have given me their endless love and support, not only throughout this journey but throughout my life.

On a more formal note, I would like to thank the five organisations that made this study possible:

- Firstly, I wish to acknowledge the financial assistance of Savino Del Bene (Pty) Ltd in this research. The opinions expressed and conclusions arrived at are those of the author and should not necessarily be attributed to Savino Del Bene (Pty) Ltd. I am grateful for the financial support, expertise and practical experience that Savino Del Bene (Pty) Ltd allowed me in this Doctoral scholarship.
- Secondly, SAAFF, XA Traders and TIASA for working with the data and testing the various case studies.
- Finally, to the North-West University, thank you for giving me the opportunity to do my PhD and for all the support.

I want to thank God for giving me the strength, determination, insight and courage to have completed my studies.

ABSTRACT

The role of customs administrations has undergone a major paradigm shift in modern times with a greater emphasis on protecting socio-economic interests from fiscal and non-fiscal threats, especially given the increased flow of goods internationally. Historically, many customs administrations have used risk-averse approaches, requiring 100 per cent inspection of all shipments, conveyances, crews and passengers. These outdated approaches would have brought vast networks of increased global trade to a halt; therefore, there was a need for customs administrations to apply risk management practices. These applications have maintained a safe, secure environment while facilitating the flow of global trade. Since there is limited literature available to explain the impact of customs risk management on trade, especially in the southern African region, this thesis sets out to fill the gap. It presents an impact analysis of customs risk management practices from a South African perspective. This thesis is presented in the form of three independent articles, each addressing various interrelated aspects.

Article 1 investigates the current customs risk management models employed around the world and compares them to the model currently employed by South Africa's customs administration. The emphasis of the investigation is on the increased role that the private sector plays in securing the end-to-end supply chain and shifting away some responsibility from customs administration as prescribed by the WCO SAFE Pillar II and other forms of economic operator programmes. The article shows that several countries (e.g. the US, UK, EU) are currently at different stages of developing new performance measurement models based on the relationship between customs and business. Although South Africa has a similar programme (the 'preferred trader' or PT) in place, progress has been slow. The article finally makes recommendations towards a best practice customs risk model based on numerous risk factors, such as entity, transactional, cargo and commercial risk, to improve the risk engine that South African customs employs. This, in turn, should solve many of the problems mentioned in articles 2 and 3.

Article 2 explores the effectiveness of the current customs risk management practices and their impact on trade in South Africa. It further explores whether inefficient customs processes or unnecessary customs delays impact on the seamless flow of cargo, commonly indicating a low-risk score. Given that multiple factors affect the customs process, it is essential to identify the areas of worst performance and their common underlying causes to progress towards improved solutions. The research defines the most important process outcomes from a trade (industry) and customs perspective, identifies the key input factors and extracts the performance measures from the data exchanged between the customs administration and cargo consignors between September 2014 and September 2016. The study measures the time it took to complete the

customs process per category and the effectiveness of the customs administration in screening consignments for inspection. This article highlights the need for improved customs processes in the South African context to ensure more efficient trade. The results show that of all shipments that were delayed by customs, more than 90 per cent were delayed unnecessarily, which is an indication of inefficient risk identification in the South African customs process.

Article 3 examines the quantified impact of customs delays using a case study on the vertical tyre market in South Africa. Against the backdrop of increased flows of tyre imports into South Africa, the article uses transaction-level flows between the South African customs administration (SARS) and consignors of tyres imported into South Africa between January 2017 and April 2018 (16 months). The article indicates that a customs delay in the vertical tyre market in South Africa results in an average direct cost increase of 3.8 per cent of customs value for the imports and adds an additional 4.8 days to the end-to-end supply chain. In addition to the direct impact, customs delays also have a lasting indirect impact on cost and time, differing in range from one tyre importer to another. This article also highlights the need for improved customs processes in the South African context to ensure more efficient trade in the vertical tyre market.

Collectively, this thesis contributes to the limited literature on customs efficiency in southern Africa. It reveals that there is a need for improved customs risk management processes in the South African context to facilitate trade more efficiently. The results of the study indicate that the role of customs administration in the twenty-first century is no longer as static as before and must evolve to meet the dynamic demands of global trade in a modern, technology-driven era. The responsibility of securing a safe, efficient and transparent trading environment no longer rests with customs administration alone but should include stronger collaboration with the private sector. Finally, customs risk management should start before the transactions are concluded, with efficient profiling and screening of operators, and continue after transactions are concluded with post-clearance audits.

Key terms: *customs administration, customs risk management, trade facilitation, South Africa*

OPSOMMING

Die rol van doeane-administrasie het die laaste tyd 'n groot paradigmaskuif gemaak na 'n groter klem op die manier waarop doeane-administrasie gedwing word om sosio-ekonomiese belange teen fiskale en nie-fiskale bedreigings te beskerm gegewe die toenemende internasionale vloei van goedere. Meeste histories gebruiklike doeane-administrasies het risiko vermydende benaderings gebruik, wat 100 persent inspeksie van alle verskepings, vervoer, bemanningslede en passasiers vereis het. Aangesien hierdie verouderde benaderings groot netwerke van toenemende globale handel tot 'n stilstand sou bring, was dit nodig dat die doeane-administrateurs risiko-bestuurspraktyke toepas namate 'n veilige handelsomgewing te handhaaf en terselfdertyd die vloei van wêreldhandel vergemaklik. Aangesien daar 'n beperkende hoeveelheid bestaande literatuur is wat die impak van doeane-risikobestuur op handel verduidelik, veral in die suidelike Afrika omgewing, beoog hierdie proefskrif om die gaping te vernou deur 'n impakanalise te doen op doeanerisiko-bestuurspraktyke vanuit 'n Suid-Afrikaanse oogpunt. Hierdie proefskrif word aangebied in die vorm van drie onafhanklike artikels, waarvan elk verskillende verwante aspekte aanspreek.

Artikel 1 ondersoek huidige wêreldwye risikobestuursmodelle en vergelyk hulle met die model wat tans in Suid-Afrika se doeane-administrasie gebruik word. Die klem van die ondersoek val op die toenemende rol wat die privaatsektor speel om die handelsooreenkoms van die punt-tot-punt handelsketting te verseker, waar dit van die verantwoordelikhede wegskuif van doeane-administrasies, soos voorgeskryf deur die *WCO SAFE Pillar II* en ander vorme van ekonomiese operateursprogramme. Die artikel toon aan dat verskeie lande (soos die VSA, VK, EU) tans op verskillende stadia van die ontwikkeling van nuwe prestasie-metingsmodelle staan, wat op die verhouding tussen doeane en sake gebaseer is. Alhoewel Suid-Afrika 'n soortgelyke program in plek het (die voorkeur-handelaarsprogram) is vordering stadig. Die artikel maak uiteindelik aanbevelings vir 'n bestepraktyk-doeane-risikomodel wat gebaseer is op talle risikofaktore, soos entiteit, transaksie, en vrag- en kommersiële risiko's, ten einde die risiko-enjin van Suid-Afrikaanse doeane te verbeter. Hierdie aanbevole risikomodel moet op sy beurt verskeie probleme oplos wat in artikel 2 en 3 geïdentifiseer word.

Artikel 2 ondersoek die doeltreffendheid van die huidige doeane-risikobestuurspraktyke en die impak daarvan op handel in Suid-Afrika. Die artikel ondersoek verder of doeaneprosesse of onnodige doeanevertragings 'n impak het op die gladde vloei van vragte wat gewoonlik 'n lae risiko-telling aantoon. Aangesien verskeie faktore 'n impak het op die doeane-proses, is dit noodsaaklik om die faktore wat die swakste presteer, sowel as die onderliggende oorsake wat tot hierdie swak prestasie bydra te identifiseer met die oogmerk op uiteindelijke verbeterde

oplossings. Die belangrikste prosesuitkomst vanuit die perspektief van beide handel (industrie) en doeane word gedefinieer, die sleutelinsetfaktore geïdentifiseer en prestasiemaatreëls onttrek vanuit data wat tussen die doeane-administrasies en vragbesenders uitgeruil word gedurende die tydperk September 2014 tot September 2016. Die tydsduur vir die voltooiing van die doeaneproses word per kategorie gemeet, sowel as die doeltreffendheid van die doeane-administrasies in die keuring van vragte vir inspeksie. Hierdie artikel beklemtoon die behoefte aan verbeterde doeaneprosesse in die Suid-Afrikaanse konteks om handel meer doeltreffend te laat plaasvind. Die resultate dui aan dat meer as 90 persent van alle verskepinge wat deur doeane vertraag is, onnodig vertraag is, wat ondoeltreffende risiko-identifisering in die Suid-Afrikaanse doeaneproses aandui.

Artikel 3 ondersoek die gekwantifiseerde impak van verdragings deur doeane-administrasies deur middel van 'n gevallestudie oor die vertikale bandemark in Suid-Afrika. Teen die agtergrond van die toename in die invoer van bande in Suid-Afrika, gebruik die artikel transaksievloei strome wat tussen die Suid-Afrikaanse doeane-unie (SARS) en verskepers van bande wat ingevoer is na Suid-Afrika, vir die tydperk Januarie 2017 tot April 2018 (16 maande). Die artikel dui aan dat 'n doeane-vertraging in die vertikale bandemark in Suid-Afrika gemiddeld 'n gemiddelde direkte koste-verhoging van 3.8 persent van die doeane-waarde vir die invoer van bande tot gevolg het, en 'n addisionele 4.8 dae tot die punt-tot-punt handelsketting byvoeg. Benewens die direkte impak, het doeaneverdragings ook 'n beduidende indirekte impak ten opsigte van koste en tyd, wat wissel van invoerder tot invoerder. Hierdie artikel beklemtoon verder die behoefte aan verbeterde doeaneprosesse in die Suid-Afrikaanse konteks om meer doeltreffende handel in die vertikale bandemark te verseker.

Algeheel dra hierdie proefskrif by tot die beperkte bestaande literatuur deur die behoefte aan verbeterde doeaneprosesse in die Suid-Afrikaanse konteks aan te spreek ten einde meer doeltreffende handel te verseker. Die resultate dui daarop dat die rol van doeane-administrasies in die een-en-twintigste eeu nie meer so staties is soos dit van tevore was nie, en dat dit moet ontwikkel om aan die dinamiese eise van globale handel in 'n tegnologie-gedrewe moderne era te voldoen. Verder lê die verantwoordelikheid om 'n veilige, doeltreffende en deursigtige handelsomgewing te verseker, nie meer uitsluitlik by doeane-administrasies nie, maar dat dit nouer moet saamwerk met die privaatsektor. Ten slotte moet die toepassing van doeane-risikobestuur in werking tree voordat transaksies aangegaan word, deur middel van effektiewe profielskepping en keuring van operateurs, en moet dit aanhou totdat transaksies afgehandel is met die toepassing van doeane-risikobestuur nadat transaksies met na-goedkeuring oudits afteken is.

Sleuteltermes: *doeane-administrasie, doeane-risikobestuur, handel fasilitering, Suid-Afrika*

LIST OF ABBREVIATIONS

3PLs	=	Third-Party Logistics Services Providers
40 FCL	=	40-Foot Full Container Load
AEO	=	Authorised Economic Operators
APDP	=	Automotive Production and Development Programme
ASYCUDA	=	Automated System for Customs Data
C-2-B	=	Customs-to-Business
C-2-C	=	Customs-to-Customs
C-2-OGA	=	Customs-to-Other Government Agency
CBCU	=	Customs and Border Control Unit
CBRA	=	Cross-Border Research Association
CCU	=	Commercial Crime Unit
CITES	=	Convention on International Trade in Endangered Species
COO	=	Country of Origin
CPC	=	Customs Procedure Codes
CPFR	=	Collaborative Planning, Forecasting and Replenishment
CSI	=	Container Security Initiative
CUSCAR	=	Customs Cargo Report
DPS	=	Declaration Processing
DTI	=	Department of Trade and Industry
EDI	=	Electronic Data Interchange
EU	=	European Union

EWP	=	Examination without Prejudice, Customs
GACC	=	General Administration of Customs of the People's Republic of China
GATT	=	General Agreement on Trade and Tariffs
GDP	=	Gross Domestic Product
GVC	=	Global Value Chains
HMRC	=	Her Majesty's Revenue and Customs
HS	=	Harmonised System
HTS	=	Harmonised Tariff Schedule
ICT	=	Information and Communications Technology
IDC	=	Industrial Development Corporation
IT	=	Information Technology
JIT	=	Just-in-Time
LDCs	=	Least Developed Countries
MNEs	=	Multinational Enterprises
MRA	=	Malawian Revenue Authority
MRAs	=	Mutual Recognition Agreements
MRN	=	Movement Reference Number
NAFTA	=	North American Free Trade Agreement
NCAP	=	New Customs Act Programme
NRCS	=	National Regulator of Compulsory Specifications
NWU	=	North-West University
NZCS	=	New Zealand Customs Service
OECD	=	Organisation for Economic Co-operation and Development

OGA	=	Other Government Agencies
PCA	=	Post-Clearance Audit
PSCG	=	Private Sector Consultative Group
PT	=	Preferred Trader
RCG	=	Reporting of Conveyancing and Goods
RFID	=	Radio Frequency Identification
RKC	=	Revised Kyoto Convention
RLA	=	Registration, Licensing and Accreditation
SAAFF	=	South African Association of Freight Forwarders
SACU	=	Southern African Customs Union
SADC	=	Southern African Development Community
SAFE	=	Framework of Standards to Secure and Facilitate Global Trade
SAPS	=	South African Police Department
SARS	=	South African Revenue Service
SATMC	=	South African Tyre Manufacturers Conference
SES	=	Secure Exports Scheme
SIDA	=	Swedish International Development Cooperation Agency
SMEs	=	Small and Medium Enterprises
TCTT	=	Transactional Crime Task Team, SAPS
TEUs	=	Twenty-Foot-Equivalents
TFA	=	Trade Facilitation Agreement
TIASA	=	Tyre Importers Association of South Africa
TIU	=	Tactical Intervention Unit

TRIPS	=	Agreement on Trade-Related Aspects of Intellectual Property Rights
TRS	=	Time Release Study
UNCTAD	=	United Nations Conference for Trade and Development
US	=	United States
VAT	=	Value-Added Tax
VOC	=	Voucher of Correction
WCJ	=	World Customs Journal
WCO	=	World Customs Organisation
WEF	=	World Economic Forum
WTO	=	World Trade Organisation

TABLE OF CONTENTS

ACKNOWLEDGEMENTS.....	I
ABSTRACT.....	II
OPSOMMING.....	IV
LIST OF ABBREVIATIONS.....	VI
CHAPTER 1: INTRODUCTION	1
1.1 Introduction	1
1.2 Literature background	3
1.2.1 The role of customs administration and risk management.....	6
1.2.2 Customs and the process of risk management in South Africa	8
1.3 Problem statement and research questions	11
1.4 Objectives	11
1.5 Motivation	12
1.6 Research method	14
1.6.1 Data.....	15
1.7 Chapter outline.....	16
1.8 Notes to the reader	17
1.8.1 Publications.....	17
CHAPTER 2: LITERATURE OVERVIEW.....	18
2.1 Introduction	18
2.2 The role of customs in facilitating trade	19
2.2.1 The role of the World Customs Organisation	21

2.2.2	Mirror statistics used in customs to identify value fraud	24
2.2.3	Summary	25
2.3	Globalisation and global value chains	26
2.3.1	Managing risks in global value chains.....	30
2.4	Trade facilitation (WTO TFA).....	35
2.5	Conclusion.....	39

CHAPTER 3: AN INVESTIGATIVE STUDY INTO GLOBAL CUSTOMS RISK

MANAGEMENT PRACTICES	41
3.1 Introduction	41
3.2 Customs risk management practices globally	42
3.3 A regulatory framework for customs risk management practices	51
3.4 Customs-to-business risk management practices globally	55
3.4.1 United States.....	57
3.4.2 European Union	60
3.4.3 United Kingdom.....	61
3.4.4 Belgium	62
3.4.5 New Zealand	63
3.4.6 China.....	65
3.4.7 Malawi	65
3.4.8 Kenya	67
3.4.9 Summary	67
3.5 Customs risk management practices in South Africa.....	69
3.5.1 Introduction and historical context.....	69

3.5.2	Customs legislation in South Africa.....	70
3.5.3	SARS preferred trader programme	71
3.5.4	SARS risk assessment.....	73
3.5.5	Summary	78
3.6	Recommendations towards an improved customs risk management model for South Africa	78
3.6.1	Entity risk.....	82
3.6.2	Transaction risk.....	83
3.6.3	Cargo risk.....	83
3.6.4	Commercial risk	84
3.7	Conclusions and recommendations	85
3.8	Reference list.....	88
	CHAPTER 4: AN EXPLORATIVE STUDY INTO THE EFFECTIVENESS OF A CUSTOMS OPERATION AND ITS IMPACT ON TRADE	94
4.1	Introduction	94
4.2	Literature background	97
4.3	The South African customs landscape.....	99
4.4	Description of data.....	100
4.5	Methodology for extracting information from the data	102
4.6	Results and findings from the analysis	105
4.6.1	Overview of the dataset	106
4.6.2	Imports, exports, ex-bond and in-transit.....	109
4.6.3	Performance per customs office	110

4.6.4	Performance per CPC code	118
4.6.5	Performance per country of export.....	119
4.6.6	Performance per mode of transport	120
4.6.7	Performance per consignor.....	123
4.6.8	Performance per HS code.....	123
4.6.9	Correlation analysis between input factors and outcomes.....	125
4.7	Conclusion and recommendations	127
4.8	Reference list.....	128

CHAPTER 5: AN IMPACT STUDY ON CUSTOMS DELAYS IN THE VERTICAL TYRE MARKET IN SOUTH AFRICA 130

5.1	Introduction	130
5.2	An overview of the vertical tyre market in South Africa.....	136
5.2.1	Composition and growth of vertical tyre market in South Africa.....	136
5.2.2	Customs risks within the vertical tyre market in South Africa.....	144
5.2.3	The role of SARS customs in the vertical tyre market in South Africa	147
5.3	Empirical analysis of the vertical tyre market in South Africa	150
5.3.1	Overview of the data	150
5.3.2	Risk factors impacting the probability of customs inspections	154
5.3.2.1	Impact of HS code on probability of customs inspections.....	154
5.3.2.2	Impact of country of origin on probability of customs inspections	157
5.3.2.3	Impact of customs valuation on probability of customs inspections.....	160
5.3.2.4	Summary.....	162
5.3.3	Impact of customs inspections	163

5.3.3.1	Direct costs incurred due to customs delays in the vertical tyre market in South Africa.....	163
5.3.3.2	Direct time incurred due to customs delays in the vertical tyre market in South Africa.....	168
5.3.3.3	Indirect cost incurred due to customs delays in the vertical tyre market in South Africa.....	170
5.3.3.4	Summary	172
5.3.4	Proposed system for customs risk management in the vertical tyre market	172
5.3.5	Summary of the empirical analysis	174
5.4	Conclusions and recommendations	176
5.5	Reference list.....	178
CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS		181
6.1	Introduction	181
6.2	Summary of the results and conclusions of the study	183
6.3	Contribution.....	186
6.4	Recommendations	188
6.4.1	Recommendations for future research in the field of customs risk management	189
6.4.2	Recommendations for policymakers and SARS customs	190
REFERENCE LIST		193
APPENDIX		207

LIST OF TABLES

Table 3-1:	Summary of risk management processes in the international trade environment:.....	52
Table 3-2:	Risk indicators and possible remedies in the greater supply chain:	80
Table 4-1:	Input factors reflecting customs declaration processes.....	101
Table 4-2:	Customs response codes	101
Table 4-3:	Description of customs codes and outcomes	103
Table 4-4:	Statistics for all consignments over total period	106
Table 4-5:	Description of transport mode codes.....	121
Table 5-1:	Growth in import customs value (2010-2017) per country of origin (millions)	139
Table 5-2:	Main subheadings of tyres imported into South Africa (2010-2017).....	143
Table 5-3:	Total number of MRNs & average customs value per MRN of tyre imports to South Africa (2010-2017).....	143
Table 5-4:	Identifying the risk location within the vertical tyre market.....	145
Table 5-5:	Total number of MRNs per company & average customs value per MRN of tyre imports to South Africa (Jan 2017 - Apr 2018)	151
Table 5-6:	Share of observations per customs outcome	151
Table 5-7:	Vertical tyre market, typical domestic logistics (excluding VAT, duty and levies) cost for a 40 FCL.....	153
Table 5-8:	Statistics of tyre imports to South Africa stopped by customs per HS code (Jan 2017 - Apr 2018, per line entry)	154
Table 5-9:	Statistics of tyre imports to South Africa stopped by customs which required amendments (Jan 2017 - Apr 2018, per line entry).....	157

Table 5-10:	Statistics of tyre imports to South Africa stopped by customs per country of origin (Jan 2017 - Apr 2018, per line entry)	158
Table 5-11:	Statistics of tyre imports to South Africa stopped by customs per product valuation (Jan 2017 - Apr 2018, per line entry)	160
Table 5-12:	Direct cost incurred for a customs stop (40 FCL)	163
Table 5-13:	Domestic logistics cost for OGA stops per code:	167
Table 5-14:	Domestic logistics cost as a percentage of customs value for tyre imports to South Africa (Jan 2017 - Apr 2018)	168
Table 5-15:	Average time incurred for tyre consignments not stopped and stopped by customs (days)	169
Table 5-16:	Summary of tyre consignments stopped by customs	170

LIST OF FIGURES

Figure 2-1:	Key areas of transformation in the supply chain: Driven by new market dynamics	28
Figure 2-2:	Ever-present, end-to-end proactive risk management practices	32
Figure 2-3:	Stages in the logistics-outsourcing process	34
Figure 2-4:	Trade efficiency and trade facilitation form the “New frontier of competitiveness”	37
Figure 3-1:	Effecting profiling and screening to indicate high-risk consignments (method to reduce the risk pie)	44
Figure 3-2:	Activities that can trigger a risk in the movement of goods (for example, FCL Import and the relationship linkage)	45
Figure 3-3:	WCO instruments, guidelines and deployments for the analysis and study of risk management	51
Figure 3-4:	Port of Antwerp: Integrated risk-based clearance approach	63
Figure 3-5:	Malawian import processing	66
Figure 3-6:	SARS customs improvements since 1980	70
Figure 3-7:	SARS PT programme and alignment to AEO compliance, safety, security and AEO full fledge	73
Figure 3-8:	SARS’s view on implementing a risk assessment model	74
Figure 3-9:	Trade management portal with four dedicated risk interventions	75
Figure 3-10:	Position of message grid between SARS and Private sector on data fields submitted	76
Figure 3-11:	Holistic view of the treatment of low- and high-risk cargo	77
Figure 3-12:	Risk indicators in the greater supply chain:	80
Figure 3-13:	A suggested SARS customs risk management model	82

Figure 4-1:	Time trend over all consignments: number of declarations and average duration (h)	106
Figure 4-2:	Statistics for different stopped outcomes.....	108
Figure 4-3:	Comparison of time trends: stopped and inspected vs stopped, inspected and amended	109
Figure 4-4:	Average duration to process declarations per customs office	112
Figure 4-5:	Comparison of share stopped and inspected between different customs offices	113
Figure 4-6:	Comparison of fraction unjustified stops between different customs offices	113
Figure 4-7:	Histogram of customs processing time at Beitbridge border post	115
Figure 4-8:	Time durations of unjustified stops per customs office	116
Figure 4-9:	Time duration for different outcomes at Durban customs office	117
Figure 4-10:	Time trends: different customs offices – physical inspections.....	118
Figure 4-11:	Comparisons of average duration between different CPC codes.....	119
Figure 4-12:	Comparisons of average durations between different counties of origin	120
Figure 4-13:	Comparisons of average duration between different modes of transport.....	122
Figure 4-14:	Comparisons of average duration of unjustified stops between different modes of transport.....	122
Figure 4-15:	Comparison of average duration between different consignors	123
Figure 4-16:	Comparisons of average duration between different HS codes	124
Figure 4-17:	Comparisons of average duration of unjustified stops.....	124
Figure 4-18:	Correlation between various customs outcomes and nine explanatory variables	126
Figure 5-1:	Growth in imported customs value (2010-2017).....	138

Figure 5-2:	Top 10 export countries (COO) of tyres to South Africa based on MRNs by year (2010-2017)	140
Figure 5-3:	Growth per chapter heading (entry line level) for tyre imports to South Africa (2010-2017), number of units	141
Figure 5-4:	Country of origin for tyre imports to South Africa based on tariff subheadings (2010-2017), number of units	142
Figure 5-5:	Context of the New Customs Acts Programme – RLA, DPS and RCG	148
Figure 5-6:	Visual breakdown of domestic cost per category for importer tyres to South Africa	152
Figure 5-7:	T-statistic comparisons of different HS codes	156
Figure 5-8:	Tyre imports to South Africa stopped by customs per country of origin (Jan 2017 - Apr 2018)	159
Figure 5-9:	T-statistic comparisons of different countries of origin	160
Figure 5-10:	T-statistic comparisons of different product valuation (per HS code)	162
Figure 5-11:	Vertical tyre market, total customs value of imports and share of consignments stopped (customs and OGAs), 2017/2018, per quarter	164
Figure 5-12:	Vertical tyre market, domestic logistics cost for consignments stopped by customs, 2017/2018, per quarter	165
Figure 5-13:	Vertical tyre market domestic logistics cost for consignments stopped by other government agencies (OGAs), 2017/2018, per quarter	166
Figure 5-14:	Customs' continual change over the last 30+ years	173

CHAPTER 1: INTRODUCTION

1.1 Introduction

The pace and extent of globalisation in recent decades (associated with an information and communications technology (ICT) revolution and transnational production growth) may lead create the impression that international exchange (international communication, movement of goods, services and factors) is now relatively free of friction (Milner, 2013:689). It has, furthermore, become increasingly common to produce goods in a number of geographically dispersed stages that are linked by the global network of international trade, also known as global value chains (Ferrantino, 2013:3).

The effect of this global change on the industry organisation is that it now required many more export and import transactions to provide a single unit for final demand, especially for complex goods such as computers and automobiles. While examples of production fragmentation go back to ancient times, the widespread adaptation of this method of production and trade has a number of implications for how the world economy works today.

Some of these implications include reallocating the added value of trade among different countries, depending on where they fit in the supply chain (Koopman *et al.*, 2010:56) and, possibly, making international trade flows more sensitive to the business cycle, as demonstrated in the recent Great Recession and Great Trade Collapse of 2008-2009 (Baldwin, 2009:43). Other implications concern the governance of increased levels and greater integration of trade.

The rising levels of international trade and the progressively integrated nature of supply chains have created a global need for sophisticated risk management services, with the help of modern information technology (IT) systems, to make global trade more visible (Manners-Bell *et al.*, 2014:233) and effectively measure any disruption in the supply chain.

Disruptions in international supply chains can often be ascribed to failure of a link or node in the chain. Since global supply chains are analogous with integrated systems (with their functioning being reliant on various elements working in unison), the process is only as effective as the weakest link in the chain. As the complexity of the supply networks increases, so do the links and hence a greater risk of failure within one of these links (Trent & Roberts, 2010:41; Manners-Bell *et al.*, 2014:223). Examples of modern-day supply chain failures are plentiful and teach us is that the nature of a threat or risk is dynamic rather than static.

One such example is the Yemen air cargo plot in 2010 (Manners-Bell, 2014:157). Two packages were shipped from Yemen to synagogues in the Chicago area on UPS and FedEx cargo planes. The explosive packages were hidden in printer cartridges and were identified with the help of intelligence tips from Saudi Arabian authorities while in transit on cargo planes in the United Kingdom and Dubai (Carafano & Zuckerman, 2011:14). Each bomb had already been transported on passenger and cargo planes at the time of discovery without being detected by authorities en route to the United States.

This incident demonstrates that risk management in the supply chain can no longer be limited to verifying a full customs declaration (e.g. product classification, country of origin and valuation) at the time of importation. It should, rather, be more targeted and proactive with a system that analyses the geographic routing of a specific parcel and matches it with the full customs declaration. The Yemen air cargo incident (along with many other similar incidents) and the overall increase in trade transactions have also led to a focus on the important role of customs administration in different countries (Widdowson, 2007:34).

The changing role of customs administration can be explained by the need to facilitate trade through integrated supply chain activities while protecting the fiscus (ability to collect money) and the safety and security of their citizens at the same time (Creskoff, 2016:193). Given the shift from gatekeeper to facilitator in the role of customs administration in the modern sphere of international trade, it is crucial to execute this role efficiently (Widdowson & Holloway, 2011:106-107).

Customs administration at either the frontline or borderline cannot interrupt global transactions and supply chain movements simply based on a perceived risk; however, neither can high-risk cargo be allowed (such as those in the Yemen air cargo incident) because the matching of full declaration data (product classification, country of origin and valuation) was not effectively linked to the entire supply chain movement of the parcel. Consequently, risk management in customs today calls for a much more robust approach compared to the traditional one of gatekeeping, coupled with 100 per cent stopped inspections. This robust approach calls for the inclusion of many different facets of intelligence in customs operations. The importance of including intelligence in customs operations must rest on modern legislation. Legislation should allow information to be collected and shared, even internationally, where appropriate (Dunne, 2010:15).

World trade has been dynamic in terms of price gaps and policy offering over the past decade. Until recently, the underlying development was driven by the strong growth of export and import traffic from China (Taleb, 2012:11). The traditional trade lanes are losing some of their importance and Africa, for example, has become one of the fastest-growing investor markets for China,

especially pertaining to mining and infrastructure opportunities (Taleb, 2012:19). This emphasis on trade in Africa (with many more import and export transactions) places much more pressure on customs administration to evolve with trade. Customs administrations must, therefore, improve their management processes to improve their reputation, capacity to work more effectively with the same or fewer resources professionalism of their staff and to have a more 'intelligent' approach. This will lead to better customs results overall, ultimately leading to customs achieving its organisational and national objectives (Dunne, 2010:16).

As Baldwin (2016:125) explains, a reduction in cost, easier movement of goods across international borders, the international separation of factories and the possibility of coordinating complex activities from a distance, have all contributed to lowering trade and communication costs. Now, there is a greater possibility of lowering the cost of face-to-face communications. Ultimately, a more efficient customs risk management process is central to lowering trade costs and facilitating international trade.

Therefore, this study will focus on the impact of customs risk management processes within the South African context. The following section provides a brief literature overview followed by the problem statement and research questions. This is followed by the study's objective, the motivation behind the research and, finally, the research method that will be used.

1.2 Literature background

International trade transactions have been a part of human history since the earliest times (Creskoff, 2016:7). Therefore, it is important to understand the progress of trade from a local supply-and-demand (consumption) pattern to regional economic integration and, ultimately, vast networks of global trade. The creation of 'no borders' around the world has come about by forming and establishing globalisation between nations. The world is no longer fragmented but is a global village with greater visibility and links to trade transaction costs with tariff and non-tariff barriers to protect a national economy. To understand said progress, it is necessary to know the reasons why countries engage in trade with one another in the first place.

During the sixteenth century, conventional wisdom implied that the foremost manner for a country to prosper in trade was to export more than it imported. Trade barriers were created and subsequently, the first theory of trade – mercantilism – was developed. Governments intervened with protection measures to encourage exports and limit imports, which led to a favourable trade balance (Maneschi, 2007:20).

Sir Thomas Mun, generally regarded as the major creator of the mercantile system, wrote in his posthumously published *Treasure by Foreign Trade*, “to sell more to strangers yearly than we consume of theirs in value” (Mun, 1713:5). Mercantilism believed that one country could only prosper at the expense of another. Successfully challenging mercantilism theory, Adam Smith published his opus magnum *The Wealth of Nations* (Smith, 1776), which explained that both countries could benefit when trading with one another through the absolute advantage theory. Producing a product more cost-effectively than its counterparts gives a country an absolute advantage with that product. Countries were thus encouraged to focus on products that enjoy a cost advantage over other countries (specialisation). When two countries enjoy an absolute advantage in productivity and engage in trade with one another, both countries will reap the benefits.

In the absence of absolute advantage, countries could even benefit from a difference in opportunity costs. Through his historical example of England and Portugal trading wine and cloth, David Ricardo explained how both countries could benefit from trading with one another (through specialisation), even though Portugal enjoys an absolute advantage in both goods (Van Marrewijk, 2012:55).

During the 1930s, Swedish economists, Eli Hecksher and Bertil Ohlin, extended the comparative advantage theory and claimed that most international trade patterns are determined by the differences in resources or the abundant factors of production in countries (Van Marrewijk, 2012:154). By using various assumptions, the authors explained that countries are either capital-intensive or labour-intensive and concluded that countries will specialise in the production of those goods that it is better endowed with (Krugman & Obstfeld, 2009:54).

The American economist, Wassily Leontief, tested the Hecksher-Ohlin theory in 1953. In an apparent contradiction to the Hecksher-Ohlin theory, the author found that while the United States (US) had an abundance of capital-intensive goods, their exports were labour intensive. Leontief put forth his results, explaining the increased level of productivity that the US labourers enjoyed in relation to foreign labourers (Leontief, 1953:349).

The founder of the competitiveness theory, the American economist, Michael Porter, explained in numerous studies how a country could effectively produce the exact high-level products or services while benefiting from a cost or differentiation advantage relative to its competitors at the same time (Porter, 1985). By being competitive, countries can gain from trade through their strategic positions and their ability to outwit their competitors. To successfully compete

internationally, countries should have adequate factors of production at either the firm-industry level or the national level (Porter, 2011).

One of the first pivotal contributions of the American economist, Paul Krugman, appeared in 1991, giving a different view on the reason for trade and inequalities. His contribution can be summed up in the new concept of “geographical economics”, especially when it combines elements of international economics, industrial organisations, economic geography, spatial economics, urban economics and endogenous growth (Krugman, 1991).

Trade across the world was then further expanded by developing and evolving supply chains in the movement of goods across borders and inside borders, with a reduction in international movement costs. Supply chain(s) is a collective term to describe the movement of goods from one location to another across geographic borderlines of countries and thousands of kilometres for sourcing, manufacturing, assembly or consumption by the end consumer (Kaplinsky & Morris, 2001:4).

Various modes of transport such as air, sea, road and rail are tangled with newer manufacturing strategies, e.g. Just-in-Time (JIT), specialisation, shorter life span and customisation, being situated closer to the demand point. These modes result in a totally new dimension of meeting the consumer’s demands. Within that realm, a vast and integrated network is now satisfying some of these desires. It can be summarised by the term “international trade”, which has evolved further with time.

In fact, throughout history, especially since the end of World War II, international trade has become the focal point of global economic activity. This era and the ongoing acceleration of globalisation has, undeniably, seen international trade grow faster than at any other time. Currently, the sum of exports and imports across nearly all nations amounts to more than 50 per cent of the value of total global output. The factors above accentuate the role that international trade plays in nations’ economic activity, especially in South Africa. Merchandise trade as a percentage of gross domestic product (GDP) in South Africa amounted to 54.5 per cent in 2017 (WB, 2019).

Additionally, numerous studies point to the fact that increased trade results in higher economic growth. Some of the most cited papers in this field (e.g. Frankel & Romer, 1999 and Alcalá & Ciccone, 2004) rely on long-running macroeconomic data and find evidence of a causal relationship in which trade is one of the driving factors of economic growth. Other important papers in this field have focused on microeconomic evidence, exploring the causal impact of

specific trade liberalisation policies on firm-level productivity within countries. These studies found that trade liberalisation has led to growth in the firms' productivity.

This section highlights the important contribution of trade to economic growth and development. However, along with the many opportunities that international trade brings, many downside risks, including smuggling, fraud and other forms of illicit trade remain. Therefore, trade must be facilitated seamlessly to further evolve within this scope to combat the downside risks. For that to happen, global customs administrations play the most important role.

1.2.1 The role of customs administration and risk management

The first line of defence for any society will always be its guardrails: laws, stoplights, police, customs, courts, surveillance, the FBI and other basic rules of decency for communities. They animate behaviours that produce trust and healthy interdependencies, and “they inspire hope and resilience – they keep us learning in the face of people behaving badly” (Friedman, 2017:347).

Inefficient and corrupt customs administrations can seriously impair trade transactions, whereas modern and efficient customs administrations facilitate trade that results in the seamless flow of cargo with accurate risk profiling and remedies (Truel, 2010:23). The threat of corruption is especially true within the southern African scope, for which the World Economic Forum (WEF) listed corruption as the most problematic factor in doing business in South Africa in 2017 (WEF, 2017:280).

The increasing growth in the volume of global trade as a long-term trend continues to be a significant challenge for many customs administrations, as they all strive to maintain the ability to protect the socio-economic interests from fiscal and non-fiscal threats. For many years, customs administrations have migrated towards risk management approaches to maintain control over the movement of people, goods and conveyances across borders (Widdowson, 2007:67).

Simply put, customs administrations have learnt by necessity to focus their resources on high-risk cargo while facilitating low-risk trade (Hintsa *et al.*, 2011:17). Dunne (2010) echoed this view. In managing risk, a customs administration must move away from traditional methods and adopt a new culture and ways of solving problems that include greater accountability for decision making. Risk management methodology should be flexible, adaptable and consider changes in the operating environment, including processes and legislation. It should apply to any situation where an undesirable or unexpected outcome could have a significant impact or where opportunities are identified (Dunne, 2010:16).

In the Netherlands, Dutch customs and major Dutch exporters such as Royal Philips have pioneered a more cooperative relationship that expedites trade and enhances regulatory compliance. The new, more cooperative relationship was founded on modern management and tax administration principles, including the application of risk management, use of IT, post-transaction audits, self-assessment of duties and taxes and simplified procedures for qualified traders. Customs and legitimate traders became partners in an effort to trade and increase compliance, and traders were no longer penalised excessively for honest mistakes (Phillips, 2017).

This new trade-facilitating approach to customs administration has also solved a major government resource problem. The customs administrations of developed countries did not have the financial resources to employ more customs officers to cope with the proliferation of international trade in the 1970s. The switch to a more cooperative approach has since increased administrative efficiency, improved compliance and solved the resources problem.

Perhaps no procedure is more central to the trade facilitation approach of modern customs administration than risk management. Risk management is the systematic application of management policies, procedures and practices in order to identify, analyse, assess, handle, monitor and anticipate risk (Dunne, 2010:15). Risk management (when applied to customs administration) involves statistical predictions on whether a trader dealing in a specific type of goods is a good-compliance risk (Creskoff, 2016:269).

Traders with previous law violations who trade with countries or goods present compliance risks. These traders will, therefore, have their imports and exports examined more closely. Traders with unblemished records who trade with countries or goods and do not present a high-compliance risk are not examined regularly. Customs may nevertheless audit their books and records after trade transactions have been completed. If customs then uncover violations, they will subject the traders to fines and penalties. A system that requires customs financial guarantees or customs bonds assures that traders who commit infractions will be financially liable, even years after the import and export transaction's completion.

Customs risk management systems can work without automation, although modern IT systems greatly facilitate the application of risk management criteria. The use of technology can help with identifying high-risk shipments, as traders can be identified for closer examination, even before the goods arrive at a port or airport.

The traders' self-declaration of goods is another important element of modern customs administration because it results in a simplified process for qualified imports and exporters. Self-declaration involves traders or their representatives submitting customs declarations. A customs declaration is a basic document indicating the type of goods involved in a trade transaction, their quantity and quality, price or value and other information that must be reported. The old system (still used in some parts of the world) involved customs officers inspecting import and export products and then completing customs declarations. This system has been proven inefficient as it opened an environment to corruption.

A centrepiece of modern customs administration is the special, simplified treatment of qualified traders. A simplified customs procedure can be of great financial benefit to traders. For example, if a business is entitled to simplified treatment and a competitor is not, the former will be able to import and export goods quicker and at a lower cost. This, in turn, will result in lower inventory requirements and carrying costs. Complying with customs requirements to qualify for simplified procedures has, therefore, become imperative for modern traders (Creskoff, 2016:196).

The World Customs Organisation (WCO) provides the tools, guidelines and identified means to translate the concept of risk management into action by ensuring that the WCO work programmes include the vital component of capacity building (Dunne, 2010:16). Even though WCO can provide the tools, ultimately, it is the responsibility of individual customs administrations to ensure that these tools are implemented to help achieve an environment that is more conducive of legitimate trade facilitation without creating additional trading costs or new trade barriers.

1.2.2 Customs and the process of risk management in South Africa

In the context of a highly connected world and standardised products and services, companies increasingly compete on the sum of their value proposition in comparison to both global and domestic competition (Barnes *et al.*, 2009:100). In countries with small markets and substantial distances from major markets and suppliers, the balance between the economies of scale and costs of transportation and spatial economics becomes increasingly relevant.

From a socio-economic perspective in South Africa, there is an intense pressure to attract and retain the manufacturing capability of multinational enterprises (MNEs) and stimulate job creation through export-driven trade. To attract foreign investment, the Department of Trade and Industry (DTI) has established and launched a new, focused entity called Invest SA (Graham, 2018). From the perspective of the domestic industry, local manufacturers must also compete with imports from global manufacturers such as those in China (Williams *et al.*, 2014). Their success requires

efficient, highly productive companies and a highly competitive, reliable end-to-end supply chain movement, both capable of maintaining the important factors of production while ensuring low-cost fulfilment of international export orders. The efficiency with which customs aids seamless end-to-end supply chain movements becomes increasingly important for its success within this highly competitive environment.

Although South Africa performs quite poorly in comparison with the rest of the world, it compares relatively well to its African peers in the World Bank's international customs ratings in the ease of doing business. According to the World Bank (Doing Business, 2018:200), South Africa ranks 147 out of 190 countries in trading across borders. Although competitive in the region, South Africa's cost of international transactions is high compared to international best practice and similar companies in developed countries. Despite having invested significantly in modernisation, South African customs' momentum slowed since 2012 to 2017 after Mr Tom Moyane, the acting commissioner of the South African Revenue Service (SARS) at the time, introduced the new strategic direction. Some of the directive measures included attempts to increase revenue collection and initiatives to broaden the tax base, as was widely reported in SARS annual reports throughout this period. There is hence a significant opportunity for South African businesses to lower their costs and improve predictability by reducing delays and the costs involved in moving goods across borders.

One of the main factors suppressing the competitiveness of South African businesses is the higher incidence of customs documentation and physical interventions, known as infractions, and the compounding effects of high-industry costs at each stop. These include depot fees, demurrage, additional transport and carrier costs (Hoffman *et al.*, 2016; Hoffman, 2018) and the additional working capital costs of the additional throughput times (Doing Business, 2018). Furthermore, there is an additional cost from the relative lack of predictability, consistency and transparency and the time costs associated with administering the additional processes. The reality is that the cost involved in the movement of goods is passed onto the manufacturer/importer/exporter and, ultimately, the customer. This reduces the competitiveness of South African exporters directly and the quality of life and competitiveness of downstream activities through higher costs and affordability.

For the various reasons outlined above, customs in South Africa faces a major challenge in balancing its control, collection and societal protection roles with its roles of economic protection and facilitation and supporting the DTI initiatives of economic development. The complexity of the

problem is that South African customs must perform its mandatory roles of controlling goods, people and conveyances entering, leaving and transiting through the Republic.

In practice, the South African business environment's low compliance rate puts significant pressure on customs to increase controls, given high hit rates from interventions and the large incremental rand collections derived from them. An aggressive tax avoidance culture and widespread transfer pricing practices complicate the situation further. Although the DTI protects domestic industry groups (some of the most important drivers of economic growth and job creation in South Africa) with its customs tariff policies, said groups often complain of unfair competition from imports with lower prices than the cost of the materials used (Dludla, 2017; Mahlati, 2017). These factors are regularly blamed on importers under-invoicing declarations to evade the value-added tax (VAT), which is especially evident in the clothing industry (SARS, 2017a:47,71). Other suspicious practices include duty incidences, by which the DTI protects domestic producers from this low pricing.

The imminent arrival of a new border management agency in South Africa (SA Governmental News, 2017) increased the importance and potential impact of implementing efficient and effective risk management solutions across the entire government border space. One should appreciate that the WCO developed the third pillar of the SAFE (Framework of Standards to Secure and Facilitate Global Trade) framework and customs-to-other government agencies (C-2-OGA) to help countries integrate better and be more efficient in both risk and operational outcomes. In theory, a South African border agency should provide these outputs.

Various other events, especially the recent development of new customs legislation, have also greatly shaped customs in South Africa. The legislation was conceptualised in 2003 and will replace the Customs and Excise Act 91 of 1964 with two acts – the Customs Duty Act 30 of July 2014 and the Customs Control Act 31 of July 2014 (South Africa, 2014). SARS also officially launched a customs-to-business (C-2-B) compliance programme on 8 May 2017 (SARS, 2017b). Legislated in August 2011, the programme is based on the voluntary submission of the company's compliance records, passing a customs competency test and joint verification of the appropriate internal controls, methods, reporting, systems and financial solvency. Although these events are encouraging for risk management in the customs environment in South Africa, the transition and implementation period has been less than ideal. The new acts and their implementation must unfold in their entire landscape and are expected to be completed in 2025 (Theron, 2018:9). Once this has been achieved, the full extent of their impact with specific reference to the ease of doing business, submission of data fields or reports and the appropriate identification of low-, medium-

and high-risk cargo can be evaluated. Therefore, this study aims to highlight the current issues within customs for the attention of the authorities.

1.3 Problem statement and research questions

Within the global customs environment, many countries (especially developed countries) have adopted a new, modern approach to risk management where there has been an apparent paradigm shift from the traditional gatekeeper role to the more contemporary facilitator role. Since very little academic literature is available which evaluates current customs processes and their effect on trade, especially in South Africa, it is difficult to determine how effective current risk management practices are or the full extent of implications for trade in South Africa. This study aims to analyse the impact of the customs risk management processes on trade in South Africa in terms of time delays, direct cost and indirect cost and showcase how improved risk management practices can aid countries in adopting a new, modern approach to customs risk management.

The primary research question is, therefore: *How effective are the risk management practices applied by customs in South Africa?*

Within this context, effective risk management can be explained as the systematic application of management practices and procedures which provides customs with the necessary information to address cargo movements that present a risk (WCO, 2003:4). Effective customs risk management practices and procedures will inhibit the flow of illegitimate trade while seamlessly facilitating the flow of legitimate trade.

The secondary research questions are as follows:

1. What can South Africa learn from customs risk management practices in other countries?
2. What impact do the current customs processes have on supply chains in South Africa?

1.4 Objectives

The core objective of this study is to determine the effectiveness of customs risk management practices currently applied by South African customs. Therefore, the current state of customs operations in South Africa and the impact that customs have on a specific industry must first be ascertained. After having evaluated the current customs risk management process in South Africa and comparing it to other countries, it will be possible to make recommendations for potential improvements. The research objectives are explicitly listed:

1. Investigate the current best practice models which are based on the precincts of the WCO SAFE Pillar II followed by customs administrations worldwide in order to make suggestions towards an improved customs risk management model for South Africa.
2. Determine the effect of time delays in the current customs risk management practices on transaction-level flows exchanged between South African customs administration (SARS) and consignors of goods imported into South Africa.
3. Realise the quantified impact of the current customs risk management practices in South Africa on the vertical tyre market in terms of direct and indirect cost and time delays.

1.5 Motivation

The case for focusing on South African customs is presented for a number of reasons. Firstly, similar to several AEO or PT programmes globally, SARS has implemented a C-2-B programme in an attempt to shift some the responsibility of effective trade away from customs administrations, which has in turn migrated towards operators such as manufacturers, importers, exporters, brokers, carriers, consolidators, etc., doing business in the trading sphere (Creskoff, 2016:204). Despite the fact that various custom administrations have implemented similar programmes, no previous research has synthesised or investigated the respective C-2-B approaches.

Secondly, as with many customs administrations globally, a concerted effort has been made by the South African customs administration to implement a modernisation programme in recent years. SARS claims to have made significant improvements to the customs process and to have reduced customs delays significantly with, among others, the switch from purpose codes to procedure codes and the introduction of an automated workflow driven system (SARS, 2017).

Despite the abovementioned measures, many private sector organisations still claim that SARS customs often delay the wrong cargo and inspect goods unnecessarily. These private sector organisations also believe that SARS does not seem to have a known procedure for managing and identifying risk. Empirical research to support these claims and measure the performance of the current risk management processes applied by South African customs (and indeed other customs administrations globally) is limited. Many studies have followed a survey approach in order to circumvent the difficulty of obtaining transaction-level data for a sufficient period. Since this research has obtained and subsequently used transaction-level data, a quantitative approach can be followed to verify the problems faced by the trading community through accurate measurements, with limited existing data to prove the exact source of delays.

In capturing the abovementioned reasons, very little academic research exists on customs risk management processes in South Africa, southern Africa or, in fact, globally. The motivation of this study is, consequently, to bridge the gap in the literature and analyse the efficiency of the current customs risk management model in South Africa. The limited body of research currently includes the following studies: In terms of a pure customs risk management model, Laporte (2011) developed risk management systems to be implemented in developing countries' customs administrations. Using data from Senegal's customs administration, he tests simple statistical scoring techniques to find the most effective risk management system.

The risk management systems that Laporte (2011) developed are in line with the current global trends in customs risk management. There has been a shift away from risk-averse systems that conducted 100 per cent inspection of all shipments, conveyances, crews and passengers. The importance of implementing an effective customs risk management system for developing countries is further noted, with studies indicating that poor customs procedures are one of the largest contributors to cargo delays in Africa (UNECA, 2013; USAID, 2015).

In an additional study on customs risk management, Davaa and Namsrai (2015) extracted a similar model from Mongolian customs data to predict infraction probability by using the following list of input variables: harmonised system (HS) classification, importer, country of origin, customs terminal code, customs broker and type of transportation means. The level of risk prediction accuracy they achieved was not quite as impressive as that of Laporte (2011).

Further studies include that of Komarov (2016), who investigated the automated risk assessments that the Ukrainian customs administration implemented. The risk profiles enabled the automated selection of high-risk transactions by grouping the transactions under risk categories. These categories included high-risk or red transactions, which were subjected to physical inspections, medium-risk or yellow transactions, which were subjected to documentation checks, and low-risk or light-green transactions, which were subjected to further information messages. The remaining green transactions were not subjected to any further checks.

All three of these studies mentioned above are in line with the current practices proposed (and overall paradigm shift) by the international bodies that govern trade, such as the WCO and the World Trade Organisation (WTO). However, the limited academic literature on the subject indicates that the topic has by no means been exhausted, but rather that there is a need to expand on the literature, especially in developing countries like South Africa. The primary motivation of the study is to better facilitate trade as proposed by the WTO's Trade Facilitation Agreement (TFA). Customs risk management practices should be modernised to include 24/7-surveillance of

the supply chain in real time, 365 days a year. It should start by controlling the entity risk with preferred trader (PT) programmes all the way through to transparent risk assessments on the frontline and, finally, a post-clearance audit (PCA) of international trade transactions where there are disparities.

1.6 Research method

The research method begins with a broad literature review and analysis of the modern environment in international trade. The study was conducted using the internet, published articles, reviews and analyses of existing data in conjunction with WCO and WTO protocols, regulations and internationally adopted standards. The research will depend on the review and analysis of existing customs risk models. It will include collecting and analysing practical customs datasets so the customs performance and impact of customs processes on trade flow can be quantified. This study, therefore, follows a multi-disciplinary approach, since economics is combined with a more statistical approach throughout.

It is noteworthy that, since international trade has inherited its jargon from history, cultural interaction and trends, it is not uncommon to find several words that describe the same process. To reduce the possibility of confusion, the WCO has compiled a list of terminology and definitions, which will be used throughout this study (WCO, 2018).

The research method continues with various literature and empirical studies in the format of three articles. The research method of these three articles is described below.

The first article aims to investigate the current customs risk management practices around the world. The article initially provides a broad literature overview of customs risk management practices from a holistic perspective. Global customs risk management practices are then investigated with a special focus on the SAFE Pillar II C-2-B practices. The current customs risk management practices in South Africa are also investigated. Thereafter, the qualitative empirical analysis proposes a modernised, best practice customs risk management model from the literature for South Africa.

The second article aims to determine the effect of the current customs risk management practices on general trade in South Africa. The article starts with a literature review on the current landscape of customs administration around the world and then proceeds to review the current landscape of the South African customs administration. The empirical analysis then investigates transaction-level flows between the SARS and the consignors of goods imported into South Africa from

September 2014 to September 2016 (approximately 3.5 million transactions submitted to SARS over the given period). Lastly, the results and findings of the empirical analysis are interpreted.

The third article aims to determine the impact of the current customs risk management practices on a specific industry in South Africa. Hence this article, which contains a case study on the vertical tyre market in South Africa (tyre supply chain). The tyre industry has been chosen because it is one of the largest sub-sectors in South Africa, forming part of the even larger automotive industry. In fact, SARS lists the tyre industry as one of the seven key industries to engage with stakeholders to combat illicit trade (SARS, 2017a:32). Also, since tyre imports have significantly increased in recent times (as indicated in the article), the tyre industry is a good example of an industry experiencing the impact of the current customs risk management processes in South Africa first-hand. The research method in this article starts off with an in-depth review of the current customs environment and legislative structure of South Africa. The empirical study of article three, firstly, provides an in-depth, descriptive representation of trade volumes and values of the vertical tyre market in South African ports. Secondly, the article empirically analyses the risk factors impacting the probability of customs inspections. Finally, the article showcases the direct and indirect impact of the current risk management processes on trade in the vertical tyre market.

In summary, the first article aims to answer the first research objective by investigating the current best practice models followed by customs administrations worldwide. By ascertaining these best practices, the first article can make suggestions towards an improved customs risk management model for South Africa. The second article aims to answer the second research objective by determining the effect of time delays in the current customs risk management practices on trade in South Africa. Finally, the third article aims to answer the third research objective by determining the impact (in terms of direct and indirect cost and time delays) of the current customs risk management practices on a specific industry in South Africa. The industry in question is the vertical tyre market. Collectively, the three articles aim to answer the primary research question by providing insight into the effectiveness of risk management practices applied by customs in South Africa.

1.6.1 Data

No specific data sets were used for the first article since it is qualitative in nature.

For the second article, data was obtained from several freight forwarders in South Africa following an agreement between North-West University (NWU) and the South African Association of Freight

Forwarders (SAAFF). The data represents transaction-level flows between the South African customs administration (SARS) and certain consignors of goods imported into South Africa from September 2014 to September 2016. The data included about 3.5 million transactions over the given period.

For the third article, the data used comprises two sources. Firstly, data was obtained from Stratalyze, a private trade database of SARS import data of the vertical tyre market, representing transaction-level flows between the South African customs administration (SARS) and consignors of tyres imported into South Africa from January 2010 to December 2017. The data includes around 588 000 transactions over the given period. Secondly, data was obtained from a South African freight forwarder representing transaction-level flows between the South African customs administration (SARS) and consignors of tyres imported into South Africa between January 2017 and April 2018 (16 months).

1.7 Chapter outline

The outline of this thesis is presented in the form of three independent articles, each addressing various interrelated aspects. The content will be spread over six chapters as follows:

Chapter 2: A literature review of the role that customs plays in facilitating trade, including customs risk management identification and remedies, in view of effectively controlling the risk to the government and its citizens. The chapter also provides an overview of globalisation and global supply chain and their link to regional integration and trade facilitation.

Chapter 3: Article one, namely *An investigative study into global customs risk management practices*.

Chapter 4: Article two, namely *An explorative study into the effectiveness of a customs operation and its impact on trade*.

Chapter 5: Article three, namely *An impact study on the custom delays on the vertical tyre market in South Africa*.

Chapter 6: A summary of the research, conclusions and recommendations for future research.

1.8 Notes to the reader

1.8.1 Publications

An article arising from the research in this thesis has been published. The article, titled *An explorative study into the effectiveness of a customs operation and its impact on trade*, was published in the accredited World Customs Journal (WCJ), Volume 12, Number 2 in 2018. Since the publication was multi-authored, the respective authors (see Appendix) have granted permission to reproduce parts of the article in this thesis. The WCJ (see Appendix) has also granted permission to reproduce parts of the published article.

Besides the abovementioned article that has been published, a further article, which builds on the work throughout this thesis, has also been published in the same journal. The article, titled *Designing a new methodology for customs risk models*, was published in the accredited World Customs Journal (WCJ), Volume 13, Number 1 in 2019. By using the same dataset as in Chapter 4 (and indeed the abovementioned article), the article developed a rigorous methodology for characterising the risk attributes of cargo consignments and then extracting a model that can be applied in real time to minimise disruption of trade flows while reducing customs risks to levels that are below set thresholds. Further reference to this article is made in Chapter 6.

CHAPTER 2: LITERATURE OVERVIEW

2.1 Introduction

This chapter provides a comprehensive literature review of the modern environment in international trade. This chapter aims to provide a broader background to the study.

The chapter begins by reviewing the phenomena of globalisation and subsequent creation of global value chains, after which the discussion turns to the need to better facilitate international trade. It is important to realise the changing environment in international trade since the chapter primarily aims to realise the role that customs (and ultimately risk management in customs) has played in this changing environment. International trade is no longer dominated by final goods, but rather by intermediate goods, which increases the flow of goods through global value chains, raising the question: How can customs administrations facilitate the flow of goods through these value chains?

The role of customs administrations has undergone a paradigm shift in modern times to a greater emphasis on the way customs administration is forced to sustain the protection of socio-economic interest against fiscal and non-fiscal threats given the increased flow of goods. The reasons for the growth, increased complexity in supply chains, their interdependency and agility and why it is so important for customs administrations to handle risk management in the core of their day-to-day business are discussed. Executing and handling risk cannot create new tariff barriers, nor should risk increase trade cost, which occurs in the case of unjustified interruptions/stops in the supply chain or with the complement of a low-risk hit rate on consignments (Ellison, 2018). The impact of supply chain movement and the risk associated with the movement of goods over an ever-changing landscape in the age of acceleration must guide customs administrations in determining and achieving their goal in modern times.

The structure of the chapter is as follows: Section 2.2 discusses the role of customs in the supply chain at length and the importance of customs, considering that customs administrations are crucial for the seamless flow of goods across borders. Section 2.3 provides the background on how trade has changed over the past few decades. Section 2.4 provides an overview and background of the evolution and current state of trade facilitation and the role of the WTO and introduces the role of customs administration within the scope of trade facilitation. Section 2.5 then concludes Chapter 2.

2.2 The role of customs in facilitating trade

Throughout modern civilisation, central governments have controlled and regulated the movement of goods and people between nations. The original primary aims of these border controls were to impose duties and other taxes on imports and exports to prevent smuggling and restrict the entry of aliens (Truel, 2010:6). Hence, customs administrations acted as gatekeepers, checking customs compliance at national borders. However, as international trade has grown exponentially in modern times, the gatekeeper role of modern customs administrations has become obsolete (Widdowson, 2007).

Going back some 70 years, Jacob Viner (1950) provided the first rigorous analysis of how a customs union can affect trade flows and resource allocation. He showed the demand and supply schedule of specific goods to Austria and identified the occurrence of both trade creation and trade diversion. Trade creation takes place when the suppliers from other countries within a trading bloc offer products at lower prices than the domestic suppliers. That way, instead of producing the goods in question, a country can simply import them at a preferential or zero rate. On the other hand, forming a customs union can result in trade diversion, whereby imports which used to come from low-cost suppliers in countries outside a trading bloc are now replaced by imports from high-cost suppliers in countries inside a trading bloc. In conclusion, Viner argued that if trade creation is dominant, the customs union raises welfare for the members of the customs union and world welfare, as the other members can now focus on specialising in other goods.

