EVALUATING THE FOOD SAFETY STANDARDS AND COMPETITIVENESS OF SOUTH AFRICA'S ORANGES IN STRATEGIC ASIAN MARKETS

BY

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II. DECLARATION OF PUBLICATIONS

The following papers were derived from the delivered thesis as part of the criteria for obtaining a Doctor of Philosophy degree.

Publication 1: Lucius T Phaleng, Mmaphuti A Nkoana, and Jan J Hlongwane Investigating the key limitations and improvements influencing the competitive success of the domestic oranges industry. The paper is published in the *Prizren Social Science Journal* in volume 8, issue 2, May-August. https://doi.org/10.32936/pssj.v8i2.508

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III. DEDICATION

This thesis is lovingly dedicated to my grandparents, Joel Boshomane and Matlou Boshomane, who instilled in me the importance of education from an early age. I will forever hold dear the lessons they taught me about life's value, and their memory will live on in my heart. This work is also devoted to my family and friends for their unwavering support and encouragement.

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V. ABSTRACT

This study aims to measure the effect of food safety standards and competitiveness of South African orange exports destined for strategic Asian markets. The study goal is to provide policymakers with insights to assist South Africa secure a larger market share in Asia by addressing critical factors. The research focuses on ten (10) strategic Asian markets: Hong Kong, India, Indonesia, China, Thailand, Japan, Malaysia, the Philippines, Vietnam, and South Korea. The study sets out to outline the composition and trends in South Africa’s orange exports to these Asian markets; analyze the competitive performance of other countries; identify key challenges and areas for improvement within the domestic orange industry and further assess the food safety requirements in these markets.

The study employed both primary and secondary data. The first objective was based on desktop analysis and the data was sourced from reputable data platforms. The findings indicated that South Africa has seen significant growth in orange exports to Asian markets, surpassing Europe in 2005 and 2006. Despite a slight decline in 2007, Asia remains a critical market for South African exports. South Africa's competitive performance against the competing countries in Asian markets was measured using the relative comparative advantage (RCA), net export index (NXi), relative trade advantage (RTA), and constant market share (CMS) analysis. South Africa's orange industry demonstrated a strong comparative advantage, with RCA values consistently high with 25% indices indicating robust competitiveness. Despite competition from countries like Egypt and Greece, South Africa maintains a strong position. The net export index (NXi) reported an average near 100 indicating the favourable net export performance of the South African orange industry.

The main constraints and drivers of the South African orange industry were measured using a distributed survey of the exporters of oranges. A total of 102 surveys were distributed to various stakeholders in the orange industry, with 67 completed responses, yielding a response rate of 65.7%. The main challenges that discourage the local orange competitiveness include issues like the quality of unskilled labor, political trust, electricity supply, health concerns, land reform policies, BEE policies, and crime. Additionally, poor infrastructure and ineffective trade agreements exacerbate these challenges. Specifically, the poor performance of South African ports leads to higher freight costs and delays, negatively impacting product quality and profitability.

Lastly, the gravity model was utilized to assess the effect of food safety standards on South African orange exports through STATA. It was revealed that an increase in importers' GDP by 1% decreases South Africa's export performance, while a rise in South Africa's GDP enhances it. Population growth in these markets positively influences export volumes. Furthermore, the exchange rate volatility at the 5% level appears to support rather than hinder export growth, suggesting resilience within the industry. The study highlights that Technical Barriers to Trade (TBT) and Sanitary and

Phytosanitary (SPS) measures significantly hinder South Africa's orange exports. These barriers are statistically significant and align with existing literature, emphasizing the need for better negotiation and policy alignment.

Therefore, to enhance food safety compliance in South Africa's orange industry, it is crucial to implement robust monitoring systems that adhere to technical barriers to trade and sanitary and phytosanitary standards. This will improve the quality of oranges and reduce shipment rejections, leading to better access to Asian markets. Developing specific trade agreements to address TBT and SPS barriers will improve market access and lower compliance costs, while ongoing analysis of market data will help the orange industry adapt to changing conditions and seize emerging opportunities.

Additionally, investment in port infrastructure and modern transportation systems through public-private partnerships can lower freight costs and shipping delays, ultimately improving oranges quality and competitiveness in price-sensitive markets. Targeted training programs to improve labour quality and productivity will enhance agricultural practices and post-harvest handling, supporting South Africa's competitiveness in Asian markets. Political and economic stability is essential for fostering a favourable business environment. Engaging with the government to address land reform, empowerment policies, and crime will build trust and attract investments in the orange industry. Financial strategies like hedging are needed to mitigate exchange rate risks and ensure stable revenues. Marketing efforts highlighting the quality and sustainability of South African oranges can enhance presence and customer loyalty.

Collaboration between industry leaders and government through a dedicated task force will address infrastructural and policy challenges, leading to effective operational improvements. Continuous monitoring of economic indicators will facilitate the refinement of export strategies, ensuring resilience and competitiveness in Asian markets.

Key concepts: Porter model, orange exporters, Hausman test, gravity model, food safety standards, competitiveness, Asian strategic markets, factor demand, regression, significance, phytosanitary barrier, technical barrier.

VI. NAGANWAGO

Thuto ye e ikemišeditše go ela seabe sa maemo a polokego ya dijo le phadišano ya diromelwantle tša dinamune tša Afrika Borwa tšeo di reretšwego mebaraka ya maano ya Asia. Maikemišetšo a nyakišišo ke go fa batšweletši ba melawana temogo ya go thuša Afrika Borwa go kgonthišetša karolo ye kgolo ya mmaraka ka Asia ka go rarolla mabaka a bohlokwa. Dinyakišišo di lebeletše kudu mebaraka ye lesome (10) ya maano ya Asia: Hong Kong, India, Indonesia, China, Thailand, Japane, Malaysia, Philippines, Vietnam, le Korea Borwa. Thuto e ikemišeditše go hlaloša sebopego le ditshekamelo tša diromelwantle tša dinamune tša Afrika Borwa go mebaraka ye ya Asia; sekaseka tshepedišo ya phadišano ya dinaga tše dingwe; go šupa ditlhohlo tše bohlokwa le mafelo ao a swanetšego go kaonafatšwa ka gare ga intasteri ya dinamune ya ka nageng le go sekaseka gape dinyakwa tša polokego ya dijo ka mebarakeng ye.

Thuto e šomišitše bobedi datha ya mathomo le ya bobedi. Maikemišetšo a mathomo a be a theilwe godimo ga tshekatsheko ya komporong gomme ya data e be e hwetšwa go tšwa go diforamo tša datha tše di nago le botumo bjo bobotse. Dikutollo di laeditše gore Afrika Borwa e bone kgolo ye kgolo ya diromelwantle tša dinamune go ya mebarakeng ya Asia, go feta Yuropa ka 2005 le 2006. Le ge go na le go fokotšega gannyane ka 2007, Asia e sa le mmaraka wo bohlokwa go diromelwantle tša Afrika Borwa. Tiragatšo ya phadišano ya Afrika Borwa kgahlanong le dinaga tšeo di phadišanago ka mebarakeng ya Asia e lekantšwe ka go šomiša mohola wa go bapetšwa wa go lekana (RCA), tšhupamabaka ya diromelwantle tša nete (NXi), mohola wa kgwebišano wa go lekana (RTA), le tshekatsheko ya karolo ya mmaraka ye e sa fetogego (CMS). Intasteri ya Afrika Borwa ya mmala wa namune e bontšhitše mohola wo maatla wa go bapetšwa, ka dikelo tša RCA tšeo di lego godimo ka go se fetoge ka ditšhupetšo tša 25% tšeo di laetšago phadišano ye e tiilego. Le ge go na le phadišano go tšwa dinageng tša go swana le Egepeta le Gerika, Afrika Borwa e boloka maemo a tiilego. Tšhupetšo ya diromelwantle tša nete (NXi) e begile palogare ya kgauswi le 100 yeo e laetšago tshepedišo ye botse ya diromelwantle tša nete ya intasteri ya dinamune ya Afrika Borwa.

Dithibelo tše kgolo le baotledi ba intasteri ya dinamune ya Afrika Borwa di lekantšwe ka go šomiša nyakišišo ye e phatlalatšwago ya baromelantle ba dinamune. Palomoka ya dinyakišišo tše 102 di abilwe go bakgathatema ba go fapafapana ka intastering ya

dinamune, ka dikarabo tše 67 tše di phethilwego, tšeo di tšweleditšego tekanyo ya karabelo ya 65.7%. Ditlhohlo tše kgolo tšeo di nolago moko phadišano ya selegae ya mmala wa namune di akaretša ditaba tša go swana le boleng bja bašomi bao ba se nago bokgoni, go bota ga dipolotiki, kabo ya mohlagase, dipelaelo tša maphelo, melawana ya mpshafatšo ya naga, melawana ya BEE, le bosenyi. Go tlaleletša, mananeokgoparara ao a fokolago le ditumelelano tša kgwebišano tše di sa šomego gabotse di gakatša ditlhohlo tše. Ka go lebanya, go se šome gabotse ga maemakepe a Afrika Borwa go lebiša go ditshenyegelo tša godimo tša go rwala merwalo le go diega, go ama boleng bja setšweletšwa le poelo gampe.

Mafelelong, mohlala wa maatlakgogedi o šomišitšwe go sekaseka khuetšo ya maemo a polokego ya dijo go diromelwantle tša dinamune tša Afrika Borwa ka STATA. Go utolotšwe gore koketšego ya GDP ya barekiši ba ka ntle ka 1% e fokotša tshepedišo ya diromelwantle ya Afrika Borwa, mola tlhatlogo ya GDP ya Afrika Borwa e e godiša. Kgolo ya baagi ka mebarakeng ye e na le khuetšo ye botse dibolumo tša diromelwantle. Go feta fao, go fetofetoga ga seelo sa phapantšho maemong a 5% go bonala go thekga go e na le go šitiša kgolo ya diromelwantle, go šišinya go kgotlelela ka gare ga intasteri. Thuto e laetša gore Mapheko a Sethekniki a Kgwebišano (TBT) le magato a Bohlweki le Bohlweki bja Dimela (SPS) a šitiša kudu diromelwantle tša dinamune tša Afrika Borwa. Mapheko a a bohlokwa go ya ka dipalopalo ebile a sepelelana le dingwalo tše di lego gona, go gatelela tlhokego ya ditherišano tše kaone le go sepelelana ga pholisi.

Ka fao, go godiša kobamelo ya polokego ya dijo ka intastering ya dinamune ya Afrika Borwa, go bohlokwa go phethagatša ditshepedišo tše di tiilego tša go hlokomela tšeo di kgomarelago mapheko a sethekniki a kgwebo le maemo a bohloeki le phytosanitary. Se se tla kaonafatša boleng bja dinamune le go fokotša go ganwa ga thomelo, go lebiša go phihlelelo ye kaone go mebaraka ya Asia. Go hlabolla ditumellano tše di itšego tša kgwebišano go rarolla mapheko a TBT le SPS go tla kaonafatša phihlelelo ya mmaraka le go fokotša ditshenyegelo tša kobamelo, mola tshekatsheko ye e tšwelago pele ya datha ya mmaraka e tla thuša intasteri ya mmala wa namune go tlwaela maemo ao a fetogago le go tšea dibaka tše di tšwelelago.

Go tlaleletša, peeletšo ka mananeokgoparara a boemakepe le ditshepedišo tša sebjalebjale tša dinamelwa ka ditirišano tša setšhaba le tša praebete di ka fokotša

ditshenyegelo tša go rwala dithoto le go diega ga go romela, mafelelong tša kaonafatša boleng bja dinamune le phadišano ka mebarakeng yeo e nago le tlhokomelo ya ditheko. Mananeo a tlhahlo ao a nepišitšwego go kaonafatša boleng bja bašomi le tšweletšo a tla godiša mekgwa ya temo le tshwaro ya ka morago ga puno, go thekga phadišano ya Afrika Borwa ka mebarakeng ya Asia. Botsitso bja dipolotiki le bja ekonomi bo bohlokwa bakeng sa go godiša tikologo ye e kgahlišago ya kgwebo. Go boledišana le mmušo go rarolla mpshafatšo ya naga, melawana ya maatlafatšo, le bosenyi go tla aga tshepo le go goketša dipeeletšo ka intastering ya dinamune. Maano a ditšhelete a go swana le go šireletša a a nyakega go fokotša dikotsi tša seelo sa phapantšho le go netefatša ditseno tše di tsepamego. Maiteko a papatšo ao a hlagišago boleng le go tšwela pele ga dinamune tša Afrika Borwa a ka godiša go ba gona le potego ya bareki.

Tirišano magareng ga baetapele ba intasteri le mmušo ka sehlopha sa mošomo seo se ineetšego e tla rarolla ditlhohlo tša mananeokgoparara le tša pholisi, tšeo di išago dikaonafatšong tše di šomago gabotse tša tshepedišo. Tšwela pele go hlokomela ditšhupetšo tša ekonomi go tla nolofatša go hlwekišwa ga maano a diromelwantle, go netefatša go kgotlelela le phadišano mebarakeng ya Asia.

Dikgopolo tše bohlokwa: Mohlala wa Porter, baromelantle ba mmala wa namune, teko ya Hausman, mohlala wa maatlakgogedi, maemo a polokego ya dijo, phadišano, mebaraka ya maano a Asia, nyakego ya mabaka, regression, bohlokwa, lepheko la phytosanitary, lepheko la setegeniki.

VII. TABLE OF CONTENTS

VIII. LIST OF FIGURES

IX. LIST OF TABLES

X. LIST OF ABBREVIATIONS

AFCFTA:	African Continental Free Trade Agreement
AJCEPA:	ASEAN-Japan Comprehensive Economic Partnership
ASEAN:	Associations of Southeast Asian Nations
AUC:	African Union Commission

BEE:	Black Economic Empowerment
CAC:	Codex Alimentarius Commission
CBS:	Citrus Black Spot
CDCP:	Certified Data Centre Professional
CGA:	Citrus Growers Association
CMS:	Constant Market Share
COMTRADE:	National Commodity Trade Statistics Database
DALYS:	Disability-Adjusted Life Years
EPEC:	Enteropathogenic *E. coli*
ETEC:	Enterotoxigenic *E.* coli
EU:	European Union
EUREPGAP	Euro-Retailer Produce Work Group Good Agricultural Practice
FAO:	Food and Agricultural Organization
FCM:	False Codling Moth
FDI:	Foreign Direct Investment
FSS:	Food Safety Standards
GATT:	General Agreement on Tariffs and Trade
GCR:	Global Competitiveness Report
GFSI:	Global Food Safety Initiative
HACCP:	Hazard Analysis and Critical Control Points
IDC:	Industrial Development Corporation
IFAP:	industrial food animal production
ITC:	International Trade Commission
Map Act:	Marketing of Agricultural Product Act
MAV:	Minimum Access Volumes
MFN:	Most-Favoured Nations
MRL:	Maximum residual level
NFPMs:	National Fresh Produce Markets
NGOs:	Nongovernmental Organizations
NTM:	Non-Tariff Measures
NTS:	Nontyphoidal *Salmonella enterica*
NXi:	Net Export Index
OECD:	Organization for Economic Cooperation and Development
RCA:	Relative comparative advantage

RTA:	Relative Trade Advantage
SADC:	Southern African Development Commission
SPS:	Sanitary and Phytosanitary Measures
STATA:	Statistical Software for Data Science
TBT:	Technical Barrier of Trade
TPI:	Trade Performance Index
TRQ:	Tariff rate quota
UK:	United Kingdom
UN:	United Nations
UNCTAD:	United Nations Conference on Trade and Development
UNSD:	United Nations Statistical Division
USA:	United States of America
USDA:	United States Department of Agriculture
WHO:	World Health Organization
WITS:	World Integrated Trade Solution
WTO:	World Trade Organization

CHAPTER 1
INTRODUCTION

1.1 Background

The citrus industry in South Africa stretches back to the 1600s when the first citrus fruit trees were planted in the Cape region. It subsequently grew, with citrus traded in the early nineteenth century, when three thousand boxes were sent to global markets (Dube, et al., 2021). The industry was under the Minister of Agriculture in the late 1940s through a series of legislation and regulations that determined orange production volumes, quality, and exports. Orange producers were not free to promote their produce in export channels as they saw fit. In 1997 the South African agricultural sector underwent structural and policy changes. One of the most notable policy developments was the passage of the *Marketing of Agricultural Products Act (MAP), No. 47 of 1996*, which went into force in early 1997, replacing the previous *Marketing Act of 1968* (Mtombeni, et al., 2019). The MAP Act's primary goals included, among other things, promoting market deregulation and change in the agricultural sector (Sihlobo & Qobo, 2021).

The adoption of the Act signalled the end of the 1968 Act's single-channel agricultural export marketing programmes and measures (government-directed producers). These regulatory changes compelled value chain producers and organizations to establish themselves as business-driven participants in a less regulated and now highly competitive trading environment (Dlikilili & Van Rooyen, 2018). After deregulation, hundreds of marketing agents and marketers entered the fruit export industry, increasing competitiveness (Sihlobo & Qobo, 2021). As a result, a significant drop in price and quality was brought to an international market typified by an increasing need for new products (Coetzee, et al., 2020). Since then, the fruit industry has made significant advances in terms of adopting new strategies and creative ways of supplying international markets (Coetzee, et al., 2020).

In 2022, South Africa was ranked as the second largest exporter of citrus globally, constituting 12.2% share volumes have the potential to play a significant role in achieving Vision 2030 of the National Development Plan, which aims to increase local GDP at a rate of 5.4% per year and create a million new jobs in the agricultural and agro-processing sectors (Dube & Roberts, 2021). However, with global markets

gradually undergoing significant changes because of factors such as political changes in the United Kingdom (because Britain voted to leave the European Union) and the proposed "closed economy" in the United States of America, the citrus industry must constantly reassess its competitiveness in international markets (Shikaki, 2019). Furthermore, according to (Edmonds, 2016), increasing production costs and international food demand are putting pressure on numerous food industries, including the citrus industry, to be more competitive not only in local markets but also in international markets.

Figure 1.1 shows the relationship between South African agricultural exports and their contribution to the agricultural economy. The graph shows a positive relationship between agricultural exports and agricultural GDP. As a result, an increase in agricultural exports leads to an increase in agricultural GDP. To increase agricultural contributions to GDP, policymakers should become familiar with the elements that influence exports.