The example above demonstrates that the broader role of customs administrations, specifically as an extension of the local government's arm, varies from country to country. However, the core functions of a customs administration in modern times are covered in four main areas:

- Revenue collection;
- Regulatory compliance;
- Trade facilitation;
- Security.

Each area is a source of risk for customs administrations and must, therefore, be clearly managed. Firstly, however, each area of focus or level of prioritisation depends on a country's share of customs duties/tax in its national revenue. The higher the importance of duties or taxes in the national budget, the stronger the focus on revenue collection (Widdowson, 2005:93).

Nevertheless, while developed countries' duties have not disappeared, they have dropped significantly or have been removed by trade agreements, and customs procedures are, therefore, more focused on trade facilitation with good governance for the country and its citizens (Truel, 2010:35).

Furthermore, the duties that customs impose have a direct impact on the cost of goods sold, trade cost and cash flow, as duties must be paid on the importation of goods. Most countries want to attract foreign investments, manufacturing in particular, which means they have initiatives to mitigate this impact, with added cash flow pressure, and allow the dispensation to traders for a longer period in settling the duties, allowing a rebate in duties, lowering the trade cost and helping to facilitate trade (Truel, 2010:41).

Secondly, customs administrations have an obligation to enforce customs laws and a range of regulations. This responsibility covers mandates involving the movement of people, goods, and transportation security agencies, health and safety administrations, police and law enforcement departments, revenue agencies and various military, wildlife, agricultural and food inspection organisations. Their mandates involve protecting their countries, citizens and partners from a variety of threats, from health to safety, stemming from events as diverse as contagion, terrorism, nuclear proliferation, narcotics, tax evasion, plant and animal health hazards and illegal migration (Finger *et al.*, 2010:15). Non-compliance with these regulations is a source of risk for customs administrations (Canham, 2017:32).

Thirdly, customs administrations have an integral role to play in trade, since they are the intersection of all flows. The efficiency of their operations can either enhance the exchange of goods or be a barrier to trade. The WTO has recognised the importance of this role and, therefore, has included trade facilitation in its multilateral negotiations, as discussed in the previous section. The WTO Doha negotiation round showed that, in practice, an efficient customs administration can be a competitive advantage for a country (Manners-Bell, 2017:35).

One economic study led by World Bank economist Simeon Djankov (who later became finance minister of Bulgaria), estimated that for each day the transit time of goods can be reduced, trade volume will increase by one per cent, and for time-sensitive goods, as much as seven per cent (Djankov *et al.*, 2006:20). Other studies that prove that shorter transit times increase trade volumes include Wilson *et al.* (2005), Evans and Harrigan (2005), Nordås *et al.* (2006) and Hummels and Schaur (2012). One should not overlook a customs risk management system that can significantly improve compliance in trade and facilitate trade for national economic development without creating a non-tariff barrier.

The global trade infrastructure provides traders with an extensive choice of routes to move goods between countries and traders will always choose the most efficient path (Arvis *et al.*, 2016:7). Furthermore, in the world of global supply chains and lean inventories, having goods “stuck in customs” for a simple query has become unacceptable to the trading community. Customs have been under intense pressure to facilitate and accelerate the clearance of goods and adopt a different approach to handling risk management (Widdowson, 2005:94).

The WCO’s guidance in facilitating trade can greatly assist customs administrations. The following section discusses the role of the WCO.

2.2.1 The role of the World Customs Organisation

The WCO is the primary global organisation that aims to enhance the effectiveness and efficiency of customs administrations worldwide. The WCO was formed in the aftermath of World War II when 13 governments represented in the Committee for European Economic Cooperation (CEECE) set up a study group to examine the possibility of establishing one or more customs unions. A global organisation on customs administration was formed in 1948, which was the precursor to the WCO. The WCO was officially established in Brussels, Belgium, in 1952 (formally adopting the name of World Customs Organisation (WCO) in 1994) as an independent, intergovernmental organisation.

Exclusively focused on customs matters, the organisation currently has 182 customs administration members that collectively process approximately 99 per cent of world trade (WCO, 2017). Their mission is to enhance the effectiveness and efficiency of customs, which is no easy task, given the challenges in international trade, especially in current times as the world battles to recover from the global economic and financial crisis of 2008. It also faces new challenges such as face-to-face costs, increased trade costs, virtual presence revolution, e-commerce and telorobotics (Baldwin, 2016:288).

The priorities of the WCO can be broadly categorised into five main areas:

- Setting standards for a number of diverse but interlinked customs procedures;
- Promoting international cooperation, including information exchange;
- Managing risk;
- Building sustainable capacity, including the delivery of quality technical assistance;
- and

- Enhancing the image of customs as an important state service, including its contribution to national economic prosperity and social development.

The WCO strongly promotes using risk management for border control (WCO, 2015).

The WCO negotiators amended the International Convention on the Simplifications and Harmonisation of Customs Procedures, known as the Kyoto Conventions, to include the principles of modern customs administration. The Revised Kyoto Convention (RKC) became effective in February 2006. However, some developing and less developed economies have been reluctant to become members of the organisation because of concerns about the investment requirements, other financial burdens of modernising customs administration and other aspects of trade facilitation.

One of the limitations of the WCO's RKC, the international blueprint for customs procedures, was its inability to enforce its principles on members, which became a stronger impetus for the WTO to negotiate the agreement on trade facilitation. From a customs perspective, however, additional efforts had to be made on behalf of customs administrations. Some of these efforts came in the form of C-2-B initiatives and other forms of PT programmes and promoting the use of data analytics and other forms of ICT in managing customs responsibilities.

Dr Kunio Mikuriya, the secretary-general of the WCO, indicates that more and more customs administrations have turned to data mining and predictive analytics, i.e. the process of extracting meaning from raw data (Mikuriya, 2017). They use specialised computer systems or cognitive technologies with advanced algorithms to analyse unstructured data. Unstructured data is delivered from origin to the point of final consumption through supply chain movements. The unstructured data can be used in conjunction with analytics and other emerging technologies and will arguably provide new opportunities to realise customs administrations' objectives.

Customs administrations in every country should make data analytics a strategic priority by using cutting-edge technology, establishing appropriate automation policies, recruiting experts to collect and analyse data and acting upon the data-driven insights. The key requirements of data analysis and related challenges were discussed thoroughly within the WCO in 2017 and proposed to appear on the programmes of all major WCO events, such as the IT Conference and Exhibition, the Global Conference on Transit and the Technology and Innovation Forum (WCO, 2017:8).

The WCO data model, which supports data analytics by improving data collection and enabling data to be shared between government agencies, is a key element in the management of customs' effective risk management (WCO, 2017:9).

During 2010, the WCO conducted a study from all six WCO regions, and the outcome of the survey can be summarised in 12 recommendations (Hintsa *et al.*, 2011:17). For the purpose of this study, a short summary of the 12 recommendations are extracted as follows:

1. Ensure customs risk management is embedded as a core function and not just “lip service” or another “paper tiger” within the customs administration;
2. Articulate the functions and responsibilities, which are centralised versus decentralised. Consider establishing independent risk management (targeting, analysis or risk management) units as a complementary layer, with emphasis on providing a clear mandate, governance, and interoperability with other enforcement of intelligence sections;
3. Training programmes, recognition and reward for specialised risk management officers;
4. Analyse and prioritise the fiscal and non-fiscal hazards and risk for customs administration and country by looking at the strategic and operational implications of risk realisations. Consider how decisions are made on other customs procedures, including basic import and export processes, then find solutions to promote and support risk-based decision making;
5. Consider a broad set of available qualitative and quantitative risk management tools, techniques and standards. Seek a balance between qualitative and quantitative approaches and methodologies without relying entirely on one or the other;
6. Have an open mind to improving the breadth, depth, quality and timing aspects of the commercial and other supporting data, which, in particular, can be exploited more in activities such as pre-departure or pre-arrival, where it currently has a low priority globally. Collaborate proactively with the trading community to seek data solutions that help to improve the end-to-end supply chain visibility;
7. Check which type of intelligence and other information is shared with other agencies in the country and abroad. Try and identify and solve any information (e.g. timing, quality, trust, legal or other hurdles) in preventing better risk management via proactive information sharing;
8. Verify whether there are any legal restrictions or policy barriers and consider finding solutions to upgrade the national legislation and regulations, local or regional business practices, or any other root causes behind such hurdles;
9. Study and apply the lessons learnt from existing risk management literature (including supply chain and enterprise risk management);
10. Establish systematic benefits of risk management and build performance measurement indicators into the risk management framework;

11. Collaborate and work closely with the private sector. It is important to be open and transparent about risk management (without revealing security-sensitive details). Facilitate low risk, compliant trade and, if feasible, provide tangible benefits for well-secured, highly compliant companies and supply chains using the customs risk management mechanisms;
12. Every country and region interprets risk differently; therefore, each requires a tailored approach to be successful.

Customs administrations draw their guidelines and tools from the WCO, but the implementation will depend on domestic national sovereign legal structure. It is important to understand that the guidelines of the WTO TFA are a legal, binding agreement and countries must adhere to the provision for ensuring businesses compete on a level playing field.

A working group comprising WCO members, representatives from the WCO Private Sector Consultative Group (PSCG), observers and e-commerce operators/intermediaries has been set up to deliberate on the opportunities and challenges stemming from growing e-commerce and to aid stakeholder engagement in customs-related matters. In particular, e-commerce focuses on cross-border, low-value business-to-consumer and consumer-to-consumer shipments and will carry out future related work more cohesively and sustainably in line with the WCO Strategic Plan for 2016/2017–2018/2019. The first meeting commenced during September 2016 (WCO, No 81, Oct 2016:21).

2.2.2 Mirror statistics used in customs to identify value fraud

Although a shift has occurred from the role of gatekeeper to trade facilitator in customs administration, collecting applicable revenue through trade in goods remains an important role, especially in developing countries. To combat the increased prevalence of customs undervaluation (or overvaluation) that illegitimate traders have implemented as an incentive to increase tariff evasion and misclassification (especially within some key industries and products with high tariff rates), customs administrations and researchers have also turned to mirror statistics to better develop their risk management policies and cargo selectivity. Mirror statistics involves the use of partner statistics to assess the accuracy and legitimacy of trade patterns and overall customs declarations of a respective country.

Bhagwati (1964) was one of the first to research the use of mirror statistics to combat tariff evasion when he explained that the categories of goods that showed the most significant discrepancies had tariff rates ranging up to 30 per cent and rarely below 10 per cent. Bhagwati (1974) built on

this initial research on mirror statistics to demonstrate the effect of undervaluation and overvaluation of trade statistics on balance-of-payments data.

In more recent years, Fisman and Wei (2004) quantified the effects of tax rates on tax evasion in China. The study focused on data reported on exports between Hong Kong and the rest of China at the product level and China's reported imports from Hong Kong. The authors reported that a one percentage point increase in the tax rate is largely associated with a three per cent increase in evasion. Furthermore, and as expected, evasion takes place partly through misclassification of imports from higher-taxed categories to lower-taxed ones, in addition to underreporting the value of imports.

Subsequent case studies using mirror statistics to target customs fraud have also been done on Cameroon (Canterns *et al.*, 2012), Gabon (Cariolle *et al.*, 2017), Madagascar (Canterns *et al.*, 2010) and Malawi (Kalizinje, 2018). In each case above, the use of mirror statistics reported a varying degree of successfully identified cases of customs fraud. Furthermore, evidence suggests that customs fraud is generally more prevalent within industries and tariff headings with higher duty rates.

Although using mirror statistics is limited in that the approach only targets the customs risks of tariff evasion and misclassification, the methodology nonetheless remains an important tool for customs administrations to combat illicit trade and identify systematic customs fraud, especially emphasised in quantifying undetected fraud at post facto audits.

2.2.3 Summary

Customs laws and regulations have not only changed to adapt to the evolution of world trade, but also world events. Since the events of 9/11, global threats and supply chain security have been the focus of the new rules and add a new dimension to customs risk.

In conclusion of this section, it is evident that the traditional gatekeeper role of customs has become outdated and ineffective. The adversarial and inefficient environment associated with this gatekeeper role that customs administration has maintained began to change in the 1970s with the advent of modern ICTs and increased use of data analytics and statistics. Indeed, the modernisation of technology played a fundamental role in the shifting relationship between customs administrations and traders. In combining the technology and paradigm shifts of their role, customs administrations should implement policies that secure and facilitate trade, using only their gatekeeper-type powers to stop high-risk cargo like the cargo that was responsible for

the Yemen disaster in 2010. In order to do just that, customs administrations should implement efficient and effective risk management practices.

2.3 Globalisation and global value chains

Business leaders have most frequently cited globalisation as the foremost change factor today. It has replaced post-World War II and the Cold War as the dominant driving force in world economics (Baldwin, 2016; Hirst *et al.*, 2015). The concept of the global marketplace or the global economy took on a special meaning for all enterprises (profit and non-profit, small, medium, and large, products or services) and individual consumers in the 1990s and the first decade of the twenty-first century (Prokop, 2017:36). Since then, almost every person on earth has come to share the notion that the world is becoming a global village as time and distance become compressed (Coyle *et al.*, 2017:7).

International trade in goods and services is rapidly increasing and growing faster than the world's GDP. World merchandise trade and trade in services grew about six per cent per year from 1996 to 2016, whereas world GDP only grew about four per cent per year (WB, 2019). The continued emergence of a global village can be further realised with the share of transportation cost in overall logistics cost. The cost of transport has risen from a third of overall logistics cost in the 1980s to around two-thirds of costs in the 2010s. This was fuelled by increased congestion, tolls, fuel costs and compliance and the greater underlying demand caused by these changing manufacturing strategies (Coyle, 2017:243).

Globalisation can be defined in several ways (Czinkota & Ronkainen, 2007; Pierre & Peters, 2005; Curry, 2000). Within the scope of this research, Curry's definition of globalisation is adopted, whereby globalisation refers to "the worldwide phenomenon of technological, economic, political and cultural exchanges among nations, organisations and private individuals" (Curry, 2000:18). These exchanges have led to interdependency at various levels (Awuah, 2009:12) and the ultimate formation of many different global value chains (GVCs).

Numerous factors can influence the flow of global goods and services, especially those that are economical and political (Coyle *et al.*, 2017:28). The reduction in tariff and non-tariff barriers to trade and the liberalisation of the economy to foreign investment have transferred the structure of global trade, specialisation and, in effect, global supply chains (Manners-Bell, 2017:45). As was earlier the case with imports from Japan and Germany, the rapid increase in imported goods from China has resulted in trade tensions with the US and the EU. Trade remedy measures such as anti-dumping, countervailing duty and safeguard procedures, bilateral and multilateral

agreements were used to provide some import relief for producers in developed economies losing market share to imports (Creskoff, 2016:23).

The global emergence of trading countries in the Asia-Pacific region, in particular, the integration of China, India, South Korea and Indonesia, has had a major impact on the global supply chain of sectors such as consumer electronics, clothing and furniture (Manners-Bell *et al.*, 2014:17). For many economies, trade expanded and transaction costs continued to decline during the first 16 years of the twenty-first century (Creskoff, 2016:29), which gave rise to various megacities emerging and, more importantly, large urban communities developing (Coyle *et al.*, 2017:33), with increased global trading requirements for new products and services.

It is likewise important to analyse the regional context of trade and how it links to globalisation with cargo and services that move across borders and regions, which are arranged to facilitate improved integration of the world. Regional integration can lead to a bigger global footprint, which can reduce trade costs and increase movement across borders (Baldwin, 2016:128) through the combined effect of industrial movement of goods and services, industrial innovation and industrial clustering.

Consequently, there have been changes in manufacturing strategies, JIT production, new, improved technology, high-speed internet connections using fibre-optic cables and satellites. These factors have dominated in the increasing scale of economies. Products which were pushed into the market with large stock holdings have now been replaced by made-to-order and JIT delivery schedules (Creskoff, 2016:29). In fact, JIT manufacturing became the industry standard, which resulted in the more frequent movement of goods in smaller volumes. Companies started focusing on the physical centralisation of stock, a global trend facilitated by the growth of trade blocs such as the EU and the North American Free Trade Agreement (NAFTA) as technology compressed time and distance (Coyle *et al.*, 2017:9; Baldwin, 2016:75).

As a result of these changes in the manufacturing strategy and trade swing, technology and transport have become critical in supply chains and the lowly freight company has become a major partner in ensuring that goods reach the intended recipients on time and in good condition (Manners-Bell *et al.*, 2014:16). Shorter lead times and increased product availability and reduced delivery costs have ultimately improved both the effectiveness and efficiency of trade (Coyle *et al.*, 2017:373).

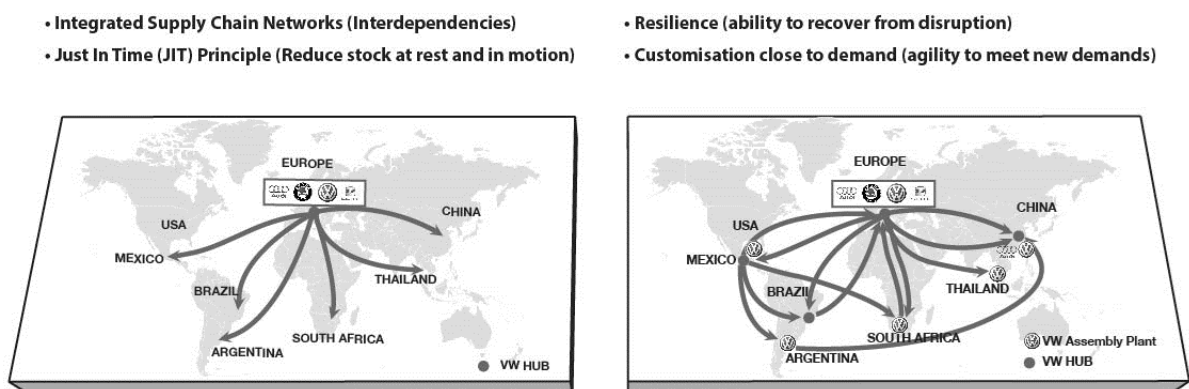
Likewise, the influence of technology on globalisation has created a convergence of global GDP (Baldwin, 2016). The share of global GDP has shifted to industrialised countries, which has

included developing countries in the last few decades as well. The cross-border flow of goods, services and finance from developing markets in 2012 accounted for 38 per cent of the total flow, up from 14 per cent in 1990 (Manners-Bell, 2017:16). South-South trade has grown from six per cent of goods flow in 1990 to 24 per cent in 2012 (Manyika *et al.*, 2014:78).

GVCs in high-technology sectors are typically more complex because firms producing pharmaceuticals, sophisticated electronic products, automobiles or smartphones heavily depend on research and development, design services and multiple sophisticated components. These firms must manage all aspects of the GVC and safeguard their intellectual property rights. Consequently, customer expectations have adapted quickly to these new manufacturing strategies, resulting in their modern adoption. Both individuals and businesses expect to receive goods faster, see more flexibility in the process, and – in the case of consumers – see low or no delivery costs (Khan & Zsidisin, 2012:56).

The changing face of trading networks and the interlink with global chains are perhaps best illustrated by the example of the Volkswagen-Audi group, as illustrated in Figure 2-1. In the 1990s, the flow of materials and finished vehicles predominantly originated in Europe. However, in the past few years, the company has transferred from being German-based exporters to the world to becoming a global automotive producer with a complex production footprint, which has had a major impact on its transportation, distribution and global supply chains in the movement or flow of goods and services. Transport volumes through the supply chains have increased by 25 per cent as a result of multiple production locations and hubs (Coyle *et al.*, 2017:225).

Figure 2-1: Key areas of transformation in the supply chain: Driven by new market dynamics



Source: Volkswagen-Audi Group in Manners-Bell (2014:13)

One of the challenges posed by globalisation is that manufacturers have begun to treat the population as a single market and rely on customisation nearest to the market for national requirements. While this leads to a closer intimacy with the customer and the effective intake of cultural preferences in the local market, and while becoming increasingly customer-oriented in product and service offerings is good for customer satisfaction, it is hard work for the logistics industry, national governments and other regulatory authorities. Their role of regulating and testing compliance with good governance of trade can no longer be ignored (Manners-Bell, 2017:21). Adding it all up, government intervention, stronger compliance and increasing customer demands put increased pressure on the supply chains to deliver a better, more predictable service at an ever-lowering cost (Shaw, 2016).

Globalisation, specifically, has placed higher demands on countries' customs authorities to ensure that the administration process is managed more smoothly (Truel, 2010:21). The growth in the volume of trade has put pressure on physical borders and customs declaration. At the same time, the documentation accompanying these shipments has inundated customs offices with data to be checked and processed. Managing this increase in volume is further complicated by the complexity of trade policies, the economic and political risk relating to shorter product life cycles and the blurring of traditional organisational boundaries (Coyle *et al.*, 2017:7).

The globalisation of the world markets with its associated risk factor has reconfigured supply chains and networks across the globe, increasing the complexities and challenges of sourcing and improving risk management (Robert *et al.*, 2010:57). Coyle *et al.* argued that an interruption or disruption in a supply chain that cuts off the flow of information and products is analogous to a "heart attack" that cuts off the flow of blood to the heart and, like a heart attack, supply chain disruption can have lasting effects (Coyle *et al.*, 2017:8).

What retailers and manufacturers want from their supply chain is simple – they want the greatest product available at the lowest inventory level. In other words, they want the right goods at the right time and as soon as possible, with the correct labelling and supporting electronic documentation to allow those goods to flow seamlessly through their distribution network to their stores or customers (Descartes, 2016:1).

Yet, several factors conspire against a retailer's vision of a high-velocity, high-precision supply chain, such as suppliers, third-party logistics services providers (3PLs) and transportation providers. Varying levels of capability and performance, disconnected processes and technology differences exist across the supply chain, and the synchronisation of all of the commercial,

logistics and customs documents from purchase order to warehouse receipt is poor (Descartes, 2016:2).

Manufacturing industries, on the other hand, are facing far greater expectations around efficiency and performance than ever before. Their customers expect faster time-to-market, reduced defect rates and customised products. Ultimately, the result may be a goal that was once impossible; a 'lot size of one', where each product is manufactured to the specifications of a specific end-customer. The advent of the industrial 'Internet of Things' and what other research refers to as 'Industry 4.0' allows manufacturing companies (whether they make industrial equipment, cars, planes, or consumer goods) to redefine everything, from the way they interact with customers to how they structure supply chains (Shaw, 2016).

The changing expectations of the international trading community are based on the commercial realities of its own operating environment. It wants the simplest, quickest, cheapest and most reliable way of getting goods in and out of the country. It seeks certainty, clarity, flexibility and timeliness in its dealings with government. Driven by commercial imperatives, it is also looking for the most cost-effective ways of doing business (Taleb, 2014:94). To this end, the risks within value chains must be assessed.

2.3.1 Managing risks in global value chains

For customs administration to effectively manage the risks in the global value chain, the principles of risk and uncertainty should first be established. The relevance of risk and uncertainty in economic analysis was initially suggested in 1921 by Frank Knight, who, within this framework, also established the crucial distinction between the two concepts. Knight explained this distinction by stating that 'risk' is present when future events occur with measurable probability, whereas 'uncertainty' is present when the likelihood of future events is indefinite or incalculable (Knight, 1921:23).

Within this framework, risks within global value chains relate to events occurring with measurable probability, however irregular, which can present time delays or add additional costs in the international movement of goods. The type of risk can be anything from a product or transactional risk to a country or political risk. Uncertainty, on the other hand, is not measurable, and so cannot be quantified.

To illustrate risk in global value chains, a small supply chain with a single production facility, for instance, is highly vulnerable to external events, whereas a large, complex supply chain with

multiple supplier options is potentially stronger as it has more sourcing options (Manners-Bell, 2017:272). Each option has a different associated supply chain risk, although the probability of overall network disruptions is less in a large supply chain compared to a disruption in a small supply chain.

Timeliness, reliability, information sharing, quality and design and more extensive benefits resulting from shared labour skills and knowledge must all be weighed along with the levels of visibility and management control. The course for external risk of customs authorities' intervention across supply chain movements must consider the dynamics of trade facilitation and supply chain movement (Baldwin, 2016:196).

Globalisation and trade openness have brought further risk to the international trading ecosystem. Extended supply chains across the globe mean longer lead times (and less agile response to market conditions), more handoffs between parties, more challenging quality control and exposure to currency fluctuations, labour disputes, shipping costs, corruption, theft and natural or geopolitical instability. Understanding this, many manufacturers have adopted a hybrid strategy of remote productions combined with near-sourcing (Coyle *et al.*, 2017:244), which makes the interdependency between local and international supply chains more dynamic in service offering to the consumer.

Korniyenko *et al.* (2017:27) explored the individual characteristics of the riskiness of individual goods. In addition to the overall measures, the authors considered the contribution of researchers and policymakers against the different dimensions of the fragility of an import or set of imports' movement. A country-level indicator can likewise be a useful starting point for undertaking nuanced policy-relevant diagnostics and analysis for identifying specific areas for reform or intervention. Over time, the methodology could be used to evaluate ongoing efforts to improve the resilience of trade to global shocks.

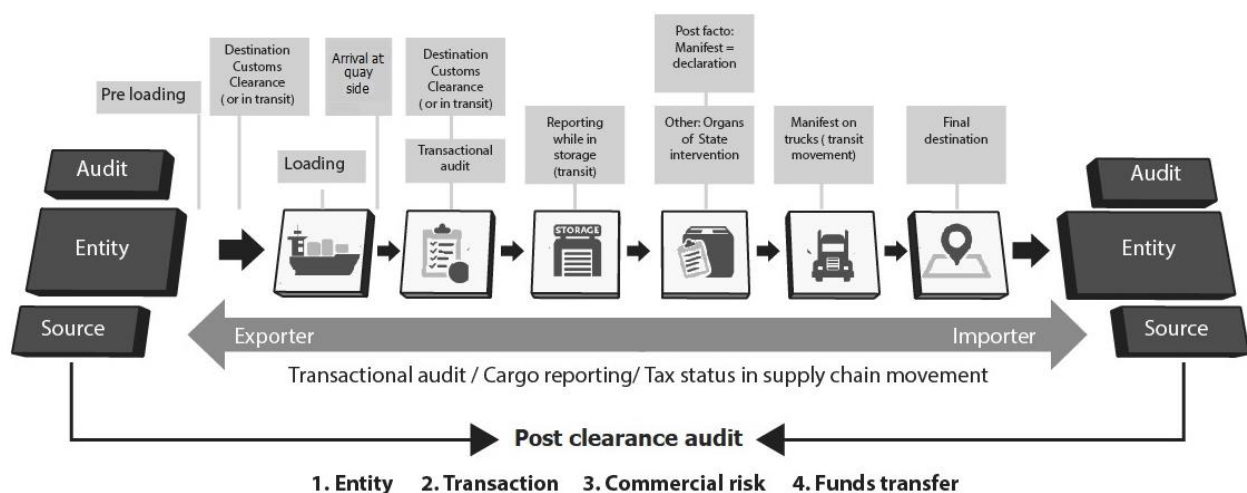
Efficient logistics connects trade to domestic and international markets through reliable, predictable supply chain networks. Social networks such as Facebook or Twitter play an ever-increasing role in business organisations and influence supply chains because of their impact on customer demand and the speed of information transfer (Coyle *et al.*, 2017:9). The factors mentioned above are evident in countries with high logistical performance characteristics.

Conversely, countries characterised by low logistical performance face high costs, not merely because of transportation but also because of unreliable supply chains, which is a major handicap in integrating and competing in global value chains (Arvis *et al.*, 2016:1) because technology has

allowed individuals and smaller organisations to connect to the world's knowledge pool to increase and establish opportunities for collaboration in supply chains.

For the supply chain to perform optimally, retailers, suppliers, customs brokers and carriers, as illustrated in Figure 2-2, must be coordinated at every stage in the supply chain. The execution of processes should ensure trade facilitation at the lowest cost and shortest time possible. Trade barriers or any interruptions by governments, customs administrations or other government agencies (OGA) have a negative influence on the lowest cost and handover point which roll up in the shortest time possible.

Figure 2-2: Ever-present, end-to-end proactive risk management practices



Source: Author's own compilation (2019)

Different parties involved in supply chains face significant coordination challenges to work in synergy, as illustrated in Figure 2-2, especially in realising a risk management system that is available real-time, 24 hours a day, 365 days a year. Buyers, suppliers, 3PLs, carriers, regulatory agencies and receiving parties must be synchronised for a supply chain to operate efficiently. Porter's value chain concepts were developed as a tool for competitive analysis and strategy to complement integrated logistics. In the value chain, inbound and outbound logistics are identified as primary components of the value chain (Coyle *et al.*, 2017:13).

Industry initiatives such as collaborative planning, forecasting and replenishment (CPFR) (which is a GS1 concept that aims to enhance supply chain integration by supporting and assisting joint practices), have dramatically reduced inventory for retailers, improved buyer/supplier coordination and the visibility of retail demand. However, CPFR only addresses a part of the inventory challenge. Effective coordination and execution extend beyond sharing point of sale and demand

data with suppliers. CPFR does not address the logistical challenges faced by the parties responsible for getting those collaboratively planned orders from the supplier to the final receiving point (Descartes, 2016:5).

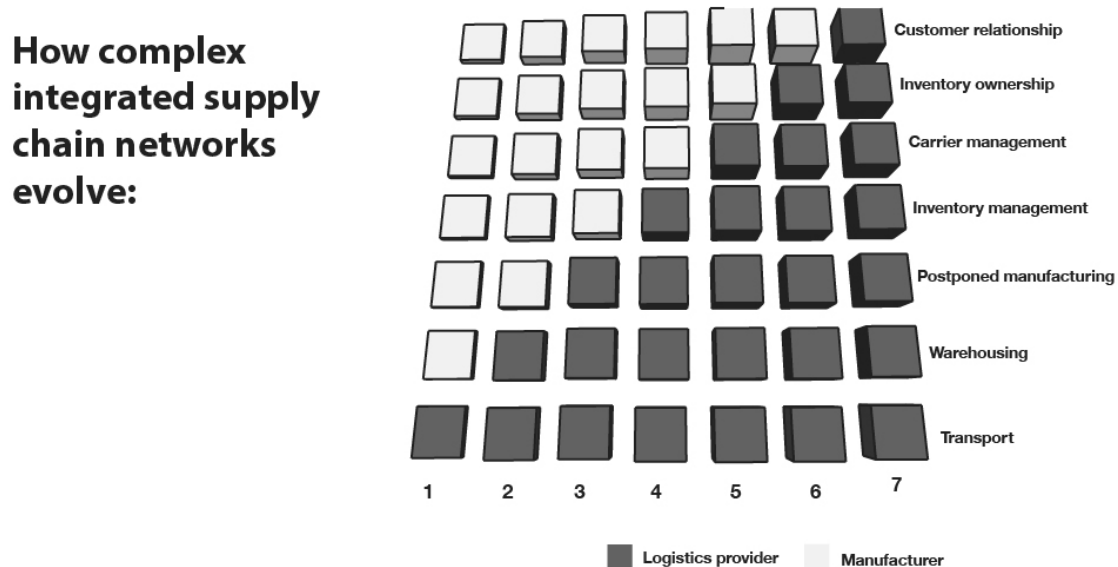
Besides inventory obstacles, supply chains have had to overcome various other modern obstacles that accompany ever-improving technology. Concepts like Big Data are plentiful, but the accumulation and storage of data is useless unless it is shared horizontally and vertically in the supply chain and used to make better decisions about inventory, customer service and transportation. Information can be a powerful tool if it is timely, accurate, well managed and shared (Manners-Bell, 2017:120). The modern supply chain is, therefore, the art and science of integrating the flow of products, information and financials through the entire supply chain, from the vendor's vendor to the customers' customer (Coyle *et al.*, 2017:17). Data means nothing unless it can be effectively analysed to transfer numbers into knowledge fast enough to spot dangers with enough time to act on (Prokop, 2017:21).

Each supply chain is unique, but there are many common processes and a basic flow in activities (with reference to Figure 2-2). Every retailer has a commercial process that begins with the purchase order and ends with supplier payment. The logistics process manages the flow of the goods from the supplier to the retailer's dock door. If the goods are sourced internationally, various government regulations determine the documents that are required to allow goods to efficiently cross borders and calculate the related duties to be paid. Many of these processes are intertwined and interdependent because much of the data is shared across these processes. The WCO data model was developed for this very purpose, namely to ensure the exchange of data on a structured platform and allow the proactive risk management of cargo reporting in the supply chain (Dunne, 2010:13). The WCO data model provides the maximum framework for standard, harmonised sets of data and standard electronic messages to be submitted by trade for customs and other regulatory purposes, to accomplish formalities of the arrival, departure, transit and clearance of goods in international cross-border trade (WCO, 2018b:13).

The strategies (as illustrated in Figure 2-3) used to manage supplier performance and related costs, along with any supply chain constraints and operational capabilities, can complicate these processes. Most retailers have employed a myriad of strategies that include: who controls the freight, what the transportation modes are, whether the inventory is consigned, whether third parties are used for consolidation and how international products are sourced. This data is all in an open domain and can be used by customs administration to do effective risk profiling and management before risky cargo reaches a country's borderline (Harrison, 2007).

Operationally, retailers must factor in supplier capabilities, product mix, volumes and seasonality, retail distribution centre size and capability into their processes to optimise the flow of inbound goods, as shown in Figure 2-3. Functionally, inbound supply chains cover a wide range of capabilities that must be synchronised across all parties for effective operation and can be linked to outsourcing capabilities with clearly identified risk indicators.

Figure 2-3: Stages in the logistics-outsourcing process



Source: *Manners-Bell (2017:23)*

Securing the global supply chain is a new challenge for customs but not for trade, as globalisation with specialisation forces organisations to adapt to this new global environment (Baldwin, 2016:196). Other modern initiatives include tracking technology, such as global positioning systems and radio frequency identification (RFID), which can pinpoint the movement of tagged objects, both large and small, along the supply chain. Shippers are continually developing ways to utilise this process to understand customer behaviour down the supply chain. On the other hand, customs administrations wish to use these technologies to assist it in the screening and inspection process (Prokop, 2017:22).

The complexity of modern global supply chains highlights the fact that distance and complexity exacerbate their vulnerability. This showcases why customs authorities play such an important role in modern times since there is a need to devise new methods of protecting economies and citizens (Coyle *et al.*, 2017:21).

Ultimately, supply chains may seem like an uncontrollable, inanimate force to be reckoned with, but they are, in fact, living systems propelled by humans and their behaviour (Gattorna, 2009:4). The potent presence of human behaviour is evident both inside and outside the organisation. Customers, suppliers and third-party providers drive the supply chain from the outside, while staff, managers and board members seek to manage and respond from within (Gattorna, 2009:3).

The following section will explain one such method, namely, trade facilitation and its legal binding to create safe, secure supply chains with risk management.

2.4 Trade facilitation (WTO TFA)

The WTO, the world's primary organisation that deals with the rules of multilateral trade, dispute settlement and trade forum, has concluded an important agreement on trade facilitation. In contrast to other organisations that could not enforce their principles on their members (more in Chapter 3), the WTO officially launched the TFA in November 2001 as part of the Doha Development Round Trade Negotiations (Ferguson, 2008). The negotiating process spanned 12 years, with professional trade and multinational businesses advocating a strong agreement. However, developing countries opposed the agreement because of implementation concerns and opposition from various vested interests. Despite the opposition, the WTO continued, arguing that many countries and firms alike (especially in developing countries) are left on the fringes of global trade. Hence, the primary aim of the TFA was to reduce the time and cost of trade by simplifying the required paperwork, modernising procedures and harmonising customs requirements (WTO, 2017b). In December 2013, the WTO concluded their agreement on TFA (WTO, 2017a).

The agreement includes the key principles of efficient risk management and simplified treatment for authorised traders (WTO, 2017b) and covers a variety of areas, including the publication and availability of information, advance rulings, review and appeal procedures, disciplines imposed on fees and charges, procedures relating to the release and clearance of goods, expedited shipments, formalities regarding export, import and transit of goods, and cooperation between customs authorities (WTO, 2017b).

The WTO TFA is an appropriate global response to the business reality that logistics efficiency within supply chains is an important determinant of business competitiveness (as discussed in the previous section) and must be addressed by all its ratified members. The WTO TFA has initiated a new 'paradigm' that recognises private businesses as important stakeholders in trade policy formulation and its subsequent implementation (UNCTAD, 2016:8).

The agreement also, importantly, provides for the phased-in implementation and technical support for developing countries and the least developed countries (LDCs). In contrast to the WCO Revised Kyoto Convention (RKC), the provisions of the WTO TFA are mandatory for the WTO members, and non-compliant WTO members are subject to the WTO's dispute-resolution process.

The TFA sets forth a series of measures for expeditiously moving goods across borders, inspired by the best practices from around the world. The agreement is ground-breaking in that, for the first time in WTO history, the commitments of developing and less developed countries are linked to their capacity to implement the TFA. The agreement states that assistance and support should be provided to help countries achieve that capacity (WTO, 2014).

The General Council adopted an amendment protocol for the TFA in November 2014 to bring the TFA into the WTO's legal framework. The agreement came into effect on 22 February 2017, after two-thirds of the WTO membership completed their domestic ratification process and deposited their instruments of acceptance at the WTO Secretariat (WTO, 2017a). Hong Kong and China became the first members to do so in December 2014.

Moreover, the trade facilitation agreement, which will be binding on all 159 WTO member states at the level of all border agencies (and not just customs administrations) has been described as a classic 'win-win' outcome. However, because there are implementation concerns among some developing countries and, especially, less developed countries, this agreement includes some flexibility, including the provision for technical assistance in implementing it (WTO 2014:3).

The WTO indicated that the objectives of this package are to speed up customs procedures, make trade easier, faster and cheaper, provide clarity, efficiency and transparency, reduce bureaucracy and corruption and use technological advances. It also has provisions on goods in transit, an issue particularly of interest to landlocked countries seeking to trade through ports in neighbouring countries (Manners-Bell *et al.*, 2014:20).

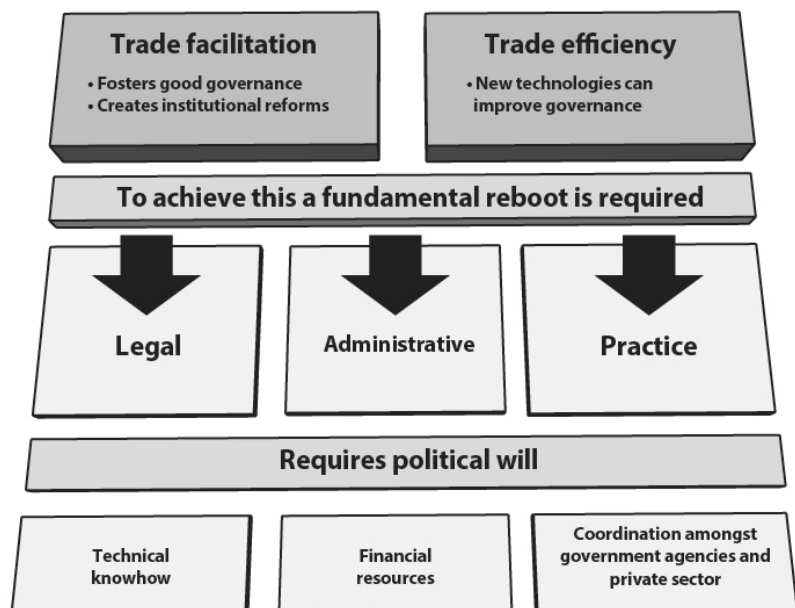
Figure 2-4: Trade efficiency and trade facilitation form the “New frontier of competitiveness”



Mr Joakim Reiter,
Deputy Secretary-General of UNCTAD

Distilled thinking from the Reiter at the WCO Europe Region Trade Facilitation Agreement Workshop – Stockholm, Sweden – 1 June 2016:

(Source: Transport and Trade Facilitation Newsletter No 70 – Second Quarter 2016)



Source: Adapted from UNCTAD (2016:2)

The TFA further recognises these differences and the pressure on developed and developing countries when supply chain networks compete in the end-to-end execution. International trade depends on the efficient transportation of material from one destination to another, whether by sea, air, road or rail. A world without these modes of transportation in the twenty-first century is unimaginable (UNCTAD, 2016:20).

Efficient management and IT solutions in the private and public sectors are vital tools of the trade in high-quality logistics. The ability to manage logistical processes in today’s global business environment is a crucial factor in national competitiveness (Arvis *et al.*, 2016:4).

For this purpose, the TFA includes 12 well-defined sections that allow developing countries to address their progress and differences and, ultimately, compete on an equal footing with developed countries in supply chain movement (WTO, 2017b):

- Article 1: Publication & Availability of Information;
- Article 2: Comment and Consultations Advance Rulings;
- Article 3: Advance Rulings;
- Article 4: Procedures for Appeal or Review;

- Article 5: Measures to Enhance Impartiality, Non-Discrimination & Transparency;
- Article 6: Disciplines on Fees and Charges;
- Article 7: Release and Clearance of Goods;
- Article 8: Border Agency Cooperation;
- Article 9: Movement under Customs Control;
- Article 10: Import, Export & Transit Formalities;
- Article 11: Freedom of transit;
- Article 12: Customs Cooperation.

The 12 articles ensure that businesses, particularly those in developing countries, can benefit from cross-border trade. However, to benefit from the TFA, businesses must understand the provisions of the agreements and how the implementation process can be influenced. The intention to ease border controls for business and ensure that the voice of the businesses is heard is evident in the way that governments implement the obligations and specific commitments they have undertaken in reaching the agreement (WTO, 2013:2).

There is a growing need for consistent strategies that cut across numerous policy dimensions, especially in high- and middle-income countries. Policymakers in large, emerging or developed economies deal with fewer border issues than low-performing countries, but with the internal performance of domestic supply chains (Arvis *et al.*, 2016:5).

Facilitating trade is at the centre of the multilateral trade agenda and will guide a host of operational reforms (Fernandes *et al.*, 2016:5; Manners-Bell *et al.*, 2014:15). Trade facilitation initiatives cannot be achieved overnight. It is a process of continually analysing the solutions, gauging performance against predefined indicators and striving to make continuous improvements (UNCTAD, 2016:8).

To gauge the performance in an international sphere, the World Bank has developed some of the most important methodologies for measuring trade facilitation for a nation or economy. These include the Trading Across Borders rankings and the Logistics Performance Index. Other international institutions have also developed important measures for trade, for instance, the World Economic Forum's Global Enabling Trade report and the Organisation for Economic Co-operation and Development's (OECD) trade facilitation indicators.

These are useful measurement tools for traders when evaluating potential problems in exporting and importing goods from a specific economy (Creskoff, 2016:201). The key elements that recur throughout these measures/indexes are customs and border controls.

Customs administrations, which play an integral role in enabling trade across international borders (Widdowson, 2007:31-33; Finger *et al.*, 2010:4), can greatly aid the performance within the realms of the measures mentioned above.

2.5 Conclusion

Progress in logistical performance for the world's least developed economies has slowed for the first time since 2007 while developing countries that implement comprehensive initiatives continue to improve their performance, according to a recent World Bank Group report (Arvis *et al.*, 2018).

As tariffs and quotas have been reduced worldwide, attention has rightfully been shifted to the remaining impediments to trade. Average world tariffs are around five per cent *ad valorem*, but average trade costs are about ten per cent. A large portion of this involved unnecessary red tape in trade (UNCTAD, 2016).

Global production and trade patterns are changing and, in a world of deepening global value chains, no one can afford to be the weakest link. JIT delivery at competitive prices is more important than ever. Unnecessary costs to trade are roadblocks to countries' aspirations of integrating into global trade and critically important investment that allows countries to access and climb value chains.

As the United Nations Conference for Trade and Development (UNCTAD) has often stated, trade efficiency in general and trade facilitation, in particular, is the "new frontier of competitiveness" (UNCTAD, 2016:23). Simply put, investing in improving trade facilitation makes total sense. The gains from trade facilitation go beyond trade efficiency gains – trade facilitation fosters good governance.

New technologies and institutional reforms can improve governance, reduce entry barriers and pull the informal sector into the formal sector. And with less paperwork to dodge and fewer palms to grease, public revenue can go up. This generates new resources for spending on essential services (Coyle *et al.*, 2017:117).

For all these reasons, trade facilitation is a clear win for growth and development as it benefits everyone – consumers, companies and governments. The global trading system that everyone ultimately depends on is effective global supply chains with risk mitigation strategies for disruptive forces and technology that fosters connection on a 24/7 basis (Manners-Bell, 2017:43). This is why so many countries are pursuing trade facilitation reforms, and it is also why so many international organisations are giving it a clear priority.

Trade facilitation is not a simple reform process. At its heart, it talks to institutional reforms – sometimes even a fundamental reboot of legal, regulatory and administrative procedures and practices. This requires technical knowledge, financial resources, coordination among government agencies and the involvement of stakeholders, not to mention political will.

A common theme that emerged from the interventions was the importance of private sector involvement in the establishment and work of the national committees, particularly representatives from small and medium-sized enterprises as business is directly affected by the customs bottlenecks and red tape that the TFA seeks to address.

Finally, it is important to position the government to better deliver results for trade by providing more comprehensive and accurate performance reporting of the customs administrations and agency programmes. Business cannot be expected to be modified and have all its challenges and associated risks removed overnight. However, the right steps can undoubtedly be taken today in becoming effective partners in the global economy of tomorrow that requires a cultural shift towards the increased use of analytics, grounded in a sound information management policy fundamental to overall modernisation efforts and a more open government (WCO, 2017:10).

In conclusion, risk assessment systems focus enforcement attention on high-risk shipments and travellers posing a threat to a country's health, safety, security or economy. Without de-emphasising control, tax revenues increase along the entire import chain by virtue of increased velocity of trade, while the administration still addresses risks such as pandemics, commercial fraud, misclassification, trafficking and terrorism (Finger *et al.*, 2010:7).

CHAPTER 3: AN INVESTIGATIVE STUDY INTO GLOBAL CUSTOMS RISK MANAGEMENT PRACTICES

3.1 Introduction

In a fast-moving world where global trade is fundamental to economic growth and social development, a stable trading environment enables economies to reap many benefits, which can impact positively on society (Manners-Bell, 2017:35). In facilitating international trade and combatting supply chain risks, customs administrations around the globe face two key challenges. The first is protecting its citizens and their key industries (which links to interventions such as trade agreements, tariffs and non-preferential duty rates), and the second, ensuring compliance by operators to customs' laws and procedures and the subsequent appropriate collection of taxes (Ellison, 2018). The role of customs administrations in implementing these two important aspects has undergone a major paradigm shift from the role of gatekeeper to facilitator in modern times (Widdowson, 2007:32; Doyle, 2011:12).

Most customs administrations no longer stop all goods at the frontline, but instead rely on the efficient screening and profiling of cargo to facilitate the flow of international trade (Karlsson, 2017:24). Since 100 per cent inspection of cargo is still unlikely to ensure 100 per cent security (Nguyen, 2012:110), the identification of supply chain risks at the earliest possible opportunity is crucial. In an ideal world, customs administrations should deploy their resources to facilitate the flow of low-risk cargo from compliant operators effectively. At the same time, they should screen, profile and, ultimately, stop high-risk cargo from non-compliant operators (Widdowson & Holloway, 2011:106-107).

In ensuring compliance, the responsibility of sustaining effective trade flows has shifted away from customs administrations towards operators such as manufacturers, importers, exporters, brokers, carriers, consolidators doing business in the trading sphere (Creskoff, 2016:204). Globally, several customs administrations now implement AEO or PT programmes, particularly in advanced economies (WCO Uganda, 2018). Arduous government regulations can be a deal-breaker for international transactions, especially if these regulations are not transparent and are subject to corrupt administration, as is often the case in developing countries (Creskoff, 2016:204).

In developed countries, the driver of customs practices has been the safety and security of the end-to-end supply chain (and their citizens) which forms the basis of customs risk management

practices. Examples of this are found in the US and the EU. In contrast, the focus of customs administration in developing countries is almost entirely on revenue generation, as is the case in South Africa. Research by Hoffman *et al.* (2018) indicates that the current customs practices in South Africa are far from efficient, with many areas of unnecessary delays and accompanying cost (see Chapter 4, Section 4 for an in-depth discussion).

Consequently, this paper aims to investigate the current customs risk management system and processes that are applied in South Africa and highlight its shortcomings. The paper subsequently aims to make recommendations towards a better customs risk management model for South Africa. To achieve this aim, customs risk management practices around the world, with specific focus on the WCO SAFE Framework of Standards Pillar II (C-2-B), are investigated.

The paper addresses the following specific research questions:

1. What are the current customs risk management models employed by other customs administrations globally?
2. What is the current customs risk management model employed by South Africa's customs administration?
3. What can South Africa learn from other models to overcome the hurdles in the current model?

The rest of the paper is structured as follows: Section 3.2 give a detailed outline of risk management from a customs perspective. Section 3.3 provides a regulatory overview of customs risk management practices from the perspective of international institutions, moreover from the WCO and the WTO. Section 3.4 then explores customs risk management practices in several countries based on the precincts of the WCO SAFE Pillar II (C-2-B). Section 3.5 examines the current customs risk management practices in South Africa and the development of the PT programme. After that, Section 3.6 proposes some recommendations towards a best practice model for South Africa's customs risk management. Section 3.7 concludes and provides recommendations.

3.2 Customs risk management practices globally

By the late 1990s, modern customs' principles and procedures were so successful in increasing compliance and revenue collection, while also improving administrative efficiency and trader facilitation; policymakers believed these principles and procedures should be enshrined in

international agreements. However, the emphasis on the role of customs in enabling trade soon dissipated and shifted elsewhere, especially in developed countries.

In light of the tragic 9/11 terrorist attacks on America, some customs administrations have seen a change in priority from risk profiling to security and safeguarding citizens (Manners-Bell, 2017:34). Again, the importance of the customs administration role varies between countries, with some customs administrations being more centred on security than others. Two common themes in the post-9/11 cargo security programmes enacted were (1) to gather more detailed sets of information on which to gauge risks; and (2) to move the point of compliance further upstream along the supply chain and, in the case of international cargo, away from the point of entry (Prokop, 2017:16).

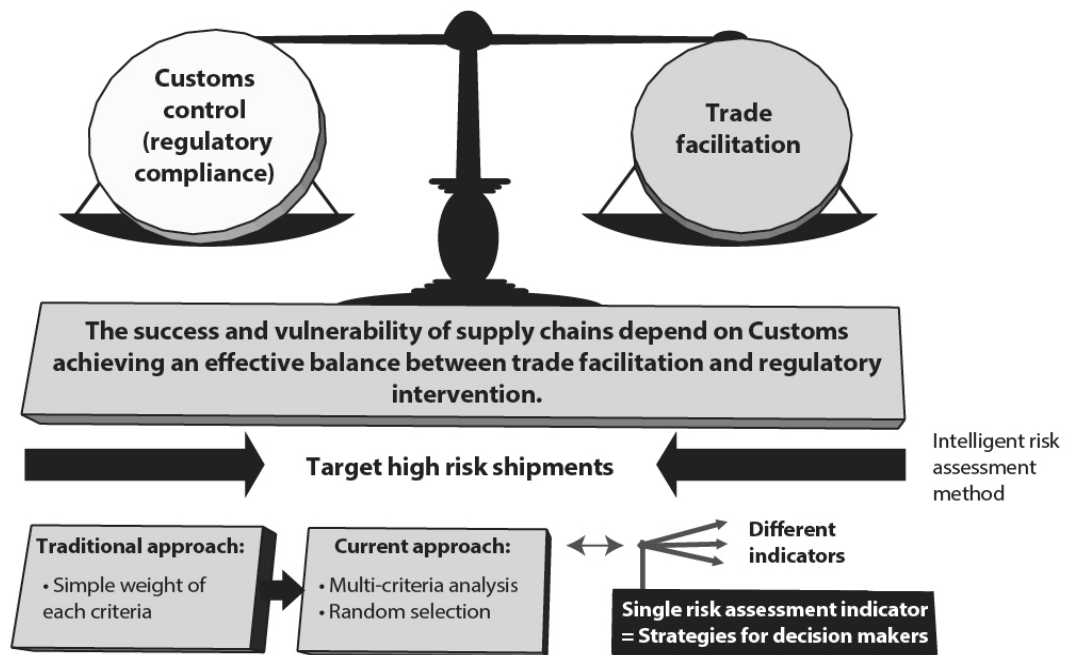
Border control agencies, including customs administrations, face major challenges in balancing a country's need for controls with the benefits of facilitating cross-border traffic in people and goods. To better manage the growing volume of travellers and trade, several leading customs administrations have adopted risk management as the guiding principle for border management. Systematically implementing risk management at strategic, operational and tactical levels ensures that customs administrations can best deploy resources to protect their citizens from threats to health, safety and security, while simultaneously supporting economic growth by maintaining efficient and predictable cross-border transit times (Finger *et al.*, 2010:3).

The evolution of these best practices has led modern customs administrations to start using automated risk management systems in which the licensing and registration of entities are the core pillar; in other words, "who do we deal with?" Can supply chain partners be trusted when customs administrations play two roles – capacity as a partner to various entities along the supply chain and regulator or police in the set-up of transaction and compliance? The automated risk management system enables customs administrations to operate in a systematic framework that focuses operational resources on the shipments of highest risk for closer scrutiny and potential regulatory inspection at the borderline (place of exit/entry of a country). At the same time, pre-approved or low-risk shipments are facilitated throughout the supply chain and across borders, thus enhancing the economy of the country and the surrounding region (Arvis *et al.*, 2016:2; Finger *et al.*, 2010:55).

Automated commercial cargo risk assessment capabilities provide customs administrations with new means of identifying high-risk shipments earlier in the trade and supply chain. The supply chain, as described, consists of important links with purchase orders, international parties and cargo movements across the geographical globe. These can all be woven into a grid that allows

a risk indicator to be formed before cargo is loaded at the place of origin (Baldwin, 2016:201). New technologies that support this approach will also reduce corruption by eliminating opportunities for tampering with sealable, traceable cargo, that exists in paper processing environments (Finger *et al.*, 2010:36). The following figure indicates the balances approach that some customs administrations aim to achieve in modern times.

Figure 3-1: Effecting profiling and screening to indicate high-risk consignments (method to reduce the risk pie)



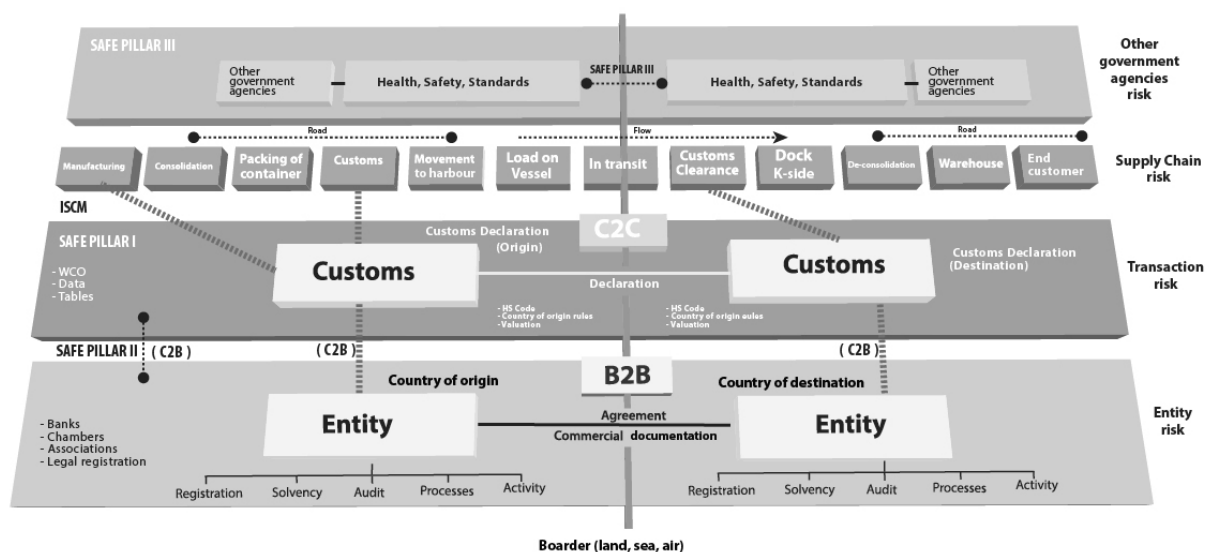
Source: Adapted from the International Network of Customs Universities (Volume 9, no. 2 & Volume 10, no. 1)

Depending on the threat involved, pre-arrival data can be reviewed and scrutinised in advance during loading and before the departure of goods to identify high-risk shipments and potentially interdict threats at the appropriate stage in the supply chain. The more safety- and security-oriented the threat, the more important it is to interdict the threat as early as possible in the supply chain and not be confused by a geographical borderline for revenue collection (Truel, 2010:72).

Unfortunately, entities often mask the true nature of the goods and the actual person or entity who will be taking possession of the goods upon arrival (Truel, 2010:73), which prompts efforts to obtain the most accurate and appropriate data as early as possible within the supply chain timeline. Many public and private organisations receive gigabytes of data daily and store it in a database that is measured in terabytes. Data analytics can reveal the patterns or relationships

between variables across time. Doing this properly requires the right set of technical skills and an understanding of the global supply chain and logistical activities being tracked (Prokop, 2017:22). While the response in interdicting a security threat (like a bomb) must begin as soon as possible (i.e. before loading or departure), other less physical threats (for instance smuggled tobacco or evasion of duties and taxes) are normally interdicted after arrival (at the borderline), as a formal declaration (product classification, country of origin, valuation) is required to prove *actus rea* (the act) and *mens rea* (intent).

Figure 3-2: Activities that can trigger a risk in the movement of goods (for example, FCL Import and the relationship linkage)



Source: Author's own compilation (2019)

Accurate and timeous supply chain data (for example cargo reports as shown in Figure 3-2) that is identified early in the supply chain can assist tremendously in identifying risk proactively, as opposed to importer declarations (product classification, country of origin, valuation) at the borderline, which follow much later in the supply chain. However, the importer declaration contains data that can be used to reveal other interesting risk factors or indicators:

Entity relationships:

- First-time relationships between shipper and consignee or importer; and
- New or low-volume importers and carriers.

Commodities:

- The first-time importer has imported a commodity;

- A valuation that is inconsistent with the commodity type (e.g. by HTS Code or description); and
- Origin inconsistent with the commodity type (e.g. by HTS Code and country or region).

Geography:

- Cargo routing is inconsistent, based on historical ports stops and transits; and
- Goods have been exported from a high-risk country.

Mode of transport:

- The first time an importer has used an airport or marine port of entry to import goods; and
- Maximum payload weight is inconsistent with the commodity type.

Although global supply chains hold mutual benefit for developed and developing countries alike, these same supply chains have also increased the risk to the global economy. The first step is to accept that global trade and global supply chains bring risk with them. However, qualifying these threats after they have been identified will be more challenging and, as such, new methods must continuously be explored to remedy the risk. Practising customs risk assessment requires a decision-making specialist to coordinate this diverse expertise and organise it so that optimal decisions can be reached and risk managed by properly treating uncertainties throughout the supply chain (Coyle *et al.*, 2017:77).

Risk assessment becomes more effective when end-to-end supply chain visibility (origin to destination, as illustrated in Figure 3-2) is created. To do so, it is necessary to draw information from as many sources as possible, whether supply chain entities go via regulated filings, other government departments or independent third-party contextual data sources (Finger *et al.*, 2010:23). Furthermore, risk assessors must use formal risk management and communication tools in a clear, open manner to encourage public support for and understanding of the adopted process (Ayyub, 2014:203).

Since global supply chain complexity and increasing new risks are not likely to reduce in the near future, customs administrations must be prepared with new thinking and remedies for risk indicators, which should be identified as early as possible in the supply chain movement. (Creskoff, 2016:55). As demonstrated by Korniyenko *et al.* (2017:27), better monitoring and more detailed data provide a more robust understanding of the risks inherent in the modern global trade system. Such risks can be foreseen and mitigated by taking the network effects on trade into

account and enacting proactive risk monitoring without creating disruptions as the supply chain moves with international cargo and goods.

Customs agencies in collaboration with the WCO have therefore adopted a layered risk approach, which applies multiple activities and deploys very different, specialised responses to provide the set of controls needed to meet the diverse customs mandate. Incentives are used to reward compliant clients, with sanctions and penalties aimed at punishing and deterring non-compliance. This development has been in line with the private sector since the early 1990s, as many organisations have implemented various supply chain initiatives to increase revenue, reduce cost or reduce assets (Sodhi & Tang, 2012:283). However, to meet these goals most supply chains have grown more complex and, consequently, more vulnerable to disruptions than before (Graighead *et al.*, 2017:24). Calls for resilience (Sheffi & Rice, 2005:45) or robustness (Sodhi & Tang, 2012:65) have been made to reduce visibility. Such disruptions in the supply chain at the frontline caused by customs administration risk management have not only long-term stock price effects but also entail reputational loss or even loss of life (Sodhi & Tang, 2012:284).

In general, since customs administrations cannot possibly counter all threats, they only act to perform necessary checks to mitigate an identified risk, thus completing the “shift from gatekeeper to risk manager” (Widdowson, 2007:32). This model combines traditional regulatory and physical border controls, a transactional risk-based approach that uses profiling, complex algorithms and artificial intelligence or Big Data to trigger potential control. This is supported by an approach that segments entities, based on historical compliance and risk, and random selectivity to maintain a normalised sample and a deterrent.

Dr Kunio Mikuriya, the secretary-general of the WCO (2017:3) once again emphasised the balance in his recent remarks: “Customs administrations should aim for a reasonable and equitable balance between ensuring compliance and minimising disruption and cost to legitimate trade and the public”.

Customs administrations should apply a holistic and robust approach to risk management to evaluate the effectiveness of customs risk management. This approach requires four types of thinking to shape the required processes and tools (Widdowson, 2005, 2007, 2011):

- **Rigorous thinking:** Ensuring that logical, systematic processes guide everyday decision-making;

- **Forward-thinking:** Managing proactively rather than reactively. Risk management is about identifying and being prepared for what could happen;
- **Responsible thinking:** Acting to manage risk, avoid or reduce adverse exposure and maximise the potential of identified opportunities;
- **Balanced thinking:** Striking a balance between the costs and benefits of managing risk. A risk-free environment is impossible (if not uneconomical) to achieve, so the administration must decide what level of risk is acceptable.

The question is raised subsequently as to how the performance of a customs risk management approach can be measured. As mentioned in Chapter 2, various global indices exist with which to compare countries' international economic performance indicators. Some of these include the World Bank's Logistics Performance Index, Doing Business Reports' trading across border index and the WEF's Burden of Customs Procedures index. However, no index has been able to capture the overall performance of border management under a single metric.

A specific customs metric aims to capture this performance. One way of evaluating the effectiveness of a customs administration's risk system is to compare the likelihood of identifying an infraction with the likelihood of identifying an infraction by random inspection. The Cross-Border Research Association has the following equation (CBRA, 2017):

$$\text{Customs True Societal Protection Performance} = \frac{NItHt + NIrHr}{NHr},$$

where N = Total number of containers imported, It = Targeted inspection rate, Ht = Hit rate with targeted inspections, Ir = Random inspection rate, and Hr = Hit rate with random inspections.

The New Zealand customs administration uses this type of metric, where the percentage rate of infractions of a sample is evaluated versus the success rate of the normal risk system infraction rate. It should be noted that this can only be compared to a similar type of compliance check at a specific point in time and that the hit rate depends on the population compliance rate.

From this metric, it is evident that random inspections are still necessary at the frontline. Customs administrations' challenge is that even with excellent risk processes in place, various unknown factors still exist. Intelligent smugglers may not choose simple pathways, but rather take advantage of a perceived low-risk consignment, either directly or indirectly. This may explain why all customs agencies maintain at least some inspection coverage. More importantly, it further

highlights the need for a better customs risk management model. Since random inspections are resource intense, they are limited. Better customs risk management will exponentially increase the hit rate of illicit goods – something that random inspections will never be able to achieve.

Measuring risk is important to managing risks and evaluate resource allocation and forms the basis for all risk and compliance management models. “The first step is to measure whatever can easily be measured. This is OK as far as it goes. The second step is to disregard that which can't be easily measured or to give it an arbitrary quantitative value. This is artificial and misleading. The third step is to presume that what can't be measured easily really isn't important. This is blindness. The fourth step is to say that what can't be measured easily really doesn't exist. This is suicide” (Handy, 1995:219).

Risk management is a national and regional focus, but it must be aligned with global partners to promote and secure flow of trade (Coyle *et al.*, 2017:133). Therefore, interoperability, harmonisation with electronic single window initiatives, international security standards and principles, customs administration and the trading community are all essential components in this mix and must ensure that those tasked with risk management duties understand that it involves every aspect of a society (Giermanski, 2008).

On May 27, 2016, the former US President Barack Obama, as the first American president to visit Hiroshima, gave a very important speech which summed up the essence of risk management in a different manner: “Science allows us to communicate across the seas and fly above the clouds, to cure disease and understand the cosmos, but those same discoveries can be turned into ever more killing machines. Naïve is thinking that we are going to survive as a species in the age of acceleration without learning to govern our new realms in new ways and our old realms in new ways. And yes, that is going to require some very rapid moral and social evolution. Where to even begin?”

Adding to the important summary from Former US President Barack Obama, it is worth noting that the fundamental component of risk is the human element. In addition to its nature as the source of all risk, it is also the most difficult element to manage, which means risk management must evolve with time (Giermanski, 2008:21; Friedman, 2017:349). This highlights the important contribution this study aims to make, insofar as suggestions towards an improved customs risk management model for South Africa are concerned.

Evidence-based and internationally recognised research clearly shows that customs administrations can contribute to making the business environment more ‘enabling’ or, in other

words, more stable and predictable. This includes streamlining procedures, tackling corruption, enhancing integrity and facilitating the cross-border movement of goods, conveyance and people in general. Karlsson (2017:23-31), Widdowson (2007:33) and other prominent authors explain how customs administrations must move away from transaction-based risk that is inspected at the frontline (e.g. an international border) to a more holistic view and combination of many risk indicators.

A more holistic approach is needed from origin to final consumption with the entity and the entity relationships at the centre of the supply chain. This methodology must also link to the AEO programme, which fosters self-compliance in a trade transaction. The WCO Risk Compendium, as crafted and updated by the WCO, stipulates that risk management in itself is a journey that requires constant refining in terms of profiling and screening, through to the end of the transaction process (PCA), in an attempt to view and evaluate the total end-to-end supply chain.

Dr Kunio Mikuriya (2018:7), the secretary-general of the WCO, expresses the passage of customs administration as a very important one and calls on governments to support specific interventions for business to flourish. “It is equally important to look at the external environment in which businesses operate” Mikuriya (2018:8). Mikuriya further reminds us that building a secure, safe business environment is an ambitious project and that even with the best intentions, we can sometimes easily fail to understand all the subtleties of how this complex reality in the supply chain works.

The solutions Mikuriya (2018) claims exist in the sharing of knowledge and information supported by in-depth research and good communication, which will hopefully achieve the aim of a fair, safe and secure business environment for economic development.

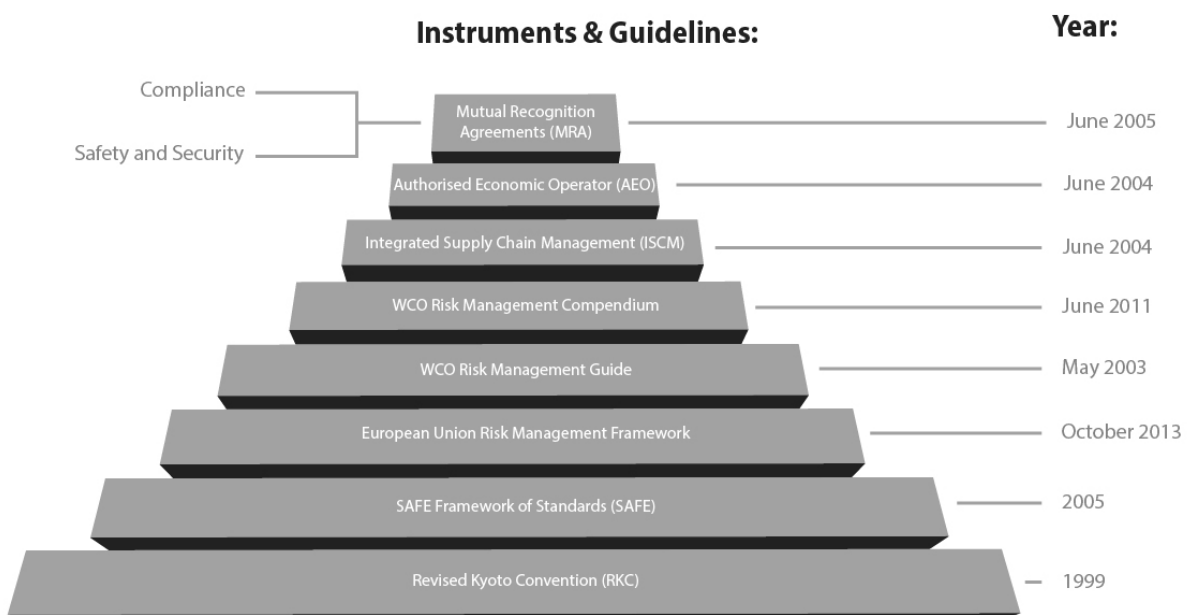
In concluding this section, the application of a risk management control regime forms the basis of modern international customs and border management strategy. This has enabled customs to balance the complex demands of a growing mandate to control, protect and facilitate goods without requiring additional resources. This enablement is necessary given the context of rapid growth trade and increasing complexity of business models, product classification, valuation and origin matters, and organised crime. The following section provides a regulatory framework for customs risk management practices to contribute to the customs risk management practices globally.

3.3 A regulatory framework for customs risk management practices

The global trends in customs risk management have been shaped by the influences of various international organisations, most notably the WTO and the WCO. This section emphasises some of the regulatory frameworks for customs risk management, starting with the WCO.

The WCO's experience is that a risk-managed approach to border control optimises customs resources by enhancing trade facilitation while achieving a balance with security (Finger *et al.*, 2010:4). The following figure illustrates the chronological progression of the WCO instruments.

Figure 3-3: WCO instruments, guidelines and deployments for the analysis and study of risk management



Source: Author's own compilation (2019)

The original document to bind WCO members to its practices was the RKC, which is the agreement governing international customs management. Since most trading nations are members of the WCO, these principles, guidelines and practices are common worldwide. However, the translation into national legislation, availability and day-to-day execution varies between countries as the guidelines of the WCO are not mandatory, a significant drawback of the WCO. The WTO TFA, on the other hand, is mandatory and gives trade more certainty to get trade facilitation with a smoother border crossing and a better scientific risk management profile and targeting to enhance predictability.

Some of the essential documents mentioned above should, therefore, be used to formulate a comprehensive understanding of risk management within the international trading environment. The principal definition of risk management, as provided by the WCO Risk Management Guide (WCO, 2003:4, Truel, 2010:30), reads as follows: “The systematic application of management procedures and practices which provide customs with the necessary information to address movements or consignments which present a risk”.

In addition to the WCO Risk Management Guide, the WCO SAFE Framework of Standards and the EU's Risk Management Framework also explicitly define risk management. That being said, the WCO SAFE Framework of Standards uses the same definition of the WCO Risk Management Guide (WCO, 2015:11), whereas the European Union's (EU) Risk Management Framework explains that “risk management helps customs authorities to determine the different levels of risks associated with goods being transported to and from the EU. It is a tool to help customs authorities decide which goods they will check and where” (EU, 2017).

Within this thesis, the documents mentioned are used as the basis for understanding the scope of risk management, in general, and customs risk management. In conjunction with explicitly defining risk management, each of these documents has a focused approach and some core objectives within the combined field of trade, customs and risk management. The following table summarises these five documents:

Table 3-1: Summary of risk management processes in the international trade environment:

	Revised Kyoto Convention	WCO SAFE Framework of Standards	EU's Risk Management Framework	WCO Risk Management Guide	WCO Risk Management Compendium
Description	The Revised Kyoto Convention is the main international trade facilitation Customs convention (Yasui, 2010).	Developed by the WCO, the SAFE framework of standards is 'a regime that will enhance the security and facilitation of international trade' (WCO, 2015:1).	The EU's Risk Management Framework is based on international risk management principles, such as the WCO SAFE Framework and the WCO Risk Compendium (EU, 2017).	The WCO Risk Management Guide explains in-depth the steps to implement risk management in Customs.	The WCO Risk Management Compendium is a methodology developed by the WCO that 'is sufficiently flexible in its application to meet the unique operating environment and conditions of individual WCO Members' (WCO, 2011)
Fundamental objectives	'To provide a set of comprehensive Customs procedures to facilitate	Aiming to promote the seamless movement of goods through global supply chain security and	• improving data quality and filing; • availability and sharing of risk-relevant info	'To progressively implement a system of "intelligent controls" where the risks have been	Aiming to provide an organisational framework for its members to both identify and treat

	legitimate international trade, while effecting Customs control including the protection of Customs revenue and society' (Yasui, 2010:3).	facilitation, supply chain management, customs administration and strengthened customs and business cooperation (WCO, 2015:2).	between customs administrations; • implementing control and risk mitigation measures; • strengthening capacity; • promoting cross-sectoral cooperation and information sharing; • improving cooperation with trade; and • tapping the potential offered by international customs cooperation.	assessed and appropriate resources have been deployed to meet the challenge (2003:5).	potential risks (WCO, 2011).
Focus	Key principles: • transparency & predictability of Customs, • standardisation and simplification of the goods declaration & supporting documents, • simplified procedures for authorised persons, • maximum use of IT, • minimum necessary Customs control to ensure compliance with regulations, • use of risk management and audit-based controls, • coordinated interventions with other border agencies, and • partnership with the trade	Described in four core elements, namely: harmonisation of cargo information, employing a consistent risk management approach, inspection of high-risk cargo based on comparable risk targeting and lastly suggesting benefits that customs will provide business that meets minimal supply chain security standards and best practices.	The underlying principles of EU customs risk management of the supply chain are as follows: • assess in advance, control where required • multi-agency cooperation • multi-layered and coordinated approach; and • efficient use of resources	Key principles: • Contribute to the achievement of objectives & improve performance; • Be tailored and aligned with the administration's external and internal context and role; • Be an integral part of all organisational processes; • Be part of all the decision-making processes; • Be systematic, structured & timely; • Based on best available information; • Be transparent & inclusive; • Be dynamic, iterative & responsive to change; • Facilitate continual improvement; and • Consider human and cultural factors	'Proposes a more holistic compliance management approach going beyond selectivity and aiming at actively managing and improving compliance (affecting client behaviour) through a bundle of different strategies mixing incentivised voluntary and enforced measures' (WCO, 2011:27).
Definition of risk management	The Revised Kyoto Convention does not explicitly define Risk Management.	'The systematic application of management procedures and practices which provide Customs with the necessary information to address movements or consignments which present a risk' (WCO, 2015:11).	'Risk management helps customs authorities to determine the different levels of risks associated with goods being transported to and from the EU. It is a tool to help customs authorities decide which goods they will check and where' (EU, 2017).	'The systematic application of management procedures and practices providing Customs with the necessary information to address movements or consignments which present a risk' (WCO, 2003:4).	The WCO Risk Management Compendium Guide does not explicitly define risk management.

Structure	The Revised Kyoto Convention is divided into five different chapters, with 20 subsequent articles coming from these chapters (WCO, 2012).	The WCO SAFE Framework of Standards is divided in a three-pillar strategy: 'Customs-to-Customs (C-2-C)'; C-2-B' and 'C-2-OGA'. Within these three pillars, a set of standards are further 'consolidated to guarantee ease of understanding and rapid international implementation' (WCO, 2015:2).	The EU's Risk Management Framework is divided into seven risk management-based objectives.	In conjunction with Chapter 6 of the Revised Kyoto Convention, the WCO Risk Management Guide sets out the steps to implement risk management in customs through: the risk management process, compliance measurement and supporting infrastructure.	The WCO Risk Management Compendium comprises of two volumes: Volume 1: - Principles - Framework - Process for managing risk Volume 2: - Operational risk management - Tools and instruments
------------------	---	---	--	---	--

Source: Author's own compilation (2019)

From the perspective of the WTO, the recently ratified TFA sets out how members must approach risk management in Article 7, subsection 4 that reads as follows:

4.1 Each Member shall, to the extent possible, adopt or maintain a risk management system for customs control;

4.2 Each Member shall design and apply risk management in a manner as to avoid arbitrary or unjustifiable discrimination or a disguised restriction on international trade;

4.3 Each Member shall concentrate customs control and, to the extent possible other relevant border controls, on high-risk consignments and expedite the release of low-risk consignments. A Member also may select, on a random basis, consignments for such controls as part of its risk management;

4.4 Each Member shall base risk management on an assessment of risk through appropriate selectivity criteria. Such selectivity criteria may include, inter alia, the Harmonised System code, nature and description of the goods, country of origin, country from which the goods were shipped, value of the goods, compliance record of traders, and type of means of transport. (WTO, 2015).

The WTO lists the rules above in an aim to reduce the time and cost to trade, while at the same time maintaining an adequate level of compliance. WTO members are required to set up or maintain a customs risk management system as their national resources allow. Yet, it is worth noting that this obligation is defused by the words "to the extent possible" since various members (especially developing countries) do not have the necessary capital (neither human nor physical) at their disposal (UNCTAD, 2014).

Additionally, as subsection 4.2 of Article 7 states, risk management systems shall operate in a non-discriminatory basis. Consequently, this means that WTO members may differentiate goods through various indicators (e.g. HS codes, country of origin and means of transport as set out in subsection 4.4), through risk analysis and selectivity criteria. The rule, therefore, seeks to ensure the application of risk management remains in good faith, avoids abuse or misuse of this provision.

Ultimately, any requirement in members' legislation for customs to examine completely, a fixed number or a minimum percentage of consignments, would generally not be compatible with risk management principles (UNCTAD, 2014). Subsection 4.3 of Article 7 clearly states where administrations should focus their attention, namely with high-risk consignments. Without an effective risk management engine, focusing on high-risk consignments is outside the realm of many customs administrations, especially those in developing countries.

Following the regulatory framework as set out above, one major advance in modern custom administrations' approach to risk management has been in the private sector. The following section investigates the different programmes currently initiated internationally.

3.4 Customs-to-business risk management practices globally

Since people, and not the goods, commit fraud, it is evident that customs administration needed a more modernised approach to combating illicit trade, namely, identifying the risk brought on by the operators themselves. The C-2-B pilot experience in several countries led to several useful conclusions. Firstly, it is not enough to base customs risk on goods and procedures alone “with little regard for the customer’s compliance history or for commercially available information that could ground admissibility checks and pre-clearance decisions” (Doyle, 2011:12). If an operator is evaluated as low risk, then the risks related to goods and procedures should have less impact on the total risk evaluation.

Secondly, ensuring customs compliance and securing the safety of all transactions in growing cross-border trade is particularly difficult. The proposed solution was to study the various systems from a wide range of perspectives to determine the likelihood of a breach, or attempted breach, of customs law that would result in an infraction. This initiated the shift from transaction-based to system-based controls, as will be demonstrated with most customs administrations throughout this section. The third landmark parameter was the realisation that if a system was able to identify high-risk operators, the system would also be able to identify low-risk operators (Karlsson, 2017:24). These initial conclusions have accelerated the evolution of a number of AEO

programmes. Today, there are approximately 77 different programmes globally (WCO, 2017:151).

Customs clearance has evolved from being at the end of the customs transaction to the beginning of the import and export management process. This allows the responsibility to be transferred from customs to the trader and is a source of risk for both the trader and customs (Truel, 2010:75). For traders, these compliance responsibilities cross the company horizontally, affecting all departments involved in a transaction. Customs practices have changed and are bringing profound changes to the way global supply chains must be managed (Finger *et al.*, 2010:36). Customs administrations must understand how to manage risk and reconcile, accelerate and secure border crossings.

This transfer of responsibility initially gives the trader a quick release of the goods and subsequently the responsibility of ensuring that all compliance matters are met (Truel, 2010:75). Traders must, therefore, integrate customs management into their business processes (Widdowson, 2007:28). By moving compliance checks away from the physical borderline to the company's office, customs have gained clear visibility of the physical, documentary and financial supply chain. Global traders have exchanged fast customs clearance for higher compliance responsibility as it brings more sustainability and certainty into the movement of supply chains (Manners-Bell, 2017:122).

The customs journey to include the private sector in proactive risk management processes in several developed countries has resulted in the innovative development of concepts like authorisation, certification and accreditation. An early example was Sweden's 'Stairway Accreditation' programme that it launched in 2004 (WCO, 2004:24). It contained modules for all stakeholders in the international supply chain, namely importers/exporters, brokers, carriers and also terminals. The philosophies of the programme were to facilitate greater levels customs compliance, counter increased demands on the Swedish business community and avoid duplication of systems through full integration with existing programmes, for the accreditation and facilitation of international trade processes (Swedish Customs, 2003:7).

The original idea of AEOs was to create a risk-based separation of trade flows through borders. The resultant flows should be more compliant, secure, predictable and less resource-intensive to manage. This idea was revolutionary since legislation in most democracies is written to guarantee neutral competition and equal treatment. Importantly, the idea was not to introduce alternative legislation and policies for compliant traders but to develop an alternative way of ensuring compliance with legislation, policies, rules and regulations. If an operator invests in meeting the

requirements and thus proves to have a low risk of errors, that operator can also be given a different control programme to manage and monitor its low risk over time and maintain its status as low risk (Karlsson, 2017:24).

In compliance management theory, which can be defined as the state of adherence to pre-defined explicit rules, procedures and standards (Foorthuis & Bos, 2012:3), this demands not only a modern, systems-based, structured control approach but also incentives to encourage companies to be compliant. Therefore, if customs risk management systems are logically structured and easy to modify and understand, government agencies are then allowed to concentrate scarce resources on prioritised high risks. “The best practice in compliance management in the border context, requires (in the oft quoted metaphor) both carrots and sticks” (Widdowson & Holloway, 2011:110). This quote indicates that customs administrations should be able to both identify and reward compliant operators (with increased levels of facilitation) while being able to identify and punish non-compliant operators (with enforcement strategies including criminal and civil penalties or name-and-shame lists) at the same time.

Globally, countries and their customs administrations are currently at different stages of implementing their individually designed programmes, which meet their own strategic intent and are aligned with their international obligations. For example, countries such as the US and New Zealand prioritise security-based authorisation, the former for homeland security, the latter for protection of exports. The EU, on the other hand, has amended its existing authorisation codes to equally prioritise safety and security, alongside compliance and access to simplifications.

The following sections highlight the current progress in various customs programmes in several countries around the globe. The purpose is to identify the key successes and lessons learnt by these countries, which could possibly also be used in the South African context.

3.4.1 United States

The first US Congress created US Customs in 1789 to collect duties on imported goods and prevent smuggling of illegal goods. In its early years, US Customs was the primary source of federal government revenue. However, by 1940, tariffs represented only six per cent of tax revenue. In modern times, the US customs’ mission has shifted primarily to law enforcement, with duties contributing a little over two per cent of all government revenue (Creskoff, 2016:206).

Previously conducted by multiple organisations, the US Customs and Border Protection (CBP) came into existence on 1 March 2003, to become the first comprehensive border security agency

in the US. Responding to the 9/11 terror attacks and supporting improved risk management as part of the US Homeland Security initiative, CBP implemented a voluntary C-2-B programme called the Customs Trade Partnership Against Terrorism (C-TPAT) (CBP, 2013). Unlike other global accreditation programmes, C-TPAT's main certification in maintaining standards of security provision for their supply chain resides solely with the US importer and intermediaries. In return, importers receive improved facilitation at borders.

As of February 2018, C-TPAT works with over 11,605 US companies, attempting to secure the movement of over 12 million 20-Foot-Equivalent Units (TEUs) in goods, accounting for over 52 per cent of US imports in value terms (CBP, 2018a). To achieve this, CBP employs approximately 150 full-time C-TPAT officers residing in six CBP offices across the US (CBP, 2013). Their responsibilities include site visits to C-TPAT importers, their suppliers and supply chain intermediaries at locations in the US and around the world.

In addition, CBP opened the Importer Self-Assessment programme under its regulatory audit authority in June 2002. The ISA allowed C-TPAT-participating importers to assess their own compliance with customs laws and regulations voluntarily and assume responsibility for monitoring their own compliance in exchange for benefits.

The original intent of the ISA programme was conceived pre-C-TPAT, with plans to conduct an Importer Compliance Monitoring Programme (ICMP) test. This was published in the Federal Register (63 FR 20442) in April 1998. Four years later, the CBP published a notice in the Federal Register (67 FR 21322), advising the public that the ICMP test had been terminated, mainly due to lower than anticipated importer participation in the ICMP. The ISA continued the principles of the ICMP for importers while relying on a more flexible approach (CBP, 2002).

In June 2014, CBP announced that it was planning to amend its programme and further retool its C-TPAT import security-focused programme into a holistic Trusted Trader programme, covering both imports and exports. The change in strategy was designed to help facilitate US exports entering global markets and align with the WCO AEO SAFE standards. It supported reciprocal arrangements for traders involved in the various mutual recognition agreements (MRAs). These MRAs, in which one or more countries recognise one another's conformity and compliance assessments, included agreements that the US signed with the EU, Japan, China and other global stakeholders. An expanded Trusted Trader programme is currently in progress following a successful pilot trade compliance programme (CBP, 2018b). Activities currently involve the pre-requisite training of partnering government agencies.

“The strategy for a Trusted Trader framework is based on a continuum of activity providing a consistent level of engagement between the trade and regulatory government partners that demonstrates the highest level of commitment in practice to security, compliance, and partnership within the global supply chain. This is a trusted relationship that is articulated with trading and/or facilitative benefits, streamlining the global trading process, allowing focus and global attention on those that pose the highest risk” (CBP Trusted Trader Strategic Review, July 2016).

While the US’s strategic shift seems to have been made to enable closer alignment with the EU AEO and WCO SAFE, it should be noted that this shift came as a result of prior supply chain security initiatives. These included US customs administrations improving border and port security, amending policy to require submission of advanced data (10+2) for pre-departure risk targeting and establishing X-ray container scanning.

In addition to the abovementioned, the new CBP Trusted Trader strategy also appreciates that many foreign customs administrations now have the appropriate powers and controls in place to support safe and secure trade and that the threat is global and not just aimed at the US. Subsequently, supply chain security in the US has migrated from a unilateral US control strategy to one of a global holistic trade programme. The signing of bilateral MRAs has created trust in audit, control and authorisation procedures in customs administrations around the world (Aigner, 2010:47).

C-TPAT audits follow an 8-point check, prompted by a checklist and recorded in an electronic report standard. However, the important factor is that the responsibility rests primarily on the US importer. AEO requirements are also more broadly applied to include compliance and security. Areas covered in the checklist include (CBP, 2018c):

- Premises security, CCTV surveillance and access controls;
- Personnel security – including staff, visitor and contractor checks;
- Business partner security;
- Cargo security, including container loading and the 7-point inspection process;
- Conveyance and transporter security to ensure integrity to port;
- Information and IT security;
- Investigations and tracking;
- Crisis management and incident recovery.

In the event of the CBP identifying a breach in C-TPAT requirements, the problem cause(s) and incurred liability will be investigated. An internal turnaround time of 15 days is required to perform the investigation into the breach, allocate responsibility and address the outcome.

In addition to C-TPAT, a new phase is currently being entered with the Automated Commercial Environment (ACE) as a type of “single window” programme (Prokop, 2017:68). Manifests updated in the ACE portal prior to the arrival of cargo at a port of entry will speed up the trade process while allowing CBP to enhance its risk management and target illicit shipments at the same time. Near real-time data will be accessible to all parties and updated daily. If these glitches can be worked out, the single window will have CBP acting as an intermediary to handle the documentation all the other agencies wish to access (Prokop, 2017:73).

3.4.2 European Union

In the EU, customs risk management is implemented through a multi-layered approach, based on four key principles. These principles are: assess in advance, control where required, multi-agency cooperation, multi-layered and coordinated approach and efficient use of resources (EU Commission for Taxation and Customs, 2018). The EU has been at the forefront of customs risk management development and the promotion of AEO. A major reorientation of the customs policies has shifted the emphasis from the fiscal role to the function of protecting and ensuring security within the community (Iordache & Voiculet, 2007:55).

Essentially, the multi-layered risk-based approach acts to efficiently target and mitigate high-risk consignments, while expediting low-risk consignments through the EU AEO programme at the same time. Since EU Customs deal with such an immense quantity of goods flowing through their borders (approximately nine customs declarations per second valued at more than €100 000), a robust risk management system allows customs to identify how best to deploy resources to respond to threats that arise (EU Commission for Taxation and Customs, 2018).

These approaches are supported by national security systems that utilise advanced pre-departure and pre-arrival cargo information, to identify risks in goods brought into and taken out of the EU customs territory. Risk profiling is segmented into scores for commercial risk and for safety and security admissibility. Commercial risks are managed through PCA teams, except for high-risk cases or where unknown entities are involved, triggering an intervention. The focus of border control is, therefore, on admissibility issues.

Based on the C-2-B partnership the WCO introduced, EU customs administrations offer AEO status as a certified standard authorisation, recognising reliable entities that are legally established in the EU, that have an Economic Operator Registration and an Identification (EORI) number and are actively involved in customs operations and international trade. The EU AEO database identifies anyone holding AEO status. On the basis of Article 39 of the Union Customs Code (UCC), the EU programme allows companies to apply for three types of AEO status: for customs simplification (AEOC), security and safety (AEOS) and a combined status.

AEOC status is issued to any business that meets the specified criteria of having a good tax and customs compliance history, good commercial and transport record-keeping standards, financial solvency and other criteria such as standards of competence and records of compliance. Benefits from AEOC status include worldwide recognition as a compliant partner in international trade, lower risk scores in commercial risk profiling, priority treatment in physical controls, reduction or waiver of guarantees and a faster application process for customs simplification and authorisation (EU Commission for Taxation and Customs, 2018).

AEOS certification is issued to any business that fulfils the appropriate security and safety standards; has a good tax and customs compliance history, good commercial and transport record-keeping standards and financial solvency. A holder of AEOS will benefit from a lower risk score for customs physical and documentary checks, the fast-tracking of consignments, reduced requirements for the submission of mandatory pre-arrival/pre-departure declarations, priority treatment in the event of disruption in the international supply chain and reciprocal arrangements and mutual recognition of AEO programmes with countries outside the EU under Joint Customs Cooperation Agreements, e.g. Canada, Japan, New Zealand and US (EU Commission for Taxation and Customs, 2018).

The EU has managed to ensure a smooth transition into the new standards by introducing a transitional period that allows AEO companies, authorised before May 2016, three years to meet the new requirements. Conditions will be included in the customs' reassessment work as part of their review of AEO status every three years.

3.4.3 United Kingdom

In the UK, the UK Border Force, a law enforcement agency within the UK Home Office is responsible for customs controls for goods and the immigration of people. The UK Border Force, currently still part of the EU, works within the confines of the EC regulation, policy and integrated system to protect goods going into the country. The UK Border Force is guided by a formal control

strategy that rates the risks by theme and severity in each category of illegal, illicit or revenue goods and according to the mode of transport. Resources are deployed to act on triggers created by specialised and centralised risk targeting hubs, focusing on each type of freight and each transport modality (UK Border Force, 2015).

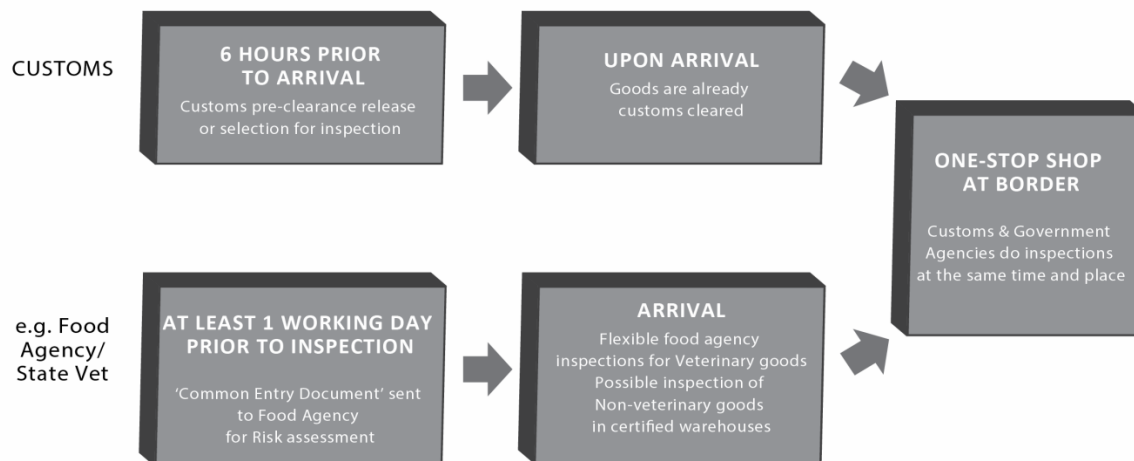
In addition to the Border Force, Her Majesty's Revenue and Customs (HMRC) plays an active role in securing national borders and simultaneously facilitating trade. HMRC facilitates the authorisation for manufacturers, exporters, freight forwarders, etc. for AEO status, as outlined in Article 39 of the UCC set out in Regulation (EU) No 952/2013. The process of obtaining either security or safety (AEOS) or customs simplifications (AEOC) are similar to those explained in the previous section, but HMRC facilitates the process (HMRC, 2018).

3.4.4 Belgium

In addition to using the same EU-wide policies, procedures and systems, the activities at the mega port of Antwerp display a second example of integrated border risk activities. Antwerp has aligned and integrated all of its customs and border regulatory activities into an efficient, streamlined approach that maintains a customer-oriented attitude to support smooth process throughput. All data submissions are made into a single window with various agencies working together in a one-stop post. Customs use its risk and audit management (RAM) tool to automatically support the execution of client-centric risk activities, including the AEO programme and risk targeting processes that risk-engines undertake.

The integration of various border agencies is typified by the processes of risk assessment and inspection of perishable goods by Customs and The Belgian Agency for the Safety of the Food Chain, which enforces measures related to food safety, animal health and plant protection.

Figure 3-4: Port of Antwerp: Integrated risk-based clearance approach



Source: Adapted from Port of Antwerp, 2018.

Border agencies use pre-arrival information to make decisions and provide clear and transparent communication to pre-notify the consignee of any physical checks required. Where a physical check is required, it is performed in a one-stop single inspection hub on either arrival or exit from the port. The flexible deployment of staff in busy periods means that Antwerp can also ensure the prompt turnaround times and minimise costs and transit times.

3.4.5 New Zealand

Established in 1840, the New Zealand Customs Service (NZCS) is the oldest governmental department in the country. On the forefront of PT development, New Zealand Customs introduced the Secure Exports Scheme (SES), a voluntary arrangement between exporters and New Zealand Customs, designed to protect the exporters' international supply chain against tampering, sabotage, smuggling and other transnational crime (NZCS, 2018a). The SES is underwritten by legislation within the New Zealand Customs and Excise Act, 1996.

The SES ensures that goods to be exported are packaged securely and conveyed to the place of shipment without interference. The scheme is voluntary and open to all exporters. Partners make a written commitment to have measures in place to protect their goods from the point of packing containers to delivery at the point of export shipment. This written commitment is set out in an approval document supported by a self-prepared security plan. The security plan must detail the company's written and verifiable policies, processes and procedures to meet various security

criteria in terms of documents, access controls, personnel, education and training and OGA requirements (NZCS, 2018b).

Applicants must also include security plans provided by third-party operated sites and transport operators that are contracted to either pack, store or transport export goods. The benefits of joining SES include (NZCS, 2018a):

- reduced export transaction fees for the lodgement of all export entries;
- a supply chain that is secure from point of packing to time of delivery to the point of export;
- internationally recognised standards and commitment to supply chain security;
- access to border clearance privileges for countries that have MRAs with New Zealand customs and advice and assistance for unexpected issues
- minimal disruption following trade disruption caused by security alerts. SES partners' exports are likely to experience minimal disruption as their security can be assured
- security measures that comply with the standards set by WCO's SAFE.

Packages sealed with a customs-approved seal or marking are also recognised under Civil Aviation Authority Regulation 109 as coming from a 'known shipper'.

New Zealand's Customs' approach is outcomes-based rather than prescriptive because every business is unique and needs different measures to secure cargo. The exporter must, therefore, demonstrate how they meet the terms and minimum requirements set out in the standard and what they are doing to secure their export goods. Practices that support the Ministry of Agriculture and Forestry requirements or Civil Aviation and occupational health and safety are often valid as a basis for Secure Export controls (NZSC, 2017).

New Zealand's customs service also has MRAs in place with customs services in other countries (Australia, the US, Japan, and the Republic of Korea) with similar supply chain security standards to SES (NZCS, 2018; WCO, 2017). These MRAs have been developed as part of New Zealand's commitment to global trade security. The first arrangements were pioneering agreements aligned to the WCO SAFE. The mutual cooperation means that overseas border agencies in mutually recognised countries treat imported goods from SES partners as 'low-security risk'. As an example, SES exporters are 3.5 times less likely to be examined by US CBP for security purposes, compared to the average inspection rate (NZCS, 2018a). MRAs allow SES exporters to have significant commercial advantages in important markets while promoting the advancement of free trade at the same time.

3.4.6 China

The General Administration of Customs of the People's Republic of China (GACC) is the headquarters of China Customs. As a full ministerial-level government agency, its key functions include customs control, revenue collection, smuggling prevention and compiling foreign trade statistics (GACC, 2018). For C-2-B coordination, China launched its AEO programme on 1 April 2008 and granted more than 35,000 'General Certified Enterprises (GCE)' accreditations by the end of 2016 (WCO, 2017:51).

In October 2016, a further C-2-B initiative, called the AEO Joint Incentive (AJI) programme, was launched. Under the existing AEO programme, companies that have met pre-determined standards have been further certified by China Customs as "Advanced Certified Enterprises" (ACE) and are entitled to enjoy as many as 49 additional facilitation measures. At the time, ACEs comprised about 3,000 enterprises, accounting for nearly a third of China's total import and export volumes (Jianping, 2018:10).

The facilitation measures of the AJI Programme can be divided into six major categories (Jianping, 2018:10):

- Category 1 – "Green Lane" (expediting licensing, registration, and release of goods);
- Category 2 – "Less Inspection" (provisions to carry out fewer inspections at ports);
- Category 3 – "Priority Treatment" (priority in requiring intellectual property protection);
- Category 4 – "Simplified Procedure" (reducing the number of documents required);
- Category 5 – "Major Reference Benchmark" (taking into account AEO status during inspections by other participating AJI agencies);
- Category 6 – "Pilot Reform Project" (priority to AJI companies participating in pilot projects implemented by customs and other government departments).

ACEs have benefitted greatly from China's AJI programme, due to reduced transaction times, lower inspection rates and priority in clearance formalities (WCO, 2017:51). Moreover, because of enhanced credit ratings, an AEO's proportion of direct financing, based on the line of credit from banks, increased from 60 per cent in 2015 to 90 in 2017 (Jianping, 2018:11).

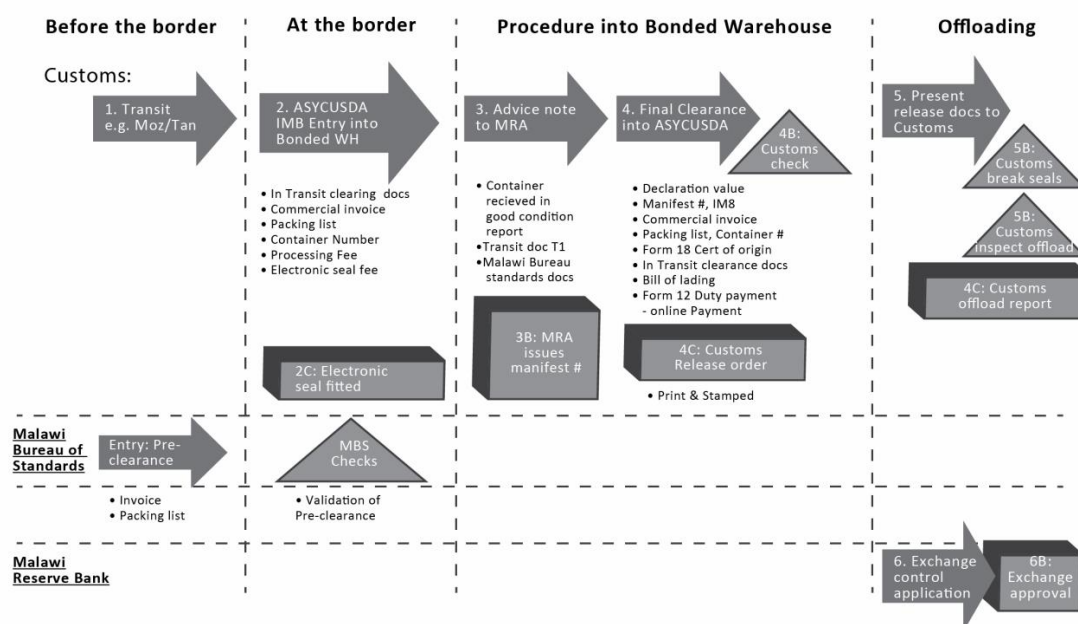
3.4.7 Malawi

Malawi has recently introduced a risk-based approach and risk engine with its Automated System for Customs Data (ASYCUDA) world declaration processing system for import, export and transit procedures entered through the Single Administrative Document. The customs administration is

part of Malawi's Revenue Authority (MRA), with their primary focus on revenue collection from imports, providing 30 per cent of national revenue (MRA, 2018). To reach this large number, imports are subjected to high tariffs and additional ad valorem excise duties on luxury goods like cars.

Due to limited border infrastructure, Malawi customs manages commercial importation through licensed agents performing a transit procedure into bonded warehouses, with customs attaching a small track and trace seal at the border. Customs then remove the seal and inspect all items offloaded from the containers at the warehouse.

Figure 3-5: Malawian import processing



Source: Ellison, 2018

The ASYCUDA system, developed by UNCTAD, uses international codes and standards developed by the WCO and the International Organisation for Standardisation (ISO). The web-based solution enables traders to lodge their declarations, cargo manifests and transit documents via the internet. The ASYCUDA risk engine divides transactions into a high-risk, red lane for physical examination, a medium risk or yellow lane where a documentary check is required before assessment, a blue lane where declarations are highlighted for PCA, and lastly, a low risk lane, where declarations are identified for the green lane (MRA, 2018).

In practice, Malawi runs transactions through the risk engine but still applies full import intervention rates, maintaining 100 per cent customs inspection in the warehouses and also

revisits about 40 per cent of volumes through PCAs. In addition, the Bureau of Standards performs inspections at the border, charging a standard inspection fee. Although Malawi is in the process of building an AEO programme (a single window and integrated border management model) there is currently little use of pre-arrival information. Limited exports of commodities require up to 10 separate paper-based approvals from relevant regulatory agencies prior to customs release.

3.4.8 Kenya

The Customs Services Department of the Kenya Revenue Authority was established in 1978. It is the largest of the four revenue departments in terms of manpower, revenue collection and countrywide operational network. Apart from its fiscal responsibilities, Customs is responsible for facilitating legitimate trade and protecting society from the illegal entry and exit of prohibited goods (Kenya Revenue Authority, 2018).

Based on the prescripts of the WCO SAFE Pillar II (C-2-B coordination), Kenya initiated their AEO Programme in 2008, under its reforms and modernisation process. The programme was officially launched in November 2011 and currently consists of 38 importers/exporters, 24 clearing agents and two transporters/shippers (WCO, 2017). Similar to the C-TPAT of the US, the obligations of operators include self-regulation and self-assessment. The benefits under the programme include expedited document processing, cargo release and a reduction in transit time resulting from faster clearance at transit points. The Kenyan AEO programme aims to increase the number of AEOs by 40 per cent annually.

Kenya's AEO programme is legislated in the East Africa Community Customs Management Act 2004 (EACCMA), with member countries, Burundi and Uganda, also having operational AEO programmes. In addition to these programmes, the region, as a whole, is busy negotiating an agreement with South Korea (WCO, 2017).

3.4.9 Summary

In summary, this section highlighted the various customs risk management practices and programmes globally. AEO programmes and other C-2-B initiatives have become key drivers for a secure, transparent and predictable trading environment. An increasing number of countries are implementing system-based controls to shift the responsibility of compliance from customs administrations to operators. Different countries are at different levels of implementation and, indeed, focus. For example, the US focuses on safety and security and overall compliance,

whereas New Zealand focuses on export promotion and the security of their exporter. The EU, on the other hand, focuses on compliance and collaboration with OGAs, as is the case in Belgium. In Africa, Malawi shows that 100 per cent physical intrusion is not possible, even in African countries where customs administrations focus more on revenue generation than safety and security.

The motivation behind the inclusion of major role players (the USA, the EU, the UK, Belgium and New Zealand) in the abovementioned C-2-B inquest is easily detectable. These countries are (as with many trade and customs related matters) on the forefront of promoting C-2-B practices in securing global trade.

The other three countries (China, Malawi and Kenya) perhaps need some further explanation. The motivation behind the inclusion of Chinese C-2-B practices is two-fold. Firstly, China has become one of the dominant forces in global trade (as is also evident in terms of their AEO programme with more than 35,000 companies having received GCE accreditation since the programme's inception in 2008). Secondly, since China is one of South Africa's largest trading partners (and also similarly classified as an emerging market), South Africa's serves to gain much insight into their own AEO programme, as well as future mutual recognition possibilities between Chinese - and South African AEOs.

Finally, the motivation behind the inclusion of Malawi and Kenya serves to provide some C-2-B practices within the African perspective. Malawi is used as an example since it is one of the most recent adopters of an AEO programme. Kenya is used since, within the region, Kenya's AEO programme is the most mature of all the African AEO programmes to date, with approximately 70 accredited business. Additionally, Kenya's AEO programme has been up and running since 2010, making it one of the longest-running AEO programmes in Africa.

Ultimately, the evolution of C-2-B partnerships in the form of AEOs play a fundamental role in transferring a portion of the supply chain risks to the operators. AEOs result in higher compliance and appear to assist the risk management practices of customs administrations greatly. By transferring the risk and raising compliance, AEOs are binding all the role players in the end-to-end supply chain with accurate and timeous reporting. The following section will investigate customs risk management practices in South Africa.

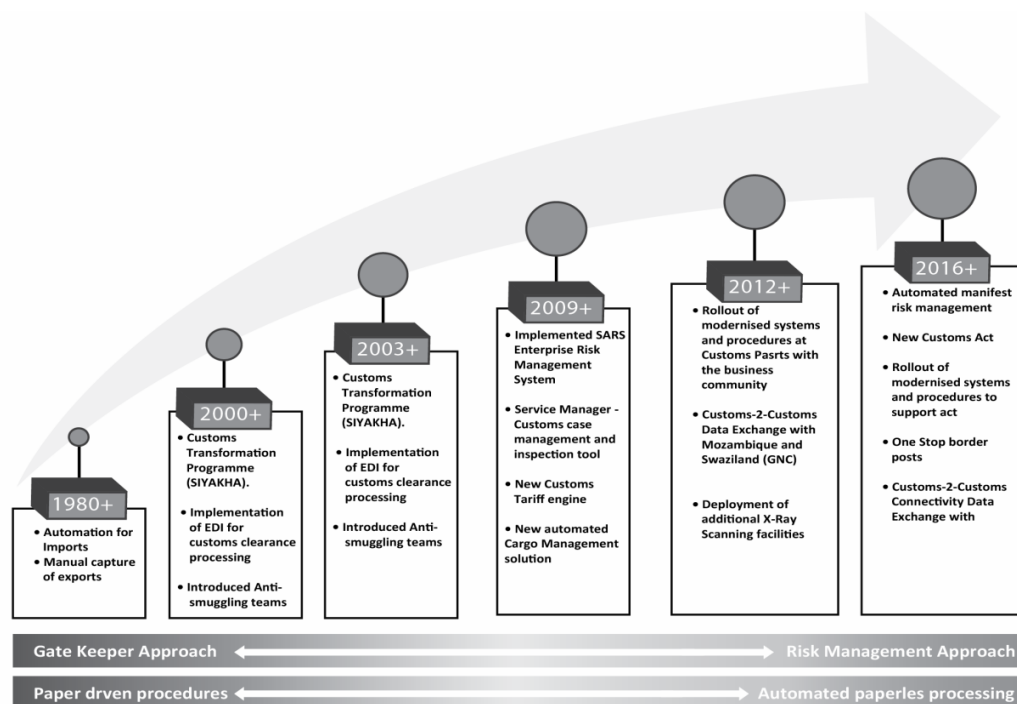
3.5 Customs risk management practices in South Africa

3.5.1 Introduction and historical context

The customs administration in South Africa is a constituency of SARS, which performs revenue collection within a single integrated structure (SARS, 2017a). This division will further be referred to as SARS customs. The strategic focus is on balancing optimal compliance and revenue collection on the one hand and performing economic protection, control of goods and safety and security matters on the other. The mandate of SARS customs reads as follows: “To collect all revenues due, ensure optimal compliance with tax, customs and excise legislation and provide a customs and excise service that will facilitate legitimate trade as well as protect our economy and society” (SARS, 2016:3).

Aligned to the risk management frameworks of the WCO, SARS customs has been on a consistent journey of investment since 1999. The passage to a fully digitalised clearance process started with the introduction of electronic data interchange (EDI) for goods declaration in 2001, followed by the implementation of the Danish ICRAS Risk Engine in 2003. Further modernisation initiatives included replacing the core processing system and introducing a new in-house automated customs risk engine (CRE) during 2009. The core developments are depicted in the following figure:

Figure 3-6: SARS customs improvements since 1980



Source: SARS, 2016

As illustrated, the leadership of SARS customs in the early millennium was innovative and committed, propelling South Africa into a position of clear African leadership in tax and customs. SARS customs' investment in risk-based processes largely focused on developing a multi-variable risk process that accurately verified declarations, in a similar focus to its tax assessment process.

Other broader customs innovations followed global trends, typified by the Port of Durban becoming the first port in the world to introduce container scanners to support US container scanning requirements following 9/11 (Rebelo, 2004). Further advancements include the early adoption of the WCO's third data model (Poverello, 2010), the development of a world-class detector dog programme (providing training to many other agencies, including Mauritius and China) and the provision of regional leadership in customs connectivity, capacity building and initiatives to create a regional accreditation programme – the PT programme.

3.5.2 Customs legislation in South Africa

The development of a new customs act has assisted in SARS customs' responsibilities. The legislation was conceptualised in 2003 and will replace the Customs and Excise Act 91 of 1964. The new customs acts were promulgated in July 2014 to install a world-class regulatory model

that is fully aligned with the RKC and other WCO instruments (Theron, 2018:2). The development of new functionality within the SARS proprietary interfront systems is scheduled to be completed by 2025. The NCAP introduced three major modernisation projects to assist with the responsibilities of customs in South Africa: The Reporting of Conveyancing and Goods (RCG), Registration, Licensing and Accreditation (RLA) and Declaration Processing (DPS).

RCG will cater to the systems developments needed to manage increased reporting requirements, specified in the new customs act, by June 2021. This will enable full manifest acquittals, matching and integrating risk profiling in tandem with the goods declaration and third-party information. The implementation of significant changes in RLA and DPR is intended to be rolled out gradually across land, sea and air modalities to manage risk (Theron, 2018:5).

3.5.3 SARS preferred trader programme

The PT programme, a C-2-B compliance programme, was officially launched on 8 May 2017 – initially awarding 28 clients with PT status (SARS, 2017b). Legislated in August 2011, the PT programme is based on the voluntary submission of the company's compliance records, passing a test of customs competency and the joint verification approval of appropriate internal controls, methods, reporting, systems and financial solvency. The intent is to trust PT companies to produce consistent, error-free transactions. In return, SARS customs certifies entities and provides benefits, including reduced interventions, a relationship manager and surety.

The PT journey started when South Africa committed to implementing AEO as part of acceding to WCO SAFE in 2005/7. The adoption of SAFE and AEO has proved considerably more challenging in practice, mainly due to the significant modernisation initiatives in terms of risk, data and approach (Ellison, 2018). In 2009, SARS initiated the development of the AEO compliance programme as one of five modernisation initiatives. However, the development of the NCAP as a whole has often distracted the delivery of separate individual commitments during the 10-year implementation period; as did the equally timely replacement of the core processing systems.

The pilot programme drew on the application of best practices from around the world, especially from the Canadian and EU models, and added a test of competence in customs matters that was largely inspired by experience from the Australian service. SARS developed and published its new audit and accreditation trader management policies to support the programme.

In the second part of the pilot scheme, SARS engaged with volunteer companies in critical industries like the automotive industry. Companies had to perform a self-assessment and then a

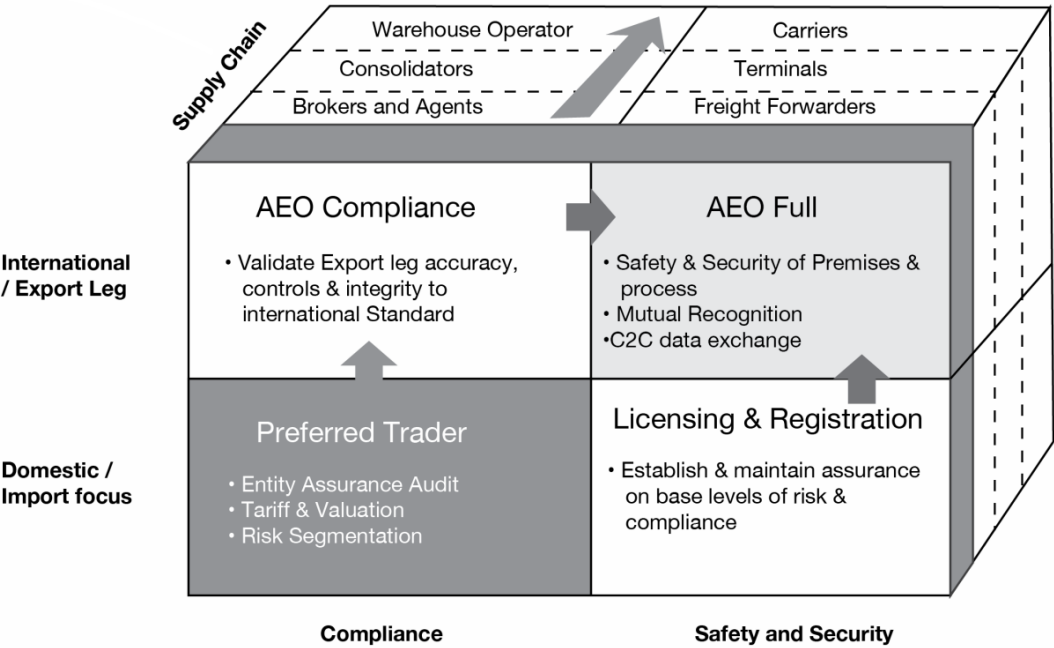
customs-led evaluation of the entity's national compliance, systems, record-keeping and solvency. SARS's work was comprehensive and aimed to ensure that the appropriate mechanisms were in place to be able to trust future compliance and test historical compliance (Ellison, 2018).

Over the following four years, SARS would grow its specific PT unit, employing around 120 employees and placing university graduates into units to support the plans to create a world-class, professional and self-sustaining division. SARS engaged over 500 companies, which represented volumes of over 50 per cent of declarations by line entry and completed 250 audits in association with clients representing nearly 30 per cent of trade volume.

The pilot project was very successful in refining the core SARS documents and changing the traditional customs approach from a purely transactional orientation into a new C-2-B relationship. This key shift would become a major focus of the NCAP, currently being implemented. In August 2011, SARS made a legal amendment to Section 64E of the Customs and Excise Act, 1964, to include a level-2 accreditation that would cater for AEO compliance (SARS, 2013). Despite its legislative capacity and the establishment of a customs accreditation review committee to award PT status, SARS did not initially award any accreditation status. A SARS AEO strategy was then developed, which required the trade community to demonstrate compliance.

Historically, South African businesses relied almost completely on their customs agent and freight forwarder. Their licensing and registration status and details were often inaccurate and identification unclear as activities were undertaken under multiple codes and across various locations. By building a solid compliance programme, however, the comprehensive safety and security standards could be added to realise the AEO programme. The EU AEO peer review team endorsed this scenario during its visit to South Africa in 2013. The team visited various leading exporters and freight forwarders. The findings indicated that South African companies had already implemented many of the physical and human resource requirements that make up the AEO criteria.

Figure 3-7: SARS PT programme and alignment to AEO compliance, safety, security and AEO full fledge



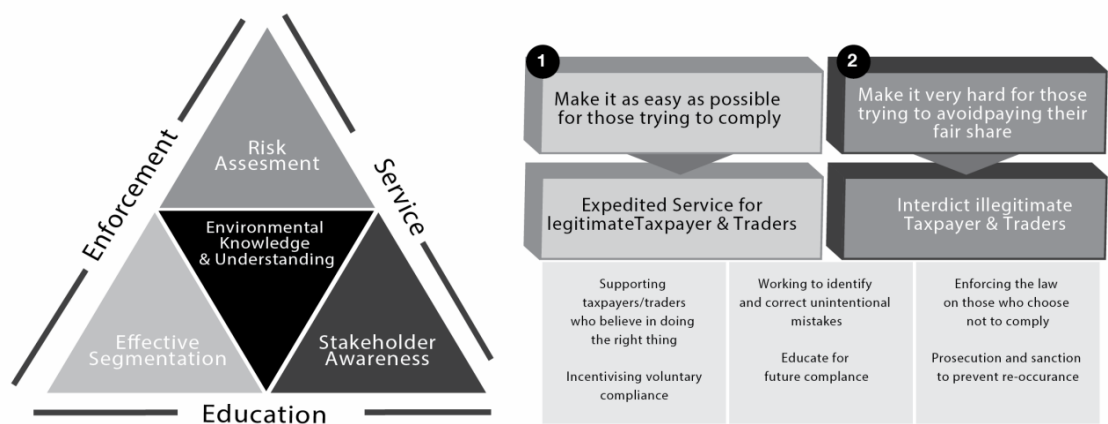
Source: Ellison, 2018

In practice, SARS has been slow to build on its initial rapid progress and capacity building. As of 2017, many private sector agents and operators remain outside the programme and the initial work of drafting AEO documentation has stalled. This is due to an organisational decision to focus on any implementation to roll out and align the new Customs Control Act and its associated systems, including its single registration or LRA platform. In practice, both have been delayed repeatedly.