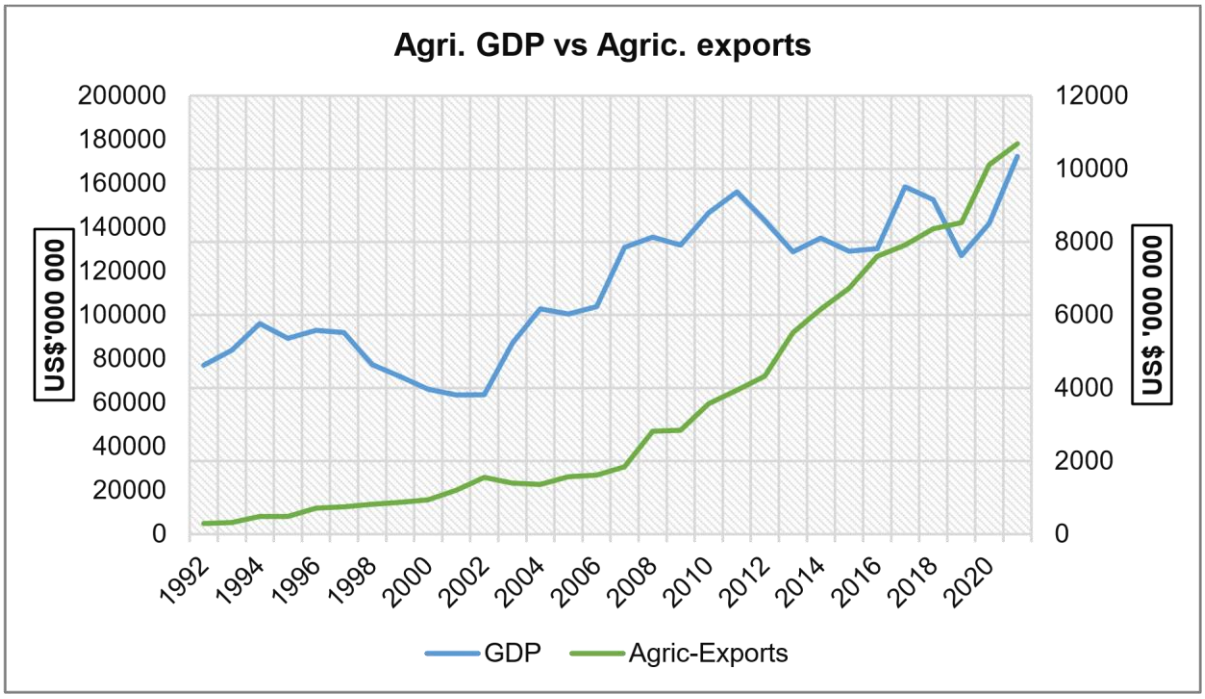


Figure 1.1: South African GDP growth versus agricultural exports.
Source: SARS and our calculations

Increased global trade increases the level of competitiveness in global markets for local producers and service providers. Reasons such as these have made competitiveness critical for export-orientated agricultural industries such as the citrus industry (Sibulali, 2018). These industries, according to O'Rourke (2011), cannot retain their financial relevance and development unless they harvest and promote competitive products. Maintaining competitiveness is critical for the future success of agricultural businesses (Tomashuk, 2023), which means that producers in the value chain must position themselves to compete in global marketplaces. The competitive strength of an export-orientated industry is also influenced by various limitations, rules, and trade agreements between countries.

Furthermore, growers face unstable weather conditions (e.g., the recent drought has been particularly difficult in certain citrus-producing areas), growing input costs, severe water limitations, changing technology, and increasing labour expenses (Makgetla et al., 2020). Others along the value chain must address onerous administrative and compliance laws concerning safety, ethics, the environment, and finances, as well as rising transportation costs (particularly shipping), packaging and labelling regulations, and so forth. Consumers are concerned about food safety standards and health, which require an active, efficient, competitive, and sustainable economy (RASA, 2019).

The ability of each country to independently analyze and monitor strong competition in other countries, as well as factors of export performance, is extremely valuable to competition authorities and other policy makers (OECD, 2021). It also provides information on a variety of potential countermeasures, such as identifying ways to eliminate or address barriers (including non-barriers), imposing limits on national strategies, promoting major trade determinants, or intensifying competition. For three primary reasons, policymakers can be educated by evaluating food safety standards and the competitiveness of local products. The first is the application of competition law to marketplaces where dominant positions may be abused. The second reason is to determine whether competitive interventions are required and whether such interventions will benefit both competitive markets. The third reason is an *ex-post* evaluation of the effectiveness of food safety regulations, competition rules, or enforced limits (Treasury, 2019).

Assessing national food safety standards and commodity export competitiveness in the global market has become a strategic goal to outperform competitors and capture new markets through greater market share. The key goal for a country to grow and preserve its position in strategic markets is to achieve dominance in global markets (Sibulali, 2018). This can be achieved through comprehensive background research as well as the creation and implementation of planned strategies (Rani, 2019). As a result, the study assesses the influence of food safety standards on the competitiveness of South African orange exports in important designated countries. According to (Genis, 2018), South Africa's oranges stand out nationally and internationally in terms of export-driven growth and job creation encourages the selection of orange fruit.

The country's absolute edge in terms of favourable environmental and climate settings provides a significant advantage for fruit cultivation. Deciduous, citrus, and subtropical fruits grow throughout the country. Stone fruit, edible grapes (edible farmed grapes), and pome-like fruits are examples of deciduous fruit (Myeki, et al., 2023). Citrus fruits are oranges, grapefruits, and lemons called soft citrus fruits. Subtropical fruits include mangoes, lychee, melon, avocado, and pineapple. South African fruits are widely exported (Julius, 2010). South Africa's fruit export sector evolved from a traditional hierarchical structure before deregulation in 1997 to a liberal market approach in 2002. Competing in the open market or cooperating in a networked environment is a critical option for each company. South African fruits are mainly exported to the world market and consumed in limited quantities locally (for processing) (Dube & Roberts, 2021). Most of South Africa's fruit exports are intended for European markets, with citrus fruit accounting for a sizable portion. Africa is the least popular market for South African fruit exports, while other regions such as the EU, the United Kingdom, and Asia continue to dominate worldwide markets (Stern & Ramkolowan, 2021).

1.2 Problem Statement and Rationale

Modern agricultural businesses are generally exposed to an increasingly societal environment, and producers' ability to remain competitive in the global market has become critical. Increased global trade leads to higher food safety standards and the amount of competition faced by local manufacturers or service providers on global markets. Different types of restrictions, laws, and trade talks between nations have an impact on the competitive power of a specific industry (Borsellino, et al., 2020). At the farm level, producers face variable weather conditions, particularly the drought has been devastating to certain citrus-producing provinces, increased input costs, water restrictions, changes in technology, and increased labour expenses, among other factors. Others in the value chain must address strict administrative and compliance laws concerning safety, ethics, the environment, and finance, as well as increasing transportation expenses (i.e., shipping), packaging and labelling regulations, among others (Dlikilili & Van Rooyen, 2018).

Consumers are also concerned about food safety standards and health (due to citrus black spots), which necessitates an active, efficient, competitive, and sustainable economy. These circumstances raise concerns regarding the trends and state of the South African citrus industry's competitive performance in global markets (Parliament, 2021). (Sibulali, 2018) aimed to ascertain the performance of the local citrus sector by analyzing the industry's competitiveness among changes in the global business environment (1987–2009) using the constant market share model and Porter diamond. Her analysis was lacking in terms of competitiveness performance: there was no analysis at the economic level, no comparison with major competitors, and internationally recognized techniques for measuring competitiveness, such as revealed comparative advantage (RCA), relative trade advantage (RTA), and the policy analysis matrix (PAM), among others, were not considered measurements used to evaluate competitive advantage.

The fruit sector believes that by studying the tactics and experiences of some successful Asian countries, it will be possible to pinpoint areas that require improvement to increase the number of exports (Schreinemachers, et al., 2018). Therefore, the South African fruit industry has recently identified potential key markets in Asia that need to be investigated. However, food safety standards have challenges

that require thorough training, ongoing monitoring, detailed documentation, and adherence to hygiene standards. Export competitiveness is influenced by several hardships that impede South Africa's ability to fulfill the requirements for maintaining strong export competitiveness which include regulatory compliance, quality standards, and political and economic stability. The mentioned aspects are becoming more critical as it becomes more vital to increase the share of export performance. To prevent local producers from competing with imported goods, most countries have established safety standards that South Africa needs to address (FAO, 2017). To find opportunities and threats, it is necessary to investigate the current competitive structure in the target markets.

The South African orange sector has experienced difficult circumstances in recent years, particularly in its traditional markets, and this has led to a loss of market share. Local exports to these traditional markets suffered from factors such as growing global competition, shifting customer tastes, and stricter laws, decrees, regulations, requirements, and procedures including testing, inspection, certification, and approval procedures (Humphrey, 2017). The success of South Africa's orange exports is further influenced by the fact that traditional markets are evolving and becoming more competitive, which is difficult for the sector to regulate.

The country's exports must outperform their rivals and adhere to all necessary food safety regulations if they are to survive and develop in those markets in the future. Therefore, the level of food safety regulations and the level of South African orange competitiveness in these markets must be measured (FACS, 2019).

As a result, the problem statement that guides this study revolves around establishing the status quo and suggesting a framework for a comprehensive statement on the competitive performance of the South African citrus industry as an important player in the global marketplace, and this is to be addressed in terms of defining competitiveness; measuring, identifying, and analyzing the factors influencing the industry's competitive performance; and proposing new strategies that can be used.

The planned research is pertinent since, together with grapes, wine, and sugar, the South African orange sector is one of the country's highest value-added exported commodities (Kapuya, et al., 2014). As the global economy becomes more open and

linked, developed and developing nations are becoming increasingly concerned about food safety standards and competitiveness (Hussain & Dawson, 2013). In addition, (Humphrey, 2017)noted that today's scholars and policy-makers show rising interest in the assessment of food safety standards and the problem of national competitiveness. In addition to giving certain nations a competitive edge and larger market share due to their stricter standards, tighter regulations also encourage exportorientated production in developing nations, which might increase food and health standards for customers in underdeveloped nations. Although (Chirelli, et al., 2021) mentioned potential spillover effects on consumers, they demonstrated that these impacts are negligible in their case study of Spain.

Strong rivalry and stringent food safety regulations are reflected in the shift of market share and the rejection of fruits in international markets (Ndou, 2012). According to (Fung, et al., 2018), the food safety issues often lead to decreased public confidence and avoidance attempts, and the government's capacity to appropriately regulate, manage, and communicate food hazards and make efforts to prevent this (Fung, et al., 2018). The proposed major commodity study is crucial, as it can increase export performance and market share. Investigating international factors that impact the sector and comparing with rivals are two other major benefits of this study. As a result, standards for food safety and global economic competition have emerged, and there is a growing need to comprehend these ideas. In line with this statement, assessing the two main issues (competitiveness and food safety regulations) and influencing changes to strategy, policy, and operational processes are essential.

1.3 Scope of the study

1.3.1 Aim of the Study

This study aimed to evaluate South Africa's exports of oranges to key Asian countries in terms of competitiveness and food safety standards.

1.3.2 Objectives

To thrive in a highly competitive environment, this research aims to evaluate the influence of food safety standards and the competitiveness of South Africa's orange exports to specified strategic markets.

i. Describe the composition and trends of South African oranges in key Asian markets.
ii. Analyze South Africa’s competitive performance in the identified markets between 2003 and 2022.
iii. Identify and describe the food safety requirements/standards for Asia import orange markets and the key constraints and improvements that affect the competitive success of local orange producers. iv. Evaluating the effect of food safety requirements on South African oranges exported to key Asian markets.

1.3.3 Research Hypotheses

The proposed study aims to answer the following questions and conclusions.

i. The composition and patterns of South Africa’s orange exports to Asian markets cannot be explained.
ii. South African oranges are not competitive in the specified strategic Asian markets.
iii. No significant limitations or success factors influence the competitiveness of South African oranges.
iv. South Africa’s orange exports to key Asian markets are not significantly affected by food safety regulations.

1.4 Study Justification

As global agricultural markets continue to evolve, understanding the dynamics of specific commodities, such as South African oranges in key Asian markets, becomes increasingly imperative for producers, policymakers, and stakeholders. South Africa has established itself as one of the leading exporters of citrus fruits, with oranges being a significant contributor to its agricultural economy. Given the ongoing demand for fresh produce in Asian markets, particularly in countries like China, Japan, and India, it is vital to analyze and comprehend the specific factors that influence South Africa's position in these markets.

The first objective provides essential insights into market dynamics, consumer preferences, and the positioning of South African oranges relative to competitors. Understanding the historical and current trends, including export volumes, and pricing patterns will illuminate avenues for enhanced market penetration and identification of effective strategies. This knowledge will also aid producers in adapting their offerings to better meet market demands. The second objective offers a comprehensive overview of the competitive landscape that South African oranges navigate within key Asian markets. By examining factors such as market share, comparative advantage, export performance, and relative trade advantage, this analysis will pave the way for informed decisions that can enhance competitiveness.

The third objective recognizes that compliance with stringent food safety regulations is critical for the continued success of South African orange exports. Furthermore, recognizing key constraints and potential improvements to current practices will provide actionable insights to stakeholders involved in the supply chain, thus fostering better compliance and positioning of South African oranges in the competitive Asian market. Finally, evaluating the effect of food safety standards on South African oranges exported to key Asian markets will provide insights into how adherence to food safety requirements can either enhance or inhibit market access for local exporters.

In summary, this study is justified due to its potential to provide a nuanced understanding of the South African orange export landscape in Asia. It will generate

valuable insights through its comprehensive analysis of market trends, competitive performance, and compliance with food safety standards. By addressing these objectives, the study will not only contribute to academic discourse, but will also aid producers, exporters, policymakers, and industry stakeholders in enhancing the competitiveness of South African oranges in key Asian markets. This study has the potential to inform tactical decisions that lead to sustainable growth in export volumes, improved economic returns for producers, and greater market share in a rapidly developing global landscape.

1.5 Organization of the Study

This section provides a map that may guide the reading and understanding of the dissertation. This activity provides a roadmap to the study by illustrating expectations about how the study was organized and conducted.

Chapter 1 - The first chapter presents an introduction to the main drive of the study: the background, problem statement, and rationale, the aim of the study, the research objectives and questions, and the hypotheses of the study.

Chapter 2 – The second chapter provides a descriptive overview of the South African orange industry, with special attention also given to its global market and competitors' performance. It also addresses key industry statistics (production, export performance, market share, market destination, etc.), industry structure, value chain, and its contribution to the country’s gross domestic product.

Chapter 3 – The third chapter provides the competitive conditions in the production of oranges. It compares the strengths, weaknesses, and key statistics of the fresh orange market industry with those of its major competitors.

Chapter 4 – the fourth chapter provides a review of South African and strategic Asian market policy changes between 1992 and 2021. The aim is to capture any change in policy or strategy over time that could have positively or negatively affected the performance of oranges in local and international markets.

Chapter 5 – The fifth chapter reviews the relevant literature on the evolution of competition theories, the food standards imposed in international markets, especially those imposed in strategic Asian markets, and their relevance to the South African

orange industry. This chapter also establishes a definition of food safety standards and competitiveness in the context of the South African orange industry.

Chapter 6 provides the WTO perspective on export determinants and discusses its impact on exports. A brief overview of the theoretical models of export determination was then given. These theories clarify various models that explain the connection between the exports of a given country to the rest of the world.

Chapter 7 – The seventh chapter presents the analytical framework and outlines the methodologies and data that were used. This is about the perfect methodologies to achieve the aim and the objectives of the study.

Chapter 8 – The eighth chapter provides a description and interpretation of the research findings and results.

Chapter 9 – The last chapter provides conclusions, a summary of key findings, strategies, and recommendations on how the industry can enhance its export performance in the strategic Asian markets.

1.6 Summary

In conclusion, Chapter 1 establishes a solid foundation, setting the stage for a detailed investigation into the factors influencing the success and challenges of South African orange exports. By weaving together, the historical context, contemporary challenges, and future opportunities, the chapter underscores the need for a robust framework that can guide stakeholders—producers, policymakers, and researchers—in making informed decisions that will bolster the competitive position of South Africa's orange industry on the global stage. This journey through the intricacies of food safety and competitiveness is not simply an academic exercise; it holds significant implications for the livelihoods of many and the broader economic health of the nation.

CHAPTER 2 OVERVIEW OF GLOBAL AND SOUTH AFRICA’S ORANGE INDUSTRY

2.1 Introduction

The purpose of this chapter is to provide an overview of the South African orange industry and to set the stage for this study. This was achieved by studying the origins and production areas of the orange sector, exports in the globe and Asian markets, and export patterns in various global regions. This chapter provides a solid and robust analysis to help readers better understand South Africa's orange sector and its role in job creation, poverty reduction, and economic development. In terms of export-led growth and job generation, South Africa's orange industry is impressive both locally and internationally. Export-led growth has been built on investments and collaboration to enable common capabilities and long-term upgrades.

2.2 A short historical overview of oranges

Oranges, like all citrus fruits, originated in the southeast Himalayan foothills in a region that includes Assam, Myanmar, and western Yunnan, China. A late Miocene (11.6–5.3 million years ago) fossil specimen from Lincang in Yunnan, China, has traits that are typical of the main current citrus groups and provides evidence for the existence of a common citrus ancestor within Yunnan Province approximately 8 million years ago (Scally, 2018). Currently, more than 75 million tons of oranges are produced worldwide on approximately 4.5 billion hectares of land. Oranges are the most cultivated fruit tree in the world, with $5.4 trillion (USD-CAD 7.5 trillion) in 2018 (Gonzatto & Santos, 2023).

Citrus trees are some of the most popular and widely cultivated fruit crops in the world. They are a good source of vitamins, minerals, and dietary fibre, which are all important for general nutritional health. Oranges account for more than half of global citrus production and are the most traded, followed by tangerines, lemons, and grapefruits (FAO, 2017). Over the last three decades, global citrus production and export have increased consistently, albeit at a slower rate than that of rival fruits such as mangoes, avocadoes, and melons (FAO, 2017).

Orange fruit farming in South Africa has a long and interesting history. Citrus was introduced to South Africa in 1654 during the time of the Dutch East Indian settlement, now Cape Town. It was first exported in 1907 when 3000 boxes were shipped to

London. Exports increased gradually, and in 1916, approximately 65000 boxes were shipped abroad (ADAMA, 2020). During 1917 and 1918, exports were interrupted by World War 1. They resumed in 1919 when postwar prices in Europe and the availability of refrigerated shipping space stimulated new plantings. Exports increased to more than 4.7 million boxes by 1939. The orange industry expanded too rapidly, and returns on packed citrus averaged US$3.32 per packed box f.o.b. the packinghouse in 1928 (Pallaver, 2015).

South African oranges compete with oranges from the United States, Brazil, and Argentina to the United Kingdom. United States oranges consist principally of California Valencia, which, along with Brazilian and Argentine oranges, is shipped to the United Kingdom during the South African orange export season, June to November. Oranges from Spain, Italy, and Palestine reach the United Kingdom in volume from November to May (Dlikilili & Van Rooyen, 2018).

2.3 Overview of Oranges Market Value Chain

Orange marketing value chain analysis has been reduced due to the omission of several linkages and the impossibility of depicting the size, degree of control, significance of each link, and flow in a single diagram (DALRRD, 2020). Within the orange value chain, the fruit harvested can be sold fresh in markets or freshly squeezed and consumed as juice at home (Begum et al., 2016). Alternatively, the fruit can be processed to produce other by-products and juice, primarily in the form of frozen concentrated orange juice (FCOJ), which is useful for international trade. In the context of globalization, there is growing competition in this industry, along with reorganisations and modifications to the marketing chain. The customer is increasingly driving the market (Ndou, 2012).

The value chain network involved in the commercial production of fresh oranges, including packaging and marketing, is evolving into a more complex and specialized network of service providers. Different value chain components may be merged, depending on the fruit's market outlet and operational scale. Small-scale growers could, for example, package and sell their oranges (FAO, 2017). Value-added activities, which include services such as packaging, shipping, and cold storage, take place at various points in the value chain. The primary segments of the orange value

chain, consumers, processing, domestic, export markets, and international retail chains, are the key topics of discussion. Figure 2.1 shows the orange value chain (Dube & Roberts, 2021).

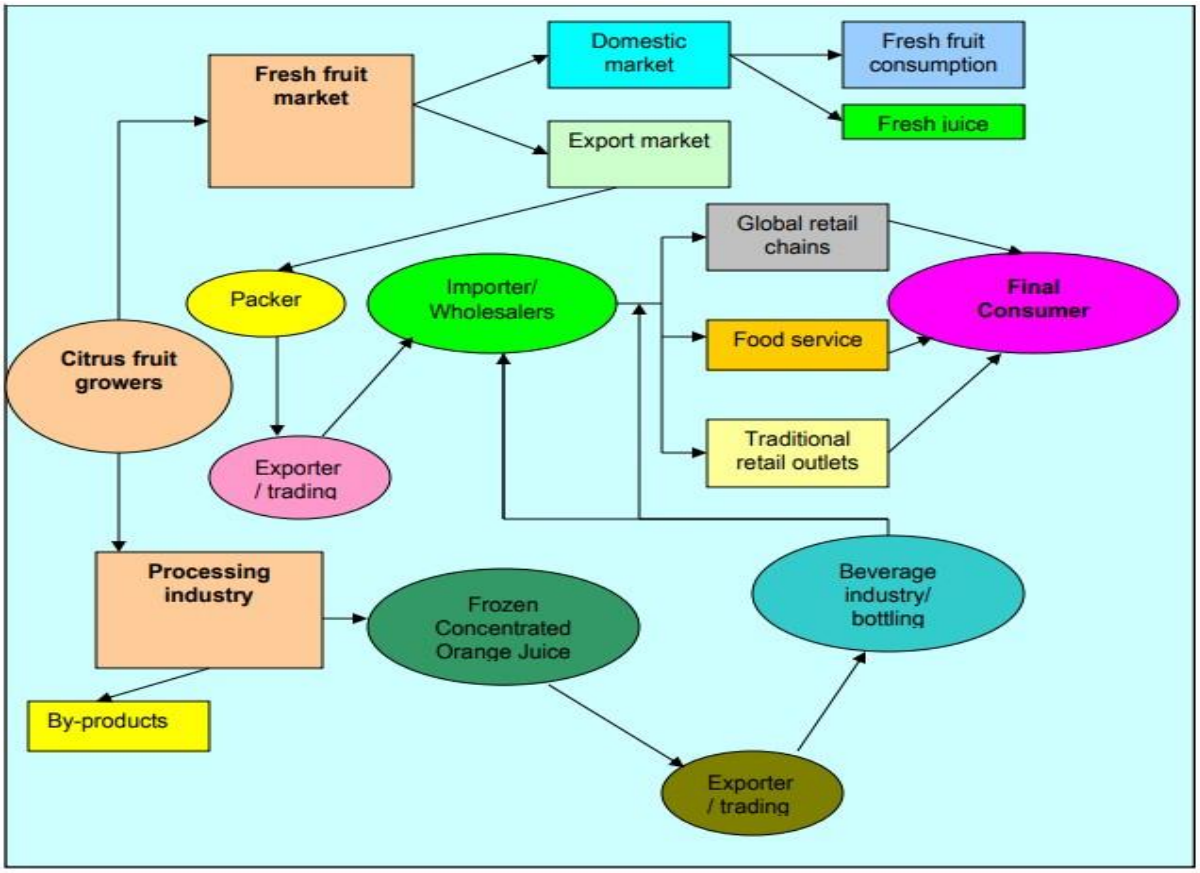


Figure 2. 1: South African orange value chain.

Source: DALRRD (2020)

2.3.1 Domestic and export markets

Growers account for only approximately one-third of the total orange farms, and commercial farms orientated to export are the primary source of international competitive production. Locally, orange fruit sold for the fresh market is taken to packing houses where it is graded and packed. Packing houses in South Africa use advanced technologies. Depending on the region and type of fruit packed (DALRRD, 2022). South African packing houses differ in size, ownership, and packing abilities. After the 1997 deregulation, some large orange farms built their own private packing houses to capture more of the returns from the value chain. To help spread the fixed costs, some smaller packing houses in the country pack deciduous fruit that is counterseasonal to citrus (Dube & Roberts, 2021).

The packed oranges are then transported for distribution to retailers such as grocery stores. Culled fruits that do not meet the grade for fresh markets are transported to processing plants for juice extraction. Bulk juice is moved to concentration plants for evaporation and freezing into frozen concentrate or to canning plants for retail packaging. Retail packaged citrus juice can be sold to retailers for sale to consumers under a nationally advertised brand or private grocery chain label (Osaretin, et al., 2022). As citrus products change form and move through market channels, value is added from labour, capital, and management. The industry is linked to input supply businesses that provide fertilizers, chemicals, orchard care services, packaging materials, transportation, etc. The labour for citrus production and processing is provided by workers on farms and in the surrounding towns. The export market is more important for fresh citrus fruits from South Africa than for juice. The industry averaged 61% of production going to export, 19% to domestic consumption, 18% to processing, and 2% to waste over five years (DALRRD, 2012).

2.3.2 Processing Industry

There are two types of juice processors: bulk processors produce most of the world's orange juice, and marketing processors sell packaged juice under their brand name and often purchase additional juice from bulk processors. The beverage industry buys juice concentrate to add water and transform, bottle, and market it. These bottlers have undergone mergers and acquisitions (e.g., Coca-Cola with Minute Maid and PepsiCola with Tropicana) (Borghoff, et al., 2023).

2.3.3 Global Retail Chains

Worldwide, retail chains are increasingly dominant in the worldwide citrus trade and their emergence has influenced agricultural supply chains and small growers, mostly due to the implementation of demanding quality requirements and regulations. Global retail chains, on the other hand, are increasingly important for the distribution of food in South Africa and other developed nations (notably the EU and the United States) (Tchonkouang, et al., 2024). This trend is also gaining traction in Latin America and Asia. The concentration and consolidation of the retail chain, as well as its global expansion, have boosted its market position and increased its purchasing power. It

enables them to exert more control over the marketing chain. They set stricter restrictions when determining production and distribution circumstances.
Supermarkets require more volume, higher quality, and less expensive pricing (Dwivedi et al., 2021).

This downstream power shift in the produce marketing chain results in more vertical coordination, primarily through supply chain management practices. Supermarkets typically form long-term agreements with preferred suppliers to ensure consistent supply at the needed quality standards. As long-term partnerships between retailers and growers have evolved, the value of NFPMs has decreased considerably (Burgess, et al., 2023). Conformingly, some citrus fruit growers and citrus processing companies are reacting by transitioning from a production-orientated approach to a more marketorientated approach, as well as enhancing supply chain management, to better fulfil customer expectations. The new marketing and trade practices of retail chains include slotting allowances and fees for placing products on supermarket shelves, special packaging, and other marketing and trade promotion services (Dube & Roberts, 2021).

2.3.4 Final Consumers

Consumer preferences are changing, and consumers are seeking more natural and nutritious products (people are becoming more aware of the health and nutritional benefits of consuming more fresh fruits and fruit juices). Consumers are also more interested in nutritional considerations, such as eating less fat and sugar, which supports fruit intake. Food safety has also become a major concern, particularly concerning recent food scandals in Europe. Consumers want high-quality food and are concerned with the taste, appearance, and shape of the fruit (Vinícius, 2021).

They want to be informed about the food they eat through proper labelling, as well as tracking and traceability initiatives. They are also interested in innovation, with a growing preference for diversity and a demand for the continued presence of new products. At the same time, changing lifestyles have increased preferences for quick and easy access to food. Convenience is becoming a major factor in produce demand. This encourages the intake of juice and easy-to-peel fruit, such as clementines.

Furthermore, customers are increasingly concerned about production conditions, both environmental and social, and are demanding more organic and fair-trade products.

2.4 Overview of the global orange industry

In recent years, producers around the world have not been able to market their entire exportable crop. Growers in many countries have been given government assistance to produce and handle their crops, as much as citrus fruit exports have not kept up with production. Growers have also been encouraged to divert large portions of their crops for preparation in the form of canned fruit and fruit juice, oils, and acids.

Figure 2.2 shows that global orange production is expected to be 5% lower than 47.8 million tons in 2022/23, as lower production in the European Union, Turkey, and the United States is only slightly compensated for by a larger crop. With less production and an increase in exports, both consumption and fruit processing decrease. On a national scale, the United States production is expected to decrease by more than a quarter to 2.3 million tons, the lowest in more than 56 years. Yields in Florida continue to fall due to fruit drop caused by citrus greening, restricted harvest areas, and severe winds from hurricanes. In 2022/23, California is expected to produce more than twice as many oranges as Florida.

However, Brazil is expected to reduce production by 179,000 tons to 16.8 million due to an off year and therefore a lower fruit load per tree. However, due to the lower rate of early fruit drop caused by ideal weather, the average weight of oranges should increase. Due to the dry and exceptionally warm summer weather in Spain and Italy, the production of the European Union is predicted to decrease by 13% to 5.9 million tons. Imports are expected to counterbalance only a portion of decreased domestic availability. This will allow the South African orange sector to improve its market share in Europe. Mexico's production is expected to increase by 600,000 tons, totalling 3.6 million tons, thanks to the expanded harvested area and the favourable weather during flowering, which promoted fruit development.

Egypt's production is expected to increase by 600,000 tons to 3.6 million tons due to the increased harvested area and the excellent weather during flowering. Due to the freeze that impacted the bloom, Turkey’s production is expected to decrease by 430,000 tons to 1.3 million. Morocco's production is expected to decrease from

367,000 to 783,000 tons due to reduced harvest area and poorer yields caused by unfavourable weather during the growing season and limited water. Finally, Chile's production is predicted to range from 10,000 to 174,000 tons based on the expected excellent weather following the previous year's frost and somewhat larger harvested area.

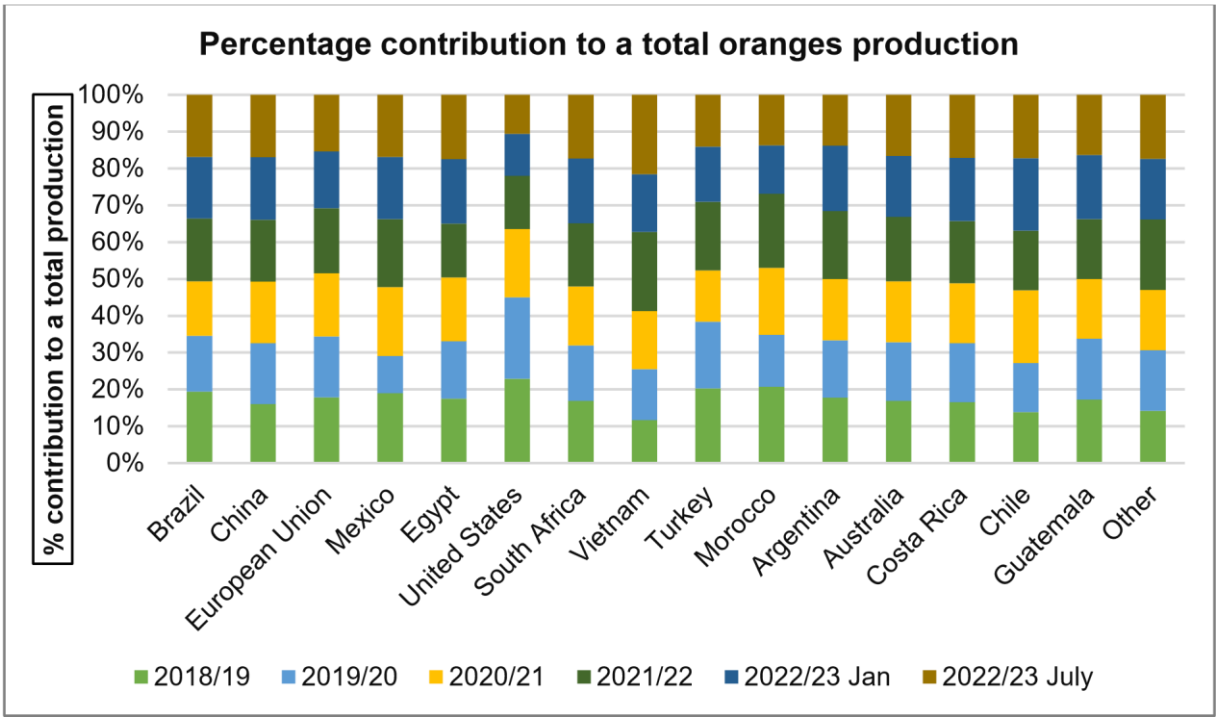


Figure 2. 2: Percentage contribution of world-leading orange producers

Source: USDA (2023).

Increasing competition in world markets has led to more uniform classification and packing of citrus fruits that enter these markets, and this improvement in preparation has helped create better demand. On the other hand, import and export trade regulations and restrictions in many importing and exporting countries have influenced the global movement of citrus fruits. During the war years, international trade in citrus fruits was seriously disrupted and, therefore, production trends were altered materially in some important countries (Dube & Roberts, 2021). Furthermore, due to security regulations, there was an almost complete “blackout” of information regarding developments. Citrus fruits are available throughout the year and due to excess production, crop shortages in any country are easily compensated for by surplus from other areas. Thus, the world demand is usually completely satisfied (Ngam, 2018).

Figure 2.3 shows the world's leading orange consumers in millions of tons for the time under consideration. With reduced yield and unpicking in exports, global consumption and fruit moving into processing are also decreasing. Consumption in the United States is flat, while oranges for processing are reduced due to a reduction in production in Florida. Consumption in Brazil is expected to remain stable, while the price of fruit for processing is expected to decrease due to the decreasing available supply. Although China's imports are likely to increase due to increased domestic demand, exports are expected to fall as more fruit is consumed.

With decreasing supply, fresh consumption, fruit processing, and exports have decreased to the European Union. Egypt and South Africa are projected to remain the top import sources. Egypt's consumption and near-record exports are likely to increase due to increased supplies, with a greater share of supply predicted to go to exports to fulfil the high global demand for fruit. With increasing available supply, Chile's consumption and exports are expected to rise. With a market share of more than 90%, the United States is expected to remain the major export market (USDA, 2023).

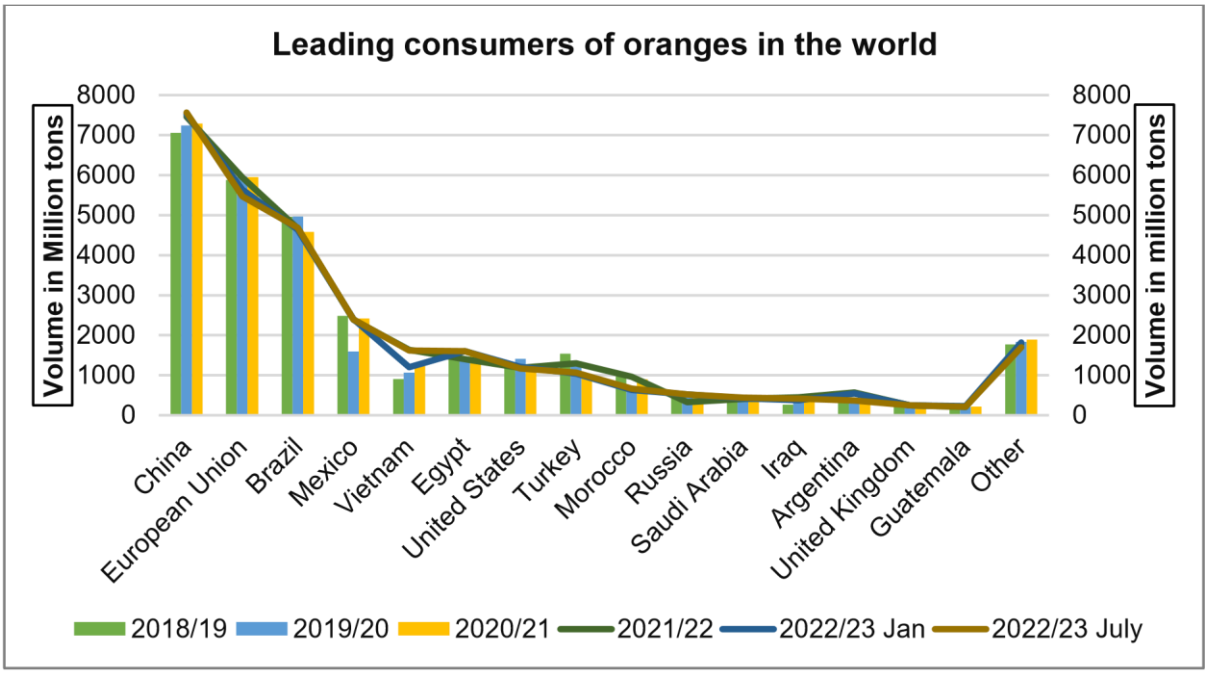


Figure 2. 3: Leading consumers of oranges
Source: USDA (2023)

World exports of oranges increased from approximately 4 395 thousand tons to 4 584 thousand tons in 2022/23. Supply from Palestine increased from 33% in 1990 to 48% in

2022, and that from the United States increased from almost 14 percent in 1990 to 26 percent in 2022.

2.5 Overview of the South African orange industry

2.5.1 Production and Distribution Trends

Fruit exports have essentially three primary sales channels. One can sell directly to an importer with or without the assistance of an agent. One can offer fruits in bulk, which will then contract out importers/marketers to take advantage of economies of scale and improved bargaining strength. Furthermore, mixed fruits may serve major retail chains. You can also join a private or cooperative export organisation that will collectively identify agents or importers and promote the produce. An export organisation, such as a combination of fruits, can supply the wholesale market or retail chains, depending on the conditions. Export organizations will wash, sort, and package the products (FAO, 2017).

They will also promote goods under their name or on behalf of members, including labelling and barcoding. Most of the time, export organisations collectively agree with goods forwarders to negotiate better costs and services (more regular transportation, cheaper peak season prices, and so on). Some countries have institutions that manage all produce (membership is required) and sell only to a small group of importers (Croome, 2019).

Agents will connect producers/export organisations with buyers in the importing country and will typically charge a commission of 2% to 3%. On the other hand, an importer will acquire and sell his capacity, carrying complete risk (except on consignment). They will also supervise the clearance of the product through customs, packing and ensuring label/quality compliance, as well as distribution. Their profit margins range between 5% and 10%. Contract importers of fruit combine on the market and distribute the combined products, clear them through customs, and in some circumstances process and package them (WTO, 2023).

Only a few exporters have long-term contracts with wholesale grocers who distribute directly to retail stores, but with the increasing relevance of standards (EUREGAP, etc.) and year-round availability of fruit, long-term contractual relationships are

projected to become more common. **Table 1.2** highlights the distribution of the orange market segment in South Africa in the period under review. It is important to note that South Africa produced approximately 1,173,068 tons in 2021, approximately 70% of which were exported to global markets, while 25% and 6% were processed and sold in local markets fresh, respectively (CGA, 2023).

Table 2. 1: South African orange market segment distribution

Year	Production	Local market	Processed market	Export market
2012	1 466 059	128636	300468	1036955
2013	1 658 827	127644	421474	1109709
2014	1 676 799	119950	439590	1117259
2015	1 647 361	114934	402088	1130339
2016	125184	88999	195436	990749
2017	1363576	87731	190354	1085491
2018	1585796	100269	317164	1168363
2019	1590463	94462	477514	1018487
2020	1413989	83098	217777	1113114
2021	1511056	94768	243220	1173068

Source: CGA (2023)

2.5.2 Orange Historical Market Price Trends

Table 2.2 shows the orange prices in the local, export, and processed markets in rand per tonne throughout the review period. It should be noted that the orange export industry yields greater returns in markets worldwide. In the export markets, the price per tonne in 2021 was R8 989. This was 2.3% lower than the export price for 2020. Orange prices rose dramatically from 2012 to 2020 but only fell in 2021. In 2021, oranges sold in local markets fetched an average price of R3 999 per tonne, while those consumed by the processing sector fetched the lowest price of R639 per tonne.

Table 2. 2: South Africa's historical market price and average prices

Year Feb - Jan	Sales to markets. R/Ton	Processed on markets. R/Ton	Exports on markets. R/Ton	Gross value (R'000)
2012	1895	564	4318	R5236834
2013	2054	591	4975	R6244319
2014	2235	619	5799	R7231367
2015	2545	654	6628	R8279056
2016	3635	1002	8570	R9272569
2017	3605	1072	8668	R10186105
2018	3361	693	8600	R10874828
2019	3643	699	8268	R9375877
2020	4897	519	10329	R12348975
2021	3999	639	8989	R11383360

Source: CGA (2022)

2.5.3 Local production areas and major export destinations

Figure 2.4 represents the European Union market, which is important for South African orange exports. **Figure 2.4** only shows countries with at least 10,000 tons of imported orange from South Africa in at least one year during the assessment period.

The European Union and the Middle East are South Africa's largest importers. In 2022, the EU represented 37% of South African orange exports, with the Middle East accounting for 21% and Southeast Asia, and others accounting for 14% and 7%, respectively.