3.5.4 SARS risk assessment

At the heart of the South African risk and compliance strategy is SARS customs’ promoting and incentivising voluntary compliance through education and service. The importance of risk management is identifying who, where, when and how to enforce the law.

Figure 3-8: SARS’s view on implementing a risk assessment model



Source: Author’s own compilation (2019)

The SARS risk management approach is integrated for both tax and trade. However, the high-level SARS models do not always fit the requirements for managing the complex customs mandate of controlling the movement of goods, conveyances and people across borders. In fact, the differences between modern customs requirements and the SARS tax model may aptly summarise the ongoing policy and strategy tension of the customs mandate within an integrated tax and customs administration.

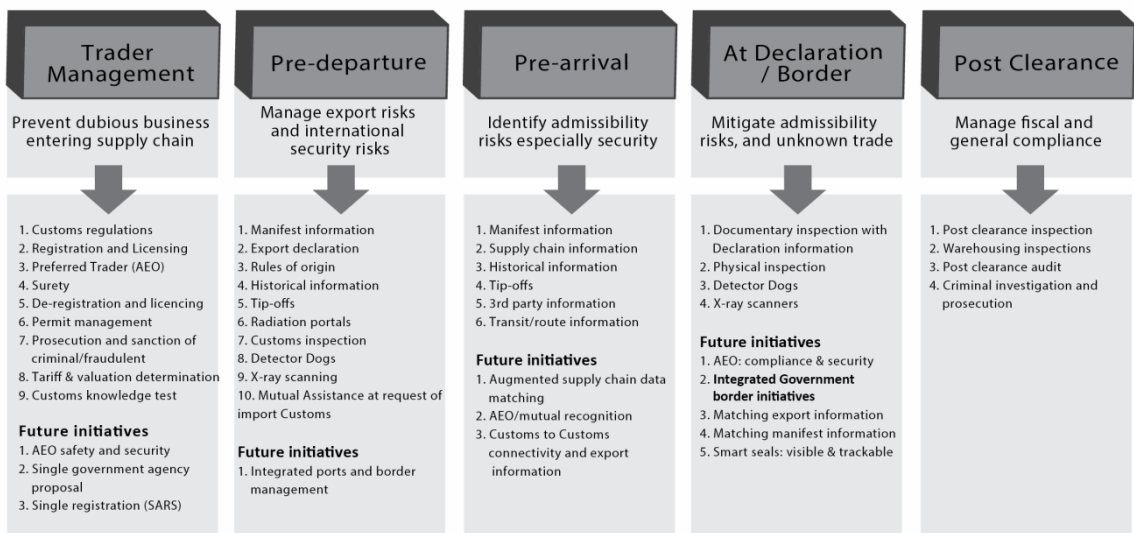
Even though SARS customs is committed to following the multi-layered risk approach prescribed by the WCO, safety and security factors are less of a priority than revenue. In practice, SARS’s emphasis remains on revenue collection targets, with specific focus on imported goods. In fact, SARS is one of the most efficient revenue collecting administrations in the world, with a cost of collection of just 0.93 per cent (SARS, 2017a:11). This figure can largely be attributed to the significant and consistent investment in building customs legislation, processes, systems and human capital infrastructure that underpin a successful risk management regime. However, it is worth noting that customs duties only comprised four per cent of SARS’s total revenue collection for 2016/2017 (SARS, 2017a:25).

SARS’s customs declarations model is set up to automatically process and release the majority of customs declarations, with SARS reporting that 89 per cent of import declarations were processed within 22 minutes of their electronic submission. On the other hand, 94 per cent of exports were handled within 17 minutes (SARS, 2016:12). In situations where the system calls for the electronic submission of supporting documents, SARS customs states that it maintains a service turnaround time of under four hours. In terms of inspections and audits, SARS customs has achieved both targets set out in 2017, with 13.63 per cent of customs declarations inspected

(against a target of 13 per cent) and 28.09 per cent audit coverage (against a target of 25 per cent) achieved (SARS, 2017a:32).

The core processing system of SARS manages all transactional activities from a central risk engine with all subsequent activities managed through a central case management system that drives workflow and reporting into each of the inspection teams. Traditional customs control areas enable the model at the borders, or designated depots, where customs perform inspections. Teams working outside of the ports and audit teams working at the client site perform additional inspections and enforcement functions.

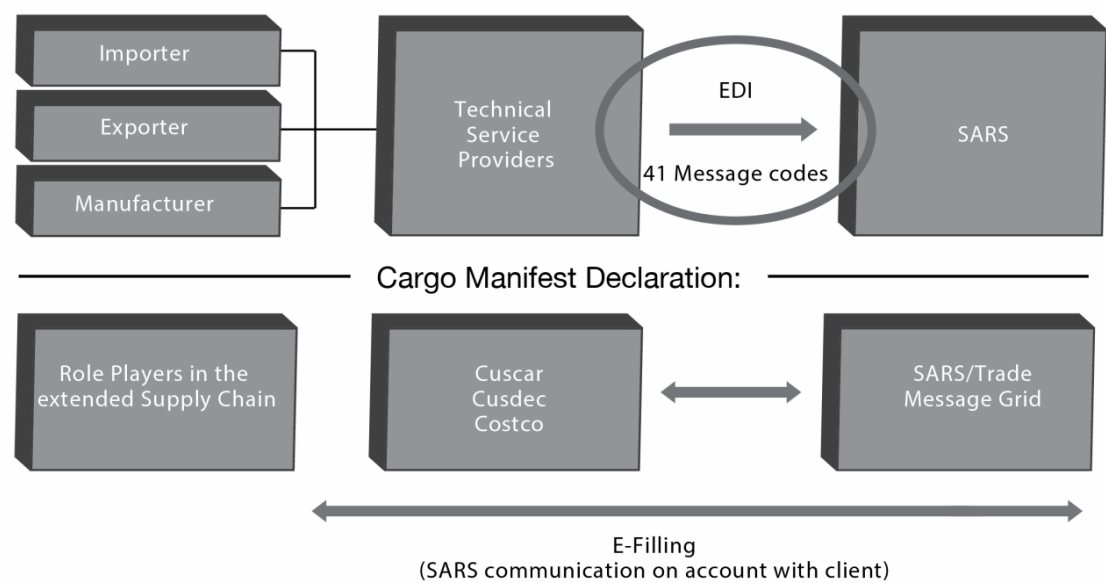
Figure 3-9: Trade management portal with four dedicated risk interventions



Source: Author’s own compilation (2019)

At the heart of the model is the customs risk engine that processes the goods declaration transactions and assesses the risk from the SAD500 fields, namely the customs declarations document. These risk assessments include client profiling, historical performance, complex algorithms and artificial intelligence to Big Data to trigger potential controls. This is supported by electronic links to validate relevant permits and permissions, undertake specific industry checks and some random selectivity to maintain a normalised sample and a deterrent. All communications between trading parties and SARS occur on the EDI-system (SARS, 2018). The following figure illustrates the message grid between SARS and traders.

Figure 3-10: Position of message grid between SARS and Private sector on data fields submitted

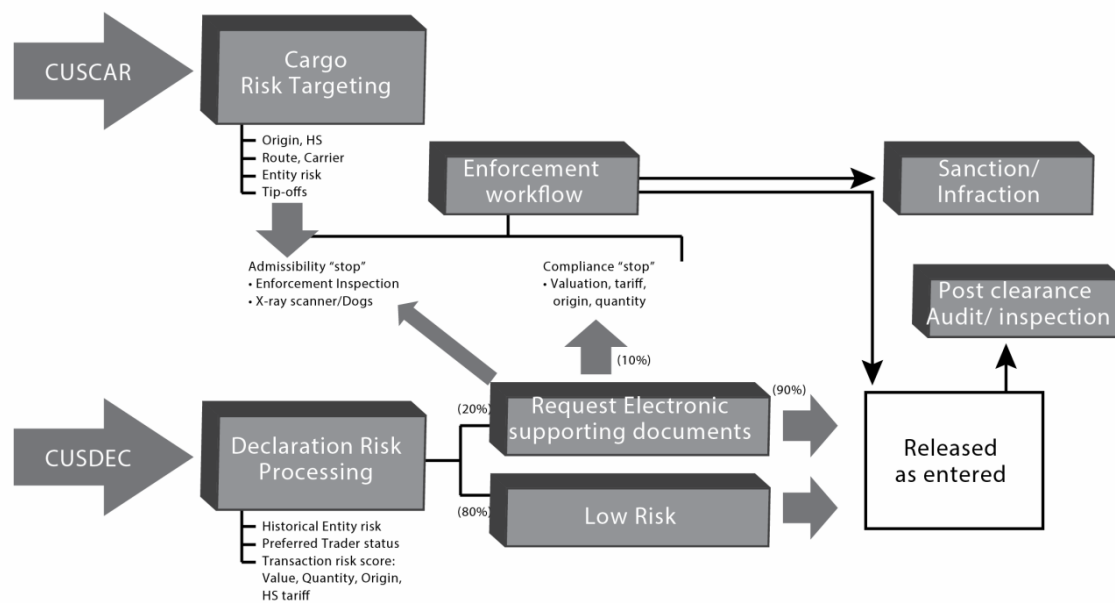


Source: Author’s own compilation (2019)

The automated cargo reporting (ACR) manifest system receives the various electronic cargo manifests into the interfront system and pieces the supply chain messages together to assess whether the scheduled goods have landed in South Africa or are appropriately amended and accounted for. The outturn reports are, in turn, verified against the goods declared by the importer. SARS uses risk resources located at local and national levels and control rooms located at ports and national levels to coordinate operations and target high-risk consignments. Risk triggers are fed into the various tactical intervention teams for further analysis and treatment.

The tactical intervention units aim to identify admissibility and specific criminal elements across prohibited and restricted products and high-priority industries such as clothing, textiles and footwear; tyres, cigarettes and tobacco, International Convention on International Trade in Endangered Species (CITES), used motor vehicles and drugs (SARS, 2016). These tactical intervention units generally act independently of the core processing systems and declaration inspection process. A PCA unit also works largely independently, again mainly focused on importation and warehousing risks.

Figure 3-11: Holistic view of the treatment of low- and high-risk cargo



Source: Author's own compilation (2019)

SARS encourages clients to submit their declarations prior to arrival so customs can perform a pre-clearance on a consignment and minimise the disruption to the flow of goods at the border. In fact, the legislation requires declarations to be submitted to customs 72 hours before the estimated time of arrival for ocean freight cargo (South Africa, 2014). After that, they will incur administrative penalties for late declarations. However, the client and their freight forwarder often determine the facilitation on import and can legally declare up to 28 days after the goods have landed. In such situations, goods subject to control will incur delays, if the documents are not swiftly processed, in addition to penalties for late declarations.

At land borders, the process has also been developed to be fully electronic in submission, risk profiling, pre-clearance and release. Following a declaration, SARS verifies the completeness and approves the consignment to 'proceed to port'. This helps to prevent unnecessary port congestion and enables SARS to inspect any high-risk consignments.

For these identified high-risk consignments, SARS deploys large compliance-oriented cargo inspection teams located in six inspection hubs. However, leading customs agencies tend to segment the fiscal controls of its large formal traders to its audit teams, rather focusing their border inspection activities on mitigating admissibility, and safety and security threats. The lack of segmentation is thought-provoking, considering that the SARS audit teams have been far more effective in collecting additional revenue in the past five years than they were in the same period before that (SARS, 2017a:11). There is also a significant burden on trade from the stops and,

although SARS has highlighted the issue of its cost-burden to trade within its strategic dialogue, it has not introduced measures or targets for trade facilitation in practice. The tweaking of the risk model towards best practice customs models could result in higher revenue, improved facilitation and a greater shift of resources to protect the economy and society at the borders.

3.5.5 Summary

This section examined the current customs risk management practices in South Africa and the development of the PT programme. SARS customs faces a demanding task in maintaining sufficient customs risk management due to a wider range of socio-political and economic challenges in South Africa. Some of these challenges include the historical legacy of poor compliance, an economy restricted by educational constraints and a burden of limited resources on the supply side, and high revenue collection to support growth, redistribution and poverty reduction on the demand side.

The administrative responsibilities of the South African customs administration are further complicated by the need to manage different tax policies in neighbouring Southern African Customs Union (SACU) countries where there are highly profitable opportunities to abuse origin rules or smuggle and divert products subject to duties. This is true of goods such as tobacco and used cars. Furthermore, there is an international responsibility to protect natural fauna such as rhino horn, lions and abalone, in alignment with the CITES, which also rests upon SARS (CITES, 2018). All of these risks must be mitigated within the physical context of porous national borders and an exceptionally long coastline. The following section, therefore, aims to provide some recommendations for SARS customs towards an improved customs risk management model.

3.6 Recommendations towards an improved customs risk management model for South Africa

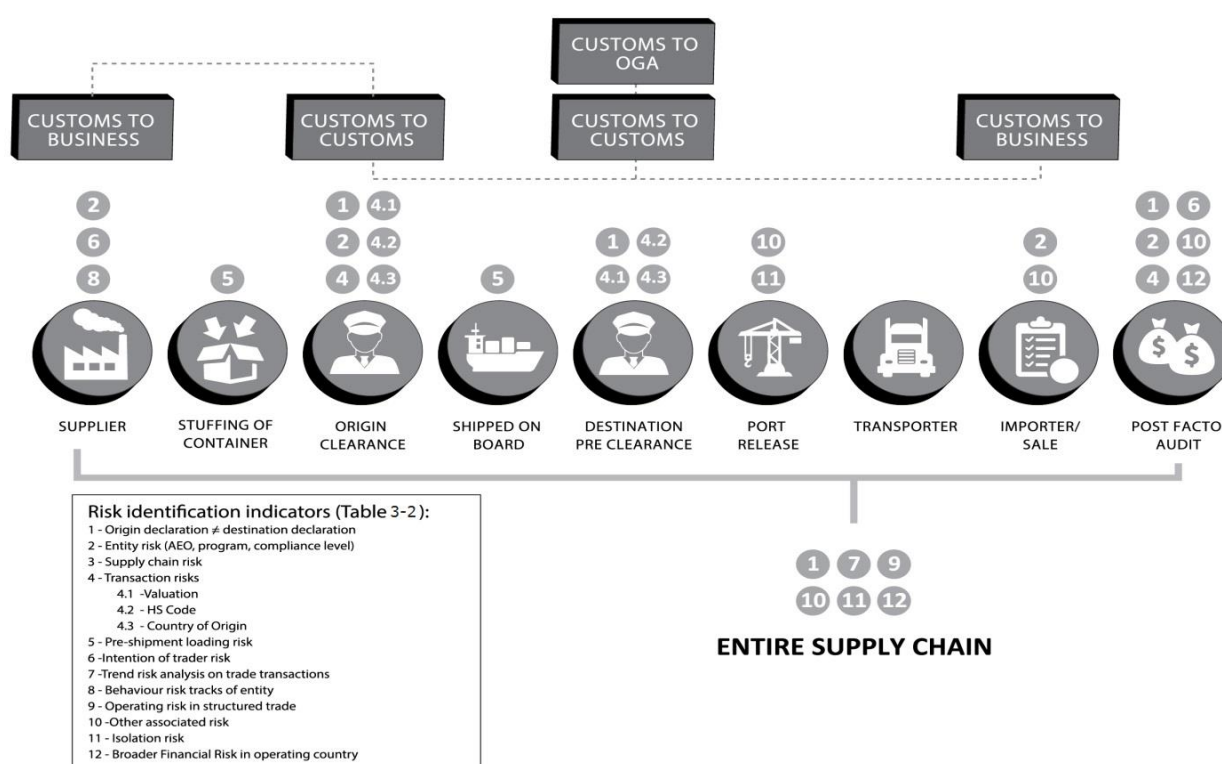
The South African experience of customs risk management truly reflects the continual journey of investment that countries need, to stay abreast of securing international trade through customs administrations in an ever-changing environment. This section seeks to propose a best practice customs risk management model for South Africa that takes into account all possible remedies in a multi-layered approach, as identified by various customs risk management practices around the world.

Within the framework of proposing a best practice customs risk management model (as identified by WCO SAFE) the key developments will result in expanding the customs risk management regime to address the following aspects:

1. C-2-C coordination;
2. C-2-B coordination;
3. C-2-OGA coordination;
4. E-commerce;
5. Base erosion and profit shifting by integrating customs into tax fields;
6. Unfair competition.

This section investigates the possible customs risk remedies and interventions to mitigate risk in the high-paced trading environment today. The move towards more complex supply chains has brought its own risks, which are related to a reduction in visibility and the development of sub-optimal networks (Manners-Bell, 2017:272). To combat this, customs administrations must gain clearer visibility of the physical, documentary and financial supply chain. Figure 3-12 illustrates the possible risk indicators in the supply chain and which process the risk pertains to, namely C-2-C, C-2-B and C-2-OGA.

Figure 3-12: Risk indicators in the greater supply chain:



Source: Author's own compilation (2019)

The diagram horizontally illustrates the different role players and their high-level activities, which will identify a risk for assessment. Effective risk analysis and management is essential to combat these risk indicators. Table 3-2 illustrates the different types of risks in the supply and which remedy customs administrations can apply to treat the identified risk.

Table 3-2: Risk indicators and possible remedies in the greater supply chain:

No	Type of Risks:	Possible Remedy
1	Origin declaration ≠ destination declaration	C-2-C: (SAFE Pillar 1)
2	Entity risk (AEO, programme, compliance level)	C-2-B: (SAFE Pillar 2) Compliance verification (first level) - AEO guideline - AEO benefit - AEO validators guide (link to TFA, Art 7)
3	Supply chain risk: (not a standard “one-size –fits all” (Integrated supply chain management)	• Seal verification • Reporting third-party data (manifest and more) • WCO Tool: integrated supply chain management • WCO Data Model

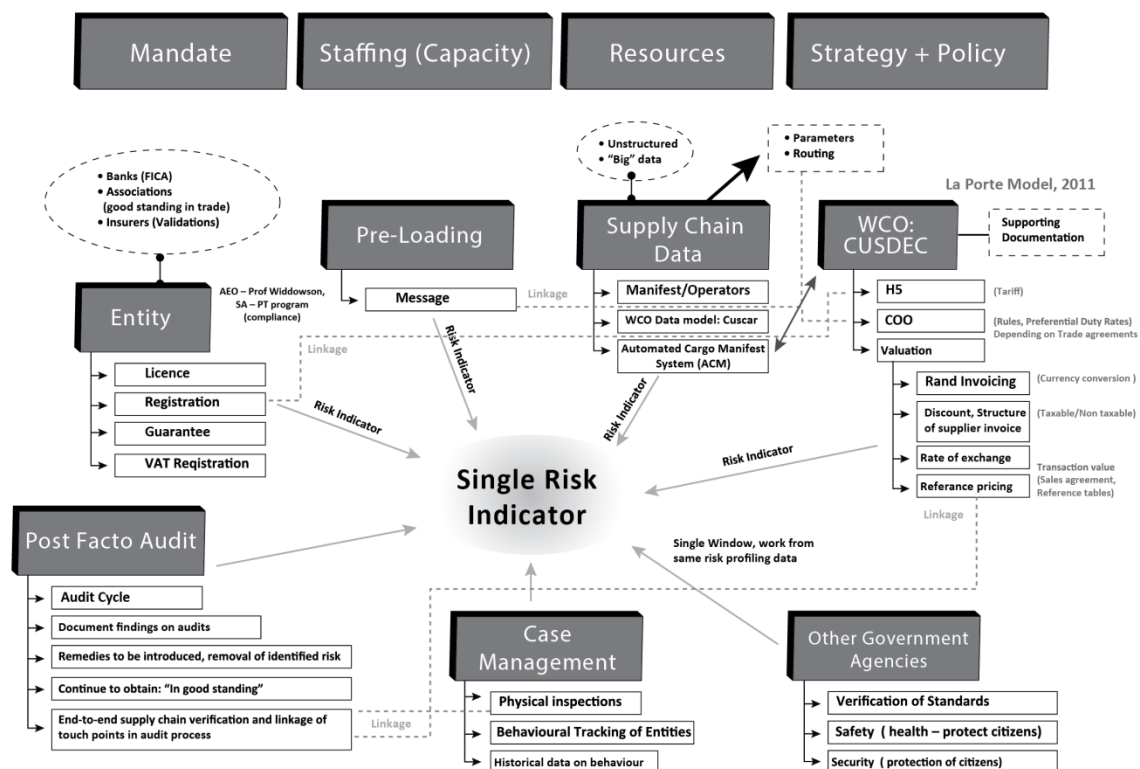
4	Transaction risks: - Valuation - HS code - Country of origin	- GATT - Harmonised System (HS) - Rules on country of origin (COO)
5	Pre-shipment loading risk	Advanced Cargo Information (ACI). Container status message
6	Intention of Trader risk	- Customs Procedure Codes (CPC) - Post-clearance audits (PCA) - Trader registration profile with SARS
7	Trend risk analysis on trade transactions	Big Data – Data analytics
8	Behaviour risk tracks of entity	Case management (historical data)
9	Operating risk in structured trade (open-source data)	Chamber verification. Business community verification and tables
10	Other risk associated with cargo	Integration with other organs of state. (single window concept) (SAFE Pillar 3)
11	Isolation risk: View transaction not in isolation, but in context of a balance risk management programme with Big Data/ richer, better quality of data (data mining and predictive analytics)	- Integrated targeting centre: - Profiling, screening - Analytical data - National/Regional targeting centre
12	Broader Financial Risk in operating country	FICA, Banks, Financial Auditing Risk Solvency table

Source: Author's own compilation (2019)

Table 3-2 provides a risk management framework for the entire supply chain. Assessing the nature of and likely impact of a risk should drive decisions on whether the action is considered appropriate and, if so, the location, type and timing of the checks or countermeasures to be taken. Unfortunately, customs law and regulations have not adapted to the evolution of global trade or world events. The available risk remedies illustrated are not sufficient to combat global supply chain threats. Since 9/11, global threats and supply chain security have been the focus of new rules, adding new dimensions to customs risk (Manners-Bell, 2014:56).

Subsequently, Figure 3-13 illustrates the ideal combination of the managing entity, transaction, cargo and commercial risks, with a feedback loop into the risk management system of SARS.

Figure 3-13: A suggested SARS customs risk management model



Source: Author's own compilation (2019)

For customs administrations to successfully manage risks, it is important to realise the impact and likelihood of each risk as it occurs throughout the supply chain. The impact can be measured in losses of both time and money. Unfortunately, a single risk indicator, as depicted above, is currently not attainable, since various risks are identified in different time zones as goods move through the supply chain. However, the joint monitoring and quality control of all procedures are key for collective management of the supply chain.

Customs administrations can, indeed, achieve the following aspects (as illustrated by Figure 3-13) to secure an end-to-end, multi-layered supply chain through the implementation of customs risk management:

3.6.1 Entity risk

The proposed model aims to combat entity risk by building on the premises of the PT and AEO programmes. If traders are known entities with historical trading records, their visibility and traceability become transparent, significantly lowering the entity risk and uncertainty surrounding them. Remedial action can be achieved by competently profiling and screening entities upon

licensing and registration, with cooperation between various commercial entities for example banks, insurers and other third-party role players, acting as a guarantee on behalf of the trader.

Additionally, entity risk can be secured by conducting PCA, providing full visibility of behavioural tracks. By creating a feedback loop encompassing the entire supply chain, entity risks are no longer singular events where a non-compliant trader could possibly escape punishment on a particular consignment.

3.6.2 Transaction risk

The proposed model aims to combat transaction risk by building on the current risk engine enforced by SARS. This focuses on the trilogy of determining the correct HS codes, verifying the country of origin and proper product valuation. The proposed model will then further combat transaction risk by adding risk indicators such as rates of exchange, reference pricing and structured invoice scanning. Data analytics should be used to better track HS code movements, especially in terms of valuation. Since various HS code groups consist of numerous products (differing greatly in terms of value), an intelligent decision-making tool would greatly assist in identifying exceptions to the rules.

A significant shortcoming of current customs risk management practices is that the transaction risk indicator arbitrarily generates a risk score, based on the three factors of product classification, country of origin and product valuation. This approach is one-dimensional and does not capture the multi-dimensional complexities of the supply chain. By adapting the risk engine to comply with multiple rules-based parameters (such as a robust look-up of reference tables capturing all permutations of the product declared), transaction risk mitigation can be intensified. Further validation codes on customs declarations and linking unique consignment reference numbers between customs administrations will help to combat transactions risk. Away from the frontline, transactions can be audited after being processed.

3.6.3 Cargo risk

The proposed model aims to combat cargo risk by monitoring the entire end-to-end physical cargo journey, from origin to destination. With the technological use of RFID and GPS tracking, cargo movement can now be tracked and traced in real time. The proposed model will flag any deviation from a set path. The model builds on the premises of C-2-C cooperation proposed by the WCO SAFE Pillar I. With efficient communication between customs administrations, a deviation from the transport routing will automatically generate a risk flag. The technological advances in Big

Data make these risk flags possible, customs administrations simply need to design a communicative system able to capture the data and simulate the movement against a rules-based reference.

Although customs risk management is entering a paradigm shift away from the frontline, cargo risk should still be handled at the border post, using measures that rely on an intelligent risk engine, including random checks, detector dogs and unpacking only of flagged cargo by licensed officers. What should be realised is the need to rely on proactive remedial activities based on accurate risk assessment – rather than reactive management of risk applied to all cargo at the frontline.

3.6.4 Commercial risk

Finally, the proposed model aims to combat commercial risk by including an additional layer of verification. In conjunction with entity risk, a commercial risk indicator will highlight whether a trader is in good standing or not. A behavioural track record can be established in this way.

Ultimately, the proposed customs risk management model exposes and highlights the fact that successful customs risk management cannot be achieved by a risk engine that evaluates and addresses risk only on the frontline. Customs risk management must evolve and encircle the opposite ends of the supply chain, finally providing a feedback loop with PCAs. The proposed model addresses the aspects above in the following ways:

1. Customs-to-customs cooperation

By connecting the end-to-end supply chain, relevant data can be shared and matched for intelligent risk management purposes. Trade can be facilitated more efficiently if each consignment does not have to be scrutinised at each custom stop; cargo movement reports can identify real cargo risk at the earliest possible moment. One-stop border posts can be implemented for collaborative risk management and facilitation by various regulatory entities to prevent the duplication of effort and verification processes.

2. Customs-to-business coordination

By incorporating the commercial operators within the scope of customs risk management, similar to the global trend (especially in developed countries), the responsibility of a safe and secure trading environment rests on all parties within the supply chain and not only on the customs administration facilitating the flow of goods, services and people across borders.

3. Customs-to-other government agencies

Collective identification and management of persons and entities can introduce single government registration, licensing and identification. This builds on the premise of customs single windows, harmonising the data capturing throughout the supply chain. Governments can be integrated into a single border management agency to facilitate trade better.

4. E-commerce

The rise of the internet is creating new business models that require new risk responses, including trade in services of data, information and intelligence. A risk model as proposed will not only reconcile good risk management with the streamlined physical flows of goods but also support e-commerce by providing additional value-added data services.

5. Base erosion and profit shifting by integrating customs into tax fields

International collaboration on issues such as base erosion and profit shifting can create a standardised approach to combatting the risks on the balance sheet. By integrating customs declarations into tax compliance sheets, the risk of transfer pricing can be addressed.

6. Unfair competition

In the instances where customs on opposite ends of the supply chain effectively communicate with one another, cases of dumping and under-invoicing or duplicate invoicing will greatly decrease; subsequently creating a fair, transparent and predictable trading environment.

In an integrated customs control chain, risk assessment for security and safety purposes is an ongoing and shared process. This process commences at the very time when the exporter prepares the goods for export by verifying the consignment integrity continually and thus avoiding the unnecessary duplication of controls. Customs will have to agree on common control and risk management standards, sharing intelligence, risk profiles and exchanging customs data, as proposed in this section. Such agreements should include the possibility of joint monitoring or quality control procedures to make sure the standards are adhered to in both customs administrations and private sector operations.

3.7 Conclusions and recommendations

This study set out to investigate the current customs risk management models around the world and compare them to the current customs risk management model employed by South Africa's

customs administration, to propose a best practice customs risk management model for the country.

Several countries are developing new performance measurement models to follow results on speed, predictability, release of goods, benefits, service, public perception and cost-saving in the flow of goods and people across international borders. These new measurement models will provide a basic platform for more advanced management, monitoring and evaluation of AEO programmes. South African customs should duly follow suit.

Within the context of South African customs risk management, one should first establish what SARS is seeking to improve. The SARS strategic plans and annual reports identify five initiatives that are underway to further improve the effectiveness and efficiency of the customs risk management:

1. Enriching the quality of its data, information and intelligence as this is the key to improved risk-based decisions;
2. Improving the risk engine and its parameters for risk processing;
3. Improving the documentary inspection process by training inspectors and focusing on quality of the evaluation process;
4. Improving physical inspection processes;
5. Expanding the PT programme into a full WCO AEO programme.

By following the proposed best practice customs risk management model as described in the previous section, SARS can expect to improve in the areas targeted by the five initiatives listed above. The proposed model will greatly improve the risk engine by using underlying technology in automatically detecting high-risk cargo and distinguishing high-risk cargo from low-risk cargo. These risk flags will substantially facilitate trade in and out of South African borders and further alleviate the physical inspection process, since unnecessary physical stops will be limited.

Additionally, South Africa must design the voluntary compliance management concept (within the PT and AEO programmes), in such a way that it can offer attractive benefits for all stakeholders (within the end-to-end supply chain) involved in the programme. AEO benefits will greatly improve data compliance and the four critical categories of speed, predictability, lower cost and better service in the flow of goods, services and people across international borders.

As in various other countries, for many years, there has been a misunderstanding that the AEO instruments only benefit big MNEs. This is fundamentally wrong since it is much easier for small

and medium-sized enterprises (SMEs) to go through a validation process than it is for MNEs with their often-complicated structures and multi-country presence. However, AEO programmes must be designed to take into account the challenges facing SMEs. SMEs are the basis for all trading nations, especially for emerging economies that rely on SMEs to a larger degree than advanced economies.

Today, several blind spots within the global supply chain have still not been addressed on the AEO platform. Typical examples are trans-shipment hubs and free zones and further general elements of the transit procedure. This must change to create new secure global trade lanes and trade corridors. In fact, these facilities play an increasingly important role in global trade, due to changing trade patterns and trends in the movement of goods and the development of global value chains. All elements of the supply chain should be included in future models, to secure and facilitate the movement of goods. Some countries have now started projects to develop models for these elements; this appears to be the way forward.

Together with other key building blocks outlined in the WCO's Customs in the twenty-first-century strategic vision and standards and guidelines contained in the RKC and the WCO SAFE, the application of customs risk management continues to be a critical element that underpins all modern customs administrations, none more so than in the case of South Africa.

3.8 Reference list

- Aigner, S. 2010. Mutual recognition of authorised economic operators and security measures. *World Customs Journal*, 4(1):47-54.
- Arvis, J.F., Saslavsky, D., Ojala, L., Shepherd, B., Busch, C., Raj, A. & Naula, T. 2016. Connecting to compete 2016. Washington: World Bank.
- Ayyub, B.M. 2014. Risk analysis in engineering and economics. Cleveland: CRC Press.
- Baldwin, R. 2016. The great convergence. Cambridge: Harvard.
- CBP (Customs and Border Protection). 2002. Termination of test regarding Importer Compliance Monitoring Program. <https://www.cbp.gov/bulletins/36genno20.pdf> Date of access: 13 Sept. 2018.
- CBP (Customs and Border Protection). 2013. C-TPAT Factsheet. www.cbp.gov/sites/default/files/documents/ctpat_factsheet_2.pdf Date of access: 20 Apr. 2018.
- CBP (Customs and Border Protection). 2018a. CTPAT: Customs Trade Partnership Against Terrorism. <https://www.cbp.gov/border-security/ports-entry/cargo-security/ctpat> Date of access: 1 Jun. 2018.
- CBP (Customs and Border Protection). 2018b. Commercial Customs Operations Advisory Committee (COAC). <https://www.cbp.gov/sites/default/files/assets/documents/2018-Jul/Trusted%20Trader%20Subcommittee%20Executive%20Summary.pdf> Date of access: 13 Sept. 2018.
- CBP (Customs and Border Protection). 2018c. CTPAT's five step risk assessment. <https://www.cbp.gov/sites/default/files/documents/C-TPAT%27s%20Five%20Step%20Risk%20Assessment%20Process.pdf> Date of access: 1 Nov. 2018.
- CBRA (Cross-Border Research Association). 2017. Customs true societal protection performance index. <https://www.cross-border.org/2017/02/24/customs-true-societal-protection-performance-index/> Date of access: 16 Sept. 2018.
- CITES (Convention on International Trade in Endangered Species). 2018. List of Parties to the Convention. <https://www.cites.org/eng/disc/parties/index.php> Date of Access: 31 May 2018.

Coyle, J.J., Gibson, B.J., Langley, C.J. & Novack, R.A. 2017. Managing supply chains: a logistics approach. 10th ed. Boston: South-Western Cengage Learning.

Creskoff, S. 2016. What you need to know to go global: a guide to international trade transactions. Bloomington: Archway.

Customs and Excise Amendment Bill **see** *South Africa*

Doyle, T. 2011. The Future of Border Management. (*In* McLinden, G., Fanta, E., Widdowson, D. & Doyle, T. eds. Border management modernization. Washington: World Bank. p. 11-22).

Ellison, B. 2018. South African customs landscape [Correspondence]. 19 Feb, Johannesburg.

EU Commission for Taxation and Customs. 2018. www.ec.europa.eu/taxation_customs Date of access: 26 Apr. 2018.

EU (European Union). 2017. Customs Risk Management Framework. https://ec.europa.eu/taxation_customs/general-information-customs/customs-risk-management/measures-customs-risk-management-framework-crmf_en Date of Access: 19 Oct. 2017.

Finger, M., Hintsa, J., Männistö, T., Hameri, A.P., Thibedeau, C., Sahlstedt, J. & Tsikolenko, V. 2010. Customs risk management: a survey of 24 customs administrations. *World Customs Organisation (WCO) Working Paper*, EPFL-WORKING-173319.

Foorhuis, R. & Bos, R. 2011. A framework for organizational compliance management tactics. (*In* Salinesi, C. Pastor, O. eds. *International Conference on Advanced Information Systems Engineering*. Springer: Berlin p. 259-268).

Friedman, T.L. 2017. Thank you for being late: an optimist's guide to thriving in the age of accelerations (Version 2.0, with a new afterword). New York: Picador/Farrar Straus and Giroux.

GACC (General Administration of Customs of the People's Republic of China). 2018. Overview of GACC. <http://english.customs.gov.cn/about/mission> Date of access: 22 Aug. 2018.

Giermanski, J.R. 2008. Container security: is the layered approach working? <https://www.csoonline.com/article/2122919/container-security--is-the-layered-approach-working-.html> Date of access: 14 Mar. 2019.

Graighead, A. 2017. Trade and customs procedures in international freight transport: requirements, issues and trends. (In Beresford, A. & Pettit, S. eds. International freight transport: cases, structures and prospects. London: Kogan. p. 57-76).

Handy, C.B. 1995. The age of paradox. Cambridge: Harvard.

HMRC (Her Majesty's Revenue and Customs). 2018. Notice 117: Authorised Economic Operator. Government Publications. www.gov.uk/government/publications/notice-117-authorized-economic-operator/ Date of access: 26 Apr. 2018.

Hoffman, A., Grater, S., Venter, W.C., Maree, J. & Liebenberg, D. 2018. An explorative study into the effectiveness of a customs operation and its impact on trade. *World Customs Journal*, 12(2):63-86.

Iordache, E. & Voiculescu, A.V. 2007. Customs risk management in the European Union. *The Romanian Economic Journal*, X(25):55-72.

Jianping, C. 2018. China's AEO joint incentive program. *WCO News*, 85:10-11.

Karlsson, L. 2017. Back to the future of customs: a new AEO paradigm will transform the global supply chain for the better. *World Customs Journal*, (11)1:23-34

Korniienko, M.Y., Pinat, M. & Dew, B. 2017. Assessing the fragility of global trade: the impact of localized supply shocks using network analysis. *IMF Working Paper*.

KRA (Kenya Revenue Authority). 2018. Customs and border control. <http://kra.go.ke/index.php/customs-services/about-customs> Date of access: 23 Aug. 2018.

Manners-Bell, J. 2017. Supply chain risk management, 2nd ed. London: Kogan Page

Manners-Bell, J., Cullen, T. & Roberson, C. 2014. Logistics and supply chains in emerging markets: The Chartered Institute of Logistics and Transport. London: Kogan Page.

Mikuriya, K. 2018. International Customs Day 2018. http://www.wcoomd.org/en/media/newsroom/2018/january/message-from-the-wco_international-customs-day-2018.aspx Date of access: 7 Jun. 2018.

MRA (Malawi Revenue Authority). 2018. ASYCUDA World. <http://www.mra.mw/custom-and-excise/asycuda-world> Date of access: 24 Apr. 2018.

- Nguyen, T. 2012. Changes to the role of US customs and border protection and the impact of 100% container scanning law. *World Customs Journal*, 6(2):109-118.
- NZCS (New Zealand Customs Service). 2017. Annual report 2017. Government publications.
- NZCS (New Zealand Customs Service). 2018a. Factsheet 34 Secure Exports Scheme. <https://www.customs.govt.nz/globalassets/documents/fact-sheets/fact-sheet-34-secure-exports-scheme.pdf> Date of access: 13 Sept. 2018.
- NZCS (New Zealand Customs Service). 2018b. Secure Exports Scheme. www.customs.govt.nz/business/export/secure-exports-scheme/ Date of access: 26 Apr. 2018.
- Port of Antwerp. 2018. Customs solutions. <http://www.portofantwerp.com/en/customs-solutions-we%E2%80%99ll-keep-moving-you-smoother#douane> Date of access: 1 Jun. 2018.
- Poverello, M. 2010. WCO data model. <https://mpoverello.com/wco-data-model-3-dmv3/> Date of access: 14 Sept. 2018.
- Prokop, D. 2017. Global supply chain security and management. Oxford: Butterworth-Heinemann.
- Rebelo, E. 2004. CSI implemented at Durban Port. <http://www.engineeringnews.co.za/print-version/csi-implemented-at-durban-port-2004-04-30> Date of access: 14 Sept. 2018.
- Sheffi, Y. & Rice, J. 2005. A supply chain view of the resilient enterprise. *MIT Sloan Management Review*, 47(1):41-48.
- SARS (South African Revenue Service). 2013. Draft Taxation Laws Amendment Bill and Tax Administration Laws Amendment Bill, 2013 - Annexure E. [http://www.sars.gov.za/Media/MediaReleases/Pages/4-July-2013---Taxation-Laws-Amendment-Bills-\(TLAB-2013\).aspx](http://www.sars.gov.za/Media/MediaReleases/Pages/4-July-2013---Taxation-Laws-Amendment-Bills-(TLAB-2013).aspx) Date of access: 14 Sept. 2018.
- SARS (South African Revenue Service). 2014. Annual Report 2013/2014. Pretoria.
- SARS (South African Revenue Service). 2015. SARS commissioner launches customs cargo scanner at Cape Town Harbour. <http://www.sars.gov.za/Media/MediaReleases/Pages/22-July-2015---SARS-Commissioner-launches-Customs-cargo-scanner-at-Cape-Town-Harbour.aspx> Date of access: 14 Sept. 2018.

SARS (South African Revenue Service). 2016. Strategic Plan 2016/2017 – 2020/2021. Pretoria.

SARS (South African Revenue Service). 2017a. Annual Report 2016/2017. Pretoria.

SARS (South African Revenue Service). 2017b. Launch of customs preferred trade program. <http://www.sars.gov.za/Media/MediaReleases/Pages/default.aspx> Date of access: 1 Mar. 2018.

SARS (South African Revenue Service). 2018. Electronic data interchange. [http://www.sars.gov.za/ClientSegments/Customs-Excise/Processing/Pages/Electronic-Data-Interchange-\(EDI\).aspx](http://www.sars.gov.za/ClientSegments/Customs-Excise/Processing/Pages/Electronic-Data-Interchange-(EDI).aspx) Date of access: 14 Sept. 2018.

Sodhi, M.S. & Tang, C.S. 2012. Managing supply chain risk (Vol. 172). Berlin: Springer.

South Africa. 2011. Customs and Excise Amendment Bill (E64 2011). Government gazette, 34498, 29 Jul.

Swedish Customs. 2003. White Paper on accreditation of operators and the supply chain security. Stockholm. http://www.unece.org/fileadmin/DAM/trade/security_conf03/docs/white_paper_scs_2_mindre.pdf.

Theron, B. 2018. New Customs Acts Programme SAAFF Presentation. <http://www.sars.gov.za/AllDocs/Documents/customsandexcise/SAAFF%20Presentation%20NCAP%20%2029%20Aug%202018.pdf> Date of access: 5 Oct. 2018.

Truel, C. 2010. A Short Guide to customs risk. Aldershot: Gower.

UK Border Force. 2015. Business Plan 2015-2018. www.gov.uk/government/latest?departments%5B%5D=border-force Date of access: 26 Apr. 2018.

UNCTAD (United Nations Conference for Trade and Development). 2014. Trade Facilitation Technical Note No. 12. Geneva.

WCO (World Customs Organisation). 2004. Special report on security and facilitation. Geneva.

WCO (World Customs Organisation). 2006. Revised Kyoto Convention. Geneva.

WCO (World Customs Organisation). 2011. WCO Customs Risk Management Compendium, (Vol. 1). Brussels.

WCO (World Customs Organisation). 2014. Kyoto Convention General Annex Chapter 7: Guidelines on application of information and communication technology. Geneva.

WCO (World Customs Organisation). 2015. SAFE Framework of Standards to secure and facilitate global trade. Geneva.

WCO (World Customs Organisation). 2017. AEO Compendium. Brussels.

Widdowson, D. 2005. Managing risk in the customs context. (*In* De Wulf, L., & Sokol, J. B. eds. Customs modernization handbook. Washington: World Bank. p. 91-99.)

Widdowson, D. 2007. The changing role of customs: evolution or revolution. *World Customs Journal*, 1(1):31-37.

Widdowson, D. 2011. Raising the academic standing of the Customs profession. *WCO News*, 64:29-30.

Widdowson, D. & Holloway, S. 2011. Core border management disciplines: Risk based compliance management. (*In* McLinden, G., Fanta, E., Widdowson, D. & Doyle, T., eds. Border management modernisation. Washington: World Bank. p. 95-114).

WTO (World Trade Organisation). 2015. Trade facilitation agreement.
https://www.wto.org/english/thewto_e/20y_e/wto_tradefacilitation_e.pdf Date of access: 18 Nov. 2017.

Yasui, T. 2010. Benefits of the Revised Kyoto Convention. Brussels: World Customs Organisation.

CHAPTER 4: AN EXPLORATIVE STUDY INTO THE EFFECTIVENESS OF A CUSTOMS OPERATION AND ITS IMPACT ON TRADE¹

4.1 Introduction

Border control agencies, with no exception of customs administrations, face major challenges in balancing revenue collection and safeguarding their citizens with the benefits of facilitating efficient cross-border traffic of people and goods, especially in the African context. The increased risk posed on individuals, society, governments and the environment by global goods shipments has been a driving force behind the vigilance of customs and regulatory authorities in different countries, who have created various approaches to managing these risks.

The heavy reliance of many African countries on the revenue obtained from tax collection has often resulted in conflicting objectives between customs administrations and the community of private sector participants in trade. Where the customs administration might only be interested in legal compliance, the private sector requires an efficient flow of goods to reduce costs and time delays for the sake of revenue and profitability.

Recent developments in global trade, including the new TFA by the WTO, have directed attention to the possible negative impact of unnecessary delays on the cost and time to trade, which directly affects a country or region's competitiveness, especially in developing new supply chains across the globe. Trade delays in the southern African region are especially high, which not only affect private sector firms trading across borders but also result in a loss in welfare to entire economies (Hoffman *et al.*, 2016:252). The TFA emphasises streamlined risk management of moving goods across borders through cooperation with authorised operators in the international supply chain (with the aim of reducing interruptions and ensuring predictable border crossings) based on accurate processing of data and automated customs risk management programmes.

For many years, customs administrations have migrated towards using risk-managed approaches to maintain control over the movement of people, goods, and conveyances across borders (Widdowson, 2007:31). However, numerous research projects have shown one of the largest contributors of delays in cross-border trade in Africa to be poor customs procedures (UNECA,

¹ An article resulting from the research reported in this chapter has been published, see Appendix. The full reference of the article is: Hoffman, A., Grater, S., Venter, W.C., Maree, J. & Liebenberg, D. 2018. An explorative study into the effectiveness of a customs operation and its impact on trade. *World Customs Journal*, 12(2):63-86.

2013; USAID, 2015). Laporte (2011:18) highlights the poor application and use of ASYCUDA, a software package sponsored by the United Nations, of which, in many cases, outdated versions are still being used.

Little empirical evidence exists of customs administrations using well-designed statistical systems to identify possible high-risk or illegal transactions. Many of these systems only combine simple criteria, such as the importer code, the origin of the goods and the applicable tax regime. Subsequently, there is a need for in-depth studies to develop statistical techniques that can be used by customs administrations to more efficiently target declarations that should be inspected and, in the process reduce the cost of unnecessary stops or inspections of compliant shipments.

According to Komarov (2016), Ukrainian customs have used risk management systems to create risk profiles to enable the automated selection of high-risk transactions by dividing transactions into risk categories: high risk, or red (representing 4.34 per cent of transactions), are subjected to physical inspections; yellow (15.60 per cent) to documentation checks; light green (6.48 per cent) to information messages, and the remaining green transactions (73.58 per cent) are not subjected to further checks. However, Komarov provides few details about the specific data being used and how the relationships between inputs and risk outcomes are established. The extent to which each type of customs intervention (i.e. releasing goods immediately, requesting additional documentation, or stopping and physically inspecting) contributes to time delays of cargo consignments has not been accurately quantified nor has the success that each type of intervention has achieved in detecting actual infractions been measured. An optimal customs operation should find an acceptable balance between the benefits created for the national economy through customs stops and the resulting costs to commercial trade as a result of such stops. No such cost-benefit comparison studies could be found in the work cited above.

In a study based on Senegalese customs data, Laporte (2011) used regression models to calculate a risk outcome that would reflect the probability of an infraction on a per-transaction basis by using six input variables: importer, freight agent, HS classification, origin, provenance and customs regime (Laporte, 2011). Laporte claimed that using this model would make it possible to filter high-risk cargo consignments to such a level of accuracy that more than 96 per cent of all infractions could be detected by inspecting only 20 per cent of consignments. In a subsequent study, Davaa and Namsrai (2015) extracted a similar model from Mongolian customs data to predict the probability of infraction with the following list of input variables: HS classification, importer, country of origin, customs terminal code, customs broker and type of transportation means. The level of risk prediction accuracy that they achieved is not quite as

impressive as those by Laporte (2011); however, their model managed to classify consignments in such a way that the incidence of infractions increased from 0.05 per cent in the lowest risk category to 0.22 per cent in the highest risk category.

The work of Laporte and others provides evidence of the value of a non-intrusive data analytics-based approach to customs risk management. Yet, no systematic method or procedure has been described for deciding on which input factors to consider and on which basis the most important ones should be selected for inclusion into a customs risk management model. The cited references provide no quantified indication of the relationships between the various input factors (like the customs office) and the operational customs performance in terms of time delays in commercial trade. Such an analysis could indicate which areas of the overall customs operation suffer the most inefficiencies and whether specific types of cargo or specific entities seem to be unfairly targeted.

Previous research by Hoffman *et al.* (2016:263) estimated the impact of long cross-border delays on the regional economy of the Southern African Development Community (SADC) region and recommended the application of data analytics to existing customs data to develop a better understanding of possible measures to streamline customs processes. The study found that the use of technology should represent an attractive investment to the regional economy. The results indicate that cross-border delays could be reduced by at least one day, on average, resulting in an expected increase in annual exports within the SADC of about US\$ 400 million, with a potential increase in exports to the rest of the world of US\$ 2 billion (Hoffman *et al.*, 2016:263).

This paper aims to investigate input-outcome relationships of customs processes currently applied in South Africa in order to identify the primary reasons for customs delays and measure the extent thereof. This paper uses transaction-level data obtained from South African freight forwarders for the period September 2014 to September 2016, with which it aims to quantify both the impact on customs delays resulting from stops and inspections and the efficiency of decisions by the current customs system.

The following specific research questions are addressed in this paper:

1. What is the average time delay experienced by cargo consignments declared to the South African customs administration (SARS)?
2. What fraction of consignments interrupted by customs represents infractions (amendments or rejection)?

3. Which input factors/criteria have a statistically significant relationship to customs delays and actual customs infractions?
4. What is the impact of customs interruptions on trade in South Africa, and how can the current South African customs decision-making process be improved?

No previous literature has produced accurate answers to the above questions in the southern African context. Hence, this paper contributes to the creation of new knowledge about the use of statistical techniques to improve a customs risk management operation, thereby developing a more complete understanding of the issues that should be considered by trade and customs in developing economies within the region.

The rest of this paper is structured as follows: Section 4.2 provides an overview of the available literature in this field, while Section 4.3 describes the South African customs landscape. Section 4.4 describes the data that was used for the study and Section 4.5 presents the methodology that was used to extract information from the said data. Section 4.6 provides the results and findings, while Section 4.7 concludes with recommendations for customs operations and suggestions for future research.

4.2 Literature background

Customs administrations have important powers that do not exist elsewhere in government, that is, the authority to inspect cargo and goods shipped into, through and out of a country and, by extent, to refuse entry or exit and to expedite entry. Customs administration, therefore, requires information about goods being imported and can require that information be provided in advance and electronically. As such, customs can play a central role in the security and facilitation of global trade. Historically, many customs administrations have used risk-averse approaches, requiring 100 per cent inspection of all shipments, conveyances, crews and passengers. As this approach could bring global trade to a halt, the private sector has put pressure on governments to minimise their intervention in commercial transactions in order to facilitate trade (Widdowson, 2007:32).

Today, a more holistic approach is required to optimise international trade supply chain movements. Therefore, customs administrations globally are in search of more efficient risk management processes, including risk identification before shipment, to ensure compliance while reducing unnecessary time and cost delays for exporters and importers. Implementing risk management systematically at strategic, operational, and tactical levels ensures that customs administrations can best deploy resources to protect their citizens from threats to health, safety

and security while simultaneously supporting economic growth by maintaining efficient and predictable cross-border transit times (Finger *et al.*, 2010:3).

The global supply chain consists of important links, starting with the purchase order all the way through to product delivery to the final consumer. Automated commercial cargo risk assessment that combines all transactions in an electronic customs grid can provide customs administrations with the means to identify potential risk indicators even before the goods are loaded at the place of origin (Manners-Bell *et al.*, 2014:2; Baldwin, 2016:201). New technologies that support this approach can also reduce corruption by eliminating opportunities of tampering with sealable, traceable cargo in paper processing environments (Finger *et al.*, 2010:36).

While customs administrations have traditionally focused on transactions to monitor supply chain movements, many transport security administrations are moving towards an approach that focuses risk assessment on the various entities in the supply chain (including the shipper, freight forwarder, importer, carrier, and the consignee), which allows for a much more collective view on the origin and type of risk associated with the movement of goods (Manners-Bell, 2017:38). This has prompted efforts by many customs administrations to obtain more accurate data (such as the HS code, country of origin, valuation) as early as possible within the supply chain timeline for a more proactive approach to risk identification.

Perhaps the most powerful aspect of customs modernisation programmes is the shift of responsibilities from customs to traders, according to SAFE Pillar II (WCO, 2015). In the past, customs compliance was checked by customs administrations at the borders, where clearing the goods signalled the end of the import and export process. Should there have been any discrepancy in the documentation, the shipment would remain “stuck in customs” for as long as it would take to resolve the discrepancy (Truel, 2010:65). Traders have demanded a separation between the clearance and the release of goods to alleviate supply chain pressures and facilitate the flow of goods, arguing that goods could be released on arrival while compliance matters could be resolved later (Khan & Zsidisin, 2012:56). Customs from many countries have responded with risk management practices that introduce fast and simple clearances at the frontier, supported by audit-based controls at the traders’ premises (Truel, 2010:45). This process is now a standard in developed countries but developing countries are struggling to implement this new approach and way of thinking (Baldwin, 2016:88).

Customs administrations should not burden the international trade community with a different set of requirements to secure and facilitate commerce. Instead, one set of international customs standards should be developed by the WCO so as not to duplicate or contradict other

intergovernmental requirements (WCO, 2015:1). However, this is not yet the case in developing countries, especially in southern Africa. The following section discusses the customs landscape in South Africa.

4.3 The South African customs landscape

South Africa is part of the Southern African Customs Union (SACU) and is the leading economy in the region. Although SACU as a customs bloc is not a member of the WTO, individual SACU member states still have certain legal obligations with which they must comply.

In response to the Trade Facilitation Agreement by the WTO, the SACU Trade Facilitation Agenda has been largely pursued through the implementation of a joint initiative between the WCO and SACU members under the WCO-SACU Connect project. The project is funded by the Swedish International Development Cooperation Agency (SIDA) and implemented in two phases. The first phase began in 2008 and ended in 2013. The second phase began in 2014 and was scheduled to have been concluded in 2018. The priorities under the second phase of the project include IT connectivity, risk management and enforcement trade partnerships (preferred trade and stakeholder engagement) and customs legislation. A steering committee governs the project and is made up of heads of customs administrations, the SACU Secretariat and the WCO.

One of the priorities of the WCO-SACU Connect project is to develop trader partnerships (TPs). To this end, a PT programme was identified as a means of rewarding traders who comply with customs law and regulations by expediting the movement of their cargo across the SACU region. The programme is strategically designed as the first step towards a fully-fledged AEO programme for the region. As a member state of SACU, South Africa has awarded 28 companies with PT status (SARS, 2017). As such, South Africa plays a critical and leading role in the customs administration environment of the region.

The South African customs administration has been working on a modernisation programme in recent years to automate the customs process and reduce the administrative burden (SARS, 2010). Some of the key modernisation initiatives have been identified as electronic supporting documents, enforcing mandatory electronic communication with traders, customs brokers, carriers and release agents, implementing risk-based customs assessment, a single registration application process for SARS stakeholders, and rolling out the PT programme. New customs legislation was also implemented in 2016, as the first new legislation since the 1964 Customs Act.

SARS claims to have made significant improvements to the customs process and to have reduced customs delays significantly, such as the switch from purpose codes to procedure codes and the introduction of an automated workflow-driven system (SARS, 2017). However, many private sector organisations still claim that South African customs often delay the wrong cargo and inspect goods unnecessarily. They also believe that SARS does not seem to have a known procedure for managing and identifying risk.

Empirical research to support these claims and measure the performance of the current risk management processes applied by South African customs is limited. Most studies have followed a survey approach in order to circumvent the difficulty of obtaining transaction-level data for a sufficient period. The problems faced by the trading community have, evidently, not been verified through accurate measurements, with limited existing data to prove the exact source of delays. This paper aims to address this gap by analysing real-time transaction-level data with which to measure the efficiency of the current process and to determine the cause of unnecessary customs delays between South Africa and its trading partners.

4.4 Description of data

Data was obtained from several freight forwarders in South Africa following an agreement between the North-West University (NWU) and the South African Association of Freight Forwarders (SAAFF). The data represents transaction-level flows exchanged between South African customs administration (SARS) and consignors of goods imported into South Africa from September 2014 to September 2016. The data includes approximately 3.5 million import and export transactions over the given period.

The following information was obtained for each transaction as input factors:

- Times and dates that electronic declarations were submitted by consignors and received by SARS;
- Name of the customs office where declarations were submitted;
- The HS code;
- The customs value;
- The mode of transport through which goods entered South Africa;
- The customs procedure codes (CPC) reflecting the reason why goods were imported into South Africa;
- The countries of origin, export and import (some goods may be in transit via South Africa en route to a final destination elsewhere in southern Africa);

- A codified identity of the entity submitting the customs declaration (preserving the anonymity of the declarants);
- A detailed set of customs response codes communicated to the declarant for each transaction, together with the time and date for each code.

Table 4-1 provides a summary of these input factors and the level of detail that was included in the data.

Table 4-1: Input factors reflecting customs declaration processes

Input Factor	Number of Categories	Examples
Import / export	7	Imports, ex-bond, in transit
Customs Office	36	Durban, Cape Town, etc.
CPC code	31	10, 11, 12, etc.
Previous CPC code	23	00, 14, 20, etc.
Country of origin	237	GB, CN, GE, etc.
Country of export	222	GB, CN, GE, etc.
Country of import	197	ZA, ZM, ZW, etc.
Transport code	9	Ocean, road, rail, etc.
Consignors	310	#0, #1, #7, etc.
HS code	18	Animal, chemical, etc.

Source: Author's own compilation (2019)

Table 4-2 provides a summary of the customs response codes that can be received for any transaction on the electronic system and indicates the actions required by customs for each specific transaction. The communication between SARS and traders, therefore, determines customs' activities after goods have been declared, such as releasing cargo, stopping cargo for an X-ray scan or physical unpack, and requesting supporting documents, among other activities.

Table 4-2: Customs response codes

Customs Response	Description
1	Release
2	Stop for physical inspection at unpack depot or X-ray
4	Refer to other governmental agency (OGA)
6	Reject declaration
13	Supporting documents required
26	Request adjustment to declaration
27	Accept
31	Request additional supporting documents
33	Supporting documents received

Source: Author's own compilation (2019)

4.5 Methodology for extracting information from the data²

The approach that was applied to extract meaningful information from the available dataset consisted of the following sequential steps:

1. *Identify the factors impacting on customs processes:* Those inputs that could affect the customs process were identified through discussions with SAAFF members and included into the dataset as reflected in Table 4.1 above. The importance of each input factor was also confirmed through a correlation analysis. The following categories were identified as having a measurable impact:

- i. Customs office;
- ii. HS code;
- iii. Transport code;
- iv. CPC code;
- v. Country of origin;
- vi. Country of import;
- vii. Consignor code.

2. *Define the sequential steps through which consignments are processed:* The customs process is not limited to a fixed number of sequential steps as described in Table 4.2 above. The data analysis indicates thousands of possible combinations of response codes. It was hence necessary to identify specific combinations of response codes that would represent specific types of customs decisions.

3. *Identify the primary customs outcomes:* From the many possibilities, the following set of primary outcomes were defined as seen in Table 4-3 below:

² The author acknowledges an existing possibility to include a multinomial (probit) regression model on the dataset described. However, given that this chapter is an explorative study into the effectiveness of a customs operation, said approach falls outside of the scope of this thesis. The findings obtained throughout this chapter nevertheless do indicate clear ways in which to guide customs reforms to improve the efficiency of the customs clearance process, which paves the way for future research. In fact, research which builds on the work in this chapter has already been published in the accredited World Customs Journal (WCJ), Volume 13, Number 1 in 2019. The full reference of the article is: Hoffman, A., Grater, S., Venter, W.C., Maree, J. & Liebenberg, D. 2019. Designing a new methodology for customs risk models. *World Customs Journal*, 13(1):31-56.

Table 4-3: Description of customs codes and outcomes

Outcome	Condition
1. Not Stopped	No code 2, 36, 13, 31, 4
2. Stopped	Code 2
a. Not Inspected	No code 36
i. Not Amended	No code 6 or 26
ii. Amended	Code 6 or 26
iii. Accepted	Code 27
b. Inspected	Code 36
i. Not Amended	No code 6 or 26
ii. Amended	Code 6 or 26
iii. Accepted	Code 27
3. Request Additional Docs	Code 13 or 33
i. Not Amended	No code 6 or 26
ii. Amended	Code 6 or 26
iii. Accepted	Code 27
4. Refer Other Government Agency	Code 4
i. Not Amended	No code 6 or 26
ii. Amended	Code 6 or 26
iii. Accepted	Code 27

Source: Author's own compilation (2019)

4. *Quantify the impact in terms of time delay for each possible outcome:* Once all the declarations had been categorised into the above input factors and outcomes, the following set of statistical parameters were measured for each category:

- i. Total time duration per observation, measured from the time and date of submission until the outcome of the final custom was reached (acceptance, rejection, amendment or referred);
- ii. Number of observations (each declaration regarded as an observation) per input category and per outcome;
- iii. The fraction of total observations per input category and per outcome;
- iv. The average, median and standard deviations of the time duration for all observations per input category and per outcome;
- v. Fraction of total observations found to contain customs infractions;
- vi. Average, median and standard deviation of time duration for each type of outcome found to contain infractions;
- vii. The fraction of all declarations interrupted by customs that contained infractions;

- viii. Fraction of total time delay represented by each outcome by different infraction types and interrupted declarations without any infractions;
 - ix. Repeating each measurement (time delays and fractions) for each outcome and infractions within each input category.
5. *Determine the quantified impact of each input factor on average time delay, probability of an infraction and avoidable time delays:* By comparing the above results between different input factor categories, the following could be determined:
- i. The way in which the customs administration made decisions regarding the consignment;
 - ii. The time delay in the consignment of goods;
 - iii. The probability of customs detecting an infraction within the consignment.
6. *Estimate the time saved through improving customs systems:* An ideal customs system would have the ability to screen all declarations and identify those with infractions, thereby allowing customs to stop, inspect and reject or amend only such consignments. Therefore, the share of consignments interrupted by way of either a request for additional documentation or by a stop and/or a physical inspection and for which no infraction had subsequently been discovered (and the associated share of the total time delay), were regarded as representing the potential to improve the customs systems from the status quo towards the ideal.
7. *Determine the trends of important outcomes:* Calculating all the above outcomes per period and plotting the resulting performance levels as functions of time helped determine whether there was a trend over time and whether specific periods were characterised by specific eventualities (for example, when customs may have decided to take special measures at specific offices). In this case, monthly measurements were used as a basis for time-dependent behaviour.
8. *Determine correlations between input factors and outcomes:* The most commonly used measure to determine whether there is a significant relationship between an input factor and an outcome is linear correlation. All the input factors that were considered are, however, categorical in nature. Therefore, to generate variables associated with the input categories that are continuous in nature to allow the calculation of a correlation coefficient, the following approach was implemented:
- Within each input category (e.g. for the Durban customs office) the accumulated average of each outcome over time was calculated (that is, the average time delay was calculated as from September 2014 until the end of each following month, for example, November 2015, December 2015, etc.);

- As these accumulated averages represent the observed behaviour within that category up to that point in time, they were used as explanatory variables;
- These explanatory variables were regarded as representing the impact of the respective input factors (e.g. customs office) on a possible outcome (e.g. finding an infraction);
- Each new observation that fell into a specific set of categories (e.g. customs office Durban, CPC code 41, Country of Origin CN, etc.) was allocated with the values of the accumulated averages for each performance parameter calculated for the category to which it belonged;
- Pearson correlations were calculated between the explanatory variable values (e.g. the average time delay for Durban up to that point in time) and the specific values for each observation (e.g. its actual time delay).

9. *Compare impact of different input factors:* The process above was repeated within each subcategory (e.g. per customs office), the correlations between the different input factors compared and the categorisation method that would have the biggest impact on each outcome determined.

The results from this analysis serve as evidence of the basis for customs decisions and the accuracy of these decisions after SARS decided to stop a consignment. It also provides an indication to trade and private sector firms of the time delays they could expect for specific consignments that fall within specific categories. SARS could use this information to improve their customs procedures to ensure that their future systems will reduce unnecessary time and cost delays and improve the predictability of customs operations in South Africa.

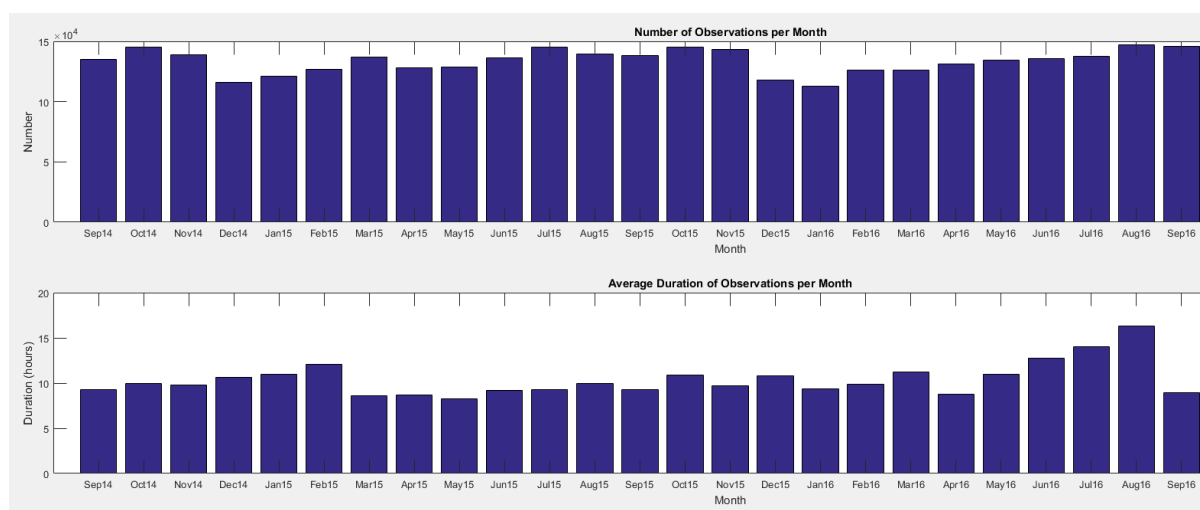
4.6 Results and findings from the analysis

This section provides an overview of the results extracted from the dataset described in the previous section. Firstly, an overview of the total dataset is given. This is followed by a results comparison between the different categories. This section concludes by calculating correlation coefficients between the different input factors and the most important outcomes, including the probability of consignments being stopped and inspected, a request for additional documentation or an infraction detected by customs. In the process, quantified outputs are provided in terms of each of the research questions to be addressed.

4.6.1 Overview of the dataset

Figure 4-1 below indicates the number of declarations available per month and the average duration of processing by customs. While the number of declarations remains more or less constant over the two-year period, there is a noticeable increase in the average duration over the last six months of the period under consideration.

Figure 4-1: Time trend over all consignments: number of declarations and average duration (h)



Source: Author's own compilation (2019)

Table 4-4 below displays a comparison between consignments that were delayed by customs (stopped) versus consignments that were immediately released by customs (not stopped). Stopped consignments (all outcomes not falling under the not stopped category) represent approximately 22 per cent of the total number but approximately 61 per cent of the total delays experienced by all consignments combined. This justifies further investigations into the stopped category.

Table 4-4: Statistics for all consignments over total period

Category	Number	Ave Duration	Fraction of Total	Fraction with Infractions	Fraction of Total Duration
All	3 520 977	11.3	1.00	0.007	1.000
Not stopped	2 755 894	6.1	0.78	0.000	0.421
Stopped but not inspected	1 995	133.9	0.00	0.742	0.007
Stopped and inspected	7 669	136.9	0.00	0.031	0.026
Request for additional documents	410 951	48.6	0.12	0.027	0.501

Referred to OGAs	187 747	9.6	0.05	0.001	0.045
Infractions	25 706	179.2	0.01	1.000	0.116

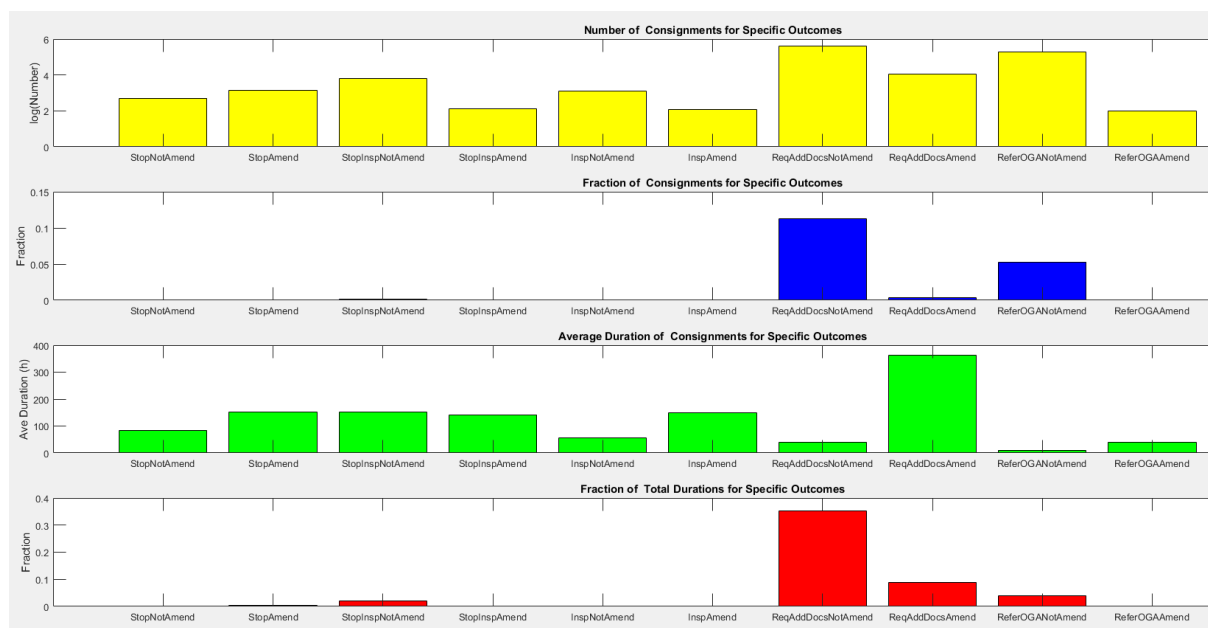
Source: Author's own compilation (2019)

Figure 4-2 breaks down the possible actions for stopped consignments into the categories as outlined in Table 4-3 above:

- Stopped but not amended;
- Stopped and amended;
- Stopped and inspected but not amended;
- Stopped, inspected and amended;
- Inspected but not amended;
- Inspected and amended;
- Request for additional documents but not amended;
- Request for additional documents and amended;
- Refer to OGAs but not amended;
- Refer to OGAs amended.

Requests for additional documents represent the largest contribution of stopped consignments, both in terms of the number of cases and the total time duration of this activity. In all cases in which an amendment was made, the time delay tended to be much longer than cases in which an amendment was not made, which can be expected.

Figure 4-2: Statistics for different stopped outcomes



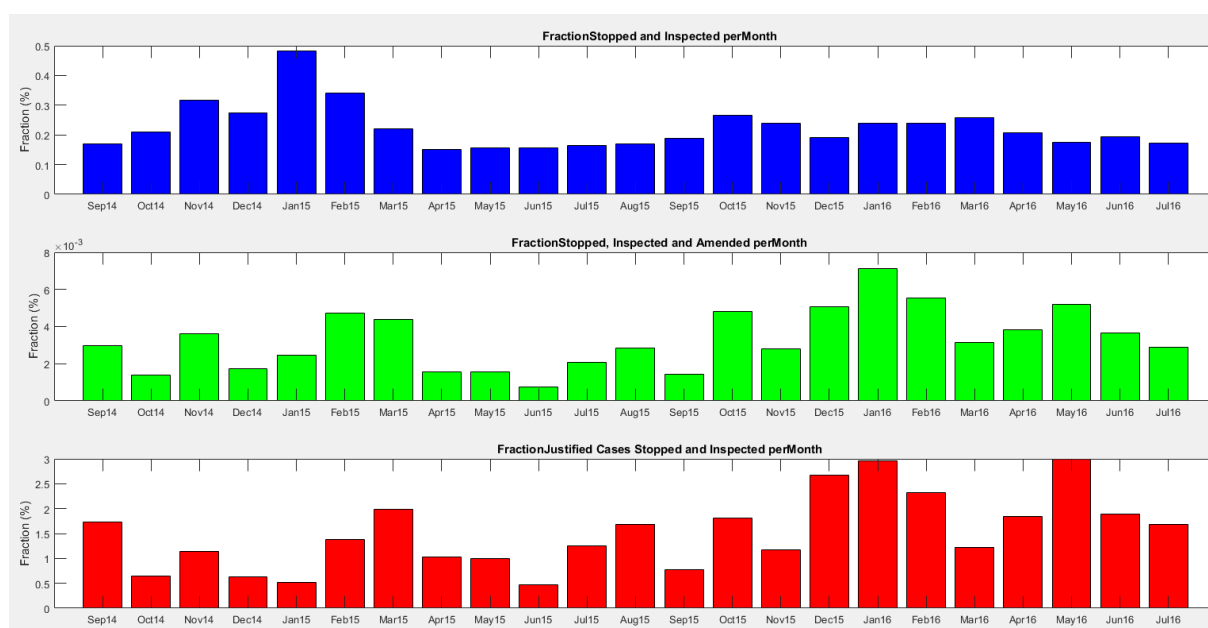
Source: Author's own compilation (2019)

An obvious question is whether the observed behaviour is systematic (i.e. it remains more or less constant over time) or whether it may be the result of sporadic behaviour. The time trends were calculated for consignments that were stopped for various reasons, including the fraction of total cases that were stopped and the fraction of the total time delay represented by the various types of stops. Due to limited space, only one of these graphs for the time trends is displayed in **Error! Reference source not found.4-3**. The following observations are made:

- While the number of observations per month remains tolerably constant over the period from September 2014 to September 2016, the average duration of processing consignments increased by approximately a factor of two over the same period.
- The number of consignments that were subjected to physical inspections peaked during specific months.
- An upward trend was observed over the two-year period for both the fraction of consignments that were stopped and the average time delay per stopped consignment. A similar trend was observed for consignments with infractions.
- The fraction of consignments for which additional documents were requested increases from between five and 10 per cent in September 2014 to 15 per cent in September 2016.

- While the fraction of justified cases for requesting additional documents did increase proportionately, there was an increase in the time lost by trade due to unnecessary requests that did not lead to amendments or rejections.
- Only a small fraction of consignments that were subjected to physical inspections or for which additional documents were requested resulted in rejections or amendments.
- The fraction of customs stops that were justified (i.e. that resulted in amendment or rejection) was consistently small; this aspect of customs performance was not restricted to specific time periods.

Figure 4-3: Comparison of time trends: stopped and inspected vs stopped, inspected and amended



Source: Author's own compilation (2019)

The most important general observation that can be made from the data thus far is that the majority of consignments that were stopped for one of the identified reasons were not amended at all and were eventually released without an amendment or a rejection. Therefore, it can be argued that a more accurate customs screening system in South African customs could drastically reduce the number of consignments for which the regular flow of cargo is usually disrupted without a valid reason. The following section offers a further breakdown of the results per category.

4.6.2 Imports, exports, ex-bond and in-transit

The first method of categorisation was as follows:

- Imports;
- Ex-bond imports (where goods first went into a bond store before duties eventually became payable);
- Exports;
- Exports ex-bond;
- BLNS transit (goods in transit to other countries in the SACU region, namely Botswana, Lesotho, Namibia and Swaziland).

The majority of declarations that formed part of this study was those for imported goods; of these about ten per cent were ex-bond imports. The reason for focusing on imports rather than exports is that the customs administrations tends to put in more effort where the most customs duties are collected. A small fraction of export, ex-bond import/export and in-transit consignments were included in the data set; some observations were made about the differences observed between these categories:

- Imports represented the bulk of the available data;
- Ex-bond imports experienced a smaller fraction of stops compared to other imports. However, the average duration of delays was larger compared to other imports;
- Ex-bond exports experienced a small fraction of stops but higher average delay times compared to imports;
- For BLNS transit, the average delay for consignments that were not stopped was much higher compared to imports;
- The fraction of total time delays, caused by requests for additional documents, was higher for imports;
- BLNS transit experienced a much higher than average fraction of physical inspections and also a significantly higher fraction of infractions;
- The fraction of justified stops (physical stops and requests for additional documents) was consistently low for all categories over the entire period.

4.6.3 Performance per customs office

The next level of categorisation was of the different customs offices in South Africa, where the declarations are processed. It would be reasonable to expect significant differences in performance between these categories due to the volumes processed (e.g. Durban, Africa's busiest freight port compared to small border offices such as Vioolsdrif or Ficksburg) as well as

the mode of transport (e.g. Durban, which processes mostly large maritime consignments compared to OR Tambo Airport, which processes mostly small air cargo consignments).

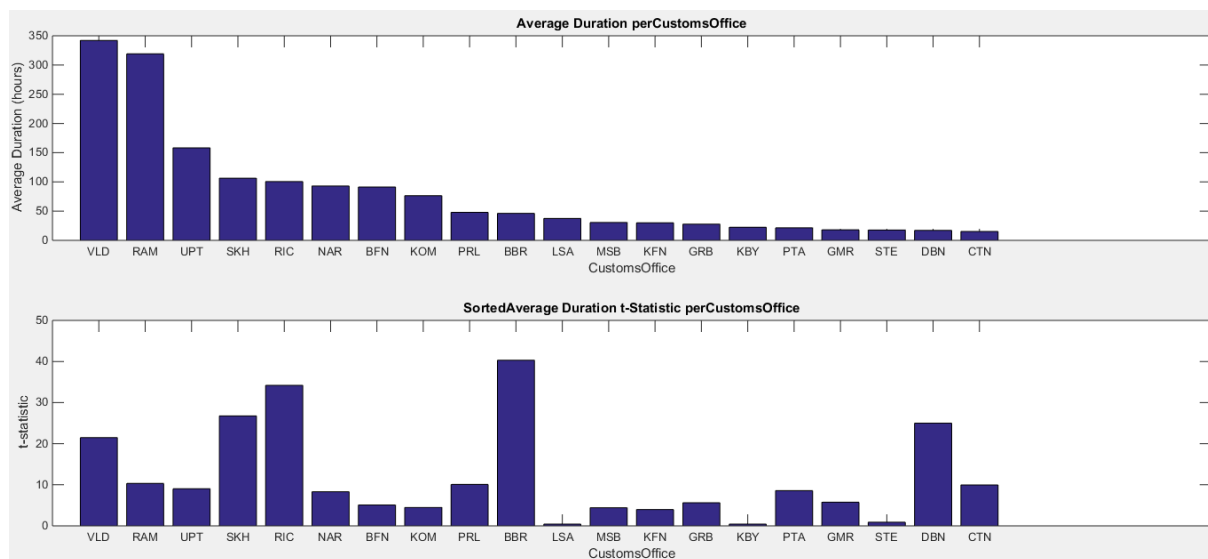
The purpose of this categorisation was to identify those offices that may have caused the most delays and to verify whether deviations between sample averages and the population average are statistically significant. For this purpose, the t-statistics for the averages per category were calculated as follows:

$$t - \text{statistic} = \frac{\mu_s - \mu}{\frac{\sigma_s}{\sqrt{N_s}}}, \quad (\text{Equation 1})$$

with μ_s the average of the sample for which the t-statistic is determined, μ the population average, σ_s the standard deviation of the sample and N_s the sample size. If the t-statistic is greater than three, then there is only a one per cent chance that the deviation of the category behaviour from the population behaviour is a result of randomness in the data – in such cases, there is an underlying reason for the observed category's deviation.

Figure 4-4 displays the average duration of declaration processes per customs office along with the t-statistics of these averages in ranking order from highest to lowest. Vioolsdrif (VLD) displays the highest average duration of more than 300 hours. While the average for Beitbridge (BBR), the busiest road freight border post, is much lower at 46 hours, its t-statistics is the highest (about 40) due to the much larger number of consignments that moved through that border. Durban (DBN) seems to be only slightly higher than the overall average; however, its t-statistic indicates a significant deviation from the overall mean, given the very large numbers that were processed by Durban. This illustrates the value of using additional statistical measures to evaluate performance.

Figure 4-4: Average duration to process declarations per customs office

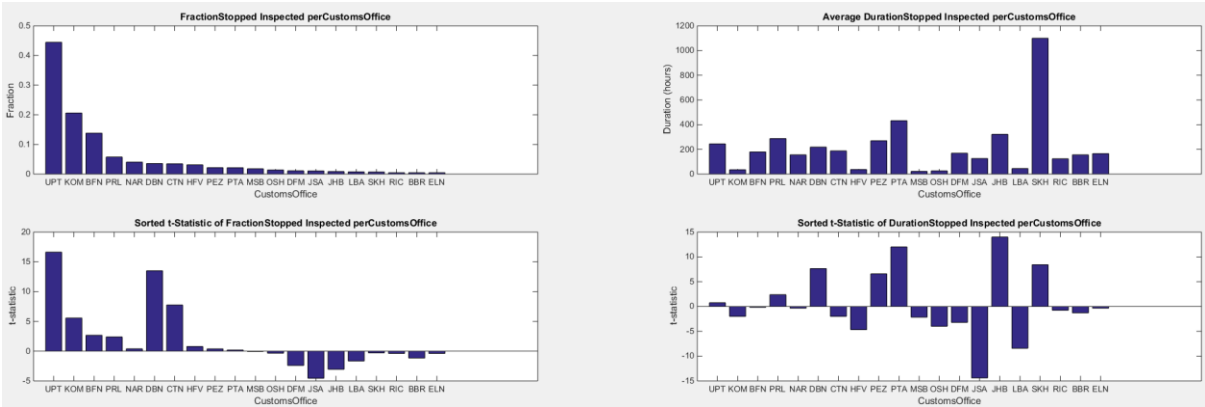


Source: Author's own compilation (2019)

Figure 4-5 displays the fraction of consignments that were stopped and inspected per customs office. Uptington had the highest fraction of consignments that were stopped and inspected, followed by Komatipoort and Bloemfontein. Skilpadshek had the highest average duration for stopped and inspected consignments by far. Many of the figures per category had very high t-statistics, implying that there had to be underlying reasons for their significant deviations from the population averages.

The statistics for the stopped and inspected but not amended category were almost identical to those for all consignments in the stopped and inspected category – in almost all cases only a small fraction of consignments that were stopped and inspected had, in fact, been amended or rejected. This is indicative of a high potential for reducing unnecessary stops without having a negative impact on customs compliance levels.

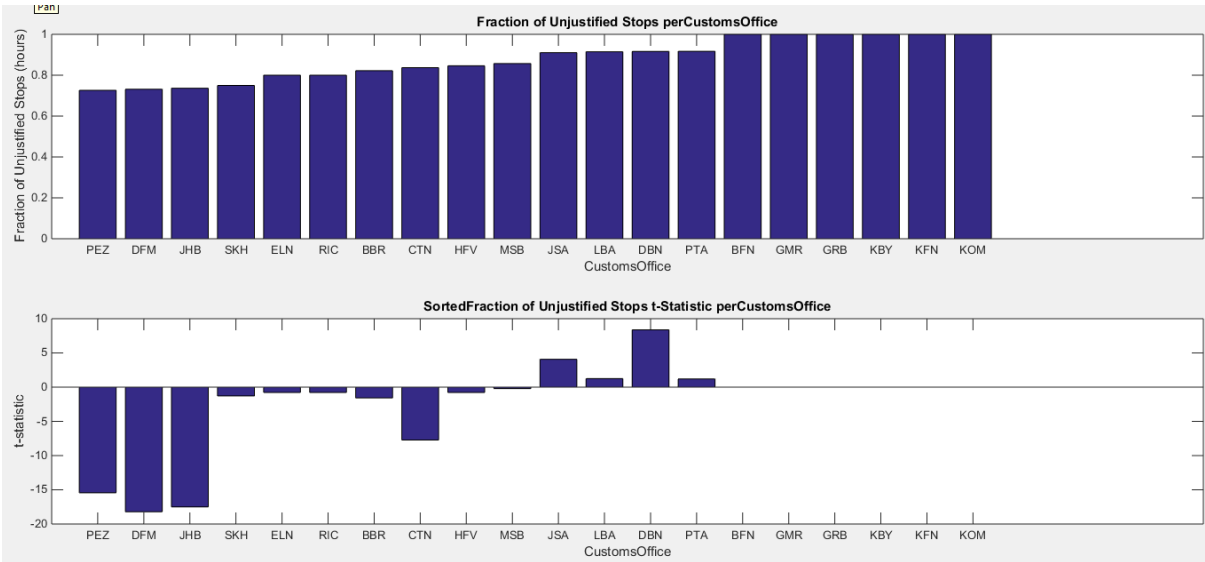
Figure 4-5: Comparison of share stopped and inspected between different customs offices



Source: Author’s own compilation (2019)

Figure 4-6 displays the fraction of unjustified stops per customs office. For many customs offices, 100 per cent of consignments that were stopped and inspected had not been amended or rejected. The best performing customs office, Port Elizabeth, only achieved a hit rate of around 25 per cent for consignments that had been stopped and inspected. Durban has the highest t-statistic for unjustified stop percentages.

Figure 4-6: Comparison of fraction unjustified stops between different customs offices



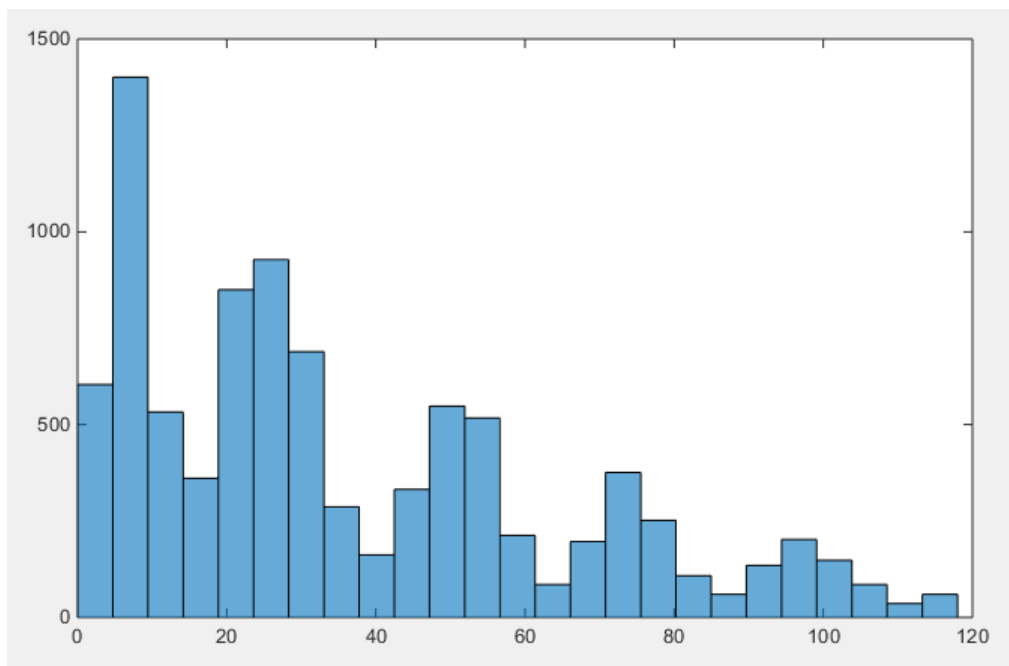
Source: Author’s own compilation (2019)

From similar results for requests for additional documents, the following observations were made:

- Some customs offices (e.g. Komatipoort) requested additional documents for more than 40 per cent of consignments; in such cases, consignments could be delayed for more than two weeks (300 to 350 hours);
- The same customs office (Komatipoort) did not amend or reject 90 per cent of the 40 per cent consignments for which additional documents had been requested, thus making most of the delays ranging from several days to two weeks unnecessary;
- As in previous cases, the t-statistics for many categories indicated systematic deviations from average behaviour rather than mere random fluctuations;
- The fraction of unjustified requests for additional documents is even worse than for unjustified stops and inspections – on average around 95 per cent;
- Only one customs office (HFV) achieved a hit rate of more than 20 per cent.

Further insight into the nature of the customs process can be obtained by observing the histogram of the time duration per border post. For example, the Beitbridge border post's time delays reflected specific aspects of operations and suggested possible reasons for delays. As can be seen in Figure 3-7, delays at Beitbridge displayed a clear, 24-hour cyclic behaviour. Consignments that were processed on the same day took a few hours, and where they had not been completed, it typically took another 24 hours, which resulted in peaks within a 24-hour cycle period. The larger fraction of consignments that had not been amended but also not cleared on the same day were indicative of the presence of extraneous factors, which justified further investigation. In some studies, interviews with trucking companies and clearing agents provided possible reasons for this behaviour. Truck drivers often spend several hours on personal activities before handing in their documentation at a clearing agent once they have reached the border post. It quite often happens that they arrive at a border post during the course of the afternoon and only hand in the documentation the next morning.

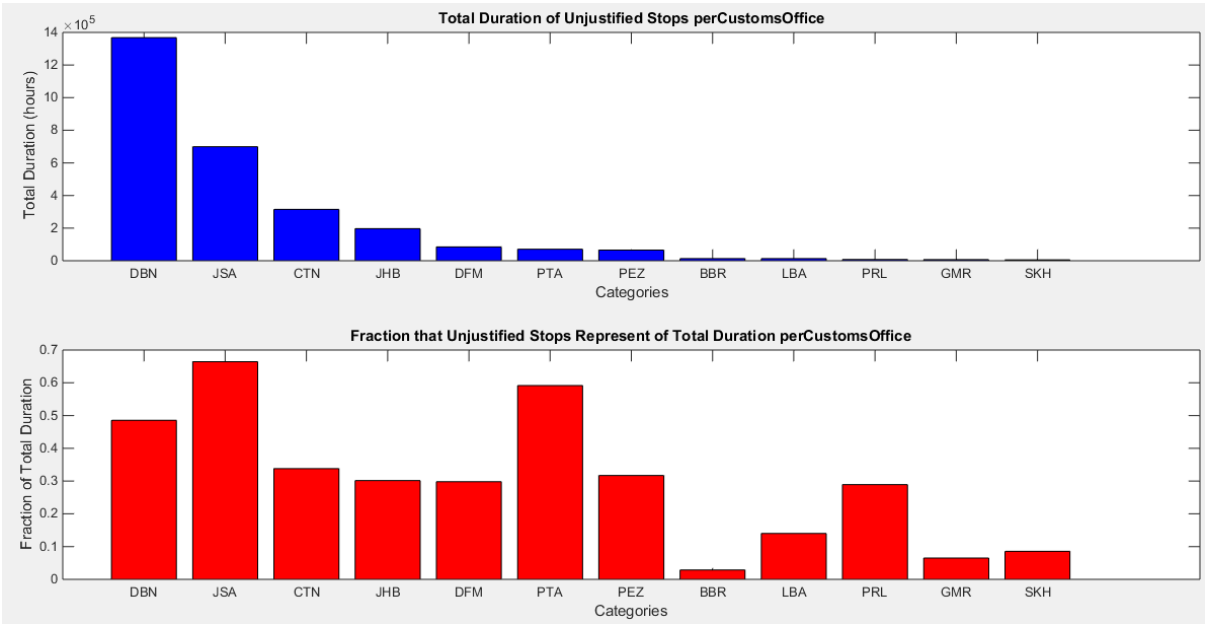
Figure 4-7: Histogram of customs processing time at Beitbridge border post



Source: Author's own compilation (2019)

By quantifying the total contribution to unjustified stops, it is possible to identify the customs offices that represent the biggest overall delay. This data is provided in Figure 4-8 below, in which it can be seen that Durban contributes most to the total duration of unjustified stops, followed by JSA (OR Tambo Airport). They are also among the customs offices that spent the largest fraction of overall time on unjustified stops. Durban was, therefore, selected for further investigation.

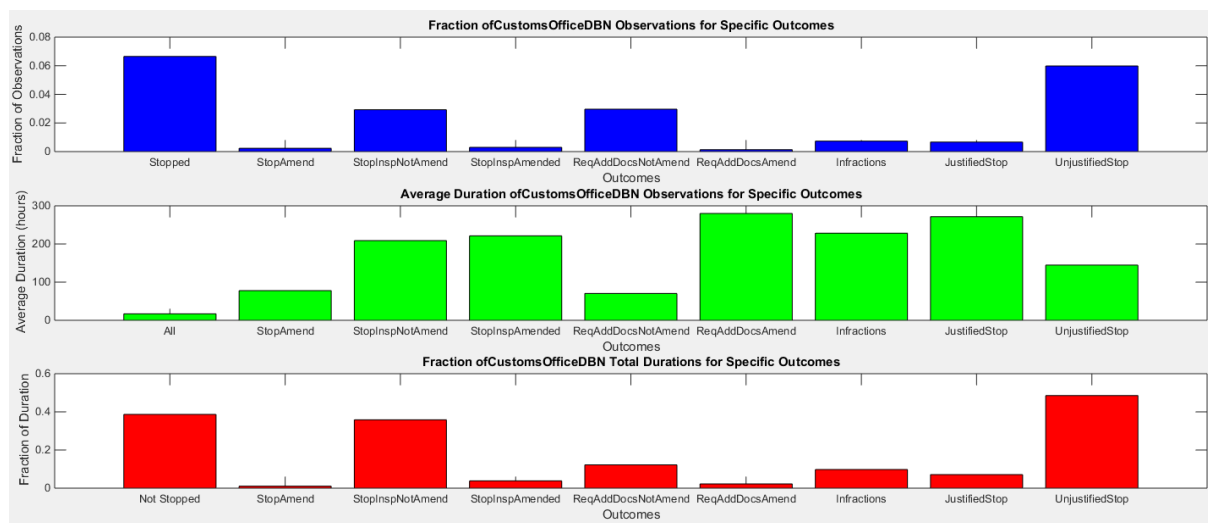
Figure 4-8: Time durations of unjustified stops per customs office



Source: Author's own compilation (2019)

Figure 4-8 shows that approximately 6.5 per cent of consignments that were stopped at Durban made a greater contribution to the total time delay than the approximate 93.5 per cent of consignments that had not been stopped and that approximately 90 per cent of the time delays for stops were unjustified as they did not lead to a rejection or amendment. Given that this is a bustling port that requires all available space for the quick processing of cargo moving from container ships to trucks or trains, the fact that so much time is wasted on unnecessary customs stoppages is a serious cause for concern.

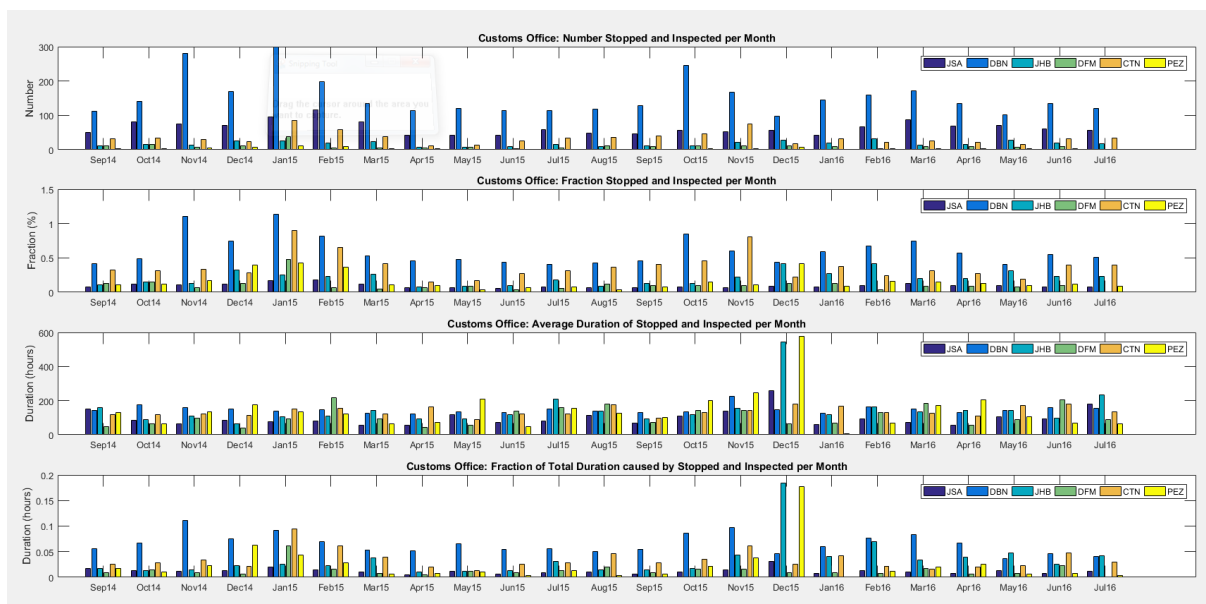
Figure 4-9: Time duration for different outcomes at Durban customs office



Source: Author's own compilation (2019)

Time trends were then further analysed for the performance of the six busiest customs offices: OR Tambo Airport (JSA), Durban Port (DBN), Johannesburg dry port at City Deep (JHB), Durban freight terminal (DFM), Cape Town (CTN) and Port Elizabeth (PEZ). A gradual increase in the average duration of processing declarations can be observed for most of these customs offices over the two-year period. The fraction of consignments that were subjected to physical inspections tends to show peaks during specific periods as is evident in Figure 4-10. The number of infractions does not display a similar increase during months of increased physical inspections and creates the impression of periodic efforts made to increase vigilance among customs officials but with no measurable positive outcomes.

Figure 4-10: Time trends: different customs offices – physical inspections



Source: Author's own compilation (2019)

From similar results for infractions, the following observations are made:

- The number of infractions significantly increased at JSA and Durban over the period of observation.
- However, there was a significant increase in the average time for processing infractions from about 150 hours to around 250 hours, mainly due to the requests for additional documents.
- While the number of justified stops increased at JSA and Durban, the fraction of justified stops was consistently low where the number of infractions was compared with the much larger number of stops and requests for additional documents.

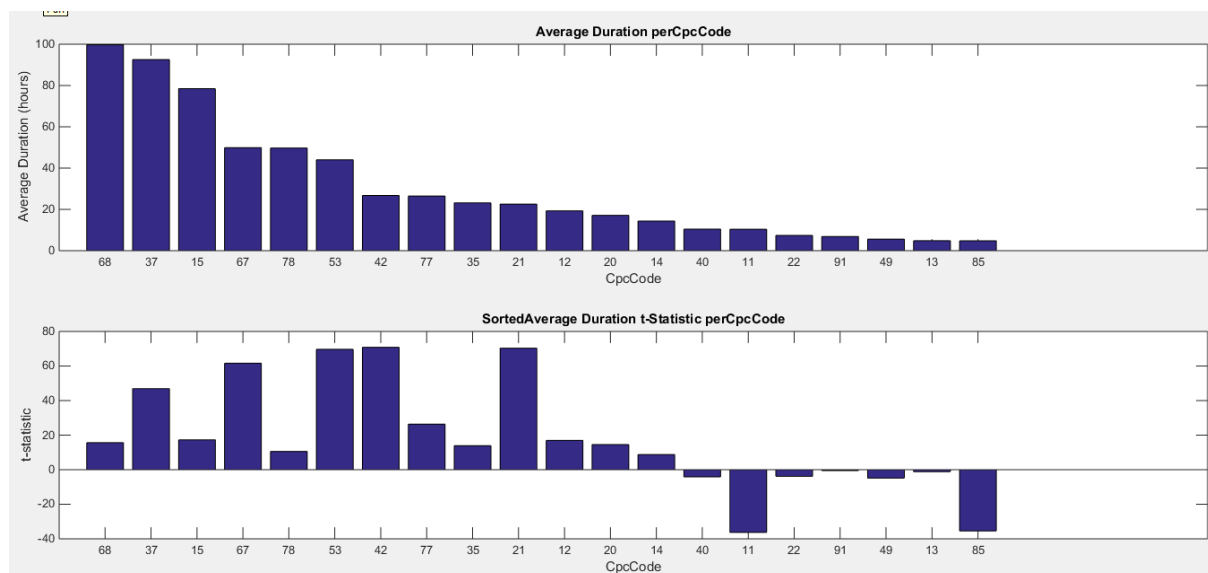
4.6.4 Performance per CPC code

Figure 4-11 displays average durations and t-statistics for different CPC Code categories. From these graphs and other information not displayed, the following are observed:

- Many CPC codes that do not appear frequently experience very high delays of 80 to 100 hours, on average, compared to a population average of approximately 11 hours.

- The high t-statistic values indicate that, even when taking into account the small numbers in those categories, these deviations cannot be attributed to random behaviour.
- Time durations for unjustified stops are dominated by code 11 (imported for local consumption) as could be expected, given that this is the most populous category.
- There are large variations between CPC codes in terms of the fraction of the total time represented by unjustified stops (e.g. for code 77 this fraction is larger than 60 per cent).
- Although only about five per cent of consignments for CPC Code 11 were stopped, these represented approximately 60 per cent of the total time delay, of which about 80 per cent were unjustified stops.

Figure 4-11: Comparisons of average duration between different CPC codes



Source: Author's own compilation (2019)

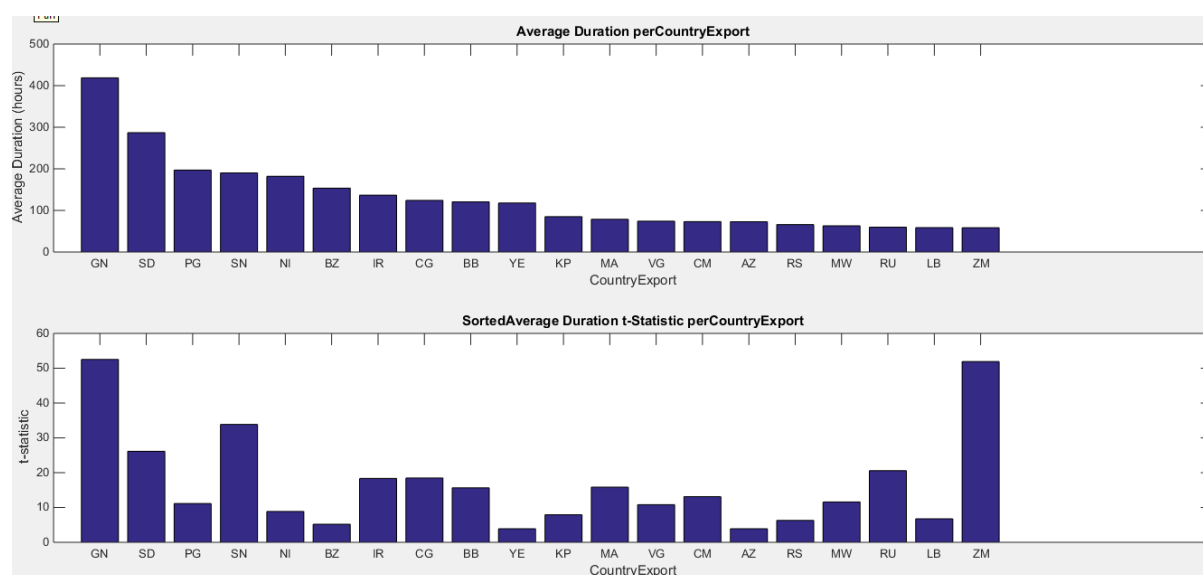
4.6.5 Performance per country of export

Previous studies (such as Laporte, 2011) have indicated that the origin of goods is an important criterion used by customs administration for estimating the probability of infractions. Therefore, significantly different behaviour can be expected to be observed for different countries of export. Figure 4-12 displays the average time duration for those countries that experienced the longest time delays. For many countries the average time duration is far above the population average;

in some cases, their t-statistics are above 50. From Figure 4-12 and other graphs not displayed here, the following observations are made:

- Consignments from numerous countries of export experienced average delays in excess of 100 hours, in some cases more than 400 hours;
- Overall, unjustified stops were mostly for imports from China;
- The fraction of unjustified delays that represents overall time delays per country does not deviate from the population mean as much as for other input factors (it varied between 20 per cent and 50 per cent);
- For other African countries like Zambia, with averages of around 50 hours, the t-statistics indicate systematic bias in these systems against specific origins for imported goods. Given that most of these goods were imported by road via Beitbridge, the time delay for Zambia is close to that of the Beitbridge border post, as is expected.

Figure 4-12: Comparisons of average durations between different counties of origin



Source: Author's own compilation (2019)

4.6.6 Performance per mode of transport

Imports arrive in South African primarily through three modes of transport: by road (from other African countries); by ocean (bulk imports from overseas countries) and by air (small-sized high-value goods from overseas). Table 4-5 provides a description of the codes used for different transport modes.

Table 4-5: Description of transport mode codes

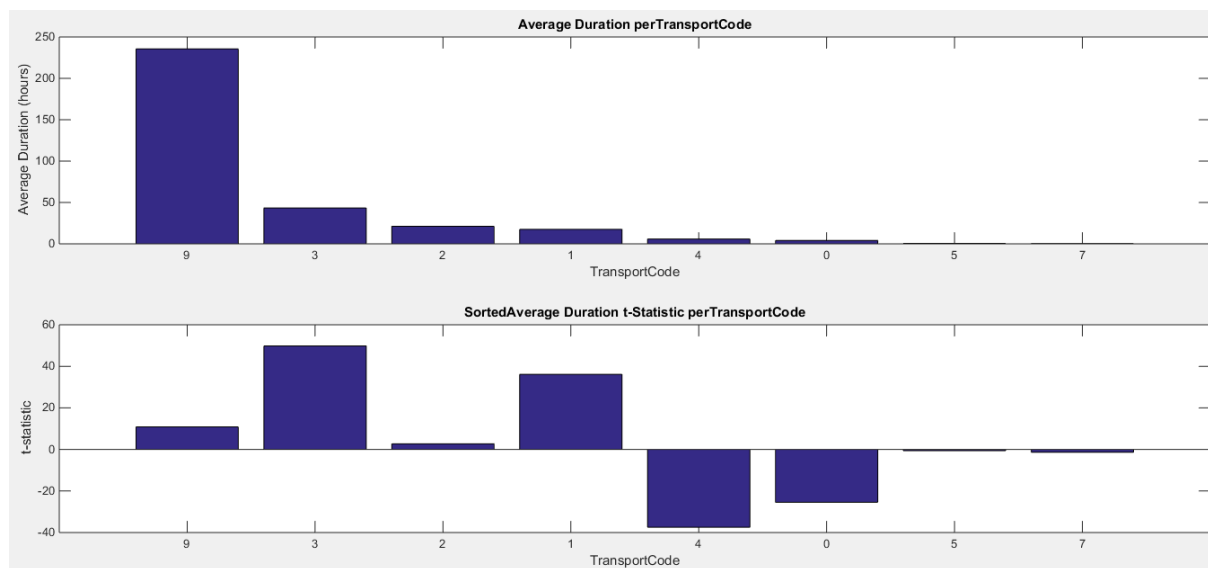
Code	Description
0	Transport mode not specified
1	Maritime transport
2	Rail transport
3	Road transport
4	Air transport
5	Mail
6	Multimodal transport
7	Fixed transport installation
8	Inland water transport
9	Transport mode not applicable

Source: Author's own compilation (2019)

Figure 4-13 confirms that the average duration for the three main modes of transport more or less equal the time delays for Beitbridge (road), Durban (maritime) and JSA (air), as these are the biggest ports of entry handling goods that arrive through these modes of transport respectively. The following general observations are made:

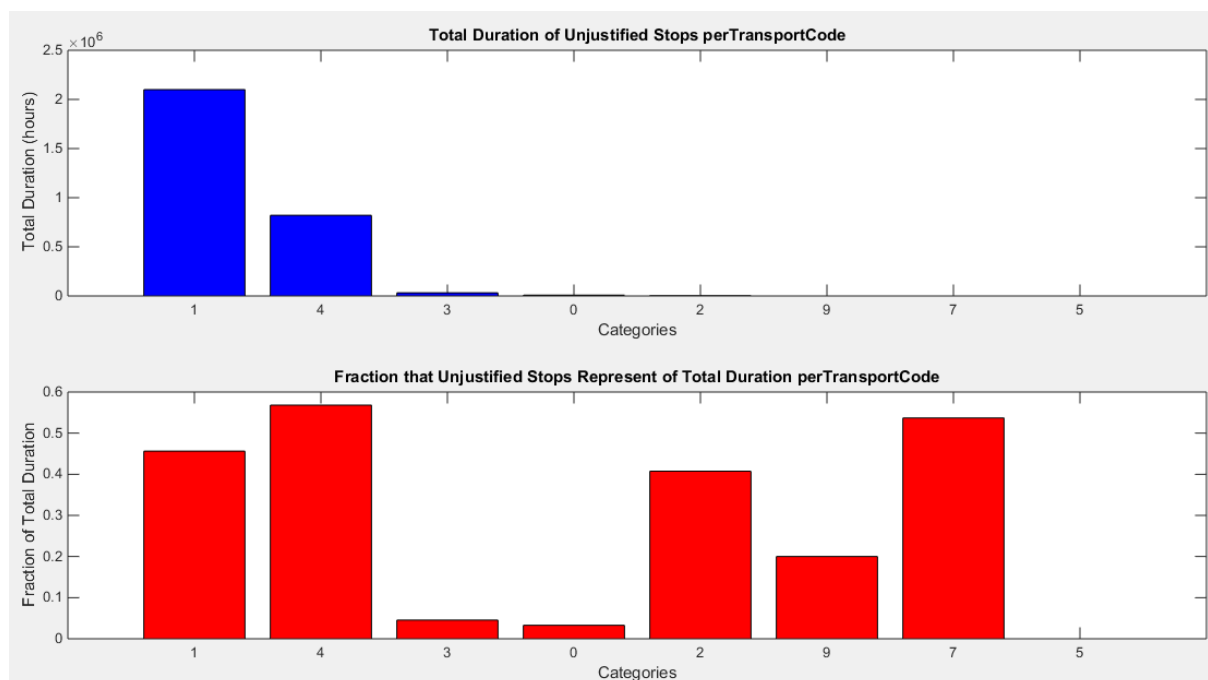
- Among the transport modes, roads experience the longest delays, and very significantly so in terms of t-statistics – most likely due to long delays at border posts like Beitbridge.
- Maritime transport dominates in terms of the total duration of unjustified stops, followed by air and then roads.
- For air transport, unjustified stops represent the largest fraction of total delays within its own category.
- A cause for concern in terms of data capturing is the fact that the largest average delays occur in the category of transport mode not specified; however, this category represents only a small fraction of the total population.

Figure 4-13: Comparisons of average duration between different modes of transport



Source: Author's own compilation (2019)

Figure 4-14: Comparisons of average duration of unjustified stops between different modes of transport

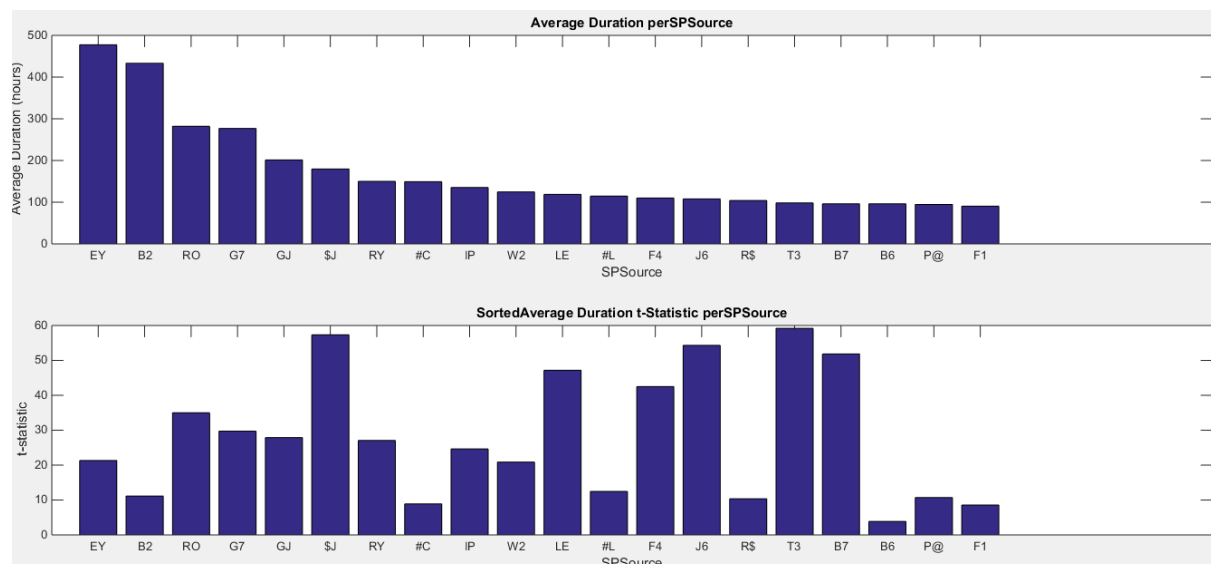


Source: Author's own compilation (2019)

4.6.7 Performance per consignor

Previous work by Laporte (2011) and others mentioned formerly have indicated the entity importing goods to be an important determinant of perceived customs risk also. Therefore, it would be interesting to observe the extent to which customs delays differed between different consignors. Figure 4-15 shows that some consignors experienced average delays in excess of 400 hours; this confirms that customs do seem to target specific consignors. The t-statistics confirm that there seems to be systematic discrimination against specific consignors. For some consignors, unjustified delays represent approximately 80 per cent of the total delays experienced.

Figure 4-15: Comparison of average duration between different consignors

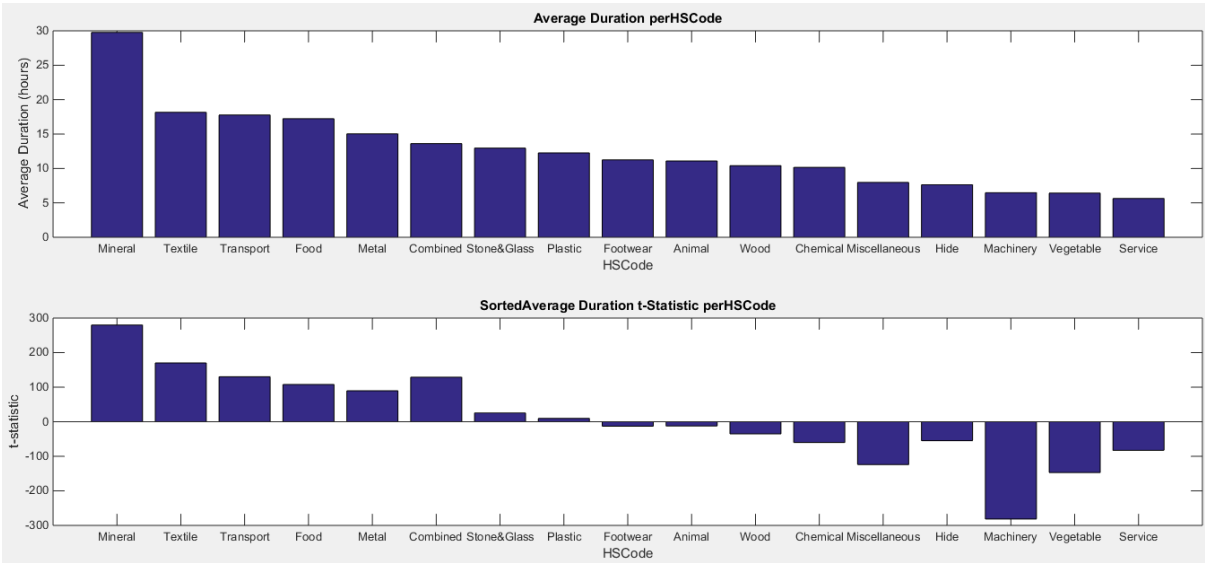


Source: Author's own compilation (2019)

4.6.8 Performance per HS code

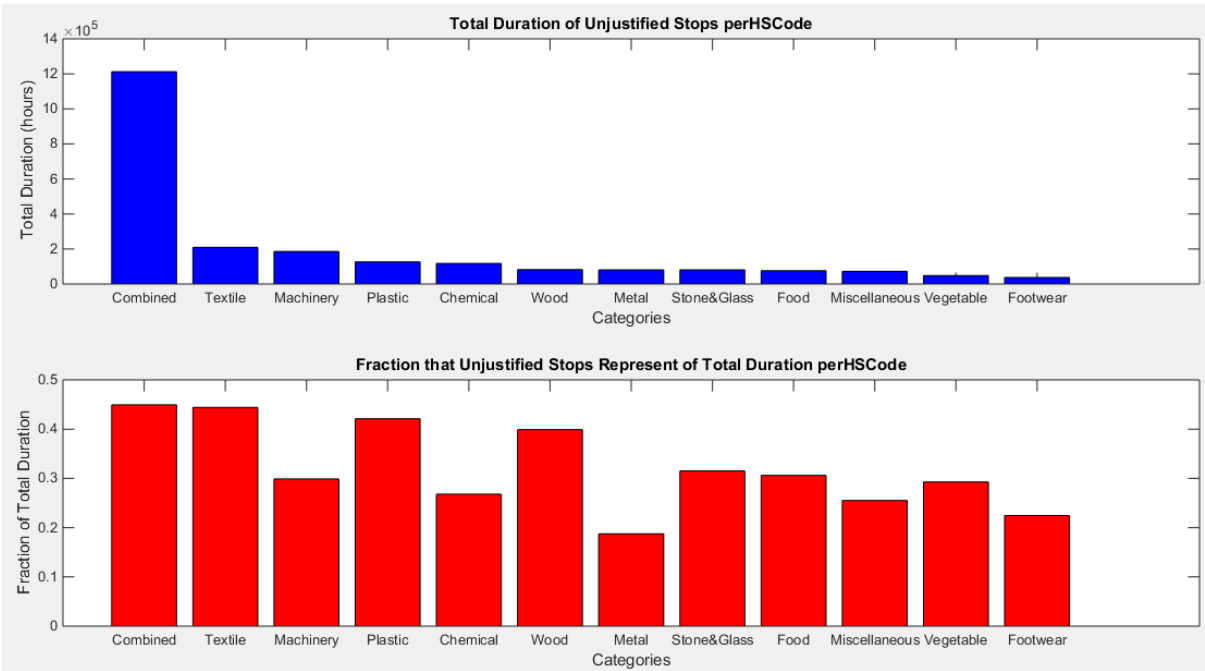
The cargo type as indicated by the HS code is important as it determines the level of customs duties payable by the importer. Figure 4-16 shows that, while minerals experienced the highest average delays, differences between HS code categories are not as big as other inputs factors. However, some did experience delays that were five times longer than categories on the low end of the spectrum; t-statistics that are mostly either highly positive or highly negative also indicate that customs must have different rules for different HS codes.