Figure 2.4 (right) shows the orange manufacturing area. Most oranges (61%) (16 857 acres) were planted in the Limpopo Province in 2022. Limpopo was followed by the Eastern Cape province (16%) and the Western Cape province (9%). Mpumalanga and Zimbabwe were also significant orange growers in 2022, accounting for 5% and 5% of total production, respectively.

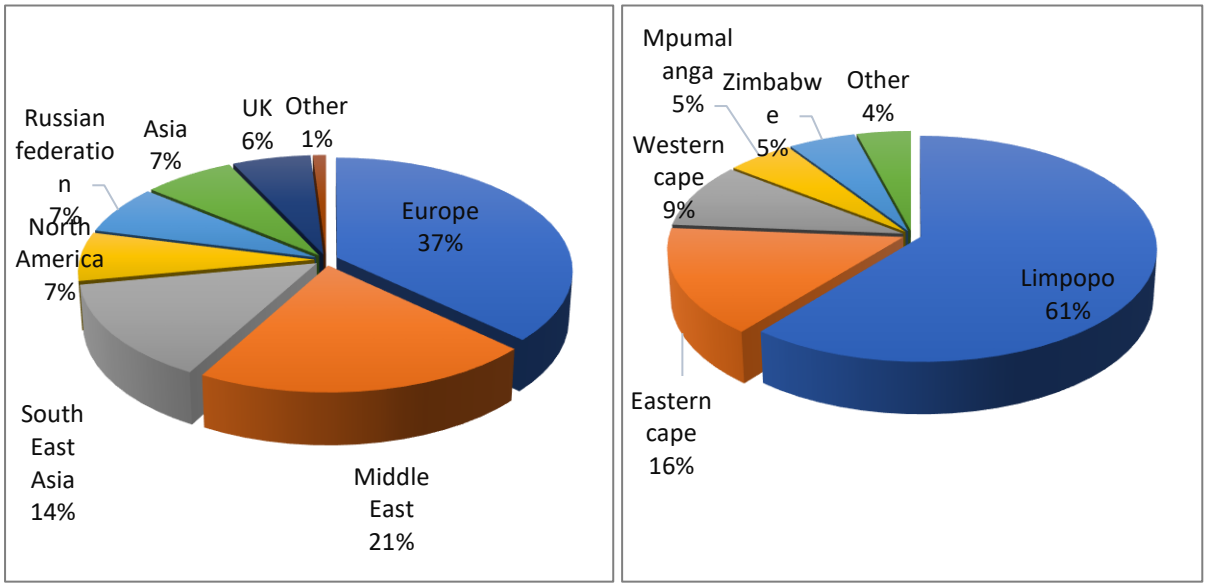
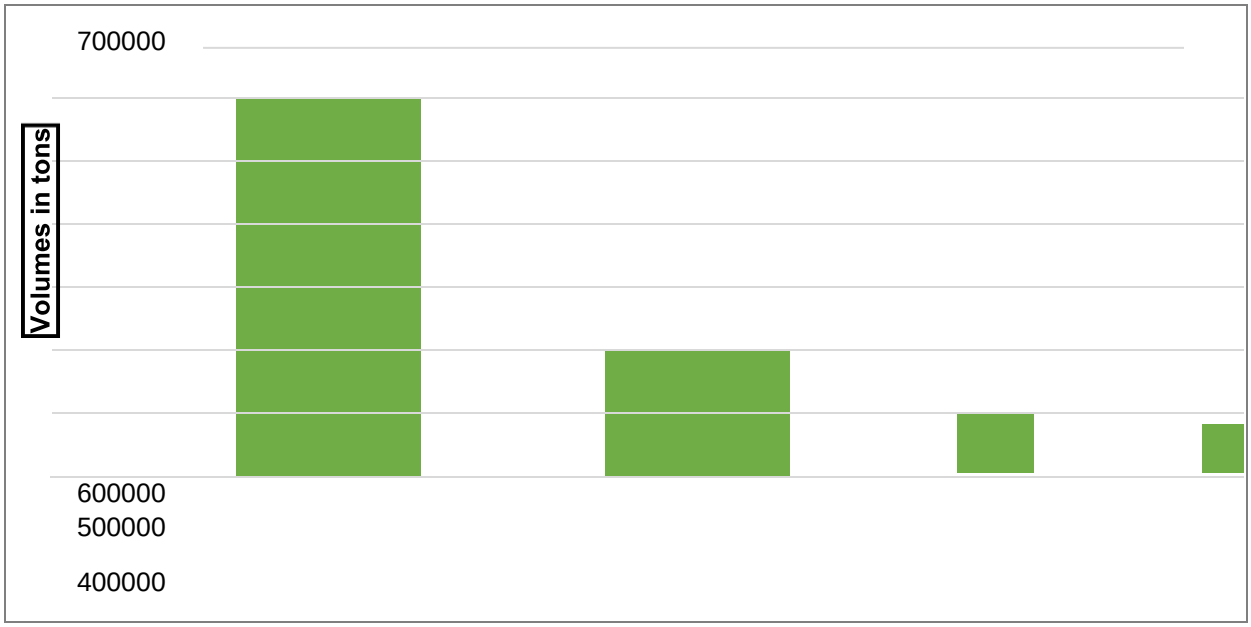


Figure 2. 4: Local provincial production areas and major market destinations Source: Citrus Growers Association (2023).

2.5.4 Loading ports of orange in Southern Africa

Citrus fruits from South Africa are largely targeted for export markets and are shipped via the ports of Durban and Port Elizabeth from South Africa or Maputo in Mozambique. Durban accounts for more than 60% of citrus exports. Citrus, intended for the Middle East, South Africa's fastest expanding market, is delivered through the port of Port Elizabeth. Maputo's port is close to the country's expanding northeast region and might serve as an important gateway to the Middle Eastern and Asian markets. The Maputo port is undergoing substantial improvements on its quay walls, quay surface, and roadways (USDA, 2023).

Figure 2.5 highlights the volumes of oranges that passed through the various ports in South Africa. The upgrades to the Maputo port are seen as a great boost for orange exports that will be destined for Asian markets in the future. Currently, Durban is ranked as the main port that allowed approximately 600,000 tons of oranges in 2022. This is followed by the Cape Town port, which absorbed 198,173 tons, followed by Gqeberha (106,915 tons) and Ngqura (88,554), respectively.



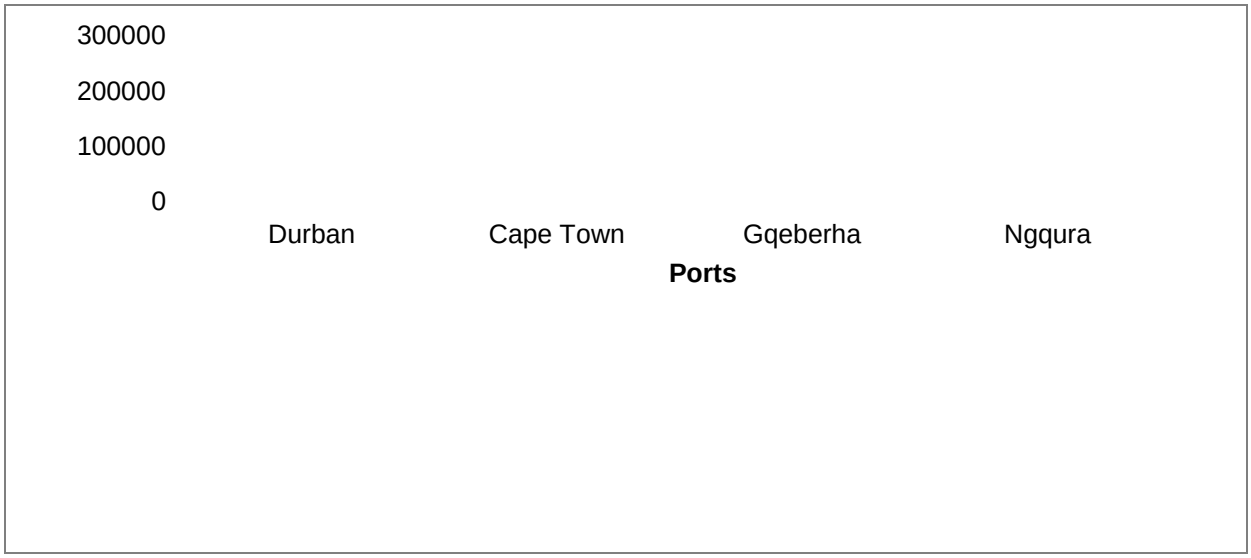


Figure 2. 5: Loading ports of oranges in Southern Africa

Source: CGA (2022)

The citrus industry has made significant investments and commitments to export oranges from Maputo. It is crucial to highlight that the strategic Asian markets included in this study may be easily accessed using Maputo, ensuring the industry's future sustainability (Staff, 2022).

2.5.5 Current situations facing the South African orange industry.

The COVID-19 outbreak was disastrous for the remainder of the season, and the Durban lootings of July 2021 merely added to the immense obstacles and logistical concerns encountered in all South African ports. Due to a global lack of shipping equipment, shipping rates have surged to never-before-seen heights, thereby eliminating any hope of profit. Fewer chances of shipping resulted in port congestion, high storage costs, and delayed deliveries to the market, all of which exacerbated quality issues. Although these external variables had a significant negative impact on the citrus export campaign, the industry managed to export a record number of 161.5 million cartons (Steinhauser & Patel, 2021).

In February and early March 2023, successful roadshows were held throughout the country in all citrus-growing regions. The CGA worked feverishly to open the Maputo port for citrus exports in the next season, with larger volumes expected to the Far and Middle East. The shipment of citrus fruit to the Philippines, as well as the long-awaited protocol adjustment for lemon exports to China, has received an additional excellent response (Meintjies, 2022). Due to the significant increase in citrus production

predicted in the coming years, the strategic goal remains to gain, maintain, and optimise market access. Due to a significant increase in the volume of citrus available for export, this will continue to be a challenge when selling through current logistic channels and sourcing new markets (Meintjies, 2022).

During the 2021 season, container terminal operations were volatile. Loss of performance has been associated with ageing and equipment failure, as well as insufficient maintenance. To increase awareness of this issue, the CGA has communicated widely with all levels of government, Transnet's top management, and the CGA board (Transnet, 2022). If millions of Rands are not invested in large-scale fleet replacement, container terminal performance will remain stagnant or worse. Transnet involves public-private partnerships with foreign terminal operators to collaborate and invest in new equipment. The cooperation procedure was launched late in 2021, with results expected in 2023 or 2024 (Transnet, 2022). Due to the increase in citrus exports, the demand for the demand for the demand for the demand for reefer containers is expected to increase from 94,000 units in 2021 to approximately 115,000 units by 2025. Although land-side issues will continue during the peak season, the forecast indicates that shipping companies will be unable to meet this demand. The only practical answer to this challenge is to expand exports on typically specialised reefer ships. These ships run more efficiently and effectively than container carriers, allowing products to reach the market sooner (Dreyer, 2023).

2.6 Summary

The chapter concludes by emphasizing the overarching theme of resilience and adaptability within the South African orange industry. As the global landscape of orange production and trade evolves, South Africa's stakeholders must cultivate agility and collaboration to navigate market fluctuations and consumer preferences. The interplay of domestic production systems, global market demands, and local socioeconomic conditions will continue to shape the sector's future. Thus, the insights from this chapter set a strong foundation for the subsequent analysis in this study, as they explain the interplay of historical and contemporary factors affecting the viability of the orange industry in South Africa, while also underscoring the strategic economic importance of this horticultural sector on both local and global scales.

CHAPTER 3 COMPETITIVE CONDITIONS IN ORANGE PRODUCTION

3.1 Introduction

In recent years, the global fresh orange market has experienced significant changes, particularly for the South African industry, which has become more competitive against other major players. Key factors include a plateau in demand for fresh oranges in developed markets, with a shift toward processed products, while consumption is rising in developing countries as incomes increase. New low-cost producers of highquality oranges have emerged, particularly in off-season markets, further intensifying competition. This chapter examines the competitive landscape of the orange industry, comparing the strengths, weaknesses, and key statistics of the fresh orange market with those of major competitors. It provides a detailed comparison between South Africa and other countries, presenting relevant industry statistics and summarizing factors influencing both South Africa and its significant competitors.

3.2 Industry comparison

Total output volume, area and yields can be used as a starting point to evaluate an industry's strengths and weaknesses. **Table 3.1** shows significant information such as the production area and yields of the fresh market orange sector in South Africa and its major competitor countries (Spain, Egypt, the United States, and the Netherlands). Spain, Egypt, and the USA produced more oranges than South Africa, which is mainly driven by the large total hectares dedicated to orange production (**see Table 3.1**). However, the volumes indicate that South Africa exports 80% of the oranges it produces. On the other hand, competitors are consuming large volumes of fresh or processed oranges in local markets.

Table 3. 1: Comparison of industries of selected countries

Product	**Factor**	**SA**	**Spain**	**Egypt**	**USA**	**Netherlands**
Oranges	Total hectares	35 884	143 170	129 862	199 391	0
	Production Volume	1 612 170	3 604 800	3 000 000	4 015 200	0
	Harvested Yield	449 270	251 785	231 014	201 373	0
	Exports	1 295 733	1 485 879	1 282 563	470 434	368 648
	Imports	3002	182 359	1.7	223 596	619 361

Source: FAO & compiled

3.3 Factors affecting the performance of the fresh market orange industry.

Several factors influence the performance of fresh orange businesses. Some factors, such as natural temperature, weather, and soil type, are ultimately beyond producers' control, but they can be controlled successfully and at varied costs. Government policies, such as environmental rules and trade policies, influence others (Duarte, et al., 2024). Others may rely on the ability of individuals or groups of producers to increase yields and product quality through changes in cultural practices or production scales, as well as cost control. An industry may be competitive domestically compared to imported products yet fail to meet international standards or phytosanitary criteria in global markets, resulting in a low export competitiveness ranking (Duarte, et al., 2024).

The following factors (not exhaustive) are analyzed to assess the strengths and weaknesses of South Africa's and its major competitor countries' fresh market orange sectors.

- Regulations: environment, labour, sanitary and phytosanitary, food safety
- Market standards
- Natural resource endowments
- Seasonality
- Government support and investment

An assessment of competitiveness in any industry is difficult. Favourable conditions for any element or a collection of factors do not always result in improved relative performance or reduced associated costs. The section that follows provides an assessment of each industry's performance utilising important factors based on an examination of multiple data sources.

3.3.1 Regulations

Producers and exporters of oranges must adhere to a wide range of regulations governing food safety, product quality, environmental stewardship, and social standards (such as labour protection, workers' compensation, and land ownership), and regulatory compliance has an impact on producer performance and costs. Some laws and standards are imposed by domestic or foreign governments, while others are voluntary and imposed by the marketplace. Due to a lack of data, evaluating the costs and advantages of the regulatory environment for orange producers in South Africa and other countries is challenging (Duarte, et al., 2024).

Regulations reflect, among other things, customer demand for safer and higher quality products, as well as the concern for social issues and the environment. Production requires compliance with packing and processing hygiene, including sanitation and fumigation requirements, pesticide use and residue restrictions, microbiological pathogen limits, classification standards, and packaging, as well as labelling regulations. The orange trade is also heavily regulated in terms of country-specific sanitary and phytosanitary (SPS) rules, which are intended to prevent pests and diseases from spreading across regional, state, or country boundaries (Duarte, et al., 2024).

Regulators are increasingly scrutinizing the production of commodities such as fresh oranges, which undergo many human handling procedures to improve food safety and traceability systems. Food safety regulations affect practices not only at the farm and packing level, where potential contamination sites include fertilizers, irrigation water, harvesting equipment, and handling, but also throughout the distribution chain, where temperature changes and exposure to contaminants can render food unsafe (Duarte, et al., 2024). Although governments generally set food quality and safety regulations, retailers and consumers frequently want even stricter food safety standards.

3.3.2 Market Standards

Customer-imposed standards that can surpass government requirements have evolved from the marketplace's desire for food safety and hygiene standards, which might range from permissible chemical residue levels on fruit to cleanliness in the packing house. Even though they are optional, most countries have made satisfying standards a de facto requirement for doing business with retail or food service enterprises. In response, South African producers and the most forward-thinking producers in key competitor countries develop their food safety programmes, which they then submit to third-party audits. Global GAP certification has been reported by leading producers worldwide (Schreinemachers, et al., 2018).

While most orange businesses that export globally generally meet quality standards in major export markets, only a small part of the Chinese and Mexican orange sectors. According to industry observers, China's main barrier to competing in the global market

is its inability to meet food safety and hygiene standards in major destination markets (Schreinemachers, et al., 2018).

3.3.3 Natural Resource Endowments

Natural endowments, such as water availability, soil quality, weather conditions/patterns, and the presence of hazardous insects and illnesses, influence the intensity with which growers must maintain their groves. Irrigation, fertilization, pest management, frost protection, and windbreaks all result in additional costs that many growers believe are necessary to remain competitive. All major citrus-producing countries generally have ideal climatic conditions for orange production and most enterprises use "best practices" such as orchard management (Skendžić et al., 2021).

The presence of certain pests and diseases has the potential not only to lower the marketable harvest each year but also to result in import prohibitions in foreign markets and, over time, to reduce the productive bearing area in producing areas. Although bilateral agreements might help to keep the orange trade flowing, specific handling and treatment can lengthen shipping times and increase prices. Government inspections are expensive for packers, costing up to 50% of the packing cost in some situations. Phytosanitary concerns about fruit fly infestations severely limit exports to their primary trading partners (TshikhudoI et al., 2021).

3.3.4 Seasonality

The capacity to offer oranges during specific seasonal windows when global supplies are low, capturing higher prices, is a strength for orange producers and one of the most significant competitive advantages for export-oriented enterprises. The production seasons for fresh oranges are dictated by the opposite seasons in the Northern and Southern Hemispheres, which are normally September through March in the Northern Hemisphere and May through November in the Southern Hemisphere. Southern Hemisphere producers, in general, profit from availability during the opposite season of the most high-demand markets in the Northern Hemisphere (Duarte, et al., 2024).

Ideally, farmers should cultivate oranges throughout the year to ensure a consistent supply for consumers. When local production in these markets is limited, orange growers in South Africa and all major rival countries plant various kinds with staggered

maturity dates and service overseas markets. Producers may also leave fruit on trees for a few months longer, utilizing growth regulators to maintain fruit quality and cold storage to regulate supply and lengthen their marketing season (USDA, 2023).

Table 3. 2: Orange marketing season by countries

Oranges	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
South Africa												
Spain												
Egypt												
USA												
Netherlands												

Source: compiled

3.3.5 Government Support and Investment

According to (Mbatha, 2024)South Africa, similar to many of its key competitors, does not enjoy significant government assistance for its fresh orange industry. However, agricultural extension services, soil and conservation initiatives, and phytosanitary regulations designed to safeguard local produce and consumers from harmful pests and diseases do provide indirect benefits to the South African sector. The national department and private sector fund research and development, while competitors typically receive minimal government backing, mainly focused on phytosanitary management, industry intelligence, market information collection and distribution, and research programs (Makapela, 2015). Through government-supported technical aid, planning, and training, both national and local authorities are working to enhance the country's overall competitiveness in the global market. However, China's national citrus plan does not offer funds, and total official financial support for orange production is thought to be modest, despite the possibility of preferential policies at the local level (Koch & Terblanche, 2013).

The Spanish industry, on the other hand, benefits from a variety of government initiatives and funding. Certain EU support programmes target fruit under the EU's common agricultural policy, complicating efforts to quantify the extent of support received by fresh orange farmers. There are, however, specific programmes for orange production. Producers receive direct compensation for market withdrawals,

processing subsidies, and export refunds designated expressly for citrus fruit, as well as assistance from the EU's rural development initiatives (OECD, 2021).