Figure 4-16: Comparisons of average duration between different HS codes



Source: Author's own compilation (2019)

Figure 4-17: Comparisons of average duration of unjustified stops



Source: Author's own compilation (2019)

Figure 4-17 displays the time duration of unjustified stops. The combined category (consolidated consignments) also dominates the total duration of unjustified stops – this could be expected as any of a number of manifests associated with the same consignment could have triggered a delay

for the entire consignment. Previous studies have shown that, on average, consolidated consignments experience longer cross-border delays than the population average. While the differences in unjustified stops between HS Code categories are not as severe as for some other input factors, it is still interesting to note that the fraction of time represented by such stops is much higher for textiles than for footwear. This may be because there is still some protection in place for the local textile industry in South Africa.

4.6.9 Correlation analysis between input factors and outcomes

The previous section provided an overview of the extent to which different input factors had an impact on observed time delays and unjustified stops. In order to perform a direct comparison between the impact of each input factor on the various outcomes, a correlation analysis was implemented as follows:

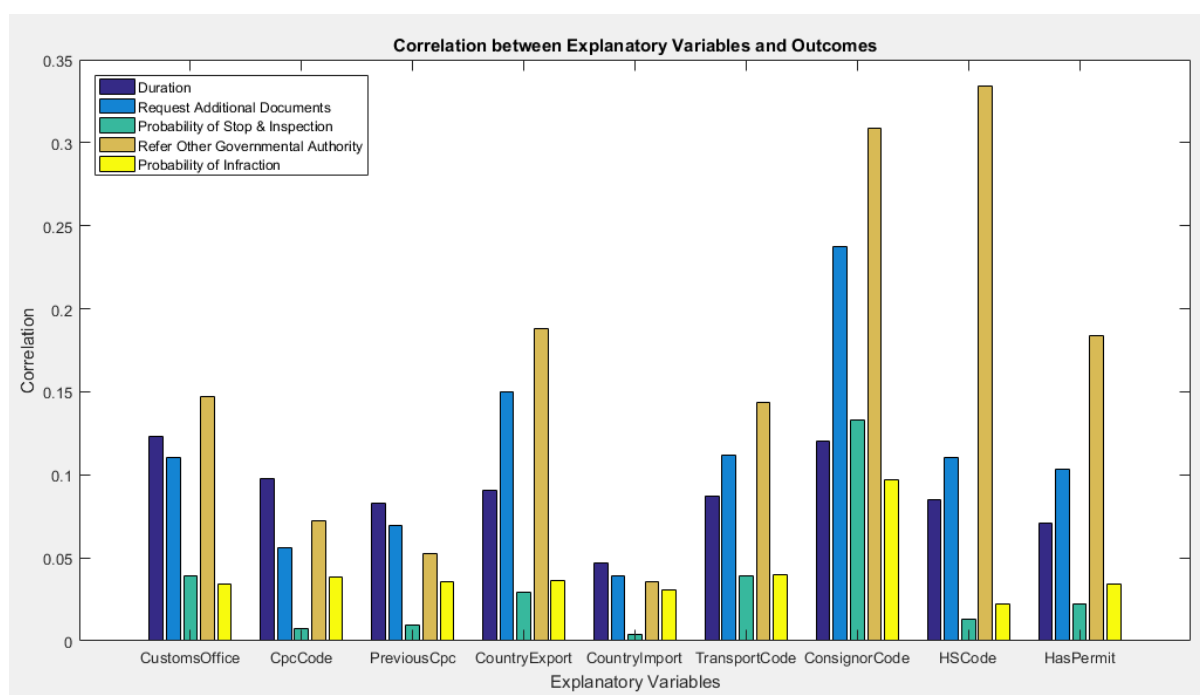
- i. The accumulated average value of each outcome was calculated as a function of time for each category (e.g. Durban or Cape Town) of each input factor (e.g. customs office). This was done by calculating the average for the respective category and outcome from the start of the observation period up to each specific month. For each subsequent month, the averages were once again calculated from the start of the observation period. These averages represent the behavioural characteristics of the respective categories at that point in time.
- ii. The values of the various input factors were determined for each new observation (e.g. customs office: Durban; HS code: textiles; transport mode: maritime, etc.). Said observations were then allocated the accumulated averages for those input factor categories as determined at the end of the previous month. Thus, each observation inherits the attributes of the categories to which it belongs. Since these attributes are continuous variables, they could be used as a basis for a correlation analysis with the observed outcomes.

Correlations were firstly determined with respect to time delay as follows: For each new observation and input factor (e.g. customs office), the mathematical correlation was calculated between the time duration to process that specific consignment and the historical average time to process consignments within that specific category (e.g. Durban).

Figure 4-18 displays the correlations of various outcomes (customs decisions and resulting infractions) with respect to all the input factors. The input factor that displays the largest correlation with most customs decisions is the consignor code (entity submitting the declaration) – this

confirms some of the suspicions by the private sector in South Africa that the identity of the importer is used by customs to target specific consignments for scrutiny. Other input factors with a significant correlation with customs decisions are HS code, country of export, and customs office. What should be noted is that the correlations of the same input factors with resulting infractions are much weaker than the correlations with customs decisions. While the consignor code still has the most prominent correlation, the correlation value is much smaller, while the correlation with probability of request for additional documents is almost 0.25 and with reference to OGA about 0.32, the correlation with probability of infraction is less than 0.1. This indicates that, while customs use consignor identity as the primary determinant of stops, the infractions that are actually found do not fully justify this strategy, as consignor identity is not as strongly correlated with actual infractions. In light thereof, some consignors appear to be unjustifiably discriminated against, with significant implications in terms of overall time delays experienced in practice.

Figure 4-18: Correlation between various customs outcomes and nine explanatory variables



Source: Author's own compilation (2019)

4.7 Conclusion and recommendations

This study attempted to generate a better understanding of the customs risk processes in South Africa and their impact on trade in the region. The study applied statistical data analysis to a set of South African customs data that represented a significant fraction of the total number of imports over the period September 2014 to September 2016. Not only did the study deliver interesting results, but it also demonstrated that it is possible to generate performance statistics as functions of various input variables, thereby analysing the efficiency of a customs process in much more detail than in previous studies.

The available data for South Africa indicated an increasing trend in the average time spent by South African customs to process consignments, mostly due to an increase in the number of consignments for which customs request additional documentation. Of this fraction of consignments, only about five to 10 per cent were actually amended or rejected, which implies that it should be possible to improve the efficiency of the risk identification processes applied by the customs administrations.

More than 90 per cent of the delays caused by South African customs could have been avoided had shipments been screened differently. The amount of time consumed by these apparently unjustified stops represented almost 50 per cent of the overall time delays experienced by all consignments in the data set, which suggests that there is significant room for improvement in the current system.

From the correlation analysis, it was clear that customs use specific inputs factors to target consignments for scrutiny, of which the most import factors appear to be the identity of the consignor, followed by country of origin and cargo type. The fact that correlations between these factors and infractions were found to be much lower than correlations with the number of consignments that were stopped indicates that the current strategies are not fully justified and do not produce high hit rates.

This study provided an example of the value of detailed statistical analysis based on transaction-level data over a sufficiently long period in extracting reliable results. Other developing countries in Africa should consider incorporating these kinds of capabilities in order to further trade facilitation in the region.

4.8 Reference list

- Baldwin, R. 2016. The great convergence: information technology and the new globalisation. Cambridge: Harvard.
- Davaa, T., Namsrai, B. 2015. Ways to modernise customs risk management in Mongolia. *World Customs Journal*, 9(2):24-37.
- Finger, M., Hintsa, J., Männistö, T., Hameri, A.P., Thibedeau, C., Sahlstedt, J. & Tsikolenko, V. 2010. Customs risk management: a survey of 24 customs administrations. *World Customs Organisation (WCO) Working Paper*, EPFL-WORKING-173319.
- Hoffman, A.J., Grater, S., Schaap, A., Maree, J. & Bhero, E. 2016. A simulation approach to reconciling customs and trade risk associated with cross-border freight movements. *South African Journal of Industrial Engineering*, 27(3):251-264.
- Khan, O. & Zsidisin, G.A. 2012. Handbook for supply chain risk management: case studies, effective practices, and emerging trends. Fort Lauderdale: J. Ross.
- Komarov, O.V. 2016. Risk management systems in Customs: The Ukrainian context. *World Customs Journal*, 10(1):35-44.
- Laporte, B. 2011. Risk management systems: using data mining in developing countries' customs administration. *World Customs Journal*, 5(1):17-28.
- Manners-Bell, J. 2017. Supply chain risk management, 2nd ed. London: Kogan Page.
- Manners-Bell, J., Cullen, T. & Roberson, C. 2014. Logistics and supply chains in emerging markets. The Chartered Institute of Logistics and Transport. London: Kogan Page.
- SARS (South African Revenue Service). 2010. Customs modernisation: moving into the future. Trader pocket guide.
http://www.saaffkzn.co.za/web/webroot/files/articles/1294/60983_TRADERSPOCKETGUIDEv4.pdf Date of access: 14 Nov. 2017.
- SARS (South African Revenue Service). 2017. Customs Modernisation.
<http://www.sars.gov.za/ClientSegments/Customs-Excise/AboutCustoms/Pages/Modernisation.aspx>. Date of access: 14 Nov. 2017.

Truel, C. 2010. A Short Guide to customs risk. Aldershot: Gower.

UNECA (United Nations Economic Commission for Africa. 2013. Trade facilitation from an African perspective. Addis Ababa: United Nations Economic Commission for Africa.

UNECA **see** United Nations Economic Commission for Africa

USAID (The United States Agency for International Development). 2015. LEAP-II Trade Intervention Agenda SA Final Report. Washington, DC: The United States Agency for International Development.

WCO (World Customs Organisation). 2015. SAFE Framework for standards to secure and facilitate global trade. http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/facilitation/instruments-and-tools/tools/safe-package/safe2015_e_final.pdf?la=en Date of access: 14 Nov. 2017.

Widdowson, D. 2007. The changing role of customs: evolution or revolution? *World Customs Journal*, 1(1):31-37.

CHAPTER 5: AN IMPACT STUDY ON CUSTOMS DELAYS IN THE VERTICAL TYRE MARKET IN SOUTH AFRICA

5.1 Introduction

For much of the twentieth century, the predominant manufacturing strategy centred on creating economies of scale (Sodhi & Tang, 2012:74). This involved long production runs that created high levels of stock at low unit costs (Manners-Bell, 2017:26). Products were pushed out into the market continually with the hope that there would be a sufficient demand (Cohen & Roussel, 2005:78). This strategy was called Just-in-Case manufacturing. During this period supply chains were characterised by:

- full loads (inbound and outbound);
- low levels of service provision requirements;
- long lead times;
- regular, stochastic movements.

The shortcomings of Just-in-Case manufacturing is that demand can often be volatile. Manufacturers, retailers and other supply chain partners had to tie up considerable amounts of capital in inventory, and as a result, stock would run the risk of becoming redundant, lost or stolen (Gattorna, 2009:7; Hugos, 2006:100).

There were other problems too, not least in the fast-moving sectors such as fashion or electronics, where product lifecycles are measured in terms of months, not years. These sectors, therefore, also needed the flexibility to release new products on shorter lead times compared to other sectors (Sodhi & Tang, 2012:62).

Therefore, production strategies continually evolved, notably in Japan. Starting in the 1980s and continuing through the 1990s, the rest of the world quickly began to adopt Japanese manufacturing processes for its efficiency; the best known of these originated within the automotive giant, Toyota (Schonberg, 1982:227). In addition to these developments, smaller, modern production runs were adopted with production lines running on an “as and when” basis, which depended on demand. This is known as the ‘Kanban’ system. This Build-to-Order strategy did away (in theory) with the need for buffer stocks (Hugos, 2006:85).

The levels of agility and flexibility in supply chains as they evolve are perhaps best demonstrated by the technology company Dell. The lead time for any one computer is now generally five to six

working days – two to three days for production and two to three days for shipping (Manners-Bell, 2017:19).

Along with a change in production systems, there was also the consequent introduction of Just-in-Time (JIT) delivery schedules that complemented the on-demand nature of manufacturing (Hugos, 2006:80). This had a significant impact on transport requirements for the movement of goods across the globe, including goods moving across country borders (Creskoff, 2016:199).

Nevertheless, manufacturers in Europe and North America implemented a JIT supply chain strategy that was notably different from that of Japan. Manufacturers in Japan were able to achieve high levels of supply concentration around assembly plants. For example, all 11 of Toyota's assembly and major components plants were located in and around Toyota City whereas Nissan's vehicle assembly plant in the UK had suppliers located in Germany, Spain and France, which was up to a three-day journey away (Manners-Bell, 2017:19).

Suddenly, customers were asking freight operators for more frequent services and to move smaller consignments on a less predictable basis. Consequently, the flexibility of road services led it to replace rail operators, and air freight services replaced sea freight services. However, despite raising transport costs, the overall benefit made the trade-off more than worthwhile compared to long production runs and buffer stocks (Creskoff, 2016:171).

The 2008 global financial crisis and ensuing global recession destabilised the world economy, which affected people around the world adversely. The flow of money dried up as did the corresponding flow of goods and services. What had been obvious for some time became painfully so – the need to move away from the old static economic view of the world and embrace a new business model.

Moribund supply chains called for reinvigoration with the dynamism that people brought to the flow of goods and services inside and outside businesses. Supply chains had to be recognised as living organisms consisting of active and dynamic people. All institutions have supply chains (or pathways) that connect diverse bands of human activities and needs. In fact, supply chains in aggregate are what make many businesses which in effect makes supply chains a business concept in itself.

The ability to understand and correctly apply a more enlightened approach to managing the human presence in the supply chain will reveal a primary source of performance improvement opportunities (Gattorna, 2009:7); it suffices to say that the time has come for business leaders to

adapt to a new supply chain model that will bring organisations closer to their customers and establish new growth opportunities for business. Amid this new business reality, some important strategic changes become obvious:

- Centralisation of inventory (a trade-off between the cost of moving goods to market and the cost of holding inventories);
- Outsourcing logistics (a theory that suggests that companies should identify those functions that are non-essential to their operations and find service providers to take responsibility for those activities. This will provide a range of mostly cost-saving benefits as the service provider could, for example, make sure of their economies of scale, thus providing a more efficient service);
- Evolution towards a value-added service (from the initially transaction-focused relationships to the aspiration of deeper partnerships in which solutions development and management are most important);
- Moving operations offshore or near-source. Supply chains have become highly globalised as manufacturers and retailers took to offshore production for the advantage of low labour and transport costs. However, wage inflation and rising transport costs have started to restore balance to this particular equation in favour of production at locations closer to the major consumer markets.

Consequently, supply chains have become more dynamic, which led to the question of how to align supply chain strategies to improve or facilitate the customs administrations processes and establish a better understanding of the extended supply chain. Since the extended supply chain consists of multiple handover points and cargo movements within the supply chain, and different operators within transactions can be accurately segmented and a verified, scientific view of transactions can be reached by categorising them as low-, medium- and high-risk.

The dynamic alignment in supply chains demanded segmentation processes for each transaction, as they no longer involved only technology, warehouses and distribution centres or trucks, trains and planes in isolation (Gattorna, 2009:136). In effect, supply chains comprised of any combination of processes, handover points, functions, activities, relationships and pathways of products, services, information and financial transactions between organisations in both directions.

The role of customs administrations is central to these supply chain movements and the international trade transactions where taxes, regulations and other restrictions to protect the citizens of countries are involved in relation to importing and exporting of goods and services.

Considering that any customs administration has the power to stop goods from crossing international borders for the purpose of inspection (high-risk cargo), it could potentially disrupt to carefully designed JIT supply chains significantly where manufacturers and their component suppliers are located in different countries.

In preventing this negative impact on global trade and the economy, customs administrations have been changing their approach to less disruptive methods of inspecting compliant transactions (low risk) while reserving full inspection for perceived high-risk cargo to eliminate illegal trade. Customs administrations around the world are changing their risk management methods from a 100 per cent inspection rate of all cargo moving through their borders to a more selective process by segmenting cargo and its related supply chain movements into more accurate and appropriate low-, medium- and high-risk indicators for the owners of supply chains and operators in the extended supply chain (Karlsson, 2017:25).

Partnerships between private and public sector stakeholders are, therefore, an important ingredient of successful international supply chains. The development of effective supply chain strategies is possible by basing them on a combination of policing and partnering supported by cargo reporting throughout the supply chain activities when and where handover points happen and while cargo is at rest or in movement through the supply chain. However, customs administrations have the unilateral power to decide when to replace partnerships with policing, or, in other words, law enforcement by way of inspections. A recurring tension exists, therefore, when trying to accommodate the role of customs administrations into the supply chain risk management strategy, where time, cost and no disruptions are required.

Replacing the role of customs from partnering to policing can be disruptive to supply chain reliability, flexibility and agility as the flow of goods and related services between the point of origin, and the point of consumption might give the customs administration a reason to intervene in the otherwise seamless flow of cargo. Supply chains are subjected to greater vulnerability in the event that a perceived high-risk consignment requiring government attention is carried out incorrectly or unnecessarily, as this will result in disruptions and time delays which can be expressed in monetary value or loss of sales and reduction in customer satisfaction (Djankov *et al.*, 2010:71). Such unexpected delays could have a devastating knock-on effect on a complex supply chain with all its interdependencies.

The modernisation of the supply chain faces three key problem areas:

- Executives are not fully aware of the supply chain interdependencies that form a fundamental part of their operations;
- Perceived problems in supply chains may be addressed ineffectively because of their inherent complexity;
- The role of government in supply chains often occurs late in the process with an oversight usually consisting of constraints which do not alleviate vulnerabilities.

These points create tension between trade flows, compliance, safety and security issues. With change as the only constant in these equations, decision-makers in both supply chains and customs risk management need to address innovations and developments to maintain a balance between compliance and trade facilitation. This requires a policing and partnering approach to address the changes constantly taking place.

This research attempts to establish the link between risk indicators as they occur through the supply chain movements and in-depth analysis of the current system to exchange compliance, safety and security programmes as deployed by the South African customs administration (SARS).

Customs administrations is under pressure to implement improved trade facilitation procedures with new complaint strategies to provide economic benefits for individual traders (Creskoff, 2016:199). The faster goods move through the supply chain, the better – a day's reduction in transit time of goods will increase trade volume by at least one per cent and by as much as seven per cent for time-sensitive goods (Djankov *et al.*, 2010).

This research, therefore, aims to test the trade facilitation measures as indicated in the preceding two paragraphs, and its linkage to origin risk, scientific profiling and risk screening. Other measures also exist, such as linkages to supply chain movement risk, transaction declaration at frontlines (country borderline), entity risk, entity risk with supply chain partners involved in the movement of cargo, other law enforcement agency risks, random inspection results and recorded PCAs on entities with specific transactional data. Therefore, these facilitation measures should include the WCO's SAFE Framework of Standards Pillar II (customs-to-business coordination), which allows customs administrations to interact with all trading partners in South African supply chains.

This paper evaluates the vertical tyre market³ in South Africa to illustrate the impact of customs processes on the supply chain of a specific sector. As mentioned in Chapter 1, the motivation behind using the vertical tyre market is two-fold. In the first place, the tyre industry serves as one of the key sectors in the South African economy. Since there is a significant local tyre manufacturing footprint in South Africa, SARS has listed the tyre industry as one of the seven key industries to engage with to combat illicit imports (SARS, 2017a:35). Furthermore, additional reference is made as to the strategic importance of the tyre industry in the recent Industrial Policy Action Plan (IPAP). The tyre industry is adding to the trade deficit of the chemicals and related sectors, which has increased over the last few years (DTI, 2018:149). In the second place, transaction-level flows exchanged between the South African customs administration, SARS, and consignors of tyres imported into South Africa were available to analyse. The data was obtained from a South African freight forwarder with a significant market share in tyre imports to South Africa.

Chapter 4 analysed transaction-level flows exchanged between SARS and consignors of goods imported into South Africa across several industries (a total of 18 different HS codes). This chapter builds on the work of the previous chapter, but in this case, the analysis now focuses on a specific industry.

The following two research questions are evaluated:

1. What is the quantified impact of customs administration risk management practices on commercial operators in the vertical tyre market?
2. Will the implementation of a more effective risk management system based on the risk profile from origin to final consumption result in the improved trade in the vertical tyre market?

The rest of the paper is structured as follows: Section 5.2 provides a summary of the vertical tyre market in South Africa, and Section 5.3 then proposes a system of customs administration, describes the data used and empirically analyses the vertical tyre market in South Africa. Section 5.4 concludes with recommendations for customs administrations and proposes possible future research.

³ A vertical market is a market in which vendors offer goods and services specific to an industry, trade, profession or other group of customers with specialised needs. The concept is in contrast to a horizontal market, in which vendors offer goods and services a wide variety of industries. In this research, the vertical market under focus is the tyre vertical market, which is vendors supplying customers with tyres according to the customer's need.

5.2 An overview of the vertical tyre market in South Africa

The following section provides an overview of the vertical tyre market in South African, beginning with an outline of the composition and growth over the past 10 years. The section then continues by providing some background on the customs risks within the end-to-end vertical tyre market in South Africa. Finally, the section explains the role of SARS customs in the vertical tyre market in South Africa.

5.2.1 Composition and growth of vertical tyre market in South Africa

This section provides a brief overview of the developments around the vertical tyre market in South Africa over the past 10 years to provide a conceptual framework. Various elements have played an important role in influencing the demand and supply within this industry. The tyre industry is a classic example of a vertical market with vendors offering goods and services to meet the specific needs of the rubber tyre users. Although often called a “grudge purchase”, fitting and replacing tyres is an essential element of commercial and private transport, which includes trackless mining.

Although the dramatic change in the political scenario of South Africa in 1994 has seen the past 10 years develop into a continuum of deteriorating standards of governance control on South African roads, it has brought other opportunities in the form of the demand for tyres in South Africa (Human, 2018).

Currently, there are two major trends in the vertical tyre market in South Africa. The first is the growing dependence on road transport of people and goods, and second, the lack of corporate governance. Unfortunately, available and reliable rail transport of goods in South Africa does not presently exist, which is adding onto an already overburdened road transport system. The considerable growth in population and subsequent lack of public transport development puts additional strain on the ever-increasing private transport sector that demands tyres. The rising poverty, lack of law enforcement and inadequate public transport in South Africa breed a degraded tyre governance industry when compared to developed markets such as the EU, Australasia and the US (Human, 2018).

Fortunately for the industry, the tyre market is also linked to the growing opportunities that come with the successful vehicle assembly and related export businesses in South Africa. The Automotive Production and Development Programme (APDP), a production incentive scheme for the motor industry, has over the years attracted large investment in South Africa and raised

interest in locally manufactured tyres used for export credits. This has created a shift in supply to the South African tyre industry (Human, 2018).

Since 1994, tyre manufacturing in South Africa has become more competitive, which has required large-scale restructuring and concentration on mass production of sizes and complementation of using tyre imports. The last 10 years have seen a deepening of this trend. There are currently four large multinational tyre manufacturers in South Africa, namely Continental, Bridgestone, Goodyear and Sumitomo.

Even though the local production and exports of tyres have seen growth, the vertical tyre market in South Africa remains dominated by tyre imports. In fact, the tyre sector has been extensively rationalised, and employment has declined sharply from 11 000 in 1995 to 6 500 in 2012 (Barnes & Black, 2013:30-31).

Import duty evasion, cross-border fraud and evasion of value-added tax (VAT) are going concerns which have to date been difficult to quantify. SARS customs are making progress with systems to control import fraud and use the reference pricing guide as a risk tool to detect low values on customs declarations. Unfortunately, while some advances are made, customs lack the effective manpower and management structures to remove significant illicit trade from the vertical tyre market.

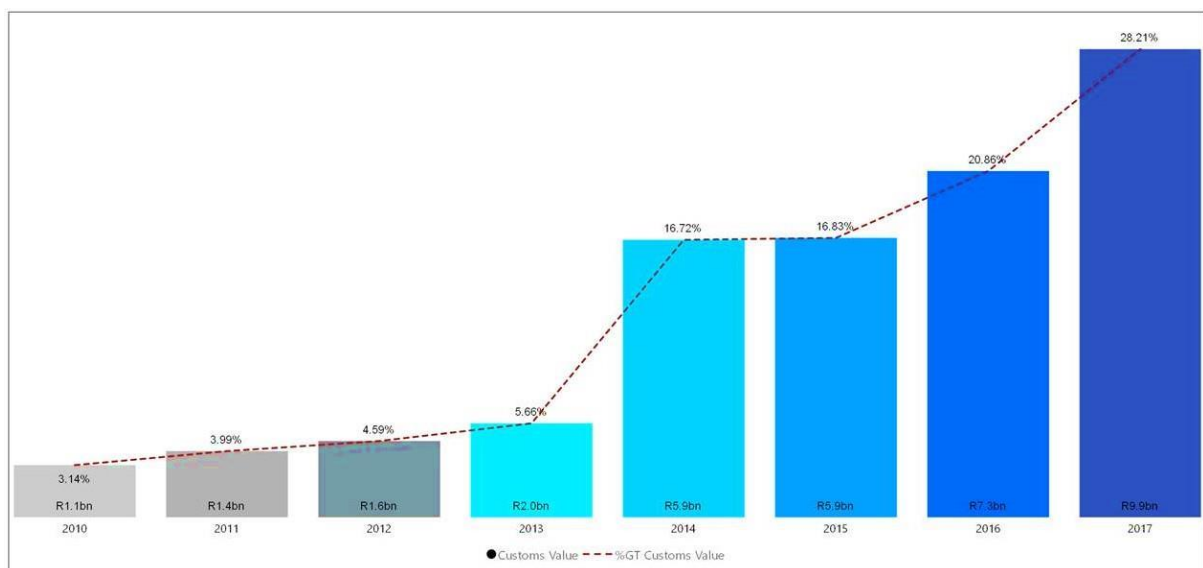
The X-raying of containers is also a valuable risk remedy tool at the frontline for drugs and the linkage of X-ray images of the actual content of the container with an HS classification verification. However, this is a risk remedy with no real benefit for the tyre industry as an X-ray cannot detect rubber. Container inspections, a risk remedy applicable to high-risk cargo, still require planning and effort as the SARS-licensed unpacking depots face constraints in unpacking, sorting and repacking of consignments, which require specialists to verify the activities where such a full unpacking operation is conducted. These efforts seem to be difficult to maintain since acceptable levels of successful intervention by customs within this market have not been recorded.

Since tyres are safety-critical commodities that require international safety standards (and continue to be enforced by agencies such as the international E-Mark (and DoT) type mark system and the local South African standards organisation or the NRCS), cost issues in this regard remain problematic. Given the heavy reliance of the South African transport industry on road transport, maintaining these safety standards of tyres will remain a necessity, irrespective of the cost. Consequently, South Africa is in no position to stop the process of effective enforcement of these international standards (Human, 2018).

Finally, the movement towards the creation of free trade regions in Africa might produce opportunities for exports to the African continent. Unsettling political matters in other parts of Africa have led to the mining industry, for example, in the Congo, to stagnate and therefore the demand for mining tyres has not increased. However, road transport in Africa which requires truck tyres continues to grow. Although the local tyre market has become more competitive over the past 10 years, ancillary issues have increased the demand for tyres in developed markets (Human, 2018).

In 2017, total trade (imports and exports) in the vertical tyre market in South Africa amounted to just over US\$ 1.1 billion in value (Trade Map, 2018). Of this, more than two-thirds (69 per cent) was for imports into South Africa, indicating the reliance on tyres imports over local manufacturing. When comparing these figures to those of seven years earlier, the immense growth of the import sector over this period is clearly observed as the customs value of tyre imports to South Africa has nearly increased ten-fold. Figure 5-1 below attests to this.

Figure 5-1: Growth in imported customs value (2010-2017)



Source: Author's calculations from Stratalyze database (2019)

According to Figure 5-1, the customs value of tyres imported to South Africa has grown from just over R1 billion in 2010 to nearly R10 billion in 2017. Sharp sustained inclines in imports are experienced from 2014 onwards. The apparent and rapid growth of imports in the tyre industry has placed additional pressure on the sustainability of the local tyre manufacturing industry in South Africa.

The following table supplements Figure 5-1 and indicates the growth of imported tyres in customs value per country of origin from 2010 to 2017.

Table 5-1: Growth in import customs value (2010-2017) per country of origin (millions)

Country	2010	2011	2012	2013	2014	2015	2016	2017
China	R392.69	R512.34	R595.88	R766.34	R1 987.88	R2 178.04	R2 466.07	R3 341.90
Japan	R27.39	R51.30	R52.13	R65.99	R395.77	R360.49	R562.66	R1 017.14
Germany	R126.40	R177.53	R231.12	R246.64	R698.29	R690.73	R860.68	R844.82
Spain	R17.03	R16.03	R15.04	R45.32	R217.49	R223.56	R288.69	R637.25
US	R56.95	R89.30	R77.47	R71.85	R296.82	R343.05	R399.88	R604.95
Turkey	R2.08	R3.23	R2.02	R10.80	R98.56	R131.22	R303.74	R391.34
Thailand	R67.24	R79.76	R109.30	R112.74	R333.84	R323.30	R400.15	R352.56
India	R34.46	R37.64	R56.01	R80.30	R93.04	R94.47	R127.87	R336.81
France	R43.28	R25.10	R32.78	R52.14	R151.16	R120.26	R205.77	R250.78
Luxembourg	R0.01	R0.00	R0.00	R15.42	R63.74	R63.51	R68.15	R211.68
Poland	R4.12	R5.71	R7.94	R15.74	R82.08	R78.63	R108.36	R194.68
Italy	R21.57	R26.83	R31.96	R45.82	R90.96	R104.19	R157.67	R169.15
Czech Rep.	R5.87	R5.82	R8.25	R9.48	R117.19	R150.13	R247.12	R166.05
Romania	R0.11	R0.35	R0.31	R6.76	R124.16	R87.06	R127.68	R155.97
South Korea	R44.08	R52.16	R55.57	R52.36	R210.45	R166.58	R165.88	R129.43
Indonesia	R3.93	R5.83	R5.94	R6.14	R104.89	R95.06	R91.32	R84.59
Sri Lanka	R35.72	R45.49	R46.36	R45.77	R56.01	R70.37	R61.04	R76.58
UK	R15.96	R18.42	R22.37	R34.13	R87.17	R63.70	R56.35	R75.03
Slovakia	R0.01	R0.33	R0.37	R24.40	R136.92	R105.36	R104.38	R69.32
Portugal	R0.02	R0.01	R0.01	R0.13	R32.73	R22.98	R64.54	R58.68
Top 20	R898.93	R1 153.16	R1 350.84	R1 708.28	R5 379.16	R5 472.69	R6 868.00	R9 168.70
Others	R202.07	R244.19	R259.66	R275.78	R482.14	R429.20	R447.11	R721.85
Total	R1 101.00	R1 397.34	R1 610.50	R1 984.06	R5 861.30	R5 901.89	R7 315.11	R9 890.55

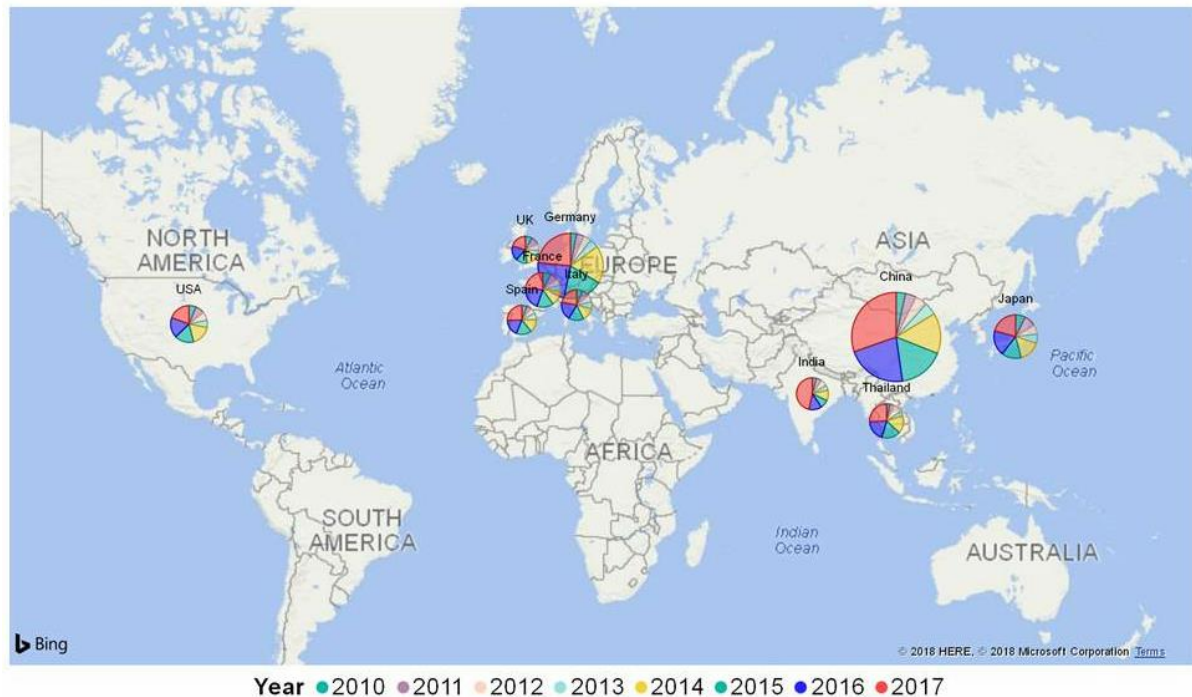
Source: Author's calculations from Stratalyze database (2019)

The table attests that countries in Eastern Europe and the Far East make up the larger part of the tyre suppliers to the South African market. The quality of tyres supplied from these areas is consistently improving. Consequently, there has been a continued shift in supply from traditional manufacturers in the EU and US to the Asian countries in the global tyre industry, including logistics, standards and subsequent fraud with regards to tyres imports. The table above illustrates that China is by far the largest foreign supplier of tyres to the South African market; however, countries such as Luxembourg, Slovakia, Portugal, Turkey and Poland have all grown considerably in value over the last eight years. The US has also increased its share of tyres supplied the South African market since 2010.

Realising this shift in supply from traditional manufacturers to other countries, as mentioned above, Figure 5-2 below illustrates South Africa's top 10 partners in the vertical tyre market over the last eight years in terms of the number of Movement Reference Numbers (MRNs), which is the number of import declarations of tyres into South Africa. As not all declarations represent the

same volume of cargo, this graphical depiction will not correspond in all respects with **Error! Reference source not found.1** above.

Figure 5-2: Top 10 export countries (COO) of tyres to South Africa based on MRNs by year (2010-2017)

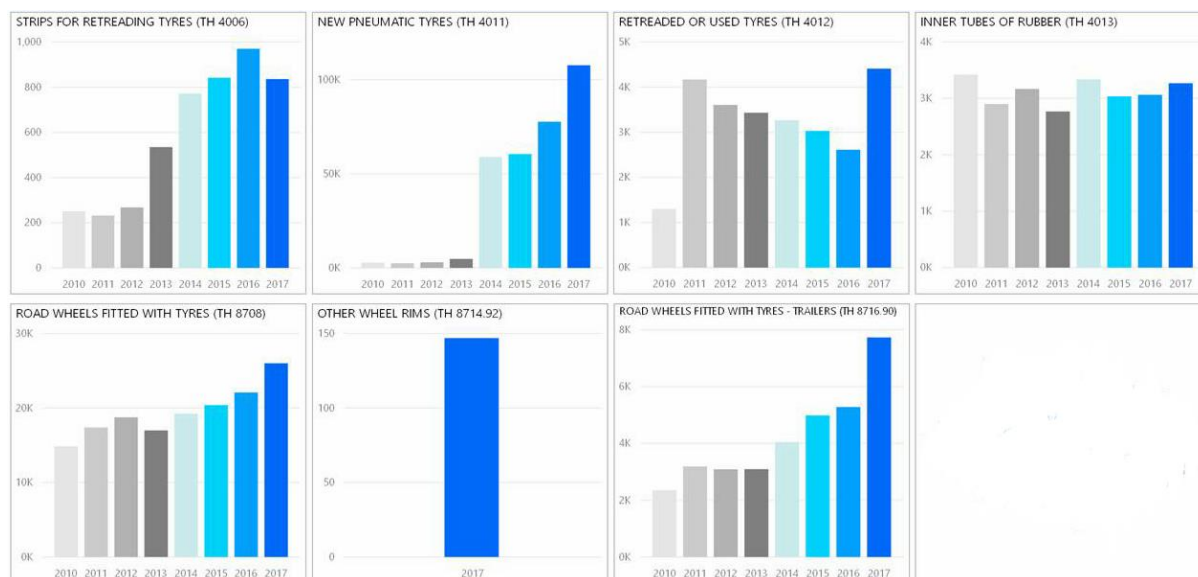


Source: Author's calculations from Stratalyze database (2019)

Figure 5-3 below indicates the yearly exports of tyres to South Africa since 2010 (the larger the circle, the greater the volume) and highlights the shift in tyre supplies to South Africa. This has seen Asian countries such as China, Thailand and India play an increasing role compared to the traditional suppliers such as Germany, France and Italy among others. Since this figure only shows the top 10 partners over the last eight years, it is worth noting the shift of tyre suppliers to countries of the Far East and Eastern European countries when viewed in conjunction with Table 5-1. The increase per MRN, or customs declaration, in Figure 5-2 should be viewed in relative terms since the customs value on one MRN can vary greatly from the next. Therefore, Figure 5-2 indicates the relative growth in import declarations since 2010.

Supplementing the growth in tyre imports shown by Figure 5-2, Figure 5-3 below illustrates the growth per chapter heading for tyre imports to South Africa since 2010. The HS code chapter headings are divided into seven different groups for tyres.

Figure 5-3: Growth per chapter heading (entry line level) for tyre imports to South Africa (2010-2017), number of units



Source: Author's calculations from Stratalyze database (2019)

The substantial growth in customs value, as depicted in Figure 5-2 is observed once again in the second square from the left in Figure 5-3. The importation of new pneumatic tyres increased substantially in 2014 and has continued to grow with more than 100 000 entries imported in 2017. Conversely, retreaded tyres (third square from the left) have subsided over the same period, except in 2017, which show an increase to similar levels of 2011. This development within the tyre import market of South Africa may be attributed to the growth of imports from Asia, with new tyres from this region becoming seemingly cheaper. The last two squares depicted in Figure 5-3 (“other wheel rims” and “road wheels fitted with tyres”) are both of interest and concern to the vertical market. Since these chapter headings are subject to suspect trade, they threaten the traditional importers of tyres to South Africa (TIASA, 2018).

The following figure, in conjunction with Figure 5-4, illustrates the country of origin of the different chapter subheadings imported into South Africa.

Figure 5-4: Country of origin for tyre imports to South Africa based on tariff subheadings (2010-2017), number of units



Source: Author's calculations from Stratalyze database (2019)

Figure 5-4 indicates that new pneumatic tyre imports to South Africa were dominated by the US, China and Turkey over the period in question. Imports of inner tubes of rubber (third square), on the other hand, originated from the US and China, with Thailand and the UK also contributing. In conjunction with Figure 5-2, roughly the same countries were exporting tyres and related tariff headings to South Africa over the period in question. Note that tyre imports are grouped according to subheadings and measured in units.

To provide a more detailed depiction of import volumes, Table 5-2 below indicates the number of units and tonnes imported of the main tariff subheadings of tyres into South Africa from 2010 to 2017.

Table 5-2: Main subheadings of tyres imported into South Africa (2010-2017)

HS Code	Description	Unit of Measurement	Units
4011	New pneumatic tyres	Numbers	± 36 million
4012	Retreaded or used tyres	Numbers	± 3 million
4013	Inner tubes, of rubber	Numbers	± 29 million
4006	Strips for rethreaded tyres	Tonnes	± 2 251
8708.70 -	Road wheels and parts thereof	Tonnes	± 224 954
8714.92 -	Other, wheel, rims and spokes	Tonnes	± 96 577
8716.90 -	Road wheels, fitted with tyres	Tonnes	± 268

Source: Author's calculations from Stratalyze database (2019)

New pneumatic tyres make up a large number of the imports and indeed the bulk thereof in terms of value (about 80 per cent of the period in question) (Trade Map, 2018). These figures once again highlight the immense pressure that the local market is under to compete with imports. The current tariffs of the majority of the subsection new pneumatic tyres stand at 15 per cent for imports from the EU and between 25 and 30 per cent from other regions (trade with SADC countries is duty-free). Worth noting is the fact that many importers use export credits under the APDP to reduce the effective import rate.

The following table indicates the growth in the number of MRNs and average customs value per MRN from 2010 to 2017 for tyre imports to South Africa.

Table 5-3: Total number of MRNs & average customs value per MRN of tyre imports to South Africa (2010-2017)

Year	MRNs	MRN growth year-on-year	Average customs value	Value growth year-on-year	Total customs value
2010	11 510	-	R95 656	-	R1.1 billion
2011	13 566	18%	R103 003	8%	R1.4 billion
2012	13 530	0%	R119 032	16%	R1.6 billion
2013	13 229	-2%	R149 978	26%	R2.0 billion
2014	19 105	44%	R306 794	105%	R5.9 billion
2015	19 675	3%	R299 969	-2%	R5.9 billion
2016	20 720	5%	R353 046	18%	R7.3 billion
2017	24 723	19%	R400 055	13%	R9.9 billion
Total	136 058	11.54%	R257 697	22.68%	R35 billion

Source: Author's calculations from Stratalyze database (2019)

Since 2010, tyre imports in terms of MRN volume increased by 11.54 per cent year-on-year, whereas the average customs value per MRN increased by 22.68 per cent year-on-year. Taking into account that the figures above include all tyres imported for all subheading groups, it is once again clear that the entire tyre industry in terms of imports into South Africa is growing at a continuous rate. Consequently, it is clear that SARS customs plays a significant role in the tyre industry since all tyres imported into South Africa must comply to South African criteria of safety and security and SARS customs is the leading law enforcement agency to test and verify the compliance. Any delays within the end-to-end supply chain movements can significantly impact the entire vertical market as the demand is driven by 'grudge purchase'.

5.2.2 Customs risks within the vertical tyre market in South Africa

The vertical tyre market in South Africa has grown remarkably in the last decade. To limit the impact of cross-border regulations and allow the smooth flow of goods across international borders, traders within the vertical tyre market in South Africa have realised the need to address the fundamentals of compliance, safety and security by embedding interactive risk management into their supply chain processes from origin to final consumption.

It is essential to have a good understanding of the relationship between each of these factors and the risks faced by traders from origin to PCA to devise effective risk remedies. Table 5-4 identifies these risks pertaining to the vertical tyre market in more depth.

Table 5-4: Identifying the risk location within the vertical tyre market

Origin	Pre-loading	Loading	Quay-side (Frontline intervention)	SARS licenced unpack depot	Bonded Warehouse	Post Clearance Audits
Document	Document	Document	Document	Document	Document	Document
Order Supplier invoice (origin)	Booking confirmation	Manifest Origin export clearance	Arrival report (arrival notification report - AFN)	Move in transit Stop note	Move in transit	- Full set of documentation - Supply chain movement
Risk Identified	Risk Identified	Risk Identified	Risk Identified	Risk Identified	Risk Identified	Risk Identified
Classification Valuation & transfer pricing (under declaration), additional to this: 1. origin of product 2. supplier invoice 3. product standards 4. entity, 5. supplier product 6. permits and licenses	Classification (6 digits) Country of origin Hazardous goods certificate (not required for tyres) Container concealment	Error: Goods loaded don't match order/supplier invoice Goods carried WMD/terror Drugs and contraband Smuggling Quantity: (additional product - depending where containers are sealed)	* Full set of documentation * Cusdec (HS, valuation, origin) * Under valuation (reference pricing rules) * Cuscar (manifest data). Verify origin and routing of cargo * Cargo that is not cleared * Mismatching of data (declaration, manifest, reporting of conveyance) * Diversion * Ghost exports * Round tripping/VAT fraud * Tampering/ concealment * Smuggling in vessel/concealment	- Admissibility of product with case number (high risk cargo) - Full unpack - Quantity - Classification - Identification and sorting (delay of examination) - Insurance risk, as cargo and container is now identified & traceable for outsiders (supply chain risk)	- Embargo - Case number - Quantity received - Valuation and accounting periods - Abuse of customs procedures e.g. export, transit, APDP, outward processing, quotas, etc.	- Valuation, country of origin - Lacking of documentary evidence: - Goods flow - Money flow - Corruptions & illicit trade - Certificates & licenses - Under valuation (reference pricing rules)

Source: Author's own compilation (2019) from interaction with TIASA and SARS stakeholders' meetings

As Table 5-4 indicates, the supply chain risks are indeed generated throughout the supply chain. The top row indicates the various stages where risk might originate and clearly identifies in the workflow factors such as origin, pre-loading, etc. The third row indicates the relevant document at each stage in the end-to-end supply chain, whereas the fifth row identifies the various risks that can be identified at each stage or multiple stages with a layered approach in the end-to-end supply chain. From the perspective of the vertical tyre market, the following risks stand out when the supply chain is linked from origin to final consumption by the end-user (which includes the various categories of risk, such as entity, transactional, cargo and commercial risk). The table, therefore, indicates a clear location where the risk is most likely to be identified and treated within the entire supply chain. These risks can be explained in more detail as follows:

- **Origin:** Manipulation of cargo value and possible instances of transfer pricing with round-tripping. Origin and valuation link closely in this market segment as it can be used to manipulate trade agreements to such an extent that it might attract preferential duty rates when these should not have applied. Since the vertical tyre market encompasses many different product classifications across two HS chapter headings (chapter 40 and chapter 87) as well as the combination from many different countries of origin with a wide range of product valuation (reference pricing), origin risk within the vertical tyre market is significant.

- **Pre-loading:** Incorrect reporting of country of origin and product classification and other administrative risks, which can occur when the country of export differs from the country of origin.
- **Loading:** Matching of actual cargo movement as per shipping line loading manifest with the extended supply chain operators reporting data messages as and when the cargo moves through the different handover points in the supply chain. Finally, the matching of this data to the customs declaration (which can be done in advance, before arrival in South Africa) to verify the accuracy between cargo movement and customs declaration that is built on HS, country of origin and valuation.
- **Quayside:** All risks pertaining to frontline interventions such as misdeclaration, undervaluation, smuggling, etc. are all very prevalent within the vertical tyre market in South Africa. The frontline and borderline serve as an important location since high-risk cargo can be unpacked, checked and verified to the customs declaration and cargo reporting data messages. Customs officials are given the powers to confiscate cargo at this point in time before it moves into the geographic borderlines of South Africa.
- **SARS-licensed unpacking depot:** Time delays in case of physical inspections on perceived high-risk cargo. This links to quayside risk-indicated workflow as the SARS-licensed unpacking depots are located in a radius of 10 km from the geographical borderline with major ports (Durban, Cape Town, Port Elizabeth) and must move under this workflow for verification.
- **Bonded warehouse:** Abuse of different customs procedure codes, with specific reference to the exporting of tyres, which results in less duty and VAT collectable by SARS.
- **PCA (post-clearance audit):** Compliance risk within the supply chain is verified through full documentary evidence that the transaction had been completed, as well as full traceability evidence through the availability of payment records. These include payments made to service providers for services delivered in the extended supply chain and payments received for the merchandise delivered to the end-customer.

Customs administration can use the historical frequency of occurrence of the above (e.g. under-declaration of customs value) associated with a specific importer or type of cargo as a combined indicator for risk, on which they can base future interventions for new customs declarations and allow more accurate assessment or segmentation of low, medium, high transactions.

All of these risk indicators must be managed and linked to the entity (cargo owner) and its relationships to the operators in the extended supply chain. These links will occur through various contractual agreements and can be expressed in documents, such as shipper's instruction,

clearing instruction, bill of lading, manifest, incoterms, sealable and traceable container, commercial invoice and packing list. The inability to address these risks could be very costly and create an ineffective supply chain with disruption stops. Risks within the vertical tyre market as tabled above can be triggered through various activities.

The discussion above clearly illustrates how ineffective supply chain movements can impact an importer of cargo negatively. However, to quantify its impact in terms of direct cost and time is another matter. Many studies have indicated how efficient supply chains can aid cost-effectiveness (Christopher & Towill, 2001; Stephens, 2001; Lee, 2004); however, little research exists that measures the exact impact thereof within a certain market or market segment. This study uses detailed data from a freight forwarder to demonstrate the impact of an ineffective supply chain, and more specifically of customs delays, on the vertical tyre market in South Africa by way of extensive data analytics and supplementary case studies. The following section provides an overview of the role of SARS customs in the vertical tyre industry in South Africa.

5.2.3 The role of SARS customs in the vertical tyre market in South Africa

The role of SARS within the tyre industry is to implement controls to uphold trade policy including tariffs, trade instruments, quotas and standards on behalf of the DTI and also to support verification of conformance to the NRCS standards. The role of customs is also multifaceted to protect South African producers against unfair competition from the abuse of valuation, tariff classification or rules of origin and to ensure that imported tyres meet safety standards.

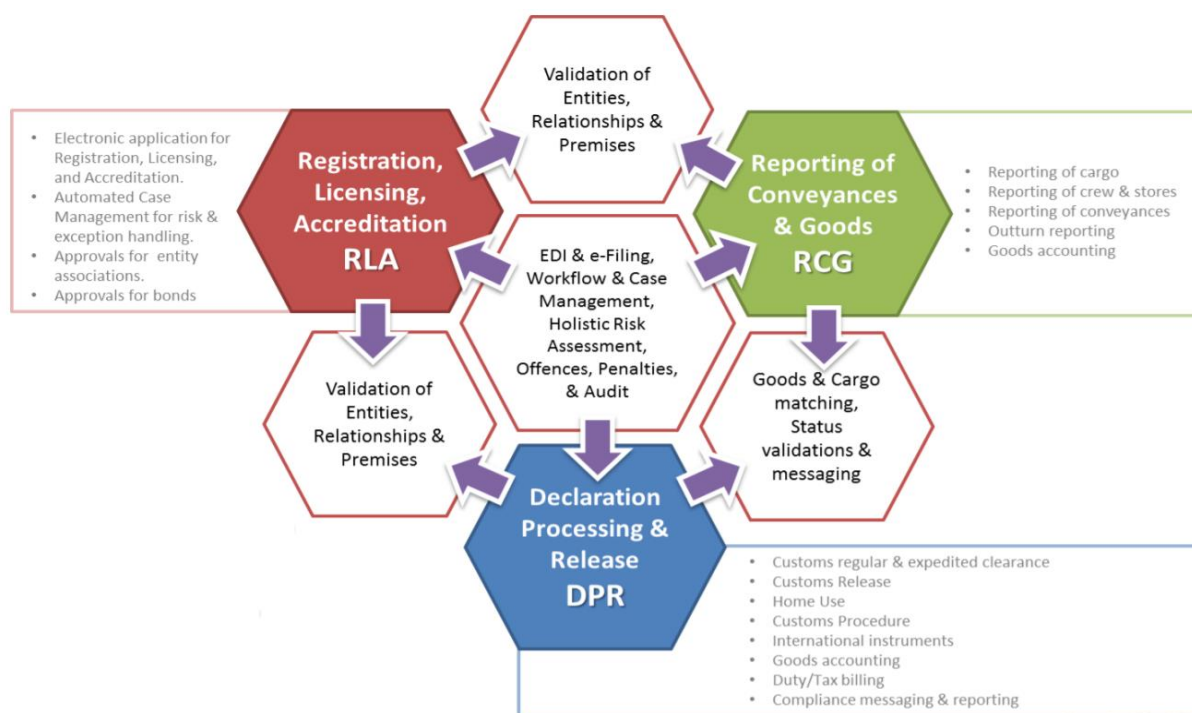
Although the South African customs and excise division is currently still governed and regulated by the Customs and Excise Act (91 of 1964), the country has acknowledged the change in the current landscape and formulated a new legal framework, which phased in from 2018 (SARS, 2018). The previous Customs and Excise Act (91 of 1964) is a single document of about 196 pages divided into 12 chapters with 122 sections, whereas the NCAP comprises two acts, namely the Customs Duty Act of 2014 and the Customs Control Act of 2014, totalling 473 pages (South Africa, 2014).

Theron (2018:2) notes that customs administrations internationally have modernised their systems and legislation with new technology. South Africa has also experienced the effects of technological advancements in trade, which extends to the entire customs environment. The Customs and Excise Act of 1964 has been replaced with new legislation that aligns with international standards.

The Customs Duty Act and the Customs Control Act were promulgated in 2014 to ensure a modern customs administration aligned with the WCO with clear, transparent, and predictable policies, procedures, and processes which touch on the entire end-to-end supply chain movement.

The rollout and implementation plan of the Customs Duty Act and Customs Control Act, now formally branded as the NCAP, has been divided into three streams: registration, licensing and accreditation (RLA), declaration processing and release (DPS) and reporting of conveyances and goods (RCG) (Theron, 2018:2).

Figure 5-5: Context of the New Customs Acts Programme – RLA, DPS and RCG



Source: Theron (2018:2)

Figure 5-5 showcases certain changes within the NCAP that could play a major role in the way trade and customs conduct business going forward. Quite clearly in line with the WCO's SAFE Framework of Standards Pillar II (customs-to-business coordination), the NCAP encompasses the entire end-to-end supply chain – a factor that the previous Act was unable to accommodate. Indeed, some items will facilitate trade; however, some may lead to stoppages and add costs to an already expensive supply chain. Ensuring that the NCAP is implemented correctly and benefits all parties requires full collaboration between all the role players in the South African trading environment and South African customs.

Once the NCAP is aligned with the WCO's SAFE Pillar II, which allows business and customs administration to communicate in a structured framework effectively, WCO instrumentation can be implemented and monitored. This will also include the WTO TFA agreement, which facilitates trade in dealing specifically with the 12 related customs administrations sections, such as pre-advance information and AEOs in the supply chain. Adherence to these international standards will bring developed and developing countries on equal footing in terms of competition and the growth of local economies.

Stakeholder engagement is the key to the South African trading environment, which includes the implementing open communication, effective collaboration and meaningful consultation, especially within key industries such as the vertical tyre market. The ultimate goal is to promote compliance and implement change effectively and efficiently, as advocated by the WCO and supported by the greater business community.

Nonetheless, within the scope of the vertical tyre market in South Africa, SARS's initiatives are battling an industry known for its scams and malpractices like undervaluation, round-tripping, abuse of trade agreements, the selling of second-hand tyres, removal in bond/transit abuse, and misdeclaration (IDC, 2010:8).

Additionally, an environmental tyre levy of R2.20/kg net has been imposed since 1 February 2017 to encourage waste reduction, reuse, treatment and recycling and to reduce disposal into landfills. The levy is administered through the Customs and Excise Act of 2014 with taxes being collected by SARS.

The NRCS's function, as discussed, is controlled by SARS, as the leading law enforcement agencies, with homologation certificates being recorded on the import customs declaration. In the absence of a homologation certificate and subsequent non-compliance by customs, physical inspection will be communicated via a customs response message to indicate a stop by other government agency (OGA), i.e. code 4 on the customs declaration submitted by the SARS electronic data interchange (EDI) gateway.

According to the South African Tyre Manufacturers Conference (SATMC), the representative body of tyre manufacturing factories in South Africa, there appears to be a major problem with regard to the verification of second-hand tyre casing imports against import permits issued.

The used tyres brought into South Africa for retreading purposes from Botswana, Lesotho, Namibia and Swaziland (the BLNS countries) are supposed to be returned to the relevant BLNS

country once it has been retreaded (SATMC, 2015). These tyres are not captured in the SARS system and no electronic acquittal system is in place to verify the gate out workflow, thereby leaving a gap for fraudulent practices.

5.3 Empirical analysis of the vertical tyre market in South Africa

This section analyses the impact of the customs delays for the vertical tyre market in South Africa empirically. After providing an overview of the data, the analysis is presented in two parts. Firstly, the risk factors impacting the probability of customs inspections are investigated and secondly, the impact of customs inspections on tyre importers within the vertical tyre market in South Africa.

The risk factors impacting the probability of customs inspections are shown in three parts, namely HS code, country of origin and customs valuation⁴. The impact of customs inspections is also shown in three parts, namely direct cost incurred, direct time incurred, and indirect cost incurred.

Data from an international freight forwarder is used, which comprises tyre imports from 31 different importers. However, the focus is on the four largest tyre importers to South Africa from this dataset. A supplementary case study on these four tyre importers is used to draw meaningful conclusions as to how customs delays impact companies differently. The anonymity of the companies is kept by replacing their names with “Company A”, “Company B”, etc.

5.3.1 Overview of the data

Data was obtained from a South African freight forwarder on transaction-level flows exchanged between the South African customs administration (SARS) and consignors of tyres imported into South Africa between January 2017 and April 2018 (16 months). The number of different importers of tyres into South Africa was 31 over this period. In total, the dataset includes 4 835 MRNs, averaging R691 987 in customs value per MRN. As mentioned above, the four largest tyre importers to South Africa from this dataset are shown separately, with the other 27 small importers grouped together to complete the dataset. The following table summarises the dataset in terms of customs value of tyre imports and share of respective companies.

⁴ As with the analysis of Chapter 4, the author acknowledges an existing possibility to include a multinomial (probit) regression model on the risk factors identified (HS code, country of origin and customs valuation). However, given the availability of company data obtained from a South African freight forwarder and consignors of tyres imported into South Africa, the relative impact of the risk factors identified is showcased in terms of direct and indirect cost incurred as well as direct time delay experienced.

Table 5-5: Total number of MRNs per company & average customs value per MRN of tyre imports to South Africa (Jan 2017 - Apr 2018)

Tyre Importer	Number of MRNs	Total Customs Value	Customs Value / MRN	Share
Company A	2551	R1 881 061 096	R737 382	56%
Company B	564	R204 291 759	R362 219	6%
Company C	378	R279 490 767	R739 394	8%
Company D	268	R132 581 222	R494 706	4%
Others (27)	1074	R848 330 848	R789 880	25%
Total	4835	R3 345 755 692	R691 987	100%

Source: Author's calculations from Stratalyze database (2019)

The total customs value of tyre imports to South Africa of the dataset amounted to R3.35 billion over the period in question, representing about 30 per cent of the total tyre imports to South Africa. However, the average customs value per MRN of R691 987 is significantly higher than the country average of R400 055 for 2017 (Table 5-3), indicating that these companies continually imported cargo of higher average MRN value compared to the rest of South Africa's tyre imports. The four largest companies collectively imported 75 per cent of the total of the dataset, with the other 27 companies collectively making up the other 25 per cent.

Most of these consignments were unaffected by customs delays, as customs immediately released the vast majority of these consignments. The following table indicates the share of consignments released (not stopped), stopped by customs (stopped) and stopped by OGAs (OGA stopped) over the period in question. Once again, the table includes the other 27 importers.

Table 5-6: Share of observations per customs outcome

Tyre Importer	Not Stopped	Customs Stopped	OGA Stopped
Company A	99.0%	0.6%	0.4%
Company B	94.9%	2.0%	3.1%
Company C	96.5%	2.6%	0.9%
Company D	98.1%	1.5%	0.4%
Others (27)	95.4%	2.8%	1.8%
Total	96.3%	2.4%	1.3%

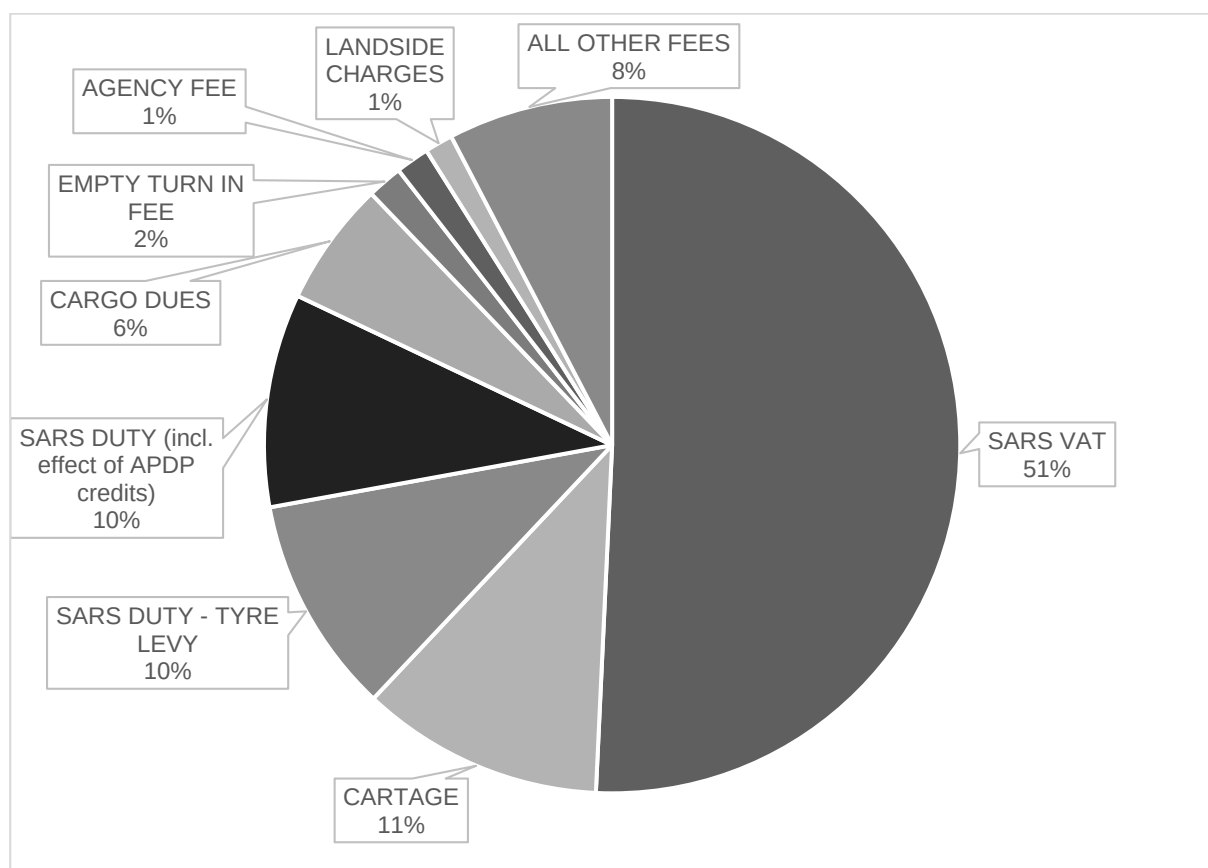
Source: Author's calculations (2019)

Of all the tyre consignments in the dataset imported into South Africa over the period in question, 3.7 per cent were collectively stopped by customs or OGAs. Company A was least affected, with a 99 per cent release rate, whereas Company B was most affected, with only a 94.9 per cent release rate. In total, 96.3 per cent of all the consignments in the dataset were released. The

domestic logistics cost incurred can be used to determine the difference between consignments being released by customs and consignments being stopped by customs and, in turn, to realise the impact of these customs delays on the vertical tyre market in South Africa.

For all of the consignments in the dataset, the total domestic logistics cost amounted to R460 million over the period in question (about 14 per cent of the customs value). Domestic cost includes billing items such as cartage fees, cargo dues, landside charges, etc. Figure 5-6 below indicates the breakdown cost incurred per category over the timespan in question.

Figure 5-6: Visual breakdown of domestic cost per category for importer tyres to South Africa



Source: Author's calculations (2019)

As is the case in many developing countries, the largest contributing domestic cost in imports is VAT collected by the customs administration. This is also the case in the vertical tyre market in South Africa, with a SARS VAT share at 51 per cent of the total cost, which is reclaimable by the importer on the VAT201 schedule submitted on the monthly or bi-monthly legal agreement. The second-largest domestic cost is cartage fees at 11 per cent of the total share. This is mainly for

road transport from Durban to Johannesburg since the majority of tyres are shipped by ocean freight to Durban port and road hauled to Johannesburg where the commercial hub of South Africa is located (about 75 per cent of the tyre import market).

From Figure 5-6 it is noteworthy that even though the SARS duty on tyre imports only indicates a 10 per cent share of total logistics cost, many importers use tyre duty credits through the APDP scheme, as mentioned before. Along with tariff duties collected by SARS, an additional tyre levy duty is incurred, which constitutes 10 per cent of the domestic cost's share in tyre imports. Other typical logistics costs, such as cartage, cargo dues, terminal handling fees, storage, demurrage and turn-in fees, which makes up all other fees or the rest of the logistics cost for the vertical tyre market in South Africa in Figure 5-6.

It is also worth noting that the breakdown of domestic logistics cost depicted in Figure 5-1 is the sum total for all domestic logistics costs incurred for the entire dataset described above. Furthermore, considering that the given dataset makes reference to the number of MRNs of tyre imports to South Africa over the period in question, it is further worth noting that multiple containers of tyres can be imported under one MRN. The following table indicates the typical domestic logistics cost incurred per 40-foot full container load (40 FCL) road hauled from Durban to Johannesburg, which provides a clear breakdown of current market rates for domestic logistics cost.

Table 5-7: Vertical tyre market, typical domestic logistics (excluding VAT, duty and levies) cost for a 40 FCL

Transport: Durban to Johannesburg	R12 000
Cargo dues	R4 200
Terminal handling fee	R2 600
Empty turn-in fee	R5 700
Admin fee	R955
Agency fee	R6 665
Clearing documentation fee	R550
Facility fee	R1 900
Total (excluding VAT/duty & levy)	R34 570

Source: Author's calculations based on typical market-related costs (2019)

As the table depicts, the domestic logistics cost incurred by shipping a 40 FCL amounts to R34 570. These figures do not take into account the bulk of the domestic charges as depicted in Figure 5-1 (such as VAT, duty and tyre levies). Nonetheless, meaningful conclusions can be made from these figures, such as suggesting that the domestic logistics costs (excluding VAT, duty and

tyre levies) constitute 11 to 15 per cent of the customs value per consignment (Table 5-5, estimated per MRN, since multiple 40 FCLs can be shipped via one MRN number). Once VAT, duty and tyre levies are added, the domestic cost of importing tyres to South Africa constitute between 22 and 30 per cent of the customs value per consignment. As mentioned above, the transport indicated in the table is for a tyre consignment shipped from Durban to Johannesburg, since approximately 75 per cent of the tyre imports are destined for Johannesburg.

5.3.2 Risk factors impacting the probability of customs inspections

The following section analyses the impact of various factors on the probability of customs inspections. Since the SARS customs risk engine uses HS code, country of origin and customs valuation per item as risk criteria to stop cargo (in addition to random inspections), it is worth further investigating the impact of these categories.

5.3.2.1 Impact of HS code on probability of customs inspections

Products are classified for international trade according to the International Convention on the Harmonised Commodity (HS) Description and Coding System and replace the Convention on Nomenclature for the Classification of Goods in Customs tariff in 1950. The Commodity Description and Coding System was developed by the World Customs Organisation (WCO) and introduced in 1988. The six (or more) digit number assigned to commodities serves as a common language which can be used to determine duty rates, provide accurate and comparable data for trade negotiation and trade disputes and standardise the collection, analysis and comparison of international trade.

The following table summarises the dataset in terms of consignments stopped by customs and OGAs based on HS codes, sorted by the number of stops.

Table 5-8: Statistics of tyre imports to South Africa stopped by customs per HS code (Jan 2017 - Apr 2018, per line entry)

HS code	Tariff book description	Customs entries	Stopped	Fraction
4011.10.09	New pneumatic tyres of rubber, of a kind used on motor cars (including station wagons and racing cars), <u>with a rim size of 43 cm (17 inches) or more</u>	18 226	342	0.0188
4011.20.18	New pneumatic tyres of rubber with a load index not exceeding 121 and <u>a rim size of 38 cm (15 inches) or more</u>	5 646	178	0.0315
4011.20.26	New pneumatic tyres of rubber with a load index not exceeding 121 <u>and a rim size exceeding 51 cm (20 inches)</u>	2 919	169	0.0579
4011.10.07	Pneumatic tyres of rubber, of a kind used on motor cars (including station wagons and racing cars) with <u>a rim size of 41 cm (16 inches)</u>	4 008	128	0.0319

4011.10.05	Pneumatic tyres of rubber, of a kind used on motor cars (including station wagons and racing cars) <u>with a rim size of 38 cm (15 inches)</u>	2 509	124	0.0494
4011.10.03	Pneumatic tyres of rubber, of a kind used on motor cars (including station wagons and racing cars) <u>with a rim size of 35 cm (14 inches)</u>	1 430	96	0.0671
4011.10.01	Pneumatic tyres of rubber, of a kind used on motor cars (including station wagons and racing cars) <u>with a rim size not exceeding 33 cm (13 inches)</u>	541	59	0.1091
4011.80.10	New pneumatic tyres of rubber, of a kind used on construction, mining or industrial handling vehicles and machines and <u>a rim size of less than 91 cm</u>	3 295	54	0.0164
4011.70.10	New pneumatic tyres of rubber, of a kind used on agricultural or forestry vehicles and machines <u>with a rim size of less than 91 cm</u>	5 047	46	0.0091
4011.40	New pneumatic tyres of rubber, <u>of a kind used on motorcycles</u>	2 272	45	0.0198
4011.20.24	New pneumatic tyres of rubber with a load index not exceeding 121 and <u>a rim size exceeding 44 cm (17.5 inches) but not exceeding 51 cm (20 inches)</u>	693	44	0.0635
4011.20.22	New pneumatic tyres of rubber with a load index not exceeding 121 and <u>a rim size not exceeding 44 cm (17.5 inches)</u>	1 380	40	0.0290
8708.70.19	Road wheels, parts and accessories: <u>Other</u>	33	32	0.9697
4011.80.20	New pneumatic tyres of rubber of a kind used on construction, mining or industrial handling vehicles and machines with <u>a rim size of 91 cm or more</u>	746	21	0.0282
4012.90	Retreaded or used pneumatic tyres of rubber with solid or cushion tyres, tyres, tyre treads and tyre flaps of rubber: <u>Other</u>	942	13	0.0138
4011.70.20	New pneumatic tyres of rubber, of a kind used on agricultural or forestry vehicles and machines with <u>a rim size of 91 cm or more</u>	913	11	0.0120
4013.90	Inner tubes of rubber: <u>Other</u>	1 396	10	0.0072
Other	-	1 480	1	-
Total	-	53 476	1 413	0.0264

Source: Author's calculations from Stratalyze database (2019)

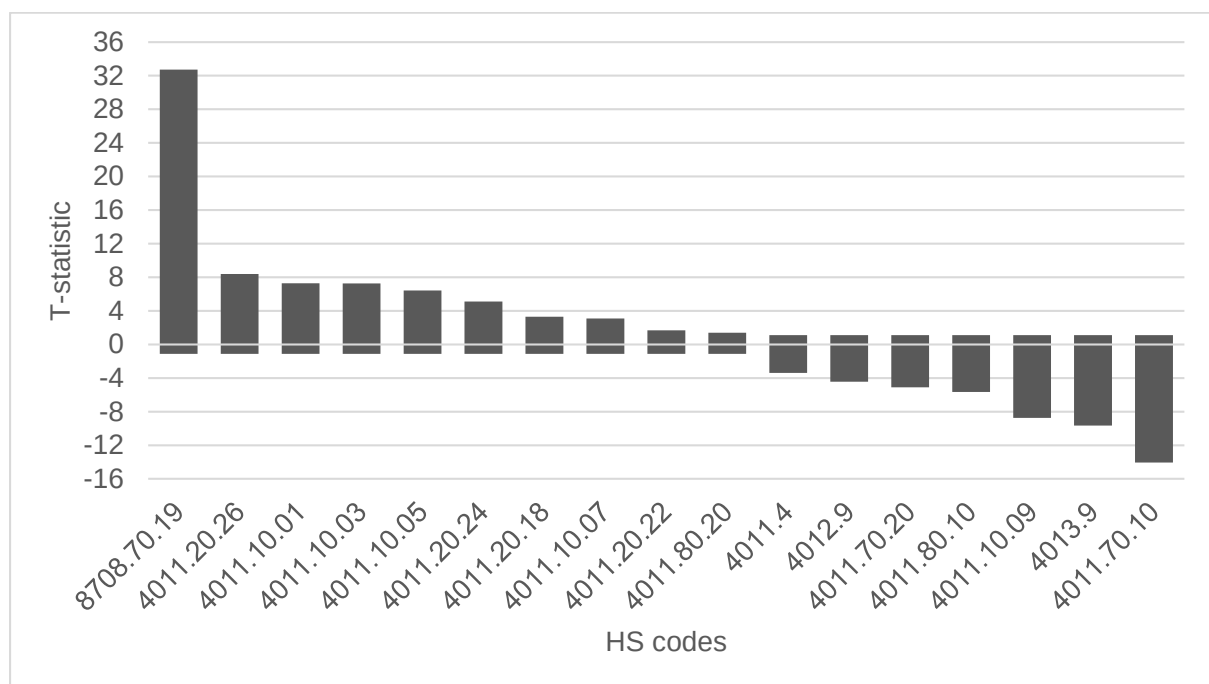
In total, 2.64 per cent of all the entries were stopped by customs. The table indicates that some groups of HS codes were stopped more frequently than others. These include road wheels, parts and accessories (8708.70.19) at 97 per cent and new pneumatic tyres within tariff headings of 4011.10.01 (at 10.9 per cent), 4011.10.03 (at 6.7 per cent) and 4011.20.24 (at 6.3 per cent). Important to note, the stops made by SARS customs and OGAs are grouped together. Furthermore, the stops are grouped according to line entries and not according to MRNs stopped.

Whether there was an underlying reason for SARS customs to specifically stop these groups of HS codes can be ascertained by calculating the t-statistic for the averages of these HS codes as follows:

$$t - statistic = \frac{\mu_s - \mu}{\sigma_s / \sqrt{N_s}} \quad (\text{Equation 2})$$

With μ_s the average of the sample for which the t-statistic is determined, μ the population average, σ_s the standard deviation of the sample and N_s the sample size. If the t-statistic is greater than three, there is only a one per cent chance that the deviation of category behaviour from population behaviour is a result of randomness in the data – in such cases there is an underlying reason for the observed category behaviour to be different. The following figure illustrates the t-statistics for HS codes of stopped tyre imports.

Figure 5-7: T-statistic comparisons of different HS codes



Source: Author's own compilation (2019)

From the figure above, it is clear that SARS customs and OGAs specifically target some groups of HS codes. The HS code group of road wheels and parts and accessories (8708.70.19) is specifically targeted together with other groups of new pneumatic tyres such as 4011.70.10; 4013.9; 4011.10.09 and 4011.20.26. The t-statistics confirms the suspected systematic discrimination against specific HS code.

Whether this systematic discrimination against a specific HS code was justified can be determined by calculating which portion of the fraction required an amendment. This is done to investigate whether the criteria used by customs had any impact on outcomes – i.e. when compared to all

those that were inspected, did the declarations that required change show similar characteristics as the ones inspected in the total population? The following table summarises the dataset in terms of consignments that were stopped by customs and OGAs which required amendments.

Table 5-9: Statistics of tyre imports to South Africa stopped by customs which required amendments (Jan 2017 - Apr 2018, per line entry)

HS code	Stopped	Infraction	Fraction	T-statistic
4011.10.09	342	13	0.0380	-3.6473
4011.20.18	178	17	0.0955	0.8979
4011.20.26	169	10	0.0592	-0.9121
4011.10.07	128	6	0.0469	-1.5442
4011.10.05	124	10	0.0806	0.2012
4011.10.03	96	10	0.1042	0.9122
4011.10.01	59	3	0.0508	-0.8698
4011.80.10	54	11	0.2037	2.3351
4011.70.10	46	13	0.2826	3.1163
4011.40	45	0	0.0000	-1.9201
4011.20.24	44	11	0.2500	2.6697
4011.20.22	40	3	0.0750	-0.0174
8708.70.19	32	0	0.0000	-1.6192
4011.80.20	21	0	0.0000	-1.3117
4012.90	13	0	0.0000	-1.0320
4011.70.20	11	0	0.0000	-0.9493
4013.90	10	0	0.0000	-0.9051
Other	1	0	0.0000	-0.2862
Total	1 413	107	0.0757	-

Source: Author's calculations from Stratalyze database (2019)

The results indicate that only 7.6 per cent of goods that were stopped for customs inspections had in fact been amended, which implies an infraction. Consequently, it can be argued that the other 92.4 per cent of entries were inspected unnecessarily (or parts of the portion reserved for random inspections). Furthermore, only the t-statistic for HS codes 4011.10.09 and 4011.70.10 were outside of the range of a one per cent chance with the implication that the deviation of category behaviour from population behaviour was due to the randomness in the data. These results indicate that there is significant room for improvement in the current system.

5.3.2.2 Impact of country of origin on probability of customs inspections

The following table summarises the dataset in terms of consignments that were stopped by customs and OGAs based on country of origin, sorted by the number of customs entries.

Table 5-10: Statistics of tyre imports to South Africa stopped by customs per country of origin (Jan 2017 - Apr 2018, per line entry)

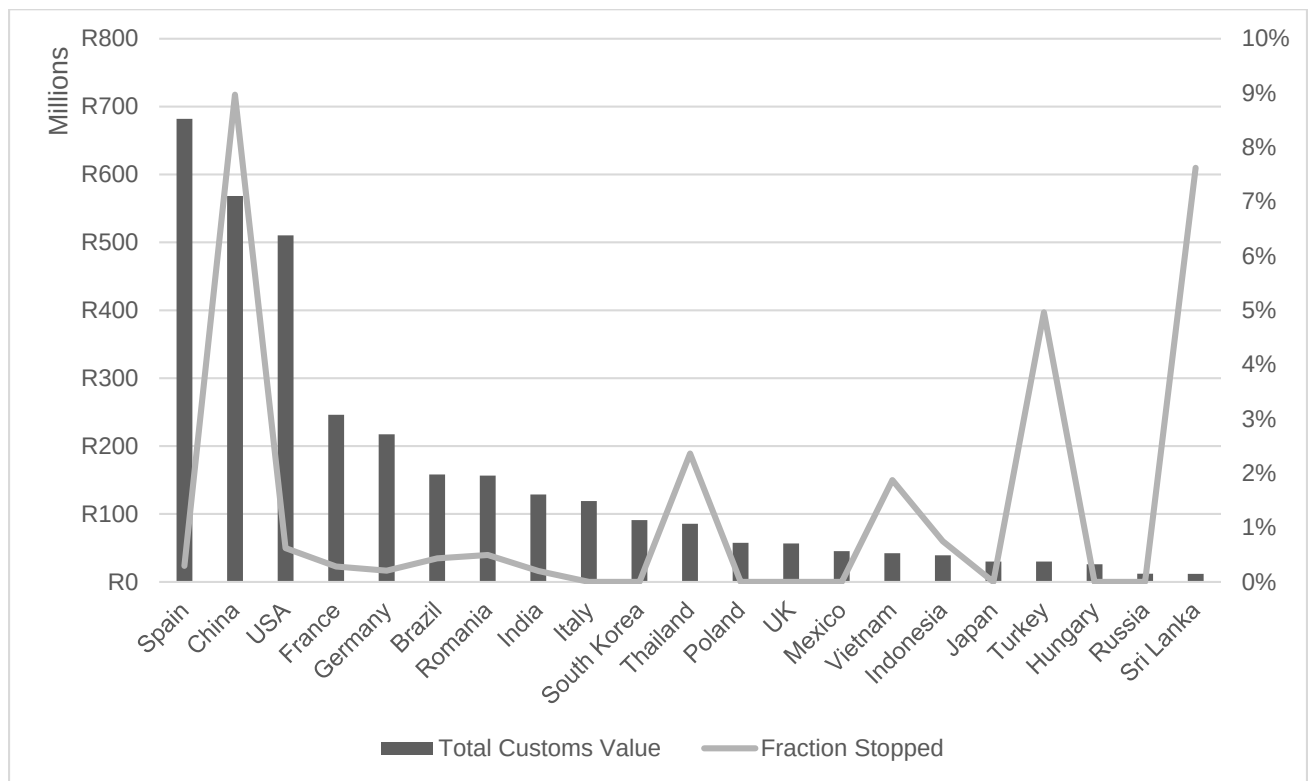
Country of origin	Customs entries	Stopped	Fraction
China	13 180	1 182	0.0897
India	6 482	13	0.0020
France	5 322	15	0.0028
Germany	3 871	8	0.0021
USA	3 383	21	0.0062
Spain	3 057	9	0.0029
Thailand	3 048	72	0.0236
Italy	2 453	0	0.0000
Romania	2 417	12	0.0050
Poland	1 533	0	0.0000
UK	1 212	0	0.0000
Japan	1 189	0	0.0000
Hungary	901	0	0.0000
South Korea	841	0	0.0000
Brazil	692	3	0.0043
Turkey	645	32	0.0496
Taiwan	587	1	0.0017
Vietnam	587	11	0.0187
Serbia	550	5	0.0091
Indonesia	400	3	0.0075
Sri Lanka	328	25	0.0762
Other	798	1	0.0013
Total	53 476	1 413	0.0264

Source: Author's calculations (2019)

Table 5-10 indicates that customs severely scrutinised tyre imports from China, with about nine per cent of line entries of goods originating in China being stopped by SARS customs or OGAs. Other countries with a significant fraction of entries being stopped includes Sri Lanka (7.6 per cent), Turkey (five per cent) and Thailand (2.4 per cent).

The following figure illustrates whether the portion of customs and OGAs stops per country of origin were representative of the portion for the total dataset by combining the total customs value and fraction of line entries stopped by customs.

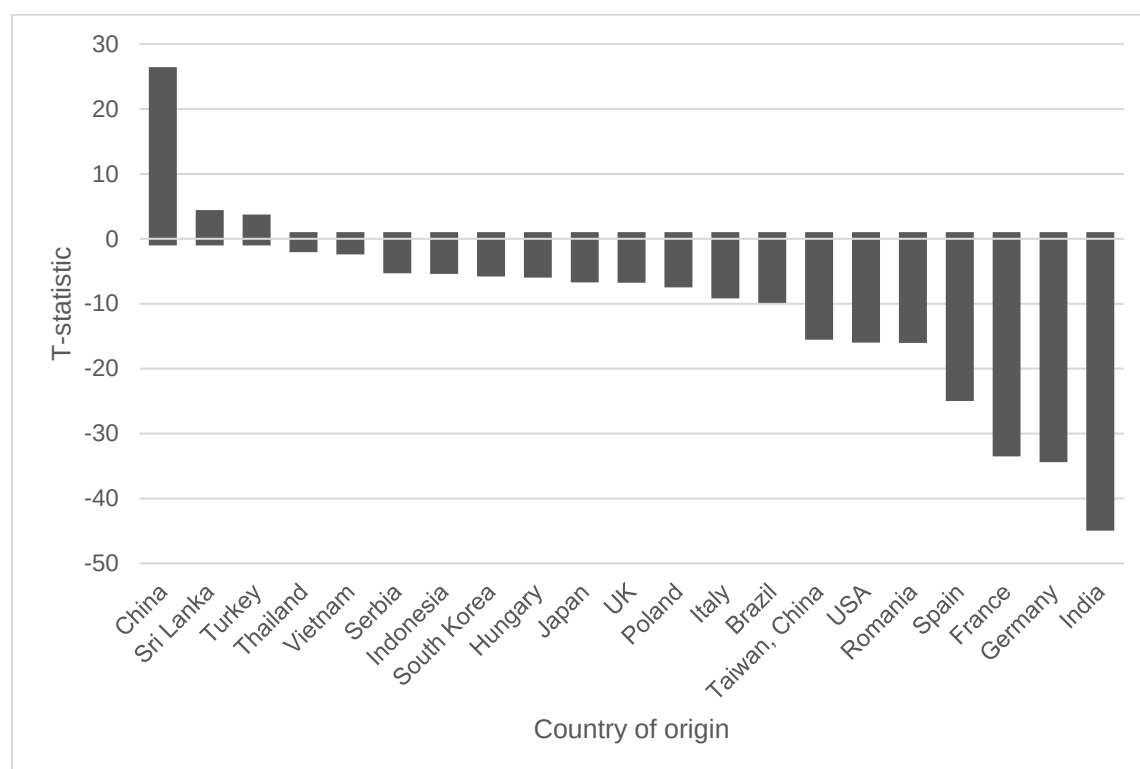
Figure 5-8: Tyre imports to South Africa stopped by customs per country of origin (Jan 2017 - Apr 2018)



Source: Author's calculations (2019)

As the figure illustrates, other countries with comparative values of tyre imports to China were not subject to the same level of scrutiny. These include Spain and the US, with very low fractions of entries that were stopped (less than once per cent). Whether there is an underlying reason why the observed category behaviour is different can be determined by calculating the t-statistic. The following figure illustrates the t-statistic for country of origin of stopped tyre imports.

Figure 5-9: T-statistic comparisons of different countries of origin



Source: Author's own compilation (2019)

From the figure above, it is clear that SARS customs and OGAs specifically target tyre imports originating from China. On the other hand, the figure also illustrates that tyre imports originating from countries such as India, Germany, France and Spain are evidently not stopped by customs and OGAs. The t-statistics confirm suspected systematic discrimination against consignments from a specific country of origin.

5.3.2.3 Impact of customs valuation on probability of customs inspections

The following table summarises the dataset of consignments stopped by customs and OGAs based on custom valuation.

Table 5-11: Statistics of tyre imports to South Africa stopped by customs per product valuation (Jan 2017 - Apr 2018, per line entry)

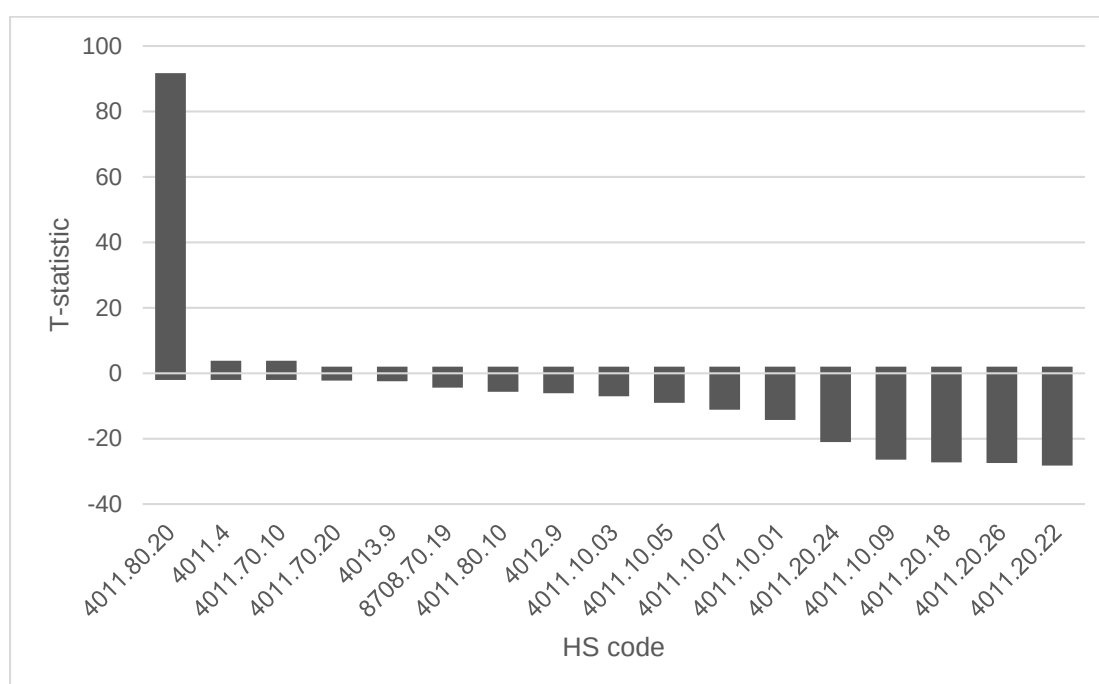
HS Code	Customs entries	Stopped	Average unit value (entries stopped)	Average unit value (all entries)	Fraction
---------	-----------------	---------	--------------------------------------	----------------------------------	----------

4011.10.09	18 226	342	487.90	870.95	0.0188
4011.20.18	5 646	178	528.22	937.58	0.0315
4011.20.26	2 919	169	1 745.04	2 838.69	0.0579
4011.10.07	4 008	128	406.31	528.08	0.0319
4011.10.05	2 509	124	276.40	325.79	0.0494
4011.10.03	1 430	96	223.39	242.76	0.0671
4011.10.01	541	59	193.88	229.71	0.1091
4011.80.10	3 295	54	4 828.21	7 966.68	0.0164
4011.70.10	5 047	46	2 806.83	2 149.22	0.0091
4011.40	2 272	45	700.88	615.85	0.0198
4011.20.24	693	44	1 297.64	2288.47	0.0635
4011.20.22	1 380	40	841.93	1343.03	0.0290
8708.70.19	33	32	27.28	28.80	0.9697
4011.80.20	746	21	326 701.50	199 042.36	0.0282
4012.90	942	13	41.69	99.42	0.0138
4011.70.20	913	11	7 181.16	7 510.97	0.0120
4013.90	1 396	10	105.59	111.94	0.0072
Other	1 480	1	-	-	0.0007
Total	53 476	1413	-	-	0.0264

Source: Author's calculations (2019)

From the table above, it appears that the majority of tyre imports were stopped because of under-invoicing, whereby the value reported to customs was significantly under the value representative of the dataset. Whether this is really the case can once again be determined by calculating the t-statistic of the different groups of HS codes according to the product valuation declared to SARS customs. The following figure illustrates the t-statistic for product valuation of stopped tyre imports.

Figure 5-10: T-statistic comparisons of different product valuation (per HS code)



Source: Author's own compilation (2019)

The t-statistics confirm the suspected systematic discrimination against the product valuation within specific HS code groups, and that in the targeted HS code groups the average unit cost of inspected cargo is significantly lower than the average unit cost for the entire HS code group.

5.3.2.4 Summary

In summary, the risk factors of the HS code, country of origin and product valuation all influenced the decision of customs to stop a consignment for inspections. The results suggest that there is systematic discrimination against certain factors within these risk indicators. In terms of HS codes, road wheels and parts and accessories (8708.70.19) were almost always stopped for inspection, at 97 per cent of the total entries, as well as new pneumatic tyre groups of HS codes 4011.70.10; 4013.9; 4011.10.09 and 4011.20.26.

In respect of consignment origin, China was most frequently targeted for inspections, with about nine per cent of line entries being stopped by SARS customs or OGAs. On the other hand, the results indicated that customs and OGAs infrequently stopped tyre imports originating from India, Germany, France and Spain. Lastly, in terms of product valuation, the HS code group of 4011.80.20 was especially targeted for overvaluation compared to the norm of the dataset,

whereas the HS code group of 4011.20.22 was especially targeted for undervaluation compared to the norm of the dataset.

5.3.3 Impact of customs inspections

The following section provides an overview of the cost implications of customs inspections. It also provides an indication to trade and private sector firms within the vertical tyre market of the time delays they could expect for specific consignments that fall within specific categories as depicted in the previous section. This section is divided into three parts. First, it provides the direct cost resulting from customs delays; secondly, the direct time delay resulting from customs delays; and lastly, the indirect cost resulting from customs delays.

5.3.3.1 Direct costs incurred due to customs delays in the vertical tyre market in South Africa

Whenever customs stops goods, the cargo must be rerouted and sent to SARS-licensed unpacking depots for examination booking and physical cargo inspection. The process will differ from the stops by OGAs, as they do not use the same remedy, workflow or locations to investigate perceived high-risk cargo by their risk scoring. The following table indicates the current domestic market rates charged for goods being stopped by customs and diverted to an unpacking depot for physical cargo examination.

Table 5-12: Direct cost incurred for a customs stop (40 FCL)

Lift on (R350x2)	R700
Lift off (R350x2)	R700
Tailboard inspection	R1 500
Cartage from terminal to SARS-licensed unpacking depot	R2 500
Communication cost of events	R100
Full unpack/repack	R10 000
Inspection supervision fee	R1 095
Closure of container	R50
Overstay (R1000 per day, normally 4 days)	R4 000
Total cost	R20 645

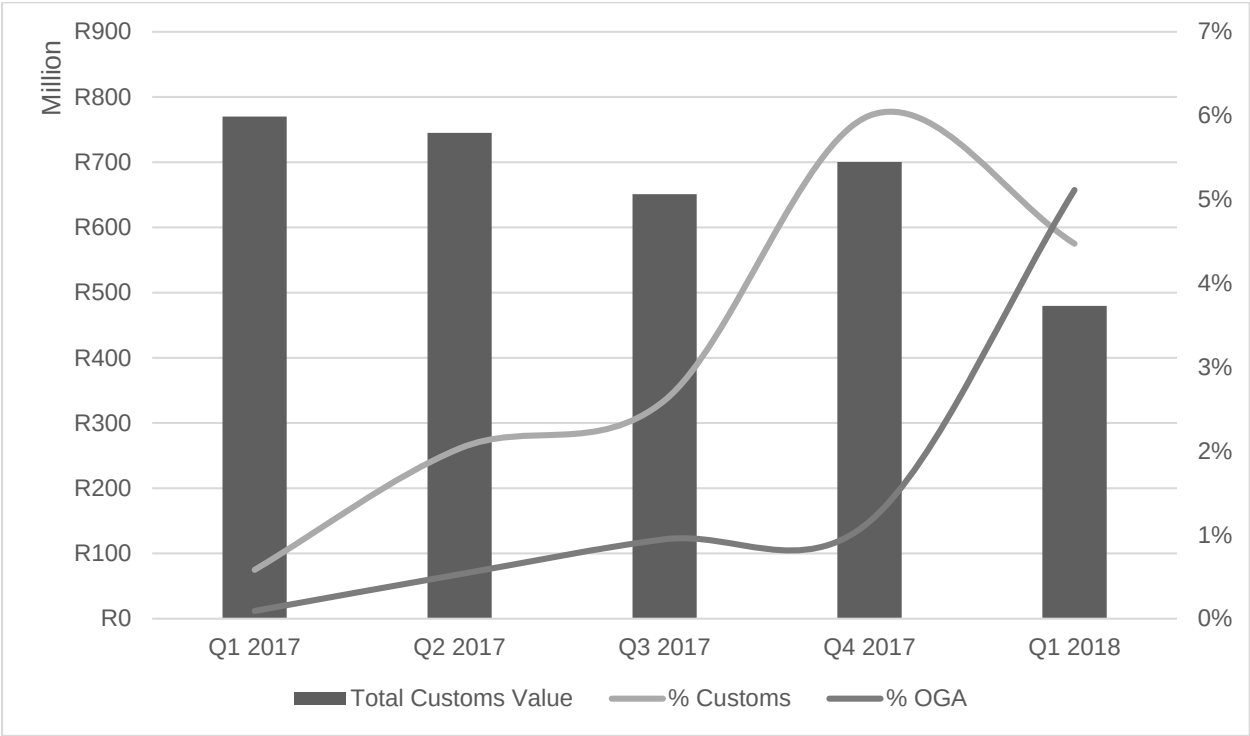
Source: Author's calculations based on current shipping line charges (2019)

The table indicates an additional direct cost of R20 645 incurred for any tyre consignment that is subject to a customs stop. When tyre import consignments are stopped by customs, the domestic logistics cost (excluding VAT, duty and tyre levies) increases by almost 60 per cent (note Table 5-7 for a reference). These additional costs are alarming as the following analyses show that the

overall cost incurred by the tyre importers resulting from a customs stop over the period in question has amounted to substantially more than indicated in the table above.

The following figure, which serves as a reference point for the rest of this section, is a summary of the total customs value of tyre imports and share of consignments which were stopped by either customs or OGAs over the period in question.

Figure 5-11: Vertical tyre market, total customs value of imports and share of consignments stopped (customs and OGAs), 2017/2018, per quarter



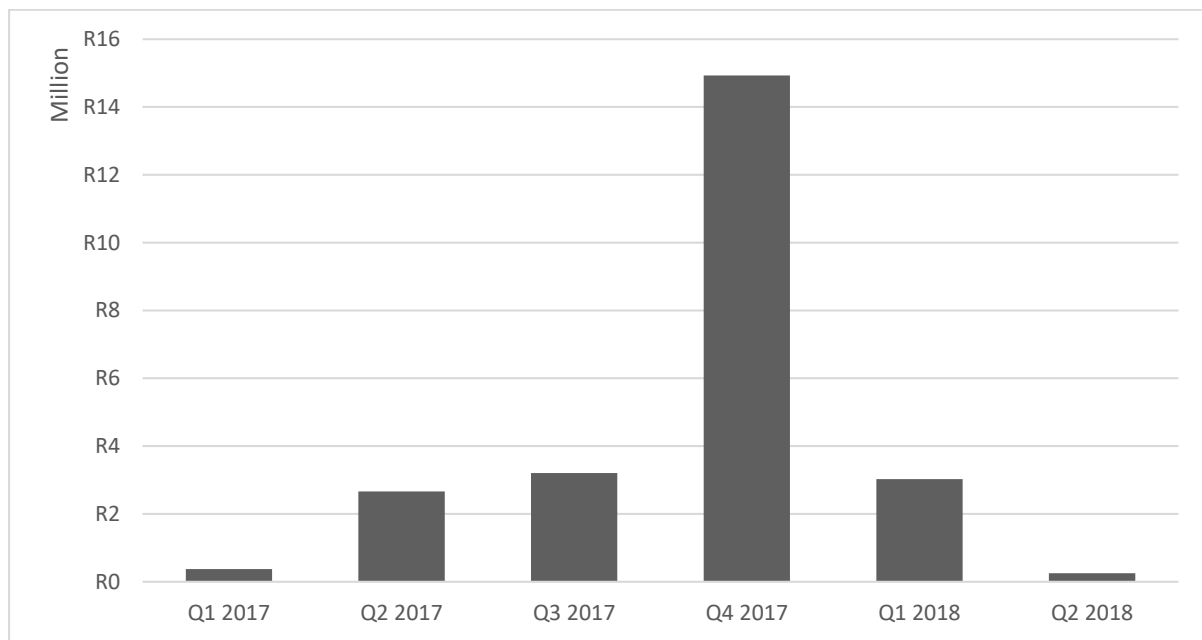
Source: Author’s calculations (2019)

The figure clearly illustrates the increased share of tyre consignments subject to either customs or OGA stops. This illustration is alarming for the vertical tyre market in South Africa and warrants further investigation. In the subsequent section, the dataset is split into two distinct categories. The domestic logistics cost will be categorised according to tyre consignments firstly stopped by customs and secondly, by OGAs.

The following part of the dataset includes the tyre consignments that were stopped by customs (therefore excluding stops made by OGAs) over the timespan of 1 January 2017 to 30 April 2018 (16 months). These consignments consequently received a customs response code 2 – thus stopped for physical inspection. The number of companies that incurred customs stops was nine

of the 31 different tyre importers included in the dataset. In total, 106 MRNs (approximately 2.2 per cent of all cases) were stopped by customs over the period in question. To evaluate the impact of these stops, the following figure provides a quarterly breakdown of the domestic logistics costs incurred by tyre consignments that were stopped by customs.

Figure 5-12: Vertical tyre market, domestic logistics cost for consignments stopped by customs, 2017/2018, per quarter



Source: Author's calculations (2019)

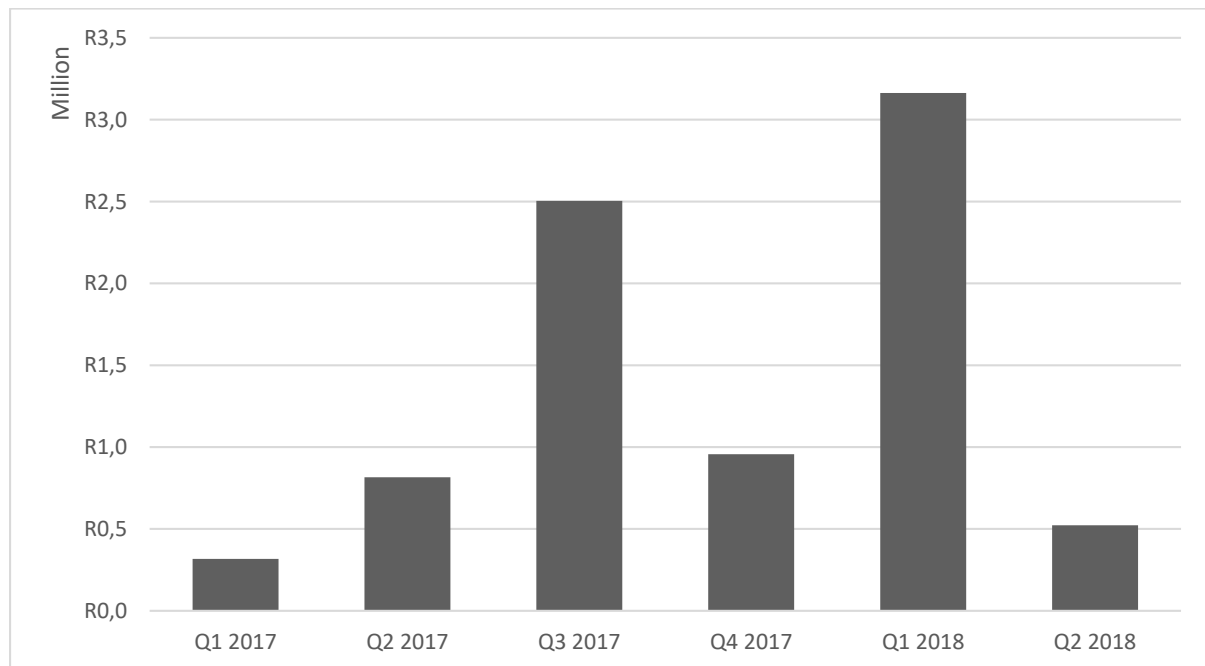
Figure 5-12 clearly illustrates that a significant number of customs stops were made in the fourth quarter. It can be concluded that SARS customs are more vigilant in the fourth quarter. However, when viewed in conjunction with Figure 5-8, the fraction of total stops made by customs and OGAs did not peak in Q4 2017 but, instead, continued to increase in Q1 2018. This might indicate that the customs value of the goods stopped in Q4 2017 was significantly higher than in Q1 2018. The other explanation might be that the majority of stops made by customs were concentrated in Q4 2017, whereas the majority of stops made by OGAs were concentrated in Q1 2018. Figure 5-10 provides additional insight.

Of the 106 consignments that were stopped by SARS customs, only four consignments had to submit a voucher of correction (VOC), meaning that either some or indeed multiple entries submitted to customs via the customs declaration form were incorrect. For the remaining 102 consignments, it is easy to deduce that they were stopped by customs unnecessarily. This might suggest, assessing from all the consignments deliberately stopped instead of being subjected to

random frontline inspections, that SARS's customs risk management system and risk engine is not efficient for tyre imports to South Africa.

The following part of the dataset includes the tyre consignments that were stopped by OGAs (excluding stops made by customs) over the timespan of 1 January 2017 to 30 April 2018 (16 months). These consignments, therefore, received a customs response code 4, i.e. detained for OGA. The number of clients who incurred stops by OGAs were nine out of the 31 different tyre importers to South Africa. In total, 55 MRNs (approximately 1.3% of all cases) were stopped by OGA over the period in question. The following figures provide a quarterly breakdown of the domestic logistics costs incurred by tyre consignments stopped by OGAs, from which the impact of these stops can be evaluated.

Figure 5-13: Vertical tyre market domestic logistics cost for consignments stopped by other government agencies (OGAs), 2017/2018, per quarter



Source: Author's calculations (2019)

In the case of tyre consignments being stopped by OGAs, no clear quarterly pattern can be assumed. The figure does, however, seem to show, in comparison with Figure 5-12, that the majority of stops made by customs were concentrated in Q4 2017, whereas the majority of stops made by OGAs were concentrated in Q1 2018 (and also Q3 2017). Working alongside SARS customs, seven different government agencies are allowed to stop inbound consignments into

South Africa. The following table shows a breakdown of the domestic logistics cost per OGA agency.

Table 5-13: Domestic logistics cost for OGA stops per code:

Code	Description	MRNs stopped	Total domestic logistics cost	Share
1	SAPS	26	R3 468 318.94	42%
2	NRCS	20	R2 693 782.46	33%
3	TIU	0	R0.00	0%
4	CBCU	4	R140 548.54	2%
5	CCU	4	R533 853.47	6%
6	TCTT	1	R270 877.11	3%
7	EWP	0	R0.00	0%
			R7 107 380.52	100%

Source: Author's calculations (2019)

The majority of tyre consignments stopped by OGAs were by either the South African Police Department (SAPS) or the NRCS). In the case of the SAPS, this might indicate random stops or stopped consignments alleged to contain illicit trade or smuggled goods. In the case of NRCS, this might indicate stopped consignments that did not adhere to specifications or those without homologation certificates, as mentioned previously. Interesting to note is that, similar to tyre consignments stopped by customs, of the 55 consignments that were stopped, only three consignments had to submit a VOC, meaning that either some or indeed multiple entries submitted to customs via the customs declaration form were incorrect. Once again, for the other 52 consignments, it is easy to deduce that these consignments were unnecessarily stopped by OGAs.

To provide a clear picture of the impact of customs delays in terms of direct cost on the vertical tyre market, the Table 5-14 below summarises the different cost scenarios as a percentage of customs value for each of the four largest tyre importers in South Africa. The table is divided into tyre consignments released (not stopped), tyre consignments stopped by either customs or OGAs (stopped) and the difference in cost between consignments released and consignments stopped. Domestic logistics cost is provided as a percentage of customs value. The table also includes the other 27 companies grouped together to complete the dataset.

Table 5-14: Domestic logistics cost as a percentage of customs value for tyre imports to South Africa (Jan 2017 - Apr 2018)

Tyre Importer	Not Stopped	Stopped	Difference
Company A	11.0%	14.6%	3.6%
Company B	20.7%	28.0%	7.3%
Company C	11.9%	15.5%	3.6%
Company D	14.3%	19.7%	5.3%
Others (27)	14.0%	18.0%	4.0%
All	11.6%	15.4%	3.8%

Source: Author's calculations from Stratalyze database (2019)

From the table above, it is clear that a substantial amount of additional costs is incurred when consignments are stopped by either customs or OGAs. For Company A, domestic logistics cost represents 11 per cent of the customs value when goods are released, compared to 14.6 per cent when goods are stopped, resulting in an increase of 3.6 per cent. Company B on the other hand, experiences an increase of 7.3 per cent, which is alarming since Company B was also most affected by stops, with only a 94.9 per cent release rate (see Table 5-6). The results are particularly worrying for Company D, which indicates a very high t-statistic and experiences an increase of four per cent in domestic logistics cost for tyre imports stopped by customs. Ultimately, when reviewing the average increase in logistics cost across the entire dataset, the impact in terms of direct costs incurred was an increase of 3.8 per cent of customs value for tyre imports to South Africa.

The impact of cargo being stopped by customs also indicates that it is a time-sensitive factor. Therefore, the following section investigates the additional direct time incurred for a tyre consignment being stopped by customs in South Africa for the dataset over the period in question.

5.3.3.2 Direct time incurred due to customs delays in the vertical tyre market in South Africa

From the given data and analysis, it is clear that a substantial amount of additional costs is incurred when consignments are stopped by customs; however, the impact of stops is also in the form of direct time delays. To realise the direct time incurred due to stopped consignments, customs and OGA stops can be benchmarked against the norm. Table 5-15 below showcases the average time incurred for tyre consignments over the timespan of 1 January 2017 to 30 April 2018 (16 months) not stopped (released) by customs and the average time for consignments that were stopped by customs and/or OGAs. The four largest importers are shown, as well as the

other 27 tyre importers included in the dataset. The time-lapse commences at the earliest time parameter that is available, which is the shipped on board date, and terminates at the point where the cargo is delivered.

Table 5-15: Average time incurred for tyre consignments not stopped and stopped by customs (days)

Tyre Importer	Not Stopped	Stopped	Difference
Company A	36.6	44.2	7.6
Company B	40.6	42.3	1.7
Company C	39.7	48.1	8.4
Company D	33.5	38.8	5.3
Others (27)	38.5	43.2	4.7
All	37.9	42.7	4.8

Source: Author's calculations (2019)

The table above reveals that the average time elapsed for an import consignment of tyres to South Africa is approximately 38 days. Various factors, such as country of origin, voyage route and weather conditions, can impact the time. However, since a total of 4 835 MRNs was included, an average can be deducted from the dataset. Note that the earliest time parameter available (and therefore used) is the shipped on board date, which consequently means that the domestic transport leg in the country of origin and the origin customs clearance were not taken into account. This, in turn, essentially aids the standardisation of the dataset to a certain degree.

The table further indicates that the delay experienced due to tyre consignments being stopped by customs or OGAs can be significant. From the earliest measurement (shipped on board date) to the final delivery (cargo delivered), the custom stops have resulted in an average delay of 7.6 days for Company A, 1.7 days for Company B, 8.4 days for Company C and 5.3 days for Company D. What these analyses indicate is that, along with the impact in the form of a substantial direct cost due to customs stops in the vertical tyre market in South Africa, companies also experience significant delays in direct time as a result of customs stops.

The following section investigates the additional indirect cost incurred for the four tyre importers due to a tyre consignment being stopped by customs in South Africa to assess its impact on direct cost and direct time.

5.3.3.3 Indirect cost incurred due to customs delays in the vertical tyre market in South Africa

The previous two sections explained the direct impact of customs delays on the vertical tyre market in South Africa. This section addresses the indirect cost impact of customs delays in the vertical tyre market in South Africa. Table 5-16 below is a summary of the tyre consignments stopped by customs and OGAs for the four largest tyre importers, including the number of units per category (passenger tyre, truck tyre, etc.).

Table 5-16: Summary of tyre consignments stopped by customs

Tyre Importer	Company A	Company B	Company C	Company D	Average
MRNs stopped	15	16	28	5	16
Total customs value	R9 317 174	R9 447 649	R42 306 798	R5 154 542	R16 556 541
Average value	R621 145	R590 478	R1 510 957	R1 030 908	R938 372
Passenger (units)	2 489	6 371	43 662	1 666	13 547
Truck (units)	1 806	4 461	15 653	3 453	6 343
Agriculture (units)	16	58 032	2 904	185	15 284

Source: Author's calculations (2019)

Several conclusions are made from the table above. As mentioned earlier, Company C was the most affected in terms of the number of MRNs stopped. Furthermore, the average customs value per MRN of all stops is substantially higher compared to the average for all consignments over the period in question (note Table 5-3), except for Company A, for which it is less. The number of tyres stopped is significant for all categories and companies, except for agricultural tyres for both Company A and Company D. Note that 4x4 tyres are included in the category of passenger tyres. The questions that arise from the table is the following: what is the indirect cost impact of these stops on the respective companies?

The indirect cost impact of customs delays cannot be determined as easily as the direct cost impacts (depicted in both cost and time) since the indirect cost does not lend itself to simple quantification. For this reason, the indirect cost was investigated by means of queries put to the top four tyre importers included in the dataset. The queries were based on the impact of customs delays in terms of stock carrying time, loss of sales and cash-to-cash cycles. The following section summarises the responses from these four tyre importers.

Company A, the largest tyre importer in the dataset, experiences a rapid sales turnaround cycle and typically carries stock for a period of seven days. Due to its size and the number of MRNs stopped relative to the number of tyre consignments imported, Company A was least affected by

customs delays (having experienced a one per cent stop rate over the period in question - note Table 5-6), but mentioned, nonetheless, that a loss of sales revenue amounting to R50 000 per 40 FCL is possible. Over the period in question and in general, Company A mentioned that the indirect cost impact of customs delays is insignificant to them. Nevertheless, Company A pointed out that custom stops carry additional risks to indirect time and cost. Since packing a container full of tyres is no arbitrary task, the capabilities of customs in repacking the container after a full unpacking is often lacking, resulting at times in damaged, incorrectly packed or even stolen stock. In general, Company A notes that following up on stops is cumbersome and, although statistically insignificant in terms of their value and volume of imports, customs stops impact on the business' bottom line since the costs for stops are not provisioned for at all.

In contrast to Company A, Company B noted that customs stops have a significant indirect impact on their business as they import a fraction of the amount of Company A and have a stock carry period of 31 days. Since customs stop a substantial number of agricultural tyres, the loss in sales can have a five-year effect since radial agriculture tyres have a product lifetime of four to five seasons. Company B estimated the loss of sales resulting from a customs stop to be around R500 000. In addition, the total indirect financial risk of a customs stop can amount to a R1 million for two weeks without stock. Company B lastly stated that a customs delay can have as much as a 2.5 per cent impact on operational costs.

Although Company C was the most affected in terms of the number of customs stops, they only reported a five per cent loss in sales (around R37 500), which was surprising. With a stock carrying time of 32 days, the longest of all four importers, Company C is best equipped to deal with the indirect impact of customs delays. When considering the responses from all of the tyre importers, it would appear that Company C takes into account best the possible impact of customs delays on their operations. Worth noting is that customs, in general, stopped imports from Company C, which had a significantly higher customs value compared to their average (R1 510 957 versus an average of R739 394). Even with the best estimates provided, Company C mentioned that the indirect cost remains difficult to quantify since it is based on their funding model and will impact their stock on hand.

Lastly, Company D listed a loss of sales of around R1.5 million per annum due to customs delays, by far the largest loss reported. Company D further stated that they typically carry 15 days' worth of stock, which is more than double in comparison with Company A. The largest impact seems to be on Company D's cash-to-cash cycle, which is the longest of the four tyre importers at 45 days.

From the response, it can be concluded that the indirect impact of customs stops from Company D is significant.

5.3.3.4 Summary

In summary, the impact of customs delays in the vertical tyre market in South Africa results in an average direct cost increase of 3.8 per cent of customs value for tyre imports to South Africa and an additional 4.8 days added to the end-to-end supply chain for the dataset analysed. While difficult to quantify, the indirect cost impact of customs delays also affects the respective tyre importers.

In an attempt to alleviate some of the effects of customs inspections, the following section proposes a system of customs risk management in the vertical tyre market.

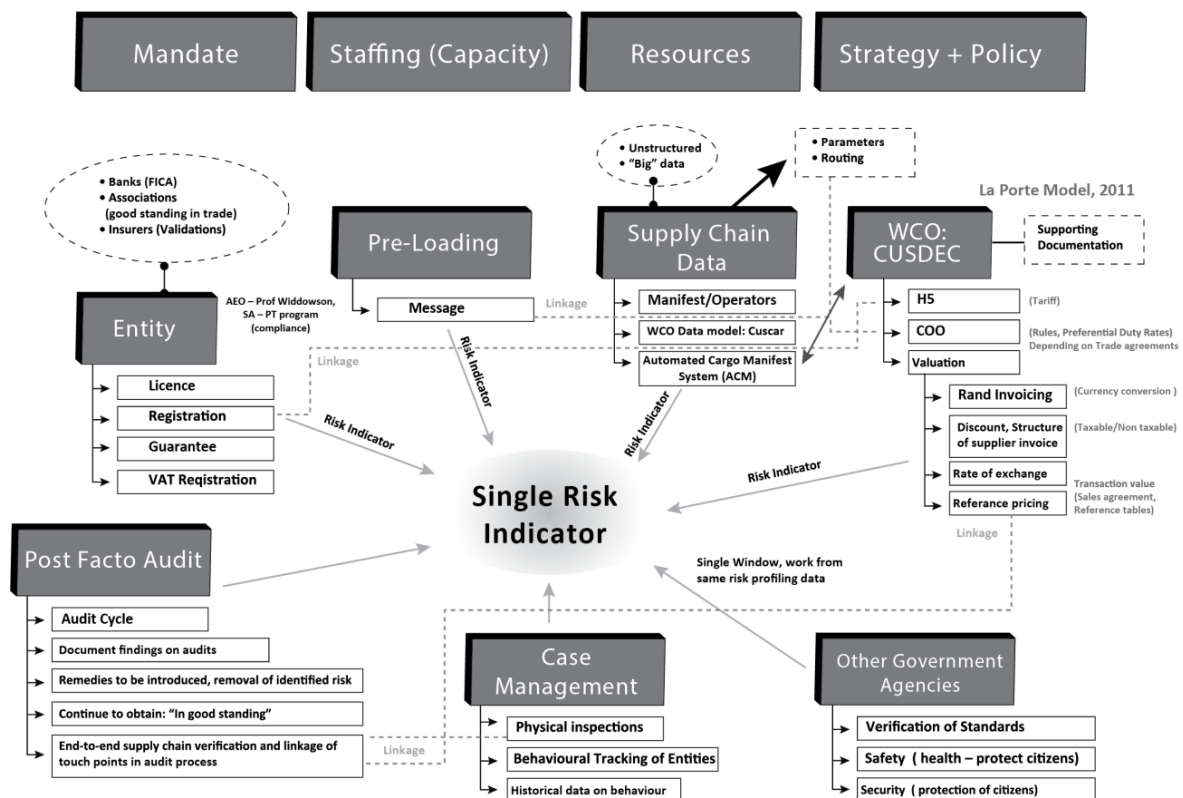
5.3.4 Proposed system for customs risk management in the vertical tyre market

The proposed system for customs risk management aims to demonstrate that a risk engine which is robust enough will identify both compliant traders within the vertical tyre market as well as uncompliant traders. As the results indicated, a significant portion of tyre imports were unnecessarily stopped by customs and OGAs for inspection. If traders are known entities with historical trading records, they become transparent as their visibility and traceability increase, effectively lowering their risk scoring. If known entities continually ship the same goods from the same suppliers in the same countries of origin with a customs value within the acceptable valuation range, there should be no need to stop these consignments.

The historical focus on the transactions trilogy of determining the correct HS codes, verifying country of origin, and proper product valuation followed by possible frontline inspections based on transactional risk assessment should be replaced with a risk assessment based on the long-term behaviour of the entities involved in the import transaction, combined with a PCA programme that performs verifications in a manner that avoids physical delays and inspections in the flow of goods as far as possible.

The following framework, as referred to earlier in the study, could be used as risk management guideline by customs administrations.

Figure 5-14: Customs' continual change over the last 30+ years



Source: Author's own compilation (2019)

A future solution of customs risk management should combine the vast experience of customs officials and the wealth of data that is captured over time into a single customs risk engine. Customs administrations, therefore, must build and provide a robust risk management solution per country with a methodology that will allow constant evolution to gain precision and handle more transaction and infraction types.