3.4 Summary

In summary, this chapter's findings highlight the intricate interplay of market dynamics, regulatory environments, and competitive strategies that define the fresh orange industry. For South Africa to enhance its competitive stance, there must be a concerted effort to navigate these challenges through innovation, compliance with stringent market standards, and the development of supportive governmental policies. As the global orange market continues to evolve, the resilience and adaptability of South African producers will be crucial determinants of their success in achieving sustainable growth and maintaining their foothold in international markets. Ultimately, this analysis directs attention to the urgent need for strategic planning and collaborative efforts across the industry to harness the full potential of its agricultural resources.

CHAPTER 4
REVIEW OF SOUTH AFRICAN AND ASIAN TRADE POLICY CHANGES AND FOOD SAFETY STANDARDS

4.1 Introduction

Food safety is at the forefront of global challenges as we navigate a rapidly changing landscape of food consumption, production, and distribution. With a projected twothirds of the world's population living in megacities by 2050, urgent action is needed to address critical issues such as food supply, sanitation, and water scarcity. These challenges are compounded by uneven progress in food safety governance, particularly affecting underdeveloped nations, where food-related diseases pose significant public health risks. Recent conferences have highlighted the need for transformative practices that ensure safe food access while mitigating climate change. Furthermore, the imposition of environmental and sanitary standards by industrialized nations often creates perceived trade barriers for developing countries, complicating the balance between food safety and market access. Addressing these complexities is essential for fostering economic growth and ensuring the health of populations worldwide.

4.2 Objectives of South Africa’s Trade Policy

The trade strategy of South Africa has had a considerable impact on trade composition and aggregate growth. Through its trade policy, the government sought to increase the living standards and quality of life for all South Africans. To achieve this goal, the present macroeconomic strategy, which includes national trade and industrial policy, is strongly focused on increasing the country's economic growth potential (WTO, 2023). For a long time, South Africa's trade and industrial policy was defined by encouraging import substitution under the protection of considerable safeguards. This was principally influenced by the imposition of customs taxes. This approach has contributed to the development of a high domestic industrial cost structure and hindered effective foreign competitiveness. Sanctions imposed by the international community compounded the challenges associated with this development. As a result, manufactured goods from South Africa were mostly uncompetitive in international markets. This relative lack of competitiveness inhibited South Africans' development of an export culture, notably in the manufacturing sector (Altam & Mayer, 2022) Furthermore, there have been fewer import substitution opportunities since the mid1970s, and gold exports have fallen. However, significant industrial exports were insufficient to compensate for the current scenario in South Africa. As a result, economic growth has slowed, and industrial development has stalled. To repair the situation and attain the goal, many aims are pursued. It is commonly understood that increased investment in internationally competitive exporting businesses is the primary means of achieving long-term economic growth. As a result, to improve the economy's supply, the government provides various investment incentives, including, among other things, a comprehensive technology innovation program. Another purpose is to promote and expand the competitive environment by preventing the formation of monopolistic cartels and restrictive practices (Altam & Mayer, 2022).

South Africa's trade strategy is intended to achieve numerous goals, including promoting economic growth, increasing international competitiveness, and fostering sustainable development. The following are some of South Africa's primary trade policy objectives:

- **Economic Growth and Development**

  South Africa's principal goal of trade policy is to boost economic growth and development by increasing exports, attracting foreign direct investment (FDI), and creating job opportunities. The goal of this approach is to support high-growth industries and sectors and advance the nation’s overall economic development (Arvananitis, 2002).

- **Export Diversification**

  South Africa strives to diversify its export base to lessen its reliance on a few goods and markets. The country hopes to strengthen its resilience to external shocks and grasp new possibilities in emerging sectors and markets by boosting the export of a diverse range of commodities and services (Schreinemachers, et al., 2018).

- **Regional Integration**

  Through trade agreements such as the Southern African Development Community (SADC) and the African Continental Free Trade Area (AfCFTA), South Africa is dedicated to advancing African regional integration. The goal is to improve regional trade and economic cooperation, boost cross-border investment, and build deeper political and economic relations with neighbouring nations (Hartzenberg, 1998).

  - **Job Creation and Poverty Alleviation**

    South African trade policy attempts to increase employment and reduce poverty by enabling trade that benefits labour-intensive industries. The policy aims to increase the competitiveness of industries that can provide significant job creation while also promoting inclusive economic development (Treasury, 2019).

  - **Industrial Development and Value Addition**

    South Africa's trade policy prioritises industrial development and the addition of value to raw materials. The goal is to advance the value chain by promoting manufacturing and processing operations, increasing the competitiveness of the South African industry, and developing higher-value export products (DTIC, 2016).

  - **Sustainable Development**

    South Africa's trade policy considers environmental and social factors to promote sustainable development. It seeks to ensure that trade is conducted in

an environmentally responsible, socially inclusive, and labour-rights-compliant manner (World-Bank, 2024).

- **Trade Facilitation and Infrastructure Development**

  South Africa aims to improve trade facilitation by improving customs procedures, reducing trade barriers, and investing in infrastructure development. The objective is to make cross-border trade more efficient, costeffective, and seamless, thus increasing competitiveness and attracting investment (Clark & Bernard, 2019).

- **Market access and export promotion**

  South Africa sought increased market access in overseas markets for its goods and services. Negotiating trade agreements, lowering trade barriers, and encouraging exports in different ways, such as through trade missions, export promotion programmes, and trade facilitation measures, were all part of this goal (DTIC, 2016).

These goals are consistent with South Africa's larger ambitions to become a part of the global trading system and use trade as a tool for economic development, regional integration, and social improvement.

4.3 Prospective changes in trade policy

In recent decades, international economists have focused their attention on developing country trade policies. Many questions about the connection between trade and growth have been raised by emerging nations' need for rapid economic growth (IMF, 2018). Proposals from the Department of Trade and Industry, organized industry and commerce, and other public sectors organisations such as the Board on Tariffs and Trade and the South African Industrial Development Corporation serve as the foundation for South African trade policy. The Ministers and Deputy Ministers of Finance, plus Trade and Industry, along with their Directors-General, Commissioners, and officials, comprise the executive branch of government responsible for trade matters (IMF, 2018).

Trade-related policies in South Africa have generally adhered to import replacement policies for a long time. A combination of selective and mild customs tariff protection was applied in "normal" competitive environments. On the contrary, formula tariffs

applied to imported commodities at rates that were not considered "normal." The home prices of South Africa's main trading partners were used to establish the "normal price" of a particular good. These formula duties were not specific to any nation or group of nations, making them indiscriminate. In addition, certain industries, such as the automobile sector, are sometimes singled out for extra scrutiny and consideration (WTO, 2017).

A heated discussion concerning tariff policy is currently raging in response to South Africa's need to increase both its economic potential through export promotion and its global competitiveness. In March 1990 the Industrial Development Corporation (IDC) was asked to produce a report on the existing tariff protection strategy and to recommend any adjustments to the government that it deemed necessary (Stern & Ramkolowan, 2021). The Corporation's report was delivered to the government in July 1990 and made public by April 1991, with the purpose of securing an agreement on a more market-orientated industrial policy. Meanwhile, the Board of Tariffs and Trade has expressed reservations about continuing to use the formula duty system. Instead, the board is working to expand the application of clear antidumping and countervailing duties. Despite South Africa's export-led growth policy, considerable adjustments will be needed, especially given the current round of GATT negotiations. A significant overhaul of tariff policy is needed, as well as a package of economic policy initiatives aimed at promoting export-led industrial development (Stern & Ramkolowan, 2021).

The World Trade Organisation (WTO), an intergovernmental organisation that oversees and facilitates international trade, has been ratified by many countries. Countries join the WTO because they believe that participation will increase commerce, aid in economic development, and encourage economic progress. The WTO was founded in 1995 based on agreements negotiated by the first 128 members. As a result, 36 new members have joined terms agreed upon with existing members (WTO, 2023). The strength of a country's import market strongly influences these terms and conditions (Bagwell & Staiger, 2011; Beshkar et al., 2015; Beshkar & Lee, 2022). While the GATT-WTO negotiations appear to be stagnant, the world is not.

As countries develop, their share of global trade in specific items will inevitably shift, as will their ability to influence global prices. This would imply that repeated rounds of

trade talks would be beneficial in maintaining commitments at mutually acceptable levels or that commitments would be contingent on some measure of import market strength. To the best of our knowledge, we are the first in the economic policy literature to make this claim, which has significant implications for how multilateral rounds or commitments should be organized, as well as how these negotiations should be theoretically modelled (Jakubik et al., 2023).

Many countries have benefited greatly from the expansion of market access prospects after accession to the WTO, and their rapid economic growth and development exceed expectations (Jakubik, et al., 2022). As they expanded, their strength in the import market increased for some products, while domestic production increased for others. As the market power of members develops, existing agreements may no longer fully reflect the possible conditions of external trade. Without further adjustments, trade tensions and political uncertainty may increase, creating greater incentives for all countries to step away from cooperative balance (Larch et al., 2019). .

Those with greater market power may wish to raise tariffs to benefit from improved terms of trade, though this is offset in practice by relatively high existing tariffs; others may wish to use higher tariffs as bargaining leverage. Some analysts interpreted the Trump administration's unilateral tariff increases in 2018 as bargaining chips intended to persuade trading partners to lower their tariffs (Mattoo & Staiger, 2020). Surprisingly, our projected reduction in annual tariff revenue required by US trading partners to offset terms of trade externalities is equal to US annual tariff revenue gains between 2018 and 2019 (Sheldon, 2022).

Historically, the GATT/WTO system dealt with such conditions (and the possibility of trade disputes) through periodic "rounds" of negotiations aimed at reflecting new market realities (Baldwin & Robert-Nicoud, 2015). Before the Uruguay Round, seven rounds were held, to significantly lower tariffs and eliminate preferential treatment (WTO, 2017). These discussions have helped to re-balancing obligations. However, no new rounds have been held since 1995. The WTO has gained new members through the arduous Article XII accession process, which may result in tariff disparities

between these new members and previous members (WTO, 2017). At the same time, the previous two decades have seen significant and unexpected changes in the global stock market (Jakubik, et al., 2023)

According to Goes and Bekkers (2023), trade policies are subject to the political, economic, and social dynamics of individual countries and the global landscape. These policies can be influenced by various factors, such as changes in government, evolving trade relationships, changes in geopolitical priorities, and emerging global trends.

- **Protectionism vs. Free Trade**

  There may be ongoing debates and potential shifts in the balance of protectionist measures versus free-trade promotion. Countries may rethink their trade policies to protect domestic industries, increase local employment, or protect national security interests. This can take the form of tariffs, quotas, or other trade barriers, or it can take the form of trade liberalization and the negotiation of new trade agreements (ITC, 2023).

- **Regional and Bilateral Trade Agreements**

  Countries frequently negotiate the establishment or revision of regional and bilateral trade agreements. These agreements seek to promote greater economic integration, lower trade barriers, and improve market access. The outcome of such negotiations has the potential to shape participating countries' trade policies and influence global trade dynamics (Harrison, 2023).

- **Digital Trade and e-Commerce**

  As digital technologies become increasingly important and e-commerce grows, trade policies can evolve to address unique challenges and opportunities in the digital realm. This could include efforts to facilitate cross-border data flows, protect intellectual property rights, and regulate digital platforms and services (Rani, 2019).

- **Sustainable and Responsible Trade**

  There is a growing emphasis on incorporating environmental and social responsibility into trade policies. Environmental protection, social responsibility, labour standards, and human rights are all factors to consider. Trade policies can

evolve to encourage more environmentally friendly production methods, address climate change, and promote fair trade practices (Schreinemachers, et al., 2018).

- **Intellectual Property Rights**

  Intellectual property protection is important in international trade. The laws and regulations of countries on intellectual property may be reviewed and updated to address emerging technologies, digital content, and innovations in various sectors. This may have an impact on trade policies regarding patents, copyrights, trademarks, and other forms of intellectual property (Chidede, 2022).

It is critical to remember that trade policy changes are context-specific and can vary between countries. The nature and direction of future trade policy changes are determined by the unique circumstances, priorities, and strategies of individual countries, as well as the dynamics of the global trade environment. According to economic theory, tariff pledges in trade agreements reflect countries' import market power at the time of negotiations (Rani, 2019). When a country grows, however, its market strength in certain sectors can change unexpectedly, and its promises may no longer reflect the changing economic reality.

4.4 Background on Food Safety Problems

Food is essential for survival, but contaminated food can cause illness and even death. Fortunately, this condition occurs only in a small percentage of cases, but the morbidity associated with millions of cases of food-related illness worldwide has significant social and economic consequences. Food poisoning, foodborne illness, and foodborne disease are all terms that can be used interchangeably in the literature (Rizzo et al., 2021). Food safety is defined as the conditions and measures that must be taken during the production, processing, storage, distribution, and preparation of food to ensure that it is safe, sound, and suitable for human consumption (Yemane & Tamene, 2022). Food is considered safe if it is free from chemical, biological, or physical hazards that could cause illness or death.

In recent years, private food safety standards have increased in addition to the norms established by the Food and Agriculture Organisation (FAO) in collaboration with the World Health Organisation (WHO). These have put agricultural food producers and exporters, particularly fresh fruit and vegetable growers, in a bind environment. Despite

the demand-side issues associated with food safety, the vast array of business-environment variables presents equally daunting challenges to exporting sectors' ability to maintain or improve market shares and compete in global marketplaces (FAO, 2016). The World Health Organisation (WHO) has long recognised the importance of educating food handlers about their food safety responsibilities, which include keeping clean, separating raw food from cooked food, thoroughly cooking food, keeping food at a safe temperature, and using safe water and raw materials (FAO, 2016).

Food safety is almost certainly as old as human history and may have begun with the discovery and subsequent avoidance of naturally poisonous foods. Early humans, most likely through trial and error, developed fundamental types of food preservation, such as drying, salting, and fermenting. As human eating habits, behaviours, and foods change, food safety becomes more formalised (Fung, et al., 2018). The rules of ancient Israel included instructions on what meals to avoid, how to prepare them, and the importance of food hygiene. According to the book Leviticus, Moses imposed restrictions to protect his people from food-related illnesses in approximately 2000 BC, such as washing garments and bathing after ritual slaughter of animals. Egyptians, Greeks, and Romans are said to have expressed comparable concerns (Chukwuma, 2022).

Some diseases are named after prominent microbiologists from the time. For example, the bacterial genus *Salmonella*, which is well known as a major food safety hazard, was named after the hog cholera researcher David E. Salmon. Dairy microbiology influences much of food microbiology, with a focus on food processing and shelf life rather than food safety (Chukwuma, 2022). Despite having little information on food safety in the 1944 edition, Frazier's book was one of the first basic texts in food microbiology. In addition to revising the preceding commodities and processing chapters, the 1956 edition added three new chapters on safety: food poisoning and infection, foodborne disease outbreak investigation, and food plant sanitation microbiology (Chukwuma, 2022). Research on food microbiology and food safety in the next millennium has demonstrated how the role of microbiology in food safety has since increased. The proceedings of the International Committee on Food Microbiology and Hygiene (17th International Conference) are presented here.

With thousands of years of food safety experience, over 150 years of food microbiology, and the most recent molecular biology techniques, it is easy to assume that food safety issues have been resolved. Reports of foodborne illnesses are increasing (Griffith, 2006). Foodborne illness caused by microbial risks is a serious and growing public health problem. Most countries that have foodborne disease reporting systems have seen significant increases (FAO/WHO Pan European Conference on Food Safety, February 2002). We are deeply concerned that foodborne illness caused by microbial infections, biotoxins, and chemical pollutants in food poses a significant risk to the health of millions of people around the world (Food Safety Resolution (EB105.R16)).

In addition, food safety issues have become more prevalent in both developed and developing countries. Although it is unlikely to be reported in some developing countries, countries with epidemiological data collection systems have reported an increase in the incidence of foodborne diseases. Data collection is essential for understanding the nature and scope of a problem. Egypt usually reports only approximately three cases per 100,000 people, whereas Sweden reports 5770 (WHO, 2019). The difference is due to better reporting and data collection rather than improved hygiene. A variety of explanations have been proposed to explain why food poisoning has increased in developed countries: food consumption patterns are changing. The use of new cooking equipment correctly or incorrectly; more diverse cuisine, including ethnic foods; changes in cooking/shopping habits, such as weekly or monthly rather than daily shopping; reduced use of preservatives; and less processing, such as more dining out (Todd, 2020).

Pathogens, or microorganisms that can infect people and cause illness, can contaminate our food supply. *Salmonella* is a bacterium found in the intestines of animals such as chicks and other young birds. Another bacterium, *Escherichia coli*, is

also known to cause foodborne illness in certain strains. Foods contaminated with animal waste can be exposed to *Salmonella*, *E. coli*, and other pathogens (Heredia & Garcia, 2018). The conditions in industrial food animal production (IFAP) facilities promote the spread of these pathogens through the transport and management of animal waste. Fertilising produce crops with untreated manure, for example, can introduce pathogens into the food supply; this is how bean sprouts, lettuce, and other fresh produce are frequently contaminated (Black, et al., 2021). Composting, for example, can destroy or inhibit some pathogens found in waste. Farmers, workers, and anyone else who encounters food animals or manure are more likely to be exposed to and spread *E. coli* and other pathogens. Feeding large amounts of grain to beef and dairy cattle, another common IFAP practice, may also increase food safety risks by altering animals' digestive systems in ways that encourage the growth of a disease-causing strain of *E. coli* (Black, et al., 2021).

Unsafe food is a global threat to human health and economies, with an estimated 600 million cases of foodborne illness each year. As a result, ensuring food safety is a public health priority and a necessary step toward food security. Effective food safety and quality control systems are critical not only to protect people's health and wellbeing but also to promote economic development and improve livelihoods by promoting access to domestic, regional, and international markets (WHO, 2019).

The FAO is widely regarded as a pioneer in the development of global food safety initiatives and their translation into country-level action. The Food Safety and Quality Programme promotes an integrated and multidisciplinary approach to food safety management, as well as holistic and feasible "food chain" solutions to specific food safety problems, as outlined in the FAO's Global Strategy for Improving Food Safety. The foundations of this approach are scientific (FAO, 2016).

Food safety encompasses a wide range of issues, including product quality as well as animal and plant diseases (Schreinemachers, et al., 2018). The core pillars of food safety standards and regulations are depicted in **Table 4.1** (Jaffee, et al., 2005).

Table 4. 1: The core pillars of food safety standards and regulations

Issue	Details
Food Safety	MRLs Heavy metals Food additives Hygiene requirements Traceability Hazard analysis and critical control points (HACCP)
Plant Health	Surveillance Plant quarantine Pest risk assessment Sanitation
Product quality	Grading Freshness Product composition Product cleanliness Labelling requirements Control of nutritional claims
Environment	Control of water and environmental contamination Recycling requirements Organic production requirements Protection of biodiversity Protection of endangered species
Social	Labor standards Fair trade standards Corporate social responsibility

Source: Adapted from Jaffee, 2005

4.5 Regulation of Food Safety Standards

According to the *Foodstuffs, Cosmetics, and Disinfectants Act of 1972* (FCD Act), the National Department of Health requires all foodstuffs to be safe for human consumption. This act governs the production, labelling, sale, and importation of foodstuffs. The *National Health Act of 2003* addresses food hygiene issues, while the *International Health Regulations Act of 1974* addresses hygiene requirements at ports and airports, including vessels and aircraft (FACS, 2019).

Regulatory aspects of food safety in the context of small, medium, and microenterprises include the following: Applicable to all food premises where food is or will be ‘handled' ('prepared, packaged, processed, produced, manufactured, stored, exhibited or served'), except those controlled under the *Meat Safety Act of 2000* (abattoirs); milking sheds; and private households that handle food for their own consumption or without compensation from any other person. Prior health approval and certification by a registered professional or environmental health practitioner is

required for all food establishments. Basic hygiene standards are applied in both developed and developing countries (FACS, 2019).

Several factors influence the evolution of food safety regulation. These are most visible in developed countries, but their impact can be seen in the evolution of increased food safety controls in developing countries. There are five key issues, not in any order, that are considered critical to understanding modern food safety regulation (Mukumba, 2011). The criteria used to establish regulations, the relationship between public and private food safety control systems, how governments approach regulation, strategic responses by private parties to regulation, and the trade implications of national food safety controls. Although this is not an exhaustive list and other authors may categorise and/or subdivide these issues differently, (Mukumba, 2011) emphasise the complex process by which food safety controls are evolving, as well as the challenges that policymakers must address (Mukumba, 2011).

Food safety assurance systems are becoming more stringent in both developed and developing countries due to increasing, real and perceived food safety problems. This is happening because of changes in both public (such as direct regulation and product liability) and private (such as self- and third-party certification) quality control systems. Furthermore, the relationship between public and private systems is changing, and the entire process is being influenced by the implementation of the World Trade Organisation (WTO) Sanitary and Phytosanitary (SPS) agreement (Bestbier, 2016).

4.5.1 Public Food Safety Regulations

Humans and animals both require safe and affordable food. Foods containing potential hazards can be harmful to your health. Consumers expect and deserve protection from foodborne hazards, so appropriate regulatory systems are critical. The *Foodstuffs, Cosmetics and Disinfectants Act of 1972* (Act 54 of 1972), as well as the *Foodstuffs, Cosmetics and Disinfectants Amendment Act of 2012* (Act 119 of 2012), govern food safety regulations in South Africa. The Foodstuffs, Cosmetics, and Disinfectants Act (FCDA) governs the production and sale of food that is unfit for human consumption in terms of public health. The Directorate of Food Control in the Department of Health and Social Development Administration enforces the law (RASA, 2019).

This act requires that food handling establishments, including red meat abattoirs, take steps to ensure that all food handlers (abattoir personnel) are adequately trained in the application and requirements of food safety systems such as the Hazard Analysis and Critical Control Point (HACCP). Regulations governing general hygiene requirements for food premises and food transport (G.N. No. R. 962 of November 23, 2012, as amended), regulations under the FCDA replacement for R. 918, and regulations under the Health Act.

The guidelines of the International Standard Organisation (ISO) ensure that food quality and safety are maintained at a relatively high level. These requirements include the following:

- SANS 10049: 2012, a food hygiene management guideline for the HACCP foundation. It outlines all the requirements that must be met for a sound HMS or Pre-Requisite Programme (PRP), as well as a detailed explanation of how to establish and maintain a documented HMS manual.
- SANS 10330: 2007: A food safety system known as HACCP is used to identify, evaluate, and control food hazards. It is applicable following the implementation of HMS/PRPs.
- SANS 22000: 2005, an FSMS originally developed by the ISO. It employs a quality management systems (QMS) approach that incorporates the wellestablished principles of principles of HACCP and good manufacturing practices (GMPs) addressed by the PRPs in ISO/SANS 22000. The farm-tofork approach of ISO/SANS 22000 can be applied to any organisation in the food chain (Escrivá & Guillermina, 2017).

4.5.1.1 Sanitary and Phytosanitary Regulations (SPSs)

SPS regulations were developed to protect human and animal life, as well as plant life and health, from contaminants, toxins, additives, and disease-causing organisms (Jha, 2023). They are used by almost all governments around the world to prevent the introduction and spread of pests to countries where they are not prevalent or widely spread (Pathak, 2022). The 19 May 2008 regionalisation confirmation emphasises the need for a disease-free exporting region or the prevalence of a disease at a lower incidence. This includes border crossing zones, as well as the entire or parts of an

exporting country (WHO, 2019). As a result, any restrictions imposed by importing countries on affected regions will increase, with no effect on non-affected regions.

The SPS regulations serve as the primary framework for food safety regulation (. SPS regulations have become a tool in some cases to protect domestic agribusinesses and producers from competition (Mukumba, 2011). However, it is argued that focusing solely on safe food in the context of strengthening the export capacity of less developed countries is a mistake. Export capacity will be prioritised over the primary goal of strengthening the consumer protection systems of less developed countries (UNCTAD, 2022). However, less developed countries face challenges in terms of compliance and resources, including scientific and technical expertise, information, and finance (Duarte, et al., 2024).

SPS regulations are based on externalities and lack information on multilateral and country-specific trade, which ultimately affects public health. Members of the WTO, on the other hand, are free to impose additional technical requirements on imports to address specific health or safety risks if they can scientifically justify the need (Mukumba, 2011). To keep up with public regulations, private standards are usually more stringent than public standards. This is based on the idea that having a variety of food safety assurance methods can result in equal health-risk safeguards. However, allowing countries to determine the levels of protection they deem best for their citizens can affect the access to food products from exporting partners.

Conformity with export market SPS regulations can be used to gain and maintain a competitive advantage over lower-cost competitors (Duarte, et al., 2024). Regaining market access that has been lost due to non-compliance may be difficult and expensive. The costs associated with SPS compliance include the non-recurring costs of achieving the necessary controls and conformity assessment capacity, as well as ongoing expenditures reflected in high supply costs. Compliance costs may be very high in the short run, but continued market access and revenue growth may be longterm pay-offs (Henson & Caswell, 1999). According to World Bank, the perception that SPS compliance outweighs associated benefits discourages necessary investments and discourages proactive approaches, increasing the likelihood of trade-related problems (World-Bank, 2024).

The SPS management capacity has not always evolved in tandem with the evolution of export market standards, nor has the establishment and expansion of the export supply chain. As market standards evolve, established capacity should be maintained and enhanced (Duarte, et al., 2024). As a result, rather than a discrete or 'once-off' response to export market requirements, compliance must be viewed as an ongoing, even 'never-ending', process of upgrading SPS management capacity. Capacity has been concentrated on specific commodities, with little spillover to the domestic supply chain. Capacity must be improved with a focus on both export and domestic markets, as well as within the context of overall competitiveness (Tiago, et al., 2020). Much of the process of complying with SPS regulations is dependent on the behaviour of private actors in the export commodity supply chain. Thus, the capacity of the private sector must be strengthened to compensate for the shortcomings of public sector controls, which have traditionally been associated with the protection of SPS management (Tiago, et al., 2020).

4.5.1.2 Implementation of the HACCP

HACCP is a mandatory system to ensure the safety of animal and non-animal food products. HACCP is also required for exporting countries whose fruits and vegetables are prepackaged, semi-processed, or processed (FAO, 2017). HACCP identifies and controls any hazard that can cause harm to the consumer. Therefore, it is a preventive measure that focuses on identifying potential points where hazards can occur and then implementing strategies to prevent them from occurring. HACCP is primarily used in the production of safe food. However, it can also be used to ensure that suppliers deliver safe raw materials. This contributes to effective food safety (Cusato et al., 2012). A process flow diagram is created, beginning with the raw material supply and ending with the finished products. Critical hazards and the points at which they can

occur, critical control points and control measures, and critical limits are identified from the list of critical points within the flow. These are accompanied by a list of monitoring actions, as well as monitoring frequencies and responsibilities. Control is maintained according to results monitoring (Cusato et al., 2012), and corrective actions, procedures, and responsibilities are predefined. The effectiveness of the system requires verification. The HACCP system requires documentation of all procedures to ensure proper operation control and the implementation of appropriate corrective actions.

4.5.1.3 Developments in pesticide regulations

The maximum concentration of pesticide residue (expressed in mg/kg) that must be legally allowed in or in food products and animal feed is recommended by the **Codex** Code of Practice (Codex, 2013). In this context, Codex refers to the collection of internationally recognized standards for food safety and quality established by the Food and Agriculture Organisation (FAO) and the World Health Organisation (WHO) which serves as a guide for food production and trade (FAO, 2016). MRLs are based on GAP data, and foods derived from commodities that meet the respective MRLs are intended to be toxicologically acceptable. The freedom of countries to identify their own standards that they consider most suitable to provide safety requirements to their citizens (FAO, 2017) has resulted in a diverse range of standards that are advocated for by various interest groups. These issues are extremely difficult to harmonize and pose a challenge for fresh produce exporters. Despite Codex MRL levels and general export tolerances, the consumer retains control. The farmer faces different levels of MRL and other private standards from a piece of land subject to the same agricultural practices and management. This necessitates supplier-side restrictions to comply with importing nations' MRLs. This is motivated by the need for the producer to meet quality standards or risk losing customer loyalty and, ultimately, market competitiveness.

4.5.1.4 Technical Barriers to Trade (TBT)

Most countries impose technical barriers to trade (TBTs) to restrict imports of commodities that do not meet certain standards of health, safety and environmental. TBT focuses on standards, regulations, and conformity to eliminate discrimination and trade restrictions. The mandatory class is 'technical regulations', while the voluntary

class is ‘standards' (Jha, 2023). Technical regulations refer to the processes and production methods that give a product its characteristics, thereby affecting the product's quality. Nations are obligated to follow international standards. However, the allowance given to each state to set private measures may not always entitle them to harmonise with international regulations (Jha, 2023). Such differentiation may be the result of the nation's unique technological and geographical environment. A trading partner may accept an equivalent technical regulation if it serves a similar purpose. Scientific evidence from an expert group can be sought in cases of disagreements over technical regulations that may be perceived as trade barriers. Although the TBT agreement encourages non-discriminatory labelling, it does not prohibit any practices that give domestically produced goods an unfair advantage (WTO, 1998).

4.5.2 Private standards

The evolution of private food safety standards has raised serious concerns about the role of public and private institutions in food safety regulation. Concerns about the legitimacy of private modes of governance where public regulation has been the dominant institution are embedded in this dialogue, with accusations that they are not risk-based and fail to adhere to basic democratic norms (Bestbier, 2016). More broadly, there is concern that private standards may undermine public policy-making processes related to food safety, both within and across nations.

Private standards supplement public regulations and are set by a varying combination of private, public, and non-governmental organizations (NGOs), which then participate in varying proportions of the governance of these standards (Mphaga, et al., 2024). As a result, they are primarily distinguished by the bodies that formed them. Individual companies, collective national standards, and collective international standards are the three main types. Large retailers set individual company standards that are then implemented throughout their supply chains. Private-label products are used to communicate information to consumers. Collective national standards are established by collective organizations (primarily retailers, processors, and producers), industry associations, and non-governmental organisations (NGOs) that operate within a country. Although these are national standards, some of them may have international

implications because they are specifically designed to establish claims about food from countries and regions. Labels and trademarks are used to communicate these data. Organisations with international representation, such as GLOBALGAP, set collective international standards. The scope of this study will not go into greater detail about the wide range of these classes, but will attempt to consider a few prominent classes, such as the GLOBALGAP.

Process documentation, food safety requirements, and logistical requirements characterise compliance with a wide range of protocols. Private standards are applied to all exporters, regardless of their geographic location or the origin of the product in question. They are collective or importer specific. GLOBALGAP and the global food safety initiative (GFSI) are two good examples of collective private standards. Retailerspecific private standard-setters include European supermarkets such as Tesco and Marks & Spencer. The main principles of the established standards for supermarket chains are to ensure sustainable and environmentally responsible production and handling of products (UN, 2007a).

The desire of retailers in developed countries to minimise risks, food scares, and scandals, combined with sophisticated technologies in detection and testing methods, has increased the stringency of private standards (UN, 2007a). Private food safety standards have been adopted in response to concerns about the origin of food and its safety for consumption (Mphaga, et al., 2024). Thus, they are a means of addressing differences in production systems, the need to bridge the ‘quality perception gap’ between producers and consumers (Hou, et al., 2019), and disloyalty in some food value chain players, particularly those associated with protectionism by export industries and governments. Private standards are a means of ensuring that food systems can meet the requirements of public regulations (Mphaga, et al., 2024). In other words, private standards go above and beyond the requirements of public standards.

Consumer willingness to pay more for higher quality has resulted in unrelenting efforts by private organizations, governments, and consumers through retailers and supermarkets to establish quality assurance mechanisms at every step of the product's movement in the value chain. Global competitiveness is thus closely linked to consumers' perceptions of product quality (Hou, et al., 2019).

The contours of public and private quality control systems are changing due to international markets and trade agreements. National governments and the European Union are now being scrutinized as potential non-tariff trade barriers under the SPS Agreement, and they are actively pursuing efforts to coordinate regulatory activities. Companies are looking for efficient private means to ensure that quality levels are acceptable to buyers while also complying with regulations in multiple countries. These challenges have significant implications for the structure and operation of individual countries' food systems, as well as for bilateral and multilateral trading relationships.

Private standards vary greatly in terms of who develops them, who adopts them, the parameters of agri-food systems they address, etc. As a result of this diversity, there has been a lack of clarity regarding which standards qualify as "private," the functions they serve, and the potential consequences. There is also a failure to recognise the differences and interdependence of public regulations and private standards (Mphaga, et al., 2024). This lack of clarity has clouded debates about the impacts of private standards and the trajectory we might expect in their future evolution and has tended to lump all private standards together (often negatively). This chapter attempts to bring some coherence to the debate by providing a reasoned analysis of how and why private standards have evolved, as well as reflecting on the implications for the role of international standards promulgated by organisations such as the Codex. The emphasis is on private standards pertaining to food safety, while acknowledging that private standards govern other aspects of agri-food products (Trevena, et al., 2020).

Before delving into what private standards mean for Codex, it is critical to understand the institutional forms they take, as well as how and why they have evolved over time. In many industrialised countries, private standards have emerged as an important mode of market governance. This is especially true in the agri-food sector, where they have permeated both domestic and international trade (Mphaga, et al., 2024). These standards may concern food safety and the integrity of food safety systems, but may also concern other food attributes, such as provenance, environmental impact, and animal welfare.

One of the distinguishing features of these private standards, particularly as they pertain to food safety, is the growing emphasis on the processes by which food is produced. Such 'process' standards must include the following:

- They serve as a foundation for making claims about food production, transportation, and processing processes and practices.
- They must include some type of monitoring and enforcement, such as second- or (increasingly) third-party certification.
- They are codified in a written statement that outlines the rules and procedures and provides specific instructions on how the rules should be implemented, monitored, and enforced.
- They include some form of traceability to connect food products downstream in the value chain to the point where the standard is met.

Critically, private standards include not only a specification of what outcomes are to be achieved, but also sets of rules to show how this should be accomplished, a certification and enforcement governance structure, and systems to generate and approve changes to each of these elements as standards evolve over time (Trevena, et al., 2020). As a result, some organisations involved in developing and/or enforcing private standards, such as the Global Food Safety Initiative (GFSI), refer to 'schemes' rather than standards. This has far-reaching implications for the Codex and, more broadly, the relationship between public and private standards.

4.6 Food safety standards and competitiveness

African policy makers are focusing more on food safety as a key contributor to food security on the continent and an opportunity to boost the economic potential of additional trade in food and agro-food commodities within and outside Africa. To adequately support the implementation of food safety and/or sanitary and phytosanitary (SPS) measures at the national, regional, and continental levels, robust food control systems are needed. According to the Codex Alimentarius Commission Principles and Guidelines on National Food Control Systems (Codex, 2013), food safety competent authorities must be able to cooperate and coordinate efforts with each other.

Estimates of the global burden of foodborne diseases from the World Health Organisation (WHO) have alerted African decision makers and regulators to the

importance of food safety and the urgency of prioritizing action to reduce the burden of disease. According to reports, these food safety hazards are responsible for approximately 137,000 deaths and 91 million cases of acute foodborne illnesses in Africa each year, the highest estimates worldwide. Diarrhoeal disease agents, including nontyphoidal *Salmonella enterica* (NTS), enteropathogenic *E. coli* (EPEC), enterotoxigenic *E. coli* (ETEC), and *Vibrio cholerae* in lower income subregions of the continent and *Campylobacter* spp. in higher income areas, were responsible for almost 70% of foodborne diseases. This represented the largest global burden of diseases among the continents, with 2500 disability-adjusted life years (DALYs) per 100,000 individuals in Africa. According to a previous report, 'the large burden of disease from food highlights the importance of food safety, particularly in Africa'.

In recent years, African decision makers have prioritised food safety and SPS issues to address some of the public health and economic challenges. The results shaped a new institutional framework for the governance of continental SPS, which was led by the African Union Commission (AUC) and its technical offices. Several discussions (AUC, 2019) have taken place on the possibility of establishing a unified food safety authority for the continent, sharing a common SPS policy framework and with the dual goal of streamlining capacity building efforts and harmonising SPS measures throughout the African continent. With the establishment and operation of several RECs in Africa focusing on progressive economic integration, the opportunity to play a significant role in ensuring appropriate coordination and communication among national food control systems was investigated in each region. In theory, these structures can play an important role in achieving sub-continental food safety coordination and in the reporting of African food safety regulatory integration, for example, to a Continental SPS Committee, international standard-setting bodies (ISSBs), the World Trade Organisation (WTO), and various development partners.

Food safety is an important aspect of human well-being (Heikkilä, et al., 2016). There is a growing awareness of the importance of street food as part of a broader concern for food security and health. There has been an international call to improve the safety of street food at all stages of the food production chain (Cortesea, et al., 2016). Food business operators (FBOs), which produce food or serve and sell food items to the public, play an important role in food safety. They must ensure the safety of the items

they sell or distribute, as well as the safety of consumers who will handle, prepare, and eventually consume the food (Heikkilä et al.2016). Fundamental global guidelines are in place to ensure food safety (Cortese et al., 2016), but the challenge is that the sanitary conditions in street food venues remain inadequate.

Over the last ten years, international trade in food and processed food products has grown dramatically. Between 1970 and 2003, global processed food exports increased at an annual rate of 8.5%, and the share of processed products in agricultural exports increased from 42% in 1990-91 to 48% in 2001-02 (AP, 2006, cited in Mohanty). The reason for this upward trend in processed product outflow is the changing food consumption patterns in developed countries, as well as the growing demand for "ready to eat" food. While rising demand for ready-to-eat foods creates exciting opportunities for food processing industries, environmental and health regulations in developed countries act as significant nontariff barriers to exports. Several constraints confront developing country producers as food safety standards become increasingly stringent.

The concerns of developed countries about food safety are not without merit. A variety of chemical substances, including pesticides and additives, are commonly used in food production and processing, and residues of these chemicals may remain in the finished product (FAO, 2017). These residues have the potential to harm humans, animals, plants, and the environment in which they live. As a result, consumers in developed countries have expressed a high level of food safety concern about their processed food supply, despite their growing demand for 'ready-to-eat' food (Lebelo, et al., 2021). Developed countries are increasingly demanding assurances that food is free of pesticides, chemical additives, hormones, and antibiotics. However, the economic nature of food safety in developing countries differs from that in developed countries. Their concern is that developed country food safety regulations act as significant non-tariff barriers. These standards raise compliance costs for suppliers, reducing their export competitiveness.

Consumers in developed countries have long been concerned about certain aspects of food safety, particularly the presence of chemical residues and contaminants in food (Lebelo, et al., 2021). However, a previous series of ‘scares' about food safety, many

of which were caused by failures in existing risk management mechanisms, amplified by the media, and exacerbated by poor risk communication, has called into question consumers' trust in the efficacy of existing food safety controls (Baba & Esfandiari, 2023). Simultaneously, broader demographic and social trends have altered the nature of food markets in developed countries, as well as expectations and demands for food safety and quality attributes (Borsellino, et al., 2020).

As a result, governments and commercial firms have implemented new and enhanced forms of food safety controls, resulting in a complex and dynamic standard ‘landscape' that continues to evolve over time, often rapidly and with periods of intense activity punctuated by periods of relative quiet. The magnitude and speed of these changes have undoubtedly presented difficulties for developing countries (Weinroth, et al., 2018).

4.7 Review of previous studies on the effect of food safety standards on competitiveness.

Several studies have attempted to investigate the effects of food safety standards on agriculture or food trade, with mixed results (Wanissa, 2023). The impact of the ability of developing countries to comply with international food safety standards on processed food exports was investigated using a structural graving modelling framework. (Jongwanich, 2009), on the other hand, investigated the impact of SPSs on US processed food imports from developing countries and discovered that US SPSs could impede imports from these exporters. Jongwanich (2009) used interval data from a 3-year average period, which could lead to biased estimates. Furthermore, the paper created a proxy for SPSs using data on retained import shipments. However, not all detained imports will be denied entry into the United States. Exporters can enter the US market if they can demonstrate that their detained shipments meet the US food

safety standards. As a result, using import retention data to capture the effect of SPSs may be ineffective.