To achieve the correct risk indicator on a single consignment implies:

- the correct profiling and screening of the operators in the supply chain as recognisable entities with a historical risk indicator that stems from historical data feeds;
- electronically reporting cargo data throughout the supply chain in a way that will suit the physical movement of the cargo;
- capturing results of PCAs and offences in the system for future reference, which could influence the overall risk rating of the specific entity;

- investing in huge data lake solutions in line with WCO recommendations to consolidate all information related to both customs and excise. This will be even more critical should the worldwide systems of customs administrations become more integrated and connected;
- regular application of data mining techniques to offline data;
- real-time risk assessment based on the combination of the three important transaction risk factors (HS, valuation and country of origin) together with the abovementioned entity risks;
- case management integration, where complying as well as non-complying trader behaviour is logged, not through manual recording, but by automatically updating it in a central system;
- extracting data from multiple systems (including the registrar office in South Africa, FICA from a commercial bank and link to local associations) to allow all risk indicators relating to customs declarations, routing of cargo, handover points and time when activity is performed in the supply chain to be viewed on one screen.

For correct risk assessment, one needs to pinpoint the most critical point as various risk indicators happen at different time intervals in the supply chain.

5.3.5 Summary of the empirical analysis

This section set out to analyse the impact of customs delays on the vertical tyre market in South Africa. The analysis was done firstly by investigating the risk factors impacting on the probability of customs inspections and secondly by evaluating the impact of customs inspections on tyre importers within the vertical tyre market in South Africa.

The risk factors HS code, country of origin and customs valuation all seem to have a significant bearing on the probability of customs stopping consignments for inspection. The analysis indicated that certain groups of HS codes, as well as consignments originating from certain countries, were specifically targeted by customs and OGAs. However, despite evidently targeting specific product groups, countries of origin and product valuations deviating from the population norm, the amendment rate within the goods stopped were particularly low at only 7.6 per cent.

In terms of HS codes, road wheels and parts and accessories (8708.70.19) were almost always stopped for inspection. Other groups of new passenger tyres of HS codes 4011.70.10; 4013.9; 4011.10.09 and 4011.20.26, were also frequently stopped.

The results further indicated that there seems to be systematic discrimination against tyre imports originating from China, with about nine per cent of line entries being stopped by SARS customs

or OGAs. The deviation in performance is confirmed by a particularly high t-statistic. On the other hand, the results indicated that tyre imports originating from India, Germany, France and Spain were infrequently stopped by customs and OGAs. The deviation in performance is confirmed by a particularly negative t-statistic.

Lastly, in terms of product valuation, the HS code group of 4011.80.20 was especially targeted for overvaluation in comparison with the norm of the dataset, whereas the HS code group of 4011.20.22 was especially targeted for undervaluation in comparison with the norm of the dataset.

The vast majority of the delays caused by SARS customs could have been avoided had tyre imports been screened differently, which suggests that there is significant room for improvement in the current system. The resulting impact of these inspections in terms of both time and cost were significant for all of the tyre importers.

Across the entire dataset, the impact of customs inspections amounted to an increase of 3.8 per cent of customs value in terms of direct costs for tyre imports to South Africa. To add to that, from the earliest measurement (shipped on board date) to the final delivery (cargo delivered), in terms of direct time incurred, customs delays in the vertical tyre market in South Africa resulted in an average delay of 4.8 days for cargo that was stopped over all of the companies across the entire dataset.

The indirect cost impact of customs delays cannot be determined as easily as the direct cost impacts (depicted in both cost and time), as it does not lend itself to simple quantification. Whichever way the impact is interpreted, the indirect effect is still significant and ranges anywhere from a loss of sales amounting to R37 500 to around R1.5 million in terms of an indirect cost impact per customs incident. In terms of the indirect time impact, a customs delay can result in the need to carry an additional stock cover of anything between seven days and 32 days, and a delay in a company's cash-to-cash cycle of anything between seven days and 45 days.

The direct time delay (4.8 days) for cargo, as the results showed, cannot be taken to establish the indirect extension of the buffer stock and cash-to-cash cycle since the four companies that were analysed all fall into different order patterns respectively as determined by the overseas supplier principle, including minimum order quantity, allocation of stock to South Africa, filling of orders per 40 FCL container, and manufacture cycle of the product range. This industry sector is mixed with manufacturing and logistic strategies so that a one-size-fits-all approach will be dangerous to arrive at as an overall conclusion on indirect cost impact.

5.4 Conclusions and recommendations

Customs administration should implement improved trade facilitation procedures to provide economic benefits for individual traders (Creskoff, 2016:199). The faster goods move through the supply chain, the better. A day's reduction in transit time of goods will increase trade volume by at least one per cent and by as much as seven per cent for time-sensitive goods (Djankov *et al.*, 2010). At the same time, reducing the number of consignments stopped (only four out of 106 resulted in amendments) will bring efficiencies and cost-saving for SARS.

This study aimed to investigate the quantified impact of customs delays on the vertical tyre market in South Africa. Given the changing nature of supply chains together with the central role that customs administrations play, it is important to quantify the impact of the risk management practices South African customs administrations on the commercial operators in the vertical tyre market.

The available data for tyre imports into South Africa shows how the industry is rapidly growing. The growth comes at the apparent expense of the local tyre manufacturing industry in South Africa, which is experiencing - similar to the country's overall economic rhetoric - a continued increase in job losses and waning competitiveness of industries.

From the empirical analysis, it was evident that a customs delay significantly impacts the vertical tyre market in South Africa in terms of both direct cost and time incurred and has a lasting indirect impact in terms of cost and time, differing in range from tyre importer to tyre importer.

The results of this research show that the implementation of a more effective risk management system is needed in this vertical tyre market to view the risk holistically in this supply chain, with cargo reporting when loaded in the country of origin, customs declaration before arrival at the geographical borderlines with a supportive in-depth analysis of supply chain documentation during PCAs.

After investigating the impact of customs delays in the vertical tyre market in South Africa, the following recommendations are made:

1. Customs administration should use the historical frequency of occurrence as a risk indicator to avoid future repetitive stops.
2. A collaborative effort should be promoted between all the role players in the South African trading environment and South African customs to implement NCAP correctly.

3. Ultimately, the results indicated that SARSs customs risk management system and risk engine are not efficient for tyre imports to South Africa and may be deliberately stopping consignments rather than subjecting them to random frontline inspections.

In conclusion, customs administrations should aim for a better risk hit rate, since the repetitive nature of stops is not currently achieving the most appropriate risk score. The current system, which is built on a segmentation process of grouping entries into low, medium and high-risk, is not working to its optimum potential.

5.5 Reference list

Barnes, J. & Black, A. 2013. The motor industry development programme 1995-2012: what have we learned? Paper presented at the International Conference on Manufacturing-led Growth for Employment and Equality, Johannesburg, 20 and 21 May 2014.

<http://www.tips.org.za/research-archive/manufacturing-conference-2014> Date of access: 21 Nov. 2018.

Christopher, M. & Towill, D. 2001. An integrated model for the design of agile supply chains. *International Journal of Physical Distribution & Logistics Management*, 31(4):235-246.

Cohen, S. & Roussel, J. 2005. Strategic supply chain management: five disciplines for top performance. New York: McGraw-Hill.

Creskoff, S. 2016. What you need to know to go global: a guide to international trade transactions. Bloomington: Archway.

Customs Control Act see South Africa.

Customs Duty Act see South Africa.

Department of Trade and Industry see South Africa.

Djankov, S., Freund, C. & Pham, C.S. 2010. Trading on time. *The Review of Economics and Statistics*, 92(1):166-173.

Edmond, C., Midrigan, V. & Xu, D. Y. 2015. Competition, markups, and the gains from international trade. *American Economic Review*, 105(10):3183-3221.

Excise Act see South Africa.

Gattorna, J. 2009. Dynamic supply chain alignment: a new business model for peak performance in enterprise supply chains across all geographies. Farnham: Gower.

Hugos, M. 2006. Essentials of Supply Chain Management. Hoboken: John Wiley & Sons.

Human, E.H. 2018. The evolvment of the vertical tyre market in South African over the last 10 years [Correspondence]. 22 Jun., Johannesburg.

- IDC (Industrial Development Corporation). 2010. Fridge Research Project.
<http://new.nedlac.org.za/wp-content/uploads/2014/10/FRIDGECustomsFraud.pdf> Date of access: 15 Feb. 2019.
- Jianping, C. 2018. China's AEO joint incentive program. *WCO News*, 85:10-11.
- Karlsson, L. 2017. Back to the future of customs: a new AEO paradigm will transform the global supply chain for the better. *World Customs Journal*, (11)1:23-34
- Lee, H.L. 2004. The triple-A supply chain. *Harvard business review*, 82(10):102-113.
- Manners-Bell, J. 2017. Supply chain risk management: understanding emerging threats to global supply chains. London: Kogan Page.
- SARS (South African Revenue Service). 2018. New customs legislature update.
<http://www.sars.gov.za/ClientSegments/Customs-Excise/AboutCustoms/Pages/New-Customs-Legislation-update.aspx> Date of access: 25 Jan. 2019.
- SATMC (South African Tyre Manufacturers Conference). 2015. The South African Tyre Manufacturing Industry: ensuring consumer and road safety through the homologation of tyres in compliance with regulated compulsory specifications and standards. Paper presented at the Public hearings on the National Regulator for Compulsory Specifications, Cape Town, 2 September. <http://www.thedti.gov.za/parliament/2015/SATMC.pdf> Date of access: 15 Feb. 2019.
- Schonberger, R. 1982. Japanese manufacturing techniques: nine hidden lessons in simplicity. New York: Simon and Schuster.
- Sodhi, M.S. & Tang, C.S. 2012. Managing supply chain risk. *Springer Science & Business Media*, 172.
- South Africa. 1964. Excise Act 91 of 1964.
- South Africa. 2014. Customs Control Act 31 of July 2014.
- South Africa. 2014. Customs Duty Act 30 of July 2014.
- South Africa. Department of Trade and Industry. 2018. Industrial Policy Action Plan: economic sectors, employment and infrastructure development cluster 2018/19 - 2020/21.

Stephens, S. 2001. Supply chain operations reference model version 5.0: a new tool to improve supply chain efficiency and achieve best practice. *Information Systems Frontiers*, 3(4):471-476.

Theron, B. 2018. New Customs Acts Programme: SAAFF Presentation.

<http://www.sars.gov.za/AllDocs/Documents/customsandexcise/SAAFF%20Presentation%20NCAP%20%2029%20Aug%202018.pdf> Date of access: 5 Oct. 2018.

Trade Map. 2018. Trade Map: trade statistics for international business development.

<https://www.trademap.org/Index.aspx> Date of access: 21 Sep. 2018.

World Customs Organisation. 2018. AEO Compendium. Brussels.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

The WCO was created within the global trading landscape to ensure that a high level of custom compliance is fostered. The aim and focus of WCO member countries' customs administration is to obtain and maintain "fair and efficient revenue collection" as contextualised during a recent WCO conference in June of 2018. The WCO provides for capacity strengthening in the role of customs administration globally and to identify and collect all revenue that is legally due. This requires customs and the business community to possess in-depth technical knowledge of the building blocks for establishing duty liability (namely, customs valuation, classification of products and country of origin) to identify signed trade agreements where preferential duty rates are applicable. These classic customs work areas should be supported by dynamic risk management and post-clearance audit programmes as discussed. This should also ring true for customs in South Africa.

In addition to the legal and compliance requirements, customs administration must develop an understanding of trade facilitation measures to facilitate growth and enable effortless legitimate trade and operate in a fair and safe environment. This environment should include the effective segregation of low-, medium- and high-risk consignments for accurate and scientifically correct assessment of trade flows with the support of Big Data analysis. Facilitating trade and managing compliant import-export businesses is, in fact, compatible with the customs goal of effective revenue collection. By using risk management techniques to determine the compliance levels of individual businesses, customs are able to allocate its resources more effectively to target low or non-compliant operators and reduce checks on legitimate trade businesses with a high compliance record.

The evolution of supply chains and the influence of human behaviour have resulted in new market dynamics which centre on economies of scale and specialisation. This has brought about a natural division of the supply chain between specialised operators, whereby each operator focuses on their service offering although ultimately bound within a complex, intertwined network of data and cargo movements. As a result, the cargo owner does not need their own warehouse for storage or distributional channels. Instead, the supply chain network links a mix of different interacting role players with well-defined handover points, proper key performance indicators and penalties where any link in the supply chain fails to deliver the timeous movement of goods or services on a continuous 24-hour, seven-days-a-week, year-round basis.

Based on this new narrative, customs administrations have been forced to adapt their scope and daily tasks as trading patterns changed around the world. Customs risk management and compliance enforcement in the new era stretches far beyond the identification of goods and assessment of duties and taxes by government agencies operating in isolation based on isolated risk indicators. The evolving order calls for a new level of cooperation between international organisations and the private sector.

The three primary instruments, namely the Revised Kyoto Convention (RKC), the SAFE Framework of Standards (SAFE) and the HS, are linked as demonstrated and as such form a solid foundation for a customs risk management base. They address the classification of goods and collection of revenue through simplified and harmonised procedures within the SAFE Framework and its three pillars when handling the inflow and outflow of cargo in a secure, safe trading environment.

The rapid growth of international trade coupled with the limited resources of customs administrations globally is the primary determinant of the choice of methods used to execute customs control. Controlling every item on arrival at customs borders has become a significant non-tariff barrier to trade due to the impracticality of such measures and the enormous amount of resource and infrastructure requirements. Various techniques exist to categorise cargo movements into low-, medium- and high-risk categories. Modern customs control systems around the world follow a selectivity-based risk management approach to negate risks based on their likelihood and potential impact.

Since an element of a risk-based management concept is applicable in almost every arena of business and government, a significant amount of experiences could be shared between customs administrations in the management of trade across borders. Its use as a means of systematic identification and implementation of all measures necessary to limit exposure to customs risk determines which persons, goods, and means of transport should be examined and to what extent. High-risk persons, goods and means of transport are therefore subject to high-level controls and interventions. On the other hand, low-risk persons, goods and means of transport are exempted from such scrutiny. Throughout this thesis, attention has been drawn to a scientific risk management approach as the only means of ensuring compliance with customs regulations in a way that also ensures trade facilitation.

A customs risk management process should consider the input and output factors of a consignment, assess the probability that the consignment will represent a significant risk and call for the attention of customs administration to mitigate the assessed risk through the most

appropriate risk remedy. To date, the execution of customs risk management has not been widely studied nor published, since customs administrations treat invariably the knowledge and expertise which enable them to take appropriate action as confidential.

This thesis presents an impact analysis of customs risk management processes in South Africa. It consists of three independent articles that addressed interrelated aspects of the overall thesis objective of enabling the country's customs to make the transition from gatekeeper to facilitator.

The first objective of the thesis was to investigate the current best practices models followed by customs administrations worldwide and Chapter 3 (Article 1) is an investigative study into the best customs risk management practices as applied around the world, with a specific focus on South Africa. The second objective of the thesis to determine the effect of the current customs risk management practices on trade in South Africa was achieved in Chapter 4 (Article 2), as an explorative study into the effectiveness of a customs operation and its impact on trade.

The third objective of the thesis assessed the impact of current customs risk management practices in South Africa on the vertical tyre market. Chapter 5 (Article 3) sets out an impact study of customs delays on this market. Chapter 5 investigates the direct and indirect costs and time delays incurred by importers of tyre consignments when subjected to customs or OGA stops.

The findings of the abovementioned objectives are presented in the following section.

6.2 Summary of the results and conclusions of the study

Chapter 2 presents a full academic literature review of globalisation and global supply chains with their link to regional integration. The role of customs in the supply chain is investigated together with the role of various international organisations such as the WTO and the WCO in ensuring an efficient, compliant and safe international trading environment. This pointed to the roadmap through which the role of customs administrations in trade could be investigated by virtue of customs risk management. The chapter set out the platform of the thesis in the form of three independent articles.

Chapter 3 presents the first article, titled '*An investigative study into global customs risk management practices*'. This article compares the current customs risk management models employed around the world to the current customs risk management model employed by South Africa's customs administration in order to propose a best practice customs risk management model for the country based on risk factors, such as entity, transaction, cargo and commercial risk.

The article shows that several countries (e.g. the US, UK, EU) are developing new performance measurement models based on the relationship between customs and business as prescribed by the SAFE Pillar II. These new models create a basic platform for more advanced management, monitoring and evaluation of the broader role of customs. As with a similar PT programme within the context of C-2-B in South African customs risk management, the proposed enhanced model will greatly improve the risk engine by making use of underlying technology in automatically detecting high-risk cargo and distinguishing high-risk cargo from low-risk cargo.

The article further posits that South Africa has to design the voluntary compliance management concept (within the PT and AEO program) in such a way that it can deliver attractive benefits to all stakeholders (within the end-to-end supply chain) involved in the program. AEO programmes are set to greatly improve data compliance and the four critical performance categories of speed, predictability, lower costs and better services in the flow of goods, services and people across international borders.

It showcases the solid building block for compliant traders in risk management brought about by the inclusion of businesses as posited by the AEO programs. The standards and guidelines contained in the RKC, the WCO SAFE and the application of customs risk management continue to be critical elements that underpin all modern customs administrations – none more so than in the case of South Africa.

Chapter 4 presents an article, titled '*An explorative study into the effectiveness of a customs operation and its impact on trade*'. It was a first attempt at gaining a better understanding of the customs risk processes in South Africa and their impact on trade in the region. Data was obtained from several freight forwarders in South Africa to represent transaction-level flows exchanged between the South African customs administration (SARS) and consignors of goods imported into South Africa between September 2014 and September 2016. Correlations were identified between customs outcomes, including the incidence of infractions and the attributes of the declarations, such as importers identity, importers national economic activity and customs office handling the import, among others.

The results demonstrate that it is possible to generate performance statistics as functions of the various input variables listed above and to relate these input variables to customs outcomes and performance levels, thereby explaining the reasons for the observed efficiency of a customs process in much more detail than had previously been done.

It is evident that the average time for the South African customs to process consignments is increasing, mostly due to an increase in the number of consignments for which customs request additional documentation. Only about five to 10 per cent of the consignments were actually amended or rejected, implying that it should be possible to improve the efficiency of the risk identification process applied by South African customs. Ultimately, more than 90 per cent of the delays caused by South African customs could be avoided if shipments are screened differently. Chapter 4 shows that South African customs use specific input factors to target consignments for scrutiny. The most important factors appear to be the identity of the consignor, followed by country of origin and cargo type. The fact that correlations between these factors and infractions were found to be much lower compared to correlations with the number of consignments that were stopped indicates that the current strategy is not fully justified and does not produce high hit rates.

This highlights the value of detailed statistical analysis based on transaction-level data over a sufficiently long period to highlight the effectiveness of a customs operation and its impact on trade.

Chapter 5 presents the third article, titled “An impact study on the customs delays on the vertical tyre market in South Africa”. This study uses a case study to quantify the impact of customs delays on the vertical tyre market in South Africa. Data obtained from a South African freight forwarder represented transaction-level flows exchanged between the South African customs administration (SARS) and consignors of tyres imported into South Africa between January 2017 and April 2018 (16 months).

Available data for tyre imports into South Africa shows how the industry is rapidly growing, especially imports from China and other Asian countries. The growth in imports ostensibly comes at the expense of the local tyre manufacturing industry in South Africa and results in a continued increase in job losses and declining competitiveness of industries.

The results show that customs delays significantly impact the vertical tyre market in South Africa in terms of both direct and indirect costs and time incurred, differing in range from tyre importer to tyre importer. In quantifying the exact impact, the conclusion is that a delay results in a direct cost increase of 3.8 per cent of customs value for tyre imports to South Africa with an additional 4.8 days added to the end-to-end supply chain.

The indirect cost impact of customs delays caused by documentary inspection, scanning of containers and a full unpacking of containers for customs inspections could not easily be determined due to different recording practices in accounting and the interpretation of impact to

the identified activity. Nonetheless, indirect costs in the vertical tyre market have shown three considerable effects:

1. Loss of sales revenue, which reduces its contribution to the gross profit and the nett profit, ranging from R37 500 to R1.5 million per customs EDI declaration depending on the type of tyre product range involved and industry need.
2. Extension of the cash-to-cash flow cycle in the supply chain with an increase in stock holding, since more time and stock are needed to buffer the hold-up activity of stock in the case of a customs stop (the cash-to-cash cycle ranges between seven days and 45 days, while the stock requirements ranges between seven days and 32 days, depending on the product range).
3. Brand damage, due to a lack of a 100 per cent fill rate on the promised date (the exact indirect cost was difficult to quantify since the different companies record this activity in their financial system with different parameters).

In conclusion, the article identifies the typical patterns for perceived high risk that results in the inspection of cargo. It provided further evidence for the need to justify a physical intervention at the frontline before import declarations are inspected (such as very high-risk cargo), as this inspection may result in significant delays and unquantifiable direct costs with its associated indirect costs.

6.3 Contribution

The primary contribution of this study is fivefold:

Firstly, this thesis identifies important risk indicators to evaluate the reasons behind the categorisation of a cargo consignment as high-risk and provides details on how it uses the identified factors in the SARS risk engine.

Secondly, it suggests the need for an improved risk model that relies on more detailed information, such as post-clearance audits (PCA) and evaluation of importer behaviour against all information that was previously audited in repetitive stops. Effectively, the suggested model ensures that results obtained through PCA and customs inspection are captured electronically against the entity or owner of the import supply chain. This data is fed into an information feedback loop, thereby adding additional valuable information to the already-known risk indicators for the entity as per the SARS risk engine. This prevents customs from deducing certain behaviour by an importer to be correct just because the behaviour is recurring.

Thirdly, it shows how the anomaly of interruption can be avoided, since the rules for classification of goods often change, or where one nomenclature code (HS) is split into two (especially seen in the vertical tyre market). Presently, data on the newly created codes (HS) will be minimal or non-existent. With the lack of historical data, as is the case with new HS codes for a period, the SARS risk engine triggers a perceived a high risk on import consignments and calls for remedies for such high risks like a full unpacking of the container, while the new classification of goods represents a low-risk indicator on the flagged consignment.

Fourthly, since import declarations consider that behaviour patterns change over time, this thesis shows how analysing old import declarations might introduce a higher risk consideration for any new import declaration that deviates from the exact registration date of the legal importer. This is especially evident in the vertical tyre market where the legal importer may expand their product range with new additions, for example, truck tyres, tyres fitted with rims or earthmoving tyres.

Fifthly, this thesis shows how the decision of a transaction can be changed from being perceived as low-risk to high-risk if and when a more detailed description of goods or manifest data is combined with the declaration and is made available through the SARS risk engine. The use of technology and increased technical innovation makes customs risk management more effective.

The secondary contributions per article are as follows:

Article 1 describes how the SAFE pillar II instrument correctly implemented will allow the C-2-B partnership to play an active role in facilitating trade on a risk management platform. The transfer of more responsibilities to the broader business community for greater compliance and active monitoring of its own supply chain activities together with the careful selection of operators and measurement tools at the handover point will reduce risk on a much larger scale and will contribute to customs administration in fostering a more compliant society.

Article 2 describes a context behind 3.5 million transactions and their relationship with customs risk management.

Article 3 contextualises the South Africa vertical tyre market in terms of the risks that can be identified.

6.4 Recommendations

The in-depth analysis of this research poses both opportunities and threats for the customs risk management environment in South Africa. This section offers recommendations for future research in the field of customs risk management as well as for policymakers and SARS customs.

As a matter of priority, there is a need for the use of technology and correct decision-making tools for effective data analysis across several databases to contribute to and affect the decisions of customs administration officials to varying degrees of relevance.

From the studies and empirical work, this thesis highlights the key to success as the timeous processing of data and identification of inconsistencies and known threats along with the cross-pollination of data from different databases and the application of heuristic methods to the data. Once data is abundant and sourced from multiple systems (allowing viewing of important information for the customs clearance and risk assessment process on a single screen), it will make room for a more suitable solution when risk is identified. The case study presented in Chapter 5 shows that physical inspections did not mitigate risk and that the private sector incurred tremendous (direct and indirect) costs.

Data analysis with a layered approach will also allow customs administrations to create rules based on its own knowledge of risks and manual recording of incidents (derived from PCAs and random stops). This will eliminate the manual interrogation of numerous supporting systems, thereby facilitating customs administrators to become experts in risk identification and the application of the risk remedy that is required.

Laporte's risk management system (2011) shows that a single risk can be determined and allocated with a risk score at the frontline or when a customs declaration is made. This thesis illustrates throughout that better results could be obtained with a layered approach, since all the activities in either an import or export process do not occur at one specific point in time within the supply chain. Risk indicators are more accurate when scaffolded while maintaining the relationship between the risk indicators. Advanced notification of loading at origin, pre-loading advice, loading notification and cargo reporting while the import and export transaction is busy unfolding in its journey to completion can help customs identify and categorise risks more accurately. This approach supports the Yemen case where cargo reporting revealed a greater risk and caution of customs officials but was viewed independently from the customs declaration.

To contribute to the existing albeit limited literature on customs risk management, this thesis offers some recommendations for future research in the field in the following section.

6.4.1 Recommendations for future research in the field of customs risk management

Considering that the SAFE Pillar III (C-2-OGA) brings customs administration and other government agencies into a joint relationship for the enforcement of customs management, it is clear that all these entities should complement each other's work to ensure a safe, secure and fair environment in a country for all its citizens.

In the event of a natural catastrophe like an epidemic, customs administrations must facilitate or even speed up the delivery of relief consignment to victims in helping to reduce the number of possible deaths. In practice, when a humanitarian emergency is declared, customs administrations are often ill-prepared to process relief consignments which arrive en masse over a very short period. Import formalities are frequently too lengthy, particularly where another administration is involved in the customs clearance, such as when a certificate or authorisation is required. An example includes the practical cases reported in 2011 in the submission of the resolution on the *Role of Customs in Natural Disaster Relief* for approval by its members. In this instance, the WCO Secretariat encouraged members to take adequate measures that would allow for effective border procedures to be put in place.

In summary, based on the literature for customs risk management in South Africa and the findings of the study, this thesis makes the following recommendations:

1. Identify problem statements in customs risk management analysis along with the most appropriate remedy to address every risk.
2. Ensure that all case recordings are done electronically with a screen view of the applicable trader on previously investigated cases or PCAs, with electronic recordings on their findings and a scope of testing to create an alignment to the WCO training programme.
3. Launch a time-release study (TRS) in coordination with business to create awareness of time releases among all stakeholders and their role in its reduction.
4. Establish and monitor an evaluation plan to ensure that the customs administration and private sector can jointly view the effects of risk management within a trading environment. Business and labour should actively be involved in shaping the trading environment and assist in improving it by:
 - a. reporting cases,
 - b. creating benefits in self-compliance programmes, and

- c. creating a shame platform for non-compliant traders.
- 5. Build a greater level of validation in the customs declaration data fields with links to other relevant databases in other government departments, that is, they should verify the data real-time with active databases.
- 6. Share capacity with businesses for data analytics between movements in the HS codes. Customs administrations should collect a significant volume of data on a daily basis. Most customs administrations have not been able to leverage such data before now due to a lack of IT infrastructure and knowledge. However, this has changed with the development of modern IT infrastructure as well as Big Data and open-source analytics solutions to manage and analyse data. In 2017, Korea Customs Service established and initiated an in-house data analysis team. They also planned to incorporate 300 experts (seven per cent of the total customs workforce) into a Big Data analysis over the next five years.

In addition to the points outlined above, this thesis proposes developing more robust risk management models through multinomial (probit) regression models. This type of approach might allow for looking at the relative impacts of different factors once the different factors have indeed been established. As mentioned before, a venture has been made into this type of approach. Research which builds on this approach has been published in the accredited World Customs Journal (WCJ), Volume 13, Number 1 in 2019. Given the rapid expansion of data generation within business in general, and the greater supply chain specifically, a strong recommendation is therefore made to continue research into customs risk management models to guide customs reforms, which can improve the efficiency of the customs clearance process.

6.4.2 Recommendations for policymakers and SARS customs

This thesis puts forward challenges accompanied by recommendations for policymakers and SARS customs administration.

Trade facilitation, as concluded in the WCO-TFA, is built into the RKC, yet most South African businesses do not have a seat in the National Trade Facilitation Committee (NTFC) despite it currently being co-chaired by DTI and SARS. Businesses and SARS customs should, therefore, receive training on and have a full understanding of the RKC (that includes the simplification and harmonisation of processes).

Subsequently, in implementing risk management as a scientific approach, SARS customs should work together with businesses and labour to define and refine a more robust process with accurate reporting on data toward fostering a more compliant society. Information should be

shared (in SARS annual reports among others) to achieve more transparent activities in terms of the number of seizures, the number of successful prosecutions and the number of random checks, among other measures.

An increased focus and input on the PT programme should be carried through to the AEOs that include the extended supply chain towards achieving higher end-to-end compliance. A collaborative approach with the private sector will successfully reach these outcomes. To this extent, the following global issues have been raised and require dedicated attention:

- Aligning the benefit for the PT with the SAFE benefits grid;
- Building trust not only between customs and the private sector companies but also among customs administrations;
- Identifying tangible benefits for AEOs, which remains a current challenge.

Another challenge is the number of small parcels to be cleared by SARS customs that has skyrocketed with the exponential growth in e-commerce. To address this, South Africa should consider a simplified customs procedure for low-value goods but with a stronger risk profile, as criminals sneak smaller quantities of goods in separate consignments to avoid reaching the *de minimis* threshold above which duties and/or taxes become payable.

Misinvoicing is a form of customs or tax fraud that involves exporters and importers deliberately misreporting the value, quantity or the nature of goods or services in a commercial transaction. The motives governing such transfers include:

- the evasion of taxes and tariffs;
- the payment of bribes and kickbacks;
- the circumvention of trade regulations;
- the exploitation of trade incentives; and
- the evasion of capital control.

In light of the above, customs have a sufficient mandate to address and minimise under-invoiced as well as over-invoiced imports and exports.

The illicit financial flow that results from misinvoicing is concealed across countless trade transactions and is impossible to measure directly. Customs should consequently also have access to foreign exchange databases to examine whether financial transactions between traders correspond to the declared value of traded goods. Closer collaboration with financial institutions is required for the data analysis of patterns suggesting different risk indicators. This links to the

adoption of a new 'data culture' and efficient reporting procedures on inspection results to enhance risk management and the development of analysis capacity among SARS customs officers and the use of analytical tools. The ultimate goal is to monitor trade and financial transactions simultaneously.

Developing practical policies for SARS to implement will facilitate the sharing of information, standardising of data formats and centralising of data for operational use. Customs should realise the necessity of adopting a 'whole-of-government' approach to develop a coherent strategy and avoid scenarios where agencies operate in silos. Customs should be allowed to take full advantage of the potential offered by new technologies, such as blockchain, to prevent any fraudulent manipulation of trade transactions and allow the sharing of relevant information in a trusted and secure manner.

Finally, SARS customs should strengthen their links to criminal courts to perform risk-sensitive and random checks at borders and inside a country with several tools at their disposal, such as mobile x-ray equipment and sniffer dogs. They should also be empowered to filter and focus on cases that will further investigation by law enforcement agencies. This approach will reduce the burden on law enforcement and prosecution authorities and shift resources from the processing of suspicious transaction reports to the investigation and prosecution of illicit financial flows.

REFERENCE LIST

- Aigner, S. 2010. Mutual recognition of authorised economic operators and security measures. *World Customs Journal*, 4(1):47-54.
- Alcalá, F. & Ciccone, A. 2004. Trade and productivity. *The Quarterly journal of economics*, 119(2):613-646.
- Arvis, J.F., Ojala, L., Wiederer, C., Shepherd, B., Raj, A., Dairabayeva, K. & Kiiski, T. 2018. Connecting to compete 2018: trade logistics in the global economy. Washington: World Bank Publications.
- Arvis, J.F., Saslavsky, D., Ojala, L., Shepherd, B., Busch, C., Raj, A. & Naula, T. 2016. Connecting to compete 2016. Washington: World Bank.
- Awuah, G.B. 2009. The impact of globalization and trade liberalization on competitiveness of firms in less developed countries: a longitudinal study. *International Journal of Business Research*, 9(3):7-19.
- Ayyub, B.M. 2014. Risk analysis in engineering and economics. Cleveland: CRC Press.
- Baldwin, R. 2016. The great convergence. Cambridge: Harvard.
- Baldwin, R.E. Ed. 2009. The great trade collapse: causes, consequences and prospects. London: Cepr.
- Barnes, C., Blake, H. & Pinder, D. 2009. Creating and delivering your value proposition: managing customer experience for profit. London: Kogan Page.
- Barnes, J. & Black, A. 2013. The motor industry development programme 1995-2012: what have we learned? Paper presented at the International Conference on Manufacturing-led Growth for Employment and Equality, Johannesburg, 20 and 21 May 2014.
<http://www.tips.org.za/research-archive/manufacturing-conference-2014> Date of access: 21 Nov. 2018.
- Bhagwati, J. 1964. On the underinvoicing of imports. *Bulletin of the Oxford University Institute of Economics & Statistics*, 27(4):389-397.
- Bhagwati, J. N. 1974. Illegal Transactions in International Trade. Amsterdam: North-Holland.

Canham, J. 2017. Emerging technologies can transform border management, but agencies must prepare. *WCO News*, 82:32-33.

Cantens, T., Ireland, R., & Raballand, G. 2012. Reform by numbers: measurement applied to customs and tax administrations in developing countries. Washington: World Bank.

Carafano, J. J. & Zuckerman, J. 2011. 40 Terror plots foiled since 9/11: Combating complacency in the long war on terror. Washington: Heritage Foundation.

Cariolle, J., Chalendard, C. R., Geourjon, A. M., & Laporte, B. 2017. Going beyond analysis of internal data to support customs modernization: A case study in Gabon. Available at SSRN 3082845.

CBP (Customs and Border Protection). 2002. Termination of test regarding Importer Compliance Monitoring Program. <https://www.cbp.gov/bulletins/36genno20.pdf> Date of access: 13 Sept. 2018.

CBP (Customs and Border Protection). 2013. C-TPAT Factsheet. www.cbp.gov/sites/default/files/documents/ctpat_factsheet_2.pdf Date of access: 20 Apr. 2018.

CBP (Customs and Border Protection). 2018a. CTPAT: Customs Trade Partnership Against Terrorism. <https://www.cbp.gov/border-security/ports-entry/cargo-security/ctpat> Date of access: 1 Jun. 2018.

CBP (Customs and Border Protection). 2018b. Commercial Customs Operations Advisory Committee (COAC). <https://www.cbp.gov/sites/default/files/assets/documents/2018-Jul/Trusted%20Trader%20Subcommittee%20Executive%20Summary.pdf> Date of access: 13 Sept. 2018.

CBP (Customs and Border Protection). 2018c. CTPAT's five step risk assessment. <https://www.cbp.gov/sites/default/files/documents/C-TPAT%27s%20Five%20Step%20Risk%20Assessment%20Process.pdf> Date of access: 1 Nov. 2018.

CBRA (Cross-Border Research Association). 2017. Customs true societal protection performance index. <https://www.cross-border.org/2017/02/24/customs-true-societal-protection-performance-index/> Date of access: 16 Sept. 2018.

Chalendard, C., Raballand, G., & Rakotoarisoa, A. 2019. The use of detailed statistical data in customs reforms: The case of Madagascar. *Development Policy Review*, 37(4):546-563.

Christopher, M. & Towill, D. 2001. An integrated model for the design of agile supply chains. *International Journal of Physical Distribution & Logistics Management*, 31(4):235-246.

CITES (Convention on International Trade in Endangered Species). 2018. List of Parties to the Convention. <https://www.cites.org/eng/disc/parties/index.php> Date of Access: 31 May 2018.

Cohen, S. & Roussel, J. 2005. Strategic supply chain management: five disciplines for top performance. New York: McGraw-Hill.

Coyle, J.J., Gibson, B.J., Langley, C.J. & Novack, R.A. 2017. Managing supply chains: a logistics approach. 10th ed. Boston: South-Western Cengage Learning.

Creskoff, S. 2016. What you need to know to go global: a guide to international trade transactions. Bloomington: Archway Publishing.

Curry, J.E. 2000. Internationales Marketing. Neue Märkte erschließen, (Expansion im Zeichen der Globalisierung), Aus der Englischen Übersetzung. Von Jürgen Ulrich Lorenz, erste Auflage, Köln, Dt. Wirtschaftsdienst.

Customs and Excise Amendment Bill **see** South Africa

Customs Control Act **see** South Africa.

Customs Duty Act **see** South Africa.

Czinkota, M.R. & Ronkainen, I.A. 2007. International marketing. Mason: Thomson.

Davaa, T. & Namsrai, B. 2015. Ways to modernise customs risk management in Mongolia. *World Customs Journal*, 9(2):24-37.

Department of Trade and Industry **see** South Africa.

Descartes. 2016. Business white paper - logistics flow control: gaining command of the inbound supply chain. <https://www.descartes.com/documents/white-paper-logistics-flow-control-gaining-command-inbound-supply-chain> Date of access: 3 Dec. 2018.

Djankov, S., Freund, C. & Pham, C.S. 2006. Trading on time. Washington: World Bank Publications.

Djankov, S., Freund, C. & Pham, C.S. 2010. Trading on time. *The Review of Economics and Statistics*, 92(1):166-173.

Dludla, S. 2017. DTI commits to helping ailing poultry industry.

<https://www.iol.co.za/news/politics/dti-commits-to-helping-ailing-poultry-industry-7365462> Date of access: 18 Jan. 2019.

Doing Business. 2018. Equal opportunity for all. *International Bank for Reconstruction and Development. The World Bank. 15th edition*. Washington DC.

Doyle, T. 2011. The Future of Border Management. (*In* McLinden, G., Fanta, E., Widdowson, D. & Doyle, T. eds. Border management modernization. Washington: World Bank. p. 11-22).

Dunne, M. 2010. Getting to grips with risk management. *WCO News*, 6:16.

Edmond, C., Midrigan, V. & Xu, D. Y. 2015. Competition, markups, and the gains from international trade. *American Economic Review*, 105(10):3183-3221.

Ellison, B. 2018. South African customs landscape [Correspondence]. 19 Feb, Johannesburg.

EU (European Union). 2017. Customs Risk Management Framework.

https://ec.europa.eu/taxation_customs/general-information-customs/customs-risk-management/measures-customs-risk-management-framework-crmf_en Date of Access: 19 Oct. 2017.

EU Commission for Taxation and Customs. 2018. www.ec.europa.eu/taxation_customs Date of access: 26 Apr. 2018.

Evans, C.L. & Harrigan, J. 2005. Distance, time, and specialization: lean retailing in general equilibrium. *American Economic Review*, 95(1):292-313.

Excise Act see South Africa.

Ferguson, I.F. 2008. World Trade Organization negotiations: The Doha development Agenda. Washington: Library of congress Washington DC congressional research service.

- Fernandes, A.M., Hillberry, R. & Berg, C. 2016. Expediting trade: impact evaluation of an in-house clearance program. Washington: World Bank.
- Ferrantino, M.J. 2013. 11 Policies to improve the supply chain: what needs to be done? *Global value chains in a changing world*, 263.
- Finger, M., Hintsa, J., Männistö, T., Hameri, A.P., Thibedeau, C., Sahlstedt, J. & Tsikolenko, V. 2010. Customs risk management: a survey of 24 customs administrations. *World Customs Organisation (WCO) Working Paper*, EPFL-WORKING-173319.
- Fisman, R., & Wei, S. J. 2004. Tax rates and tax evasion: evidence from “missing imports” in China. *Journal of political economy*, 112(2):471-496.
- Foorthuis, R. & Bos, R. 2011. A framework for organizational compliance management tactics. (In Salinesi, C. Pastor, O. eds. *International Conference on Advanced Information Systems Engineering*. Springer: Berlin p. 259-268).
- Frankel, J.A. & Romer, D.H. 1999. Does trade cause growth? *American economic review*, 89(3):379-399.
- Friedman, T.L. 2017. Thank you for being late: an optimist's guide to thriving in the age of accelerations (Version 2.0, with a new afterword). New York: Picador/Farrar Straus and Giroux.
- GACC (General Administration of Customs of the People's Republic of China). 2018. Overview of GACC. <http://english.customs.gov.cn/about/mission> Date of access: 22 Aug. 2018.
- Gattorna, J. 2009. Dynamic supply chain alignment: a new business model for peak performance in enterprise supply chains across all geographies. Farnham: Gower.
- Giermanski, J.R. 2008. Container security: is the layered approach working? <https://www.csoononline.com/article/2122919/container-security--is-the-layered-approach-working-.html> Date of access: 14 Mar. 2019.
- Graham, G. 2018. Multinationals doing wonders for SA. <https://www.iol.co.za/business-report/opinion/opinion-multinationals-doing-wonders-for-sa-14212722> Date of access: 7 Mar. 2019.

Graighead, A. 2017. Trade and customs procedures in international freight transport: requirements, issues and trends. (In Beresford, A. & Pettit, S. eds. International freight transport: cases, structures and prospects. London: Kogan. p. 57-76).

Handy, C.B. 1995. The age of paradox. Cambridge: Harvard Business.

Harrison, M. 2007. Challenges for customs. Paper presented at the Annual conference on APEC centres, Melbourne, Australia.

Hintsä, J., Männistö, T., Hameri, A.P., Thibedeau, C., Sahlstedt, J., Tsikolenko, V. & Granqvist, M. 2011. Customs risk management (CRiM): a survey of 24 WCO member administrations. Echandens: Cross-Border Research Association.

Hirst, P., Thompson, G. & Bromley, S. 2015. Globalization in question. Hoboken: John Wiley & Sons.

HMRC (Her Majesty's Revenue and Customs). 2018. Notice 117: Authorised Economic Operator. Government Publications. www.gov.uk/government/publications/notice-117-authorized-economic-operator/ Date of access: 26 Apr. 2018.

Hoffman, A., Grater, S., Venter, W.C., Maree, J. & Liebenberg, D. 2018. An explorative study into the effectiveness of a customs operation and its impact on trade. *World Customs Journal*, 12(2):63-86.

Hoffman, A.J. 2018. Characterization and modelling of a customs operation. *Condition Monitoring and Diagnostic Engineering Management*, 226.

Hoffman, A.J., Grater, S., Schaap, A., Maree, J. & Bhero, E. 2016. A simulation approach to reconciling customs and trade risk associated with cross-border freight movements. *South African Journal of Industrial Engineering*, 27(3):251-264.

Hugos, M. 2006. Essentials of Supply Chain Management. Hoboken: John Wiley & Sons.

Human, E.H. 2018. The evolvment of the vertical tyre market in South African over the last 10 years [Correspondence]. 22 Jun., Johannesburg.

Hummels, D. & Schaur, G. 2012. Time as a trade barrier (No. w17758). Cambridge: National Bureau of Economic Research.

- IDC (Industrial Development Corporation). 2010. Fridge Research Project. <http://new.nedlac.org.za/wp-content/uploads/2014/10/FRIDGECustomsFraud.pdf> Date of access: 15 Feb. 2019.
- Iordache, E. & Voiculescu, A.V. 2007. Customs risk management in the European Union. *The Romanian Economic Journal*, X(25):55-72.
- Jianping, C. 2018. China's AEO joint incentive program. *WCO News*, 85:10-11.
- Kalizinje, F. 2018. Combating Customs Revenue Fraud in WCO East and Southern African Region: A Mirror Analysis Through the Lens of Malawi. *Global Trade and Customs Journal*, 13(5):224-233.
- Kaplinsky, R. & Morris, M. 2001. A handbook for value chain research (Vol. 113). Ottawa: IDRC.
- Karlsson, L. 2017. Back to the future of customs: a new AEO paradigm will transform the global supply chain for the better. *World Customs Journal*, (11)1:23-34
- Khan, O. & Zsidisin, G.A. 2012. Handbook for supply chain risk management: case studies, effective practices, and emerging trends. Fort Lauderdale: J. Ross.
- Knight, F. H. 1921. Risk, uncertainty and profit. Chicago: University of Chicago Press.
- Komarov, O.V. 2016. Risk management systems in customs: The Ukrainian context. *World Customs Journal*, 10(1):35-44.
- Koopman, R., Powers, W., Wang, Z. & Wei, S.J. 2010. Give credit where credit is due: tracing value added in global production chains (No. w16426). Cambridge: National Bureau of Economic Research.
- Korniienko, M.Y., Pinat, M. & Dew, B. 2017. Assessing the fragility of global trade: the impact of localized supply shocks using network analysis. IMF Working Paper.
- KRA (Kenya Revenue Authority). 2018. Customs and border control. <http://kra.go.ke/index.php/customs-services/about-customs> Date of access: 23 Aug. 2018.
- Krugman, P.R. 1991. Increasing returns and economic geography. *Journal of political economy*, 99(3):483-499.

- Krugman, P.R. & Obstfeld, M. 2009. *International economics: theory and policy*. 8th ed. Boston: Pearson.
- Laporte, B. 2011. Risk management systems: using data mining in developing countries' customs administration. *World Customs Journal*, 5(1):17-28.
- Lee, H.L. 2004. The triple-A supply chain. *Harvard business review*, 82(10):102-113.
- Leontief, W. 1953. Domestic production and foreign trade: The American capital position re-examined. *Proceedings of the American Philosophical Society*, 97(4):332-349.
- Mahlati, V. 2017. Local textile industry needs support to be safe.
<https://www.iol.co.za/business-report/opinion/local-textile-industry-needs-support-to-be-safe-8203140> Date of access: 18 Jan. 2019.
- Maneschi, A. 2007. History of economic thought on trade policy. (In Kerr, W.A. & Gainsford, J.D. eds. *Handbook on international trade policy*. Cheltenham: Edward Elgar. p. 19-28).
- Manners-Bell, J. 2014. Improving global supply chain sustainability. *Risk Management*, 61(10):12-13.
- Manners-Bell, J. 2017. *Supply chain risk management*, 2nd ed. London: Kogan Page.
- Manners-Bell, J., Cullen, T. & Roberson, C. 2014. *Logistics and supply chains in emerging markets*. London: Kogan Page.
- Manyika, J., Chui, M., Bughin, J., Dobbs, R., Bisson, P. & Marrs, A. 2013. *Disruptive technologies: advances that will transform life, business, and the global economy* (Vol. 180). San Francisco: McKinsey Global Institute.
- Mikuriya, K. 2017. Data analysis: seizing opportunities for effective border management. *WCO News*, 82:7-9.
- Mikuriya, K. 2018. *International Customs Day 2018*.
http://www.wcoomd.org/en/media/newsroom/2018/january/message-from-the-wco_international-customs-day-2018.aspx Date of access: 7 Jun. 2018.
- Milner, C. 2013. Declining protection in developing countries: fact or fiction? *The World Economy*, 36(6):689-700.

MRA (Malawi Revenue Authority). 2018. ASYCUDA World. <http://www.mra.mw/custom-and-excise/asycuda-world> Date of access: 24 Apr. 2018.

Mun, T. 1713. England's treasure by foreign trade: or, the balance of our foreign trade is the rule of our treasure. London: J. Morphew.

Nguyen, T. 2012. Changes to the role of US customs and border protection and the impact of 100% container scanning law. *World Customs Journal*, 6(2):109-118.

Nordås, H.K., Pinali, E. & Grosso, M.G. 2006. Logistics and time as a trade barrier. Paris: OECD.

NZCS (New Zealand Customs Service). 2017. Annual report 2017. Government publications.

NZCS (New Zealand Customs Service). 2018a. Factsheet 34 Secure Exports Scheme. <https://www.customs.govt.nz/globalassets/documents/fact-sheets/fact-sheet-34-secure-exports-scheme.pdf> Date of access: 13 Sept. 2018.

NZCS (New Zealand Customs Service). 2018b. Secure Exports Scheme. www.customs.govt.nz/business/export/secure-exports-scheme/ Date of access: 26 Apr. 2018.

Phillips. 2017. Annual Report. <https://www.philips.com/static/annualresults/2017/PhilipsFullAnnualReport2017-English.pdf> Date of access: 18 Jan. 2019.

Pierre, J. & Peters, B. 2005. Governing complex societies: trajectories and scenarios. London: Sage.

Port of Antwerp. 2018. Customs solutions. <http://www.portofantwerp.com/en/customs-solutions-we%E2%80%99ll-keep-moving-you-smoother#douane> Date of access: 1 Jun. 2018.

Porter, M.E. 1985. Competitive advantage. New York: Free Press.

Porter, M.E. 2011. Competitive advantage of nations: creating and sustaining superior performance (Vol. 2). New York: Simon and Schuster.

Poverello, M. 2010. WCO data model. <https://mpoverello.com/wco-data-model-3-dmv3/> Date of access: 14 Sept. 2018.

Prokop, D. 2017. Global supply chain security and management. Oxford: Butterworth-Heinemann.

Rebelo, E. 2004. CSI implemented at Durban Port. <http://www.engineeringnews.co.za/print-version/csi-implemented-at-durban-port-2004-04-30> Date of access: 14 Sept. 2018.

SA Governmental News. 2017. Plans well underway for SA's border management agency. <https://www.sanews.gov.za/south-africa/plans-well-underway-sas-border-management-agency> Date of access: 7 Mar. 2019.

SARS (South African Revenue Service). 2010. Customs modernisation: moving into the future. Trader pocket guide. http://www.saaffkzn.co.za/web/webroot/files/articles/1294/60983_TRADERSPOCKETGUIDEv4.pdf Date of access: 14 Nov. 2017.

SARS (South African Revenue Service). 2013. Draft Taxation Laws Amendment Bill and Tax Administration Laws Amendment Bill, 2013 - Annexure E. [http://www.sars.gov.za/Media/MediaReleases/Pages/4-July-2013---Taxation-Laws-Amendment-Bills-\(TLAB-2013\).aspx](http://www.sars.gov.za/Media/MediaReleases/Pages/4-July-2013---Taxation-Laws-Amendment-Bills-(TLAB-2013).aspx) Date of access: 14 Sept. 2018.

SARS (South African Revenue Service). 2014. Annual Report 2013/2014. Pretoria.

SARS (South African Revenue Service). 2015. SARS commissioner launches customs cargo scanner at Cape Town Harbour. <http://www.sars.gov.za/Media/MediaReleases/Pages/22-July-2015---SARS-Commissioner-launches-Customs-cargo-scanner-at-Cape-Town-Harbour.aspx> Date of access: 14 Sept. 2018.

SARS (South African Revenue Service). 2016. Strategic Plan 2016/2017 – 2020/2021. Pretoria.

SARS (South African Revenue Service). 2017a. Annual Report 2016/2017. Pretoria.

SARS (South African Revenue Service). 2017b. Customs Modernisation. <http://www.sars.gov.za/ClientSegments/Customs-Excise/AboutCustoms/Pages/Modernisation.aspx>. Date of access: 14 Nov. 2017.

SARS (South African Revenue Service). 2017c. Launch of customs preferred trade program. <http://www.sars.gov.za/Media/MediaReleases/Pages/default.aspx> Date of access: 1 Mar. 2018.

SARS (South African Revenue Service). 2018a. Electronic data interchange. [http://www.sars.gov.za/ClientSegments/Customs-Excise/Processing/Pages/Electronic-Data-Interchange-\(EDI\).aspx](http://www.sars.gov.za/ClientSegments/Customs-Excise/Processing/Pages/Electronic-Data-Interchange-(EDI).aspx) Date of access: 14 Sept. 2018.

SARS (South African Revenue Service). 2018b. New customs legislature update. <http://www.sars.gov.za/ClientSegments/Customs-Excise/AboutCustoms/Pages/New-Customs-Legislation-update.aspx> Date of access: 25 Jan. 2019.

SATMC (South African Tyre Manufacturers Conference). 2015. The South African Tyre Manufacturing Industry: ensuring consumer and road safety through the homologation of tyres in compliance with regulated compulsory specifications and standards. Paper presented at the Public hearings on the National Regulator for Compulsory Specifications, Cape Town, 2 September. <http://www.thedti.gov.za/parliament/2015/SATMC.pdf> Date of access: 15 Feb. 2019.

Schonberger, R. 1982. Japanese manufacturing techniques: nine hidden lessons in simplicity. New York: Simon and Schuster.

Shaw, A. 2016. Transport & logistics leader, PWC Africa. Paper presented at FTW/JCCI Breakfast Seminar, Johannesburg, 7 June 2017.

Sheffi, Y. & Rice, J. 2005. A supply chain view of the resilient enterprise. *MIT Sloan Management Review*, 47(1):41-48.

Smith, A. 1776. An inquiry into the nature and causes of the wealth of nations (Vol. 1). London: printed for W. Strahan and T. Cadell.

Sodhi, M.S. & Tang, C.S. 2012. Managing supply chain risk (Vol. 172). Berlin: Springer Science & Business Media.

South Africa. 1964. Excise Act 91 of 1964.

South Africa. 2011. Customs and Excise Amendment Bill (E64 2011). Government gazette, 34498, 29 Jul.

South Africa. 2014. Customs Control Act 31 of July 2014.

South Africa. 2014. Customs Duty Act 30 of July 2014.

South Africa. Department of Trade and Industry. 2018. Industrial Policy Action Plan: economic sectors, employment and infrastructure development cluster 2018/19 - 2020/21.

Stephens, S. 2001. Supply chain operations reference model version 5.0: a new tool to improve supply chain efficiency and achieve best practice. *Information Systems Frontiers*, 3(4):471-476.

Swedish Customs. 2003. White Paper on accreditation of operators and the supply chain security. Stockholm. http://www.unece.org/fileadmin/DAM/trade/security_conf03/docs/white_paper_scs_2_mindre.pdf.

Taleb, N.N. 2012. Antifragile – things that gain from disorder: the ultimate model to aspire to. London: Penguin.

Taleb, N.N. 2014. The Black Swan: the impact of the highly improbable. London: Penguin.

Theron, B. 2018. New Customs Acts Programme SAAFF Presentation. <http://www.sars.gov.za/AllDocs/Documents/customsandexcise/SAAFF%20Presentation%20NCAP%20%2029%20Aug%202018.pdf> Date of access: 5 Oct. 2018.

Trade Map. 2018. Trade Map: trade statistics for international business development. <https://www.trademap.org/Index.aspx> Date of access: 21 Sep. 2018.

Trent, R.J. & Roberts, L.R. 2010. Managing global supply and risk: best practices, concepts, and strategies. Fort Lauderdale: J. Ross.

Truel, C. 2010. A Short Guide to customs risk. Aldershot: Gower.

UK Border Force. 2015. Business Plan 2015-2018. www.gov.uk/government/latest?departments%5B%5D=border-force Date of access: 26 Apr. 2018.

UNCTAD (United Nations Conference for Trade and Development). 2014. Trade Facilitation Technical Note No. 12. Geneva.

UNCTAD (United Nations Conference for Trade and Development). 2016. Transport newsletter, No 70, Second Quarter 2016. United Nations Publications.

UNECA (United Nations Economic Commission for Africa). 2013. Trade facilitation from an African perspective. Addis Ababa: United Nations Economic Commission for Africa.

USAID (The United States Agency for International Development). 2015. LEAP-II Trade Intervention Agenda SA Final Report. Washington.

Van Marrewijk, C., Ottens, D. & Schueller, S. 2012. International economics: theory, application, and policy. New York: Oxford University Press.

WB (World Bank). 2019. World development indicators. <http://datatopics.worldbank.org/world-development-indicators/> Date of access: 11 Jan 2019.

WCO (World Customs Organisation). 2006. Revised Kyoto Convention. Geneva.

WCO (World Customs Organisation). 2011. WCO Customs Risk Management Compendium, (Vol. 1). Brussels.

WCO (World Customs Organisation). 2014. Kyoto Convention General Annex Chapter 7: Guidelines on application of information and communication technology. Geneva.

WCO (World Customs Organisation). 2015. SAFE framework of standards to secure and facilitate global trade. Brussels.

WCO (World Customs Organisation). 2017a. History. http://www.wcoomd.org/en/about-us/what-is-the-wco/au_history.aspx Date of access: 2 Nov. 2017.

WCO (World Customs Organisation). 2017b. AEO compendium. Brussels.

WCO (World Customs Organisation). 2018a. Glossary of international customs terms. Brussels.

WCO (World Customs Organisation). 2018b. Customs Guidelines on integrated supply chain management. Brussels.

WEF (World Economic Forum). 2017. Global Competitiveness report 2017-2018. Geneva.

Widdowson, D. 2005. Managing risk in the customs context. *Customs modernization handbook*, 91-99.

Widdowson, D. 2007. The changing role of customs: evolution or revolution. *World Customs Journal*, 1(1):31-37.

Widdowson, D. 2011. Raising the academic standing of the Customs profession. *WCO News*, 64:29-30.

Widdowson, D. & Holloway, S. 2011. Core border management disciplines: risk based compliance management. (In McLinden, G., Fanta, E., Widdowson, D. & Doyle, T., eds. *Border management modernisation*. Washington: World Bank Publications. p. 95-114).

Williams, G., Cunningham, S. & De Beer, D. 2014. Advanced manufacturing and jobs in South Africa: an examination of perceptions and trends. (In International Conference on Manufacturing-Led Growth for Employment and Equality (Vol. 20). Place of publication: Name of publisher).

Wilson, J.S., Mann, C.L. & Otsuki, T. 2005. Assessing the potential benefit of trade facilitation: A global perspective. (In Dee, P. S., & Ferrantino, M. J. Eds. *Quantitative methods for assessing the effects of non-tariff measures and trade facilitation*. p. 121-160).

WTO (World Trade Organisation). 2014. Trade Facilitation Agreement. Geneva.

WTO (World Trade Organisation). 2015. Trade facilitation agreement.
https://www.wto.org/english/thewto_e/20y_e/wto_tradefacilitation_e.pdf Date of access: 18 Nov. 2017.

WTO (World Trade Organisation). 2017a. WTO's Trade Facilitation Agreement enters into force. https://www.wto.org/english/news_e/news17_e/fac_31jan17_e.htm Date of access: 22 Feb. 2017.

WTO (World Trade Organisation). 2017b. Trade facilitation.
https://www.wto.org/english/tratop_e/tradfa_e/tradfa_e.htm Date of access: 19 Oct. 2017.

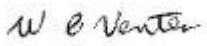
Yasui, T. 2010. Benefits of the Revised Kyoto Convention. Brussels: World Customs Organization.

APPENDIX

Author permission and relevant contribution

Article title: *An explorative study into the effectiveness of a customs operation and its impact on trade*

Full reference: Hoffman, A., Grater, S., Venter, W.C., Maree, J. & Liebenberg, D. 2018. An explorative study into the effectiveness of a customs operation and its impact on trade. *World Customs Journal*, 12(2):63-86.

Author	Contribution	Signature	Date
Alwyn J Hoffman	• Conceived and designed the analysis • Collected the data • Contributed analysis tools • Performed the analysis • Wrote parts of the paper		7 March 2019
Sonja Grater	• Conceived and designed the analysis • Wrote parts of the paper		7 March 2019
Willem C Venter	• Contributed analysis tools • Performed the analysis		7 March 2019
Juanita Maree	• Conceived and designed the analysis • Collected the data • Contributed analysis tools • Performed the analysis • Wrote parts of the paper		7 March 2019
David Liebenberg	• Provided expert comment		7 March 2019

Journal permission

Article title: *An explorative study into the effectiveness of a customs operation and its impact on trade*

Full reference: Hoffman, A., Grater, S., Venter, W.C., Maree, J. & Liebenberg, D. 2018. An explorative study into the effectiveness of a customs operation and its impact on trade. *World Customs Journal*, 12(2):63-86.