The literature focuses on econometric models that are used to determine how domestic policies affect bilateral trade flows (between South Africa and strategic Asian markets). The gravity model is the most widely used econometric approach in the literature. The gravity model is used to demonstrate that the different effects of SPS on the food trade depend on the level of economic development of the importing countries, as demonstrated by Santeramo and Lamonaca (2022), who observed a positive impact of the SPS measures imposed by developing countries on their food imports. They constructed the intensity of the SPS measures using the total number of SPSs for a country pair to investigate their trade effect. However, the high intensity of SPSs does not imply that standard measures are restrictive.

Using an aggregated index for technical standards to determine impacts on trade flows has significant limitations. The aggregated index derived from five different standards yields results that contradict conceptual expectations. Borsky & Leiter (2022), for example, worked with two types of standards: shared standards (standards used separately) and unilateral standards (several heterogeneous standards aggregated and used as indices). Their findings indicated that share standards had a positive impact on exports but had little impact on imports; unilateral standards had a positive impact on imports, but a negative impact on exports (Borsky & Leiter, 2022).

Jayasuriya et al. (2023) investigated the impact of the increasingly stringent and disparate standards of developed countries on India's food processing industry exports. Through a survey of the processed food industries, they created an index to measure food safety standards. They used the gravity model, and the index of food safety standards served as a proxy for the severity of the problem. Their index was a weighted value of various groups of standards (microbial hazards, pesticides, antibiotics, toxic chemicals, and so on) in importing countries in comparison to the Codex standard (Jayasuriya, et al., 2023). They discovered that food exported to the EU, Australia, and the United States faced extremely restrictive standards, whereas food exported to Canada and Japan faced moderately restrictive standards. They estimated that compliance costs averaged 5% of sales revenue, though they ranged from 10-15% for some food products. Based on their empirical results, they concluded

that stringent food safety standards limit Indian processed food exports. Compliance costs were estimated to be 5% of sales revenue on average, ranging from 10-15% for some food products. They concluded that stringent food safety standards limit Indian processed food exports based on their empirical findings (Jayasuriya, et al., 2023).

4.8 Summary

In conclusion, the insights presented in this chapter suggest that the evolution of trade policies and food safety standards is not merely a complex attempt but a crucial determinant of health, economic development, and regional integration. Policymakers must navigate these intricate relationships while considering the potential consequences for food producers, consumers, and international partners. To reconcile the aspirations for economic growth with the imperatives of public health, a multifaceted approach that emphasizes collaboration, innovation, and sustained investment in both food safety and trade capacity will be essential. As global food security concerns mount in the face of climate change and urbanization, fostering safe access to wholesome food through strategic trade policies remains an urgent priority for economies worldwide, particularly those in developing regions seeking to uplift their industries and populations.

CHAPTER 5
REVIEW OF MEASURES OF COMPETITIVENESS AND EMPIRICAL STUDIES ON COMPETITIVENESS

5.1 Introduction

The term "competitiveness," as it pertains to firms, industries, and nations, is fraught with ambiguity and lacks a universally accepted definition. This chapter delves into the complexities of this term by exploring various empirical studies that seek to quantify "competitiveness," particularly in the context of international trade. The diverse measures employed in these studies, such as wholesale price index ratios, export unit values, relative unit labor costs, and differences between import and export prices, serve as proxies for assessing relative export quantities, export shares, and trade balances within specific industries. Collectively, these indicators provide insights into a country's competitive position in the global market, though it becomes evident that a singular, precise metric for international competitiveness remains elusive.

Nabi and Luthria (2017) offer a foundational perspective on competitiveness by framing it as the "success" of a nation in global markets. Their analysis centers on South Africa's market share within Asian markets, highlighting the importance of export performance as a key indicator of competitiveness. Changes that boost the global sales of South African products at the expense of foreign competitors are indicative of enhanced competitiveness. However, this definition is intricately linked to external factors, including governmental policies that impose both subsidies and sanctions, which can disproportionately influence the performance of both domestic and foreign industries (Nabi & Luthria, 2017).

Moreover, an additional measure of competitiveness is the profitability of domestic industries, which is sensitive to trade barriers and export incentives instituted by the government. Alongside profitability, net domestic investment emerges as a crucial indicator, not only reflecting current competitiveness but also serving as a predictor of future market share and profitability. While these economic indicators are certainly influenced by the broader state of the domestic economy, they also serve as barometers for the country's responsiveness to global consumption patterns and external trade dynamics. Nonetheless, it is essential to recognize that macroeconomic variables, exchange rates, and inflationary conditions can further complicate these relationships.

In summary, this literature review underscores the multidimensional nature of competitiveness, indicating that while various measures attempt to capture its essence, a comprehensive understanding requires considering the interplay of domestic policies, global market conditions, and macroeconomic influences. Future sections will critically analyze how these measures correlate with empirical findings to paint a more cohesive picture of international competitiveness. This refined literature review aims to clarify key points and establish a strong foundation for the subsequent sections of your thesis. It highlights the complexity of measuring competitiveness while providing a clearer structure and flow to the narrative.

5.2 Neo-classical trade theories

The countries' level of measurement capability limits the competitiveness of their important products. The effects of measuring competitiveness can be seen in a several

of ways. For example, major product production necessitates a high level of measurement capability to:

- Products with optimised performance, quality, and compatibility should be developed.
- Create and manage production processes.
- Gain market access by demonstrating compliance with market standards.
- Agree on product specifications and performance with importers.
- After-sales support for products

To achieve international competitiveness, a high level of measurement capability is needed. There are numerous requirements, such as:

- Access to resources such as capital, labour, equipment, and technology.
- Resource protection: patents, copyrights.
- Access to international markets: tariff and non-tariff export and import restrictions.

All of the factors present formidable obstacles that must be overcome. Once these obstacles are overcome, the bottom line is this: The orange industry must deliver products that are competitive on their own merits, and their ability to do so is highly dependent on measurement capability.

Before providing a brief discussion of each individual theory, it is essential to consider some of the common assumptions put forth by neoclassical theories. These assumptions play a significant role in shaping the theory's perspectives. First, these theories assume that trade relations are limited to bilateral trade, where each country has a fixed stock of factors of production (Dolderer, et al., 2021). Traditional theories further assume that factors of production can freely move between industries within a country but cannot move globally. In addition, they assert that countries engage in trade only for final products and do not trade raw materials or semi-finished goods. Perfect competition is assumed to characterize both the factor and the product markets, with producers aiming to maximize profits and factor returns set at a level that ensures full employment of all factors. Furthermore, these theories assume a uniformity in utility functions among consumers, regardless of their geographic location.

According to these theories, technology is such that production exhibits constant returns to scale, indicating that there are no disparities in production efficiency. Transport costs associated with trade are acknowledged as existing in these theories (Dolderer, et al., 2021). Neoclassical theories encompass several specific theories, including mercantilism, absolute advantage, comparative advantage, factor endowment, the Leontief paradox, country similarity, product lifecycle, first mover, and economies of scale theories.

5.3.1 Balassa Revealed Comparative Advantage (RCA)

Balassa (1965) proposed an index of revealed comparative advantage. Balassa's index derives the underlying pattern of comparative advantage from observed statistics (Balassa, 1965). The Balassa revealed comparative advantage (RCAir) index compares a good's share of total exports in country r to that good's share of global trade:

$$RCAir = \frac{Xir/Xr}{Xi/X}$$

where *i* is a commodity index and *r* is a country index.

X*ir* is the exports of commodity *i* from country *r*,

X*r* is total exports from country *r*,

X*i* is global trade in commodity *i*, and

X is total global trade

If the share of good *i* in country *r*'s exports is greater than its share in world trade (RCAir>1), the country has a revealed comparative advantage in good *i*; if the share of good *i* in country *r*'s exports is less than its share in world trade (RCAir1), the country does not (Balassa, 1965).

Since Balassa proposed his RCA index, several other indices based on other statistics, such as net exports, have been proposed as alternatives. Balance et al. (1987) investigated the consistency of alternative RCA indices and discovered that the Balassa index is consistent with other plausible indices when used as an ordinal measure. Because the RCA index ranges from 0 to infinity, it is difficult to interpret. The symmetric RCA (SRCA) index, developed by Laursen and Engedal, ranges between -1 and +1 and is symmetric around zero (Laursen & Endegal, 1995).

$$SRCAir = \frac{RCAir - 1}{RCAir + 1}$$

An SRCA greater than zero indicates that the country has a comparative advantage in that product, while one less than zero indicates that the country does not have a comparative advantage in that product. Therefore, positive SRCA values indicate products whose exports may increase under more favourable domestic and international conditions. A positive annual change in an SRCA index indicates that the country's comparative advantage in a specific product has improved; a negative change indicates the inverse (Balassa, 1965).

5.3.2 Foreign Direct Investment (FDI)

Foreign direct investment is defined as an investment in an enterprise resident in another economy (FDI enterprise) by a resident entity in one economy (foreign direct investor) (Rani, 2019). According to UNCTAD (2022), FDI inflows include capital provided by a foreign direct investor, reinvested earnings, and intracompany loans made by a foreign direct investor to an FDI enterprise. Globalization has resulted in rapid changes and mobility of technologies, as well as the internationalization of goods and services production through foreign direct investment (FDI) and trade, over the last 30 years (Schreinemachers, et al., 2018). Africa needs export competitiveness for a variety of reasons. First, a large body of literature, particularly on the export-led growth hypothesis, suggests that exports are the primary determinants of a country's GDP growth. As a result, to sustain their growth rates, African countries must diversify their export sectors and improve the competitiveness of their exports. Second, export

diversification and increased high-technology exports play an important role in reducing export vulnerability to external shocks and, as a result, in lowering the volatility of economic growth. Third, a stronger export sector promotes job creation, particularly in the manufacturing sector. Finally, given the large current account deficits of most African countries, increased exports of sophisticated products are critical to reducing external imbalances and maintaining macroeconomic stability without incurring debt.

Most of the empirical literature on FDI focuses on its impact on economic growth or export volumes rather than on export competitiveness *per se*. A few empirical studies have examined the impact of FDI on export competitiveness, with most of these studies focusing on the impact of FDI on productivity and, by extension, export competitiveness. Blomström and Kokko (2012) discovered that global corporations had a significant impact on export growth and competitiveness in their host countries. They argue that FDI boosts manufacturing firms' productivity and competitiveness by allowing them to form strategic alliances with leading foreign MNEs to expand their technology bases (Blomstrom & Kokki, 2012). Moran (2018) proposed that increased FDI in the Mexican automobile export industry results in increased competitiveness and efficiency (Moran, 2018). Similarly, Prasanna (2020) indicated that FDI inflows into India increased export competitiveness, as measured by total and high technology-manufactured exports (Prasanna, 2020).

Zhang (2019) estimated a log-linear model of the FDI-export linkage for 186 Chinese industries and found that FDI has a greater influence on China's export performance than does domestic capital (Zhang, 2019). Zhang (2019) examined the impact of FDI on industrial competitiveness in a large panel dataset of 21 manufacturing sectors for 31 Chinese regions from 2005 to 2010. According to the study, FDI has a greater positive impact on China's low-tech manufacturing than it does on the medium and high-tech industries, which are proxies of export competitiveness. In this case, the interaction of FDI with local human capital boosts its contribution (Zhang, 2019).

According to the literature reviewed, the effects of FDI on a country's competitiveness are largely determined by factor endowments; innovation; the research and development capacity that drives technological progress and thus productivity; the human capital level; technological diffusion and spillovers; and government policies

that promote linkages between domestic and foreign firms (Prasanna, 2020). While the theoretical literature reviewed earlier supports FDI as a driver of export competitiveness, empirical evidence of the effects of FDI in SSA countries is lacking. Furthermore, the precise channels through which FDI affects export competitiveness in SSA countries are less well understood (Blomstrom & Kokki, 2012).

5.3.3 Adam Smith Absolute Advantage

Adam Smith (1776) formulated the theory of absolute advantage to provide an explanation for how markets and production function in society. According to this theory, the direction, volume, and composition of international trade are determined by market forces rather than government controls (Smith, 1986 [1776]). The central argument of this theory revolves around the concept of nations specialising in the production of goods for which they possess unique and efficient capabilities, known as absolute advantage. In other words, a nation will export a product in which it is the world's most cost-effective producer (Porter, 1990).

As a result, there will be increased production of goods, leading to a surplus that requires the free trade of these excess products. Nations engage in trading commodities that are cheaper than those produced domestically, as each country focuses on producing more of what it has an advantage in (Smith, 1986 [1776]).

5.4 New trade theories

New trade theories expand upon neoclassical theories by introducing alternative assumptions. Unlike traditional theories that assume perfect competition, new trade theories operate under the assumption of imperfect competition. Moreover, these new theories place greater emphasis on product differentiation, in contrast to the homogeneity of goods assumed by traditional theories. Additionally, new trade theories incorporate the concept of increasing returns to scale, which deviates from traditional theories that assume constant returns or nonincreasing returns to scale (Dolderer, et al., 2021). Examples of these new trade theories include Porter's diamond model, the double-diamond model, and the nine-factor model.

5.4.1 Porter's Diamond Model

According to Porter's Diamond model, there are inherent reasons why some countries are more competitive than others and why some industries within countries are more competitive than others (Harrison, 2005). According to Porter (1990a), home base is critical to establishing a competitive advantage in industries where local government is the most dynamic and challenging (Porter, 1990b). He discovered that four aspects of the domestic environment, namely, factor conditions, demand conditions, related and supporting industries, and firm strategy, structure, and rivalry, play a significant role in shaping the context that allows domestic firms to gain and sustain competitive advantage. He also mentioned "government" and "chance" as factors influencing the operation of these four major determinants. Each determinant is summarised on the following page.

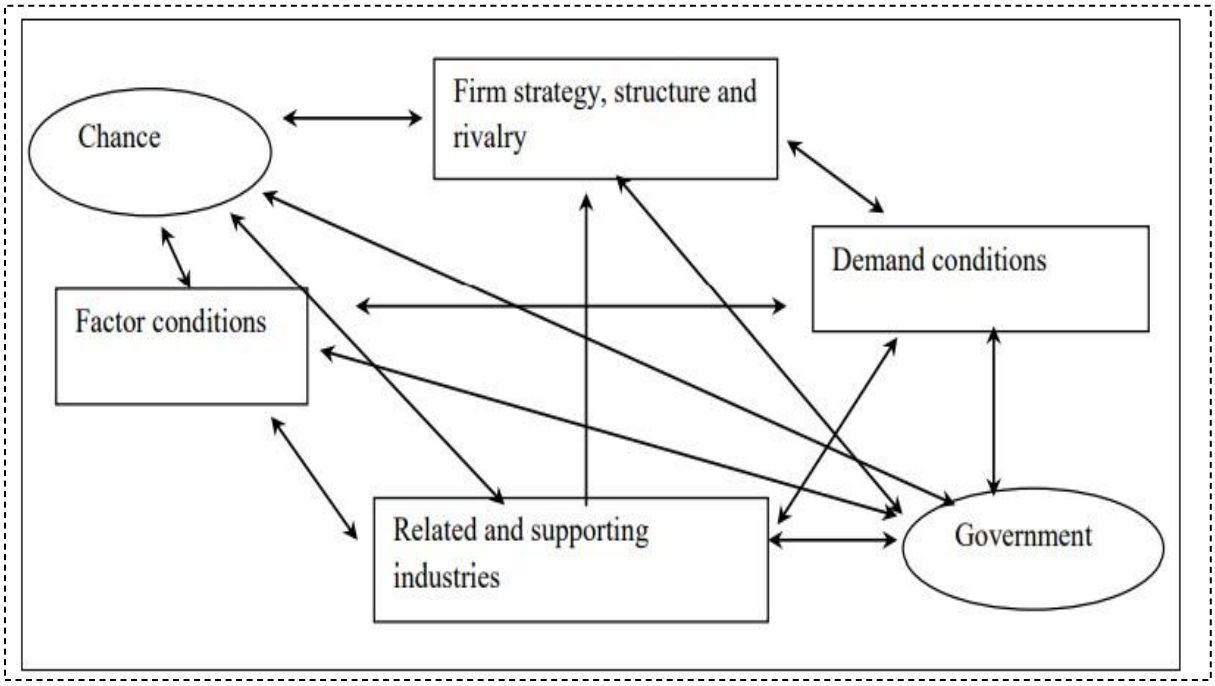


Figure 5. 1: The diamond framework for Porters.
Source: Porter, The competitive advantage of the country (1990)

a) Factor conditions

Factors of production, which encompass human, physical, knowledge, capital resources, and infrastructure, are commonly categorised as land, labour, capital, natural resources, and infrastructure. These factors of production exhibit diverse variations, such as factor mix or proportions, among different nations. This variation

gives each nation a distinct potential to achieve a competitive advantage over its rivals. A competitive advantage is attained when a nation's firms possess factors of production that are either low-cost or uniquely high-quality in a particular industry, thus influencing competition. As a result, nations tend to export goods that heavily rely on the factors of production with which they are relatively well endowed (Porter, 1990).

Having affordable and exceptionally good factors of the appropriate kind is crucial for an industry to gain a competitive edge. However, according to Porter (1990), simply possessing factors of production is not enough to determine competitiveness unless they are utilised to influence strategy and innovation. This highlights the importance of an industry developing its factor endowment efficiently and effectively. The proper use and management of production factors can be influenced by various other factors within the diamond model. However, Porter (1998) suggested that only a few factors are naturally present, meaning industries must invest in and enhance them over time through investment and improvement.

b) Demand conditions

Demand conditions refer to the level of competition and the general health of the local market that a company is faced with. It is not solely about size, but rather about the nature of local demand (Ball et al., 2008). The quality of demand is determined by buyers' needs, while quantity is influenced by the size and growth patterns of domestic demand, as well as the mechanisms through which a nation's domestic preferences are communicated to foreign markets (Porter, 1990). When customers are highly demanding and sophisticated, firms are motivated to produce innovative and highquality products that can compete globally. The impact of domestic demand shapes how industries perceive and respond to buyer needs in general. Firms have become more confident in addressing buyer needs, which is a characteristic of the global market. Higher demand exerts greater pressure on industries, forcing them to continually innovate and create higher-quality products, thereby enhancing competitiveness (Porter, 1990).

The basic and essential design of a product typically reflects the needs of the domestic market. If these needs align with those of other countries, they can contribute positively to gaining a competitive advantage (Porter, 1990). The sooner these signals are

recognised and acted upon, the earlier the opportunities arise for upgrading to highquality products. A significant domestic market size can lead to economies of scale, particularly for industries that require extensive research and development, face high levels of uncertainty, experience significant technological advancements over time, and benefit from substantial production economies of scale (Porter, 1990).

Unless there is domestic rivalry, domestic demand alone does not significantly impact international competitiveness. When there is intense competition within the domestic market, industries are compelled to direct their focus outward to achieve superior efficiency and greater profitability (Porter, 1990). This forces industries to go beyond relying on common factor advantages shared by all competitors within the nation. As industries innovate in response to domestic competition, they improve their competitive advantage by pursuing higher-level and more sustainable sources of competitive advantage. In the context of the citrus industry, the rivalry would involve citrus fruit producers competing for consumer currency and would also extend to related and supporting industries.

c) Related and supporting industries.

Related and supporting industries are those that involve cooperation or shared activities within the value chain or those that produce complementary products to the nation's firms. Related industries engage in activities related to the industry under consideration, such as technological advancements, distribution, and marketing. The presence or absence of internationally competitive suppliers and supporting industries plays a crucial role. Globally competitive industries have the potential to provide advantages to downstream firms (Porter, 1990). These industries serve as a vital foundation for competitive success by establishing a network of suppliers, subcontractors, and commercial infrastructure (Ball et al., 2008).

Domestic-related and supporting industries benefit from proximity to managerial and technical personnel, early and rapid access to cost-effective inputs that meet international standards, and a conducive cultural environment that facilitates free and open information flow. This leads to reduced transaction costs (Porter, 1998). Supplier industries must effectively and efficiently utilize the most cost-effective inputs, ensuring early and rapid access to them (Porter, 1990). They should invest in research and

development (R&D) and prioritize access to new technology, innovations, and information. For the South African citrus industry, established supporting and related industries include suppliers of input materials, suitable packaging materials, research institutions, and transport industries.

d) Firm strategy, structure, and rivalry

The competitiveness of a nation depends on the nature and quality of interactions among one or more of the four determinants of international competitiveness within its borders (Porter, 1990). These determinants shape the competitive environment for local industries and facilitate or hinder the establishment of competitive conditions. Successful export industries that engage in foreign direct investment abroad are those that leverage these home-based determinants. In essence, effectively utilising the components of home-based determinants serves as the foundation for a global firm to achieve a sustainable competitive advantage (Rugman & D'Cruz, 1993).

An advantage of this model is that it assesses all participants involved in the supply chain (Porter, 1990; 1998). While the diamond model highlights both the weaknesses and strengths of a sector, it also identifies critical success factors within the supply chain that require special attention. The objective is to develop and sustain competitiveness effectively in the future by focusing on these key areas.

Competitive advantage encompasses innovation, which goes beyond technological progress and encompasses improvements in work methods and managerial practices (Budd & Hirmis, 2004). Acquiring competitive advantage is achieved through the pursuit of a suitable national strategy and the creation of favourable conditions that support the competitive advantage of sectors and industries engaged in international trade (Porter, 1998). At the industrial level, competitive advantage is rooted in an organizational structure that focuses on cost leadership and differentiation. According to the resource-based view (RBV) of competitive advantage, unique resources serve as the basis for achieving sustained competitive advantage (Barney, 1991). The existence of diverse resource endowments contributes to the development of competitive advantages (Peteraf, 1993). These diverse resources encompass nontraded location factors and non-price factors at both the industrial and firm levels.

According to Porter 1990), the sole foundation of a nation's competitiveness lies in the productivity of its goods and services traded internationally. Productivity, which is measured as output per unit of input that encompasses both capital and labour input, is deemed by Porter to be the crucial factor determining a nation's long-term standard of living and the primary driver of per capita income. However, Davies & Ellis, (2000) also attribute competitiveness to the capacity of certain firms and industries to gain market share on a global scale.

Porter's work is seen as complementary to the theories proposed by Ricardo and Heckscher-Ohlin (Year). However, Porter's analysis lacks novelty, except for his development of a model that identifies the determinants of national competitiveness (Siudek & Zawojska, 2014)). Additionally, Porter's theory of competitive advantage of nations argues that competition is driven by industries rather than countries, although nation-specific factors can play a vital role in establishing and enhancing international competitiveness for companies or industries. Finally, it is suggested that Porter's evidence is more anecdotal in nature than based on rigorous empirical research (Ball et al., 2008).

5.4.2 Double diamond model

Rugman & d'cRUZ, (1993) introduced the double diamond model. According to their proposition, for an industry to achieve global competitiveness in terms of its survival, profitability, and growth, managers must leverage both domestic and foreign diamonds as a foundation.

Within the framework of the generalised double diamond, three diamonds play distinct roles. The outer diamond symbolizes the global diamond, which remains constant for a foreseeable period. The inner diamond represents the domestic diamond, which fluctuates depending on the size of the country and its level of competitiveness. Between these two diamonds lies the international diamond (**Figure 5.2**), which represents a nation's competitiveness, which is influenced by both domestic and international factors. The disparity between international and domestic diamonds signifies the presence of international or multinational activities, encompassing both outbound and inbound foreign direct investment (FDI).

The generalized double-diamond model expands upon Porter's original framework in three significant ways. First, while Porter's diamond model primarily focuses on the impact of traditional domestic activities, the generalized diamond model explicitly incorporates multinational activities (Rugman & D'Cruz, 1993). Second, the generalized double diamond model offers a convenient way to operationalize the concept of competitiveness. When the sizes and shapes of domestic and international diamonds are compared, strategic differences can be identified. Third, unlike Porter's diamond-model, which treats the government as an external parameter, the generalised double diamond model includes it as an essential variable that influences the other four determinants of the model (Rugman & D'Cruz, 1993).

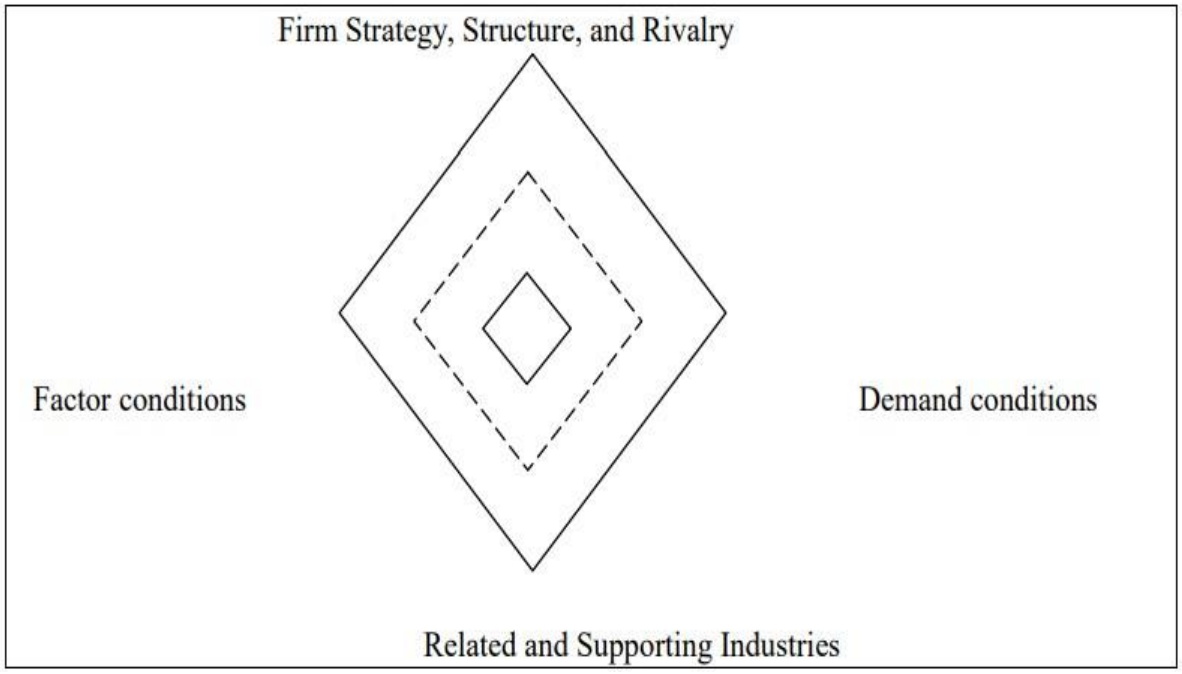


Figure 5. 2: Generalised double diamond model
Source: Porter, The competitive advantage of country (1990).

According to the generalised double-diamond model, industries involved in valueadded activities within a specific country should have the ability to maintain and sustain this value increase over extended periods, even in the face of international competition.

5.4.3 The nine-factor model

The nine-factor model, proposed by Cho in 1994 (Cho & Moon, 2000), emerged as an alternative to Porter's diamond model, which was deemed to have limited relevance in

less developed countries. We propose a revised classification of factors and introduce additional factors to account for the unique circumstances. **Figure 5.3** visually represents the factors included in the nine-factor model.

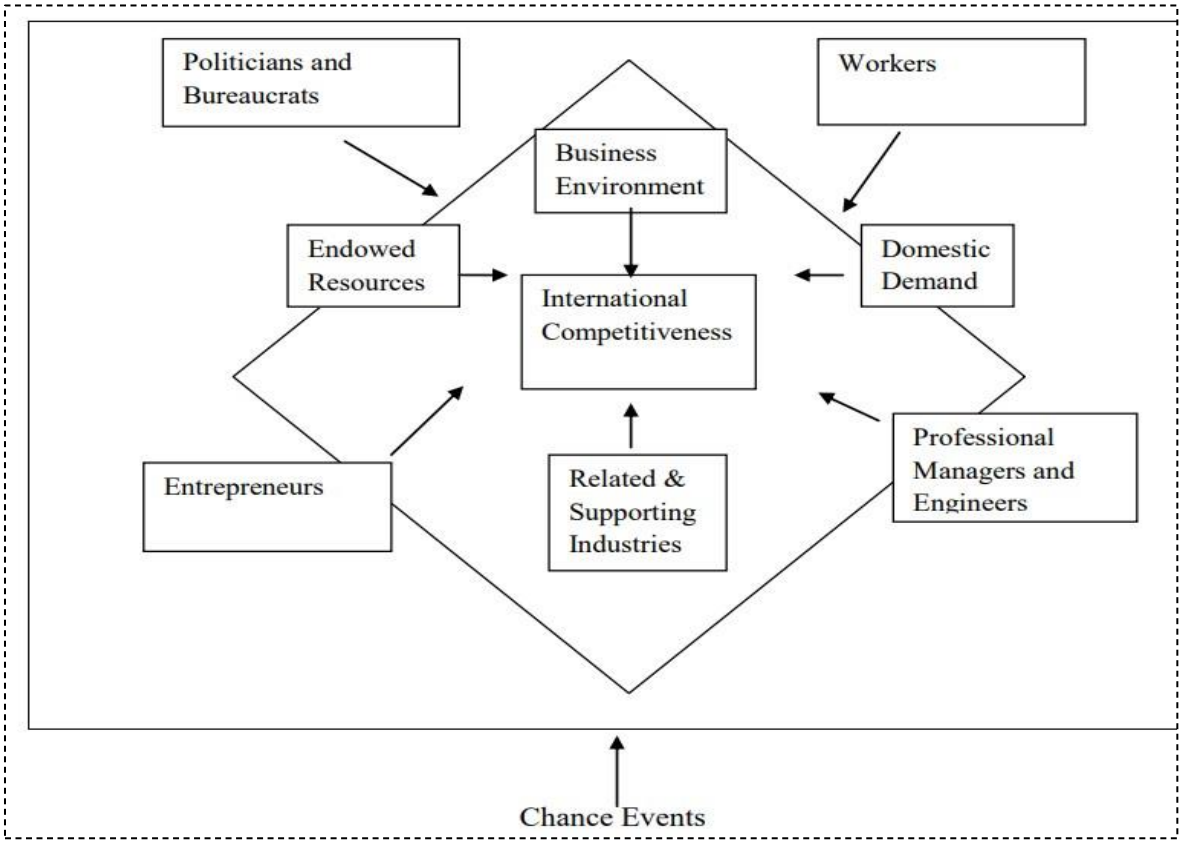


Figure 5. 3: The nine-factor model
Source: Porter, The competitive advantage of the country (1990)

Although the diamond model categorises natural resources and labour as factor conditions, the nine-factor model distinguishes natural resources as endowed resources and places labour under the worker category. According to Moon & Cho, (2000), international competitiveness is not solely determined by endowed resources. Instead, endowed resources are considered part of a broader set of determinant factors (Moon & Cho, 2000). The movement of raw materials, capital, and even labour across global borders challenges the notion of endowed resources as the sole determinant of competitiveness. However, the nine-factor model suggests that meaningful competition between nations will occur primarily between nations possessing similar comparative advantages and competing in similar industries. **Figure 5.4** provides a comparison between the diamond model and the nine-factor model, followed by a brief discussion of the determinants proposed by the nine-factor model.

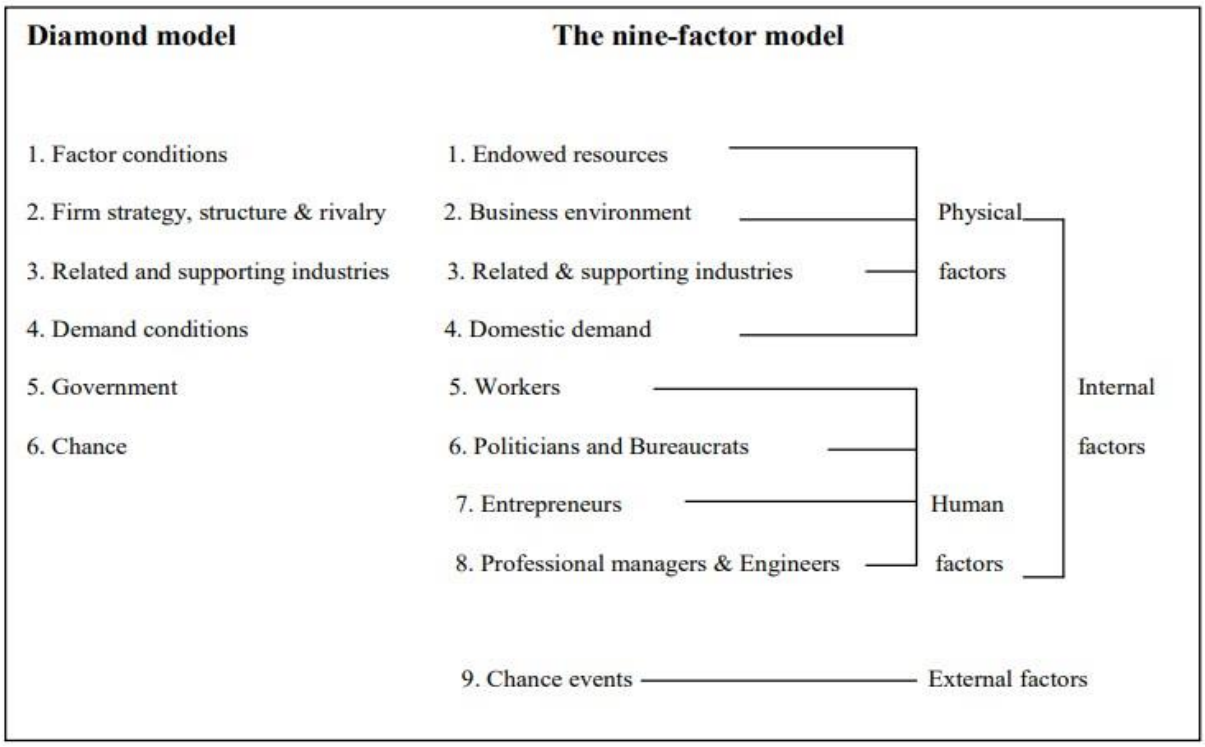


Figure 5. 4: Comparison between the diamond and nine factor model Source: Porter (1990).

5.4.3.1 Physical factors

- **Endowed resources**

These natural advantages encompass the inherent strengths that can contribute to a nation's economic activities, potentially enhancing its international competitiveness. These natural advantages are categorised into various subtypes, including mineral resources, energy resources, non-energy resources, agriculture, forests, fish stocks, and environmental factors. Mineral resources are finite and can be depleted over time, whereas agricultural, forest, and fish stocks are renewable resources. Environmental factors include elements such as land, weather, and water. Energy resources include oil, coal, and natural gas, while non-energy resources include minerals such as gold, silver, and iron ore (Cho & Moon, 2000).

- **Business environment**

The business environment comprises two distinct elements: the visible and the invisible. The visible elements encompass tangible aspects such as infrastructure,

including roads, ports, and telecommunication networks. On the other hand, invisible elements consist of intangible factors, such as the obligations associated with commercial agreements and credit, the acceptance of competitive values and market mechanisms by individuals, and the commitment demonstrated by producers, consumers, and other participants.

The business environment can be analysed at different levels, namely, the industry, the company, or the national level. At the industry level, key determinants of the business environment include the extent of product differentiation, the number and size of competitors, factors that influence the nature of competition, and the presence and magnitude of barriers to entry. Meanwhile, considerations of the business environment at the company level involve examining the attitudes and behaviours of individuals and groups within the enterprise, as well as the organisational structure and strategic choices of the business (Cho and Moon, 2000).

- **Related and supporting industries.**

The supporting industries encompass sectors such as information, transportation, finance, insurance, and other service industries. Within the nine-factor model, related industries are divided into two categories: vertical and horizontal industries (Cho & Moon, 2000). Horizontal related industries are those that share similar technology, raw materials, marketing activities, and distribution channels. Vertically related industries refer to industries involved in the upstream and downstream stages of production.

- **Domestic demand**

This encompasses both qualitative and quantitative aspects, with a greater emphasis on the qualitative dimension than on the quantitative dimension (Cho & Moon, 2000). The size of the domestic market plays a significant role in determining demand stability and the minimum economies of scale. Having sophisticated consumer expectations, a strongly consumer-oriented culture, and stringent product quality standards can be advantageous, as meeting the demands of discerning domestic consumers can also translate into international advantages. Therefore, domestic demand serves as a testing ground for products intended for international markets, reducing the risks associated with international trade (Cho & Moon, 2000).

5.4.3.2 Human factors

Human factors play a vital role in harnessing the potential of physical factors to achieve international competitiveness (Cho & Moon, 2000). The following sections provide a concise overview of the importance of human factors.

- **Workers**

The size of the workforce, educational attainment, organisational loyalty, work ethic, adherence to authority, and wage levels are among the key attributes that have a direct or indirect impact on labour productivity (Cho & Moon, 2000).

- **Politicians and bureaucrats**

Politicians who demonstrate dedication to economic growth can play a crucial role in fostering international competitiveness. They can achieve this by implementing state policies that prioritise and support international competitiveness. However, the effectiveness of such policies relies on the presence of an efficient and corruption-free bureaucracy (Cho & Moon, 2000).

- **Entrepreneurs**

These factors are of utmost importance during the initial phases of economic development. They possess the ability to engage in business ventures even in the face of significant risks, surpassing the risk tolerance of typical entrepreneurs (Cho & Moon, 2000). Through their efforts to mitigate risks and maximise profits, they contribute to the long-term strengthening of a nation's competitiveness.

- **Professional managers and engineers**

In the context of an international market that demands intense price competition and a focus on improved service, professional managers should make efforts to minimise production costs and reduce delivery times. This necessitates going beyond a risktaking mindset and requires a proactive approach from managers if they aim to enhance competitiveness (Cho & Moon, 2000).

5.4.3.3 Chance events (external factors)

Chance events refer to unforeseen changes in the environment that are typically unrelated to the international business system (Cho & Moon, 2000). These events have the potential to affect the configuration of human and physical factors in a nation, influencing its ability to maintain or improve competitiveness. Examples of common chance events include unexpected advancements in technology or products, fluctuations in world capital markets or foreign exchange rates, shocks in oil prices, shifts in foreign government policies, outbreaks of war, and changes in international demand (Cho & Moon, 2000).

5.5 Indicators for Measuring Competitiveness

Competitiveness is a relative measure that necessitates making comparisons between cases and analysing trends (Banterle & Carraresi, 2015). Regardless of the level of analysis undertaken, it is crucial to evaluate it in relation to a reference value. There are numerous measures of competitiveness available, including indices, the real exchange rate, the real effective exchange rate, the unit labour cost, foreign direct investment, domestic resource cost, the competitiveness coefficient, revealed trade advantage, constant market share, the gravity model, export performance, production cost comparisons and determinants of competitive advantage. The following section discusses some of the most commonly used measures.

5.5.1 Indices

The use of competitiveness indices is closely associated with the annual publication of the Competitiveness Index by the World Economic Forum (WEF) and the International Institute for Management Development (IMD) (Cho & Moon, 2000). These indices are based on a significant number of variables, with the WEF utilising over 300 variables and the IMD considering up to 224 variables (Olczyk, et al., 2002). Despite differences in the rankings produced by the two organisations, the variables employed are weighted and grouped into eight main factors that are largely consistent (Cho & Moon, 2000). These principal factors encompass aspects such as the internationalisation or openness of the economy, the domestic economy, government involvement and policies (including the legal and regulatory environment and

institutions of civil society), financial institutions (including their size and transparency), physical infrastructure, environment and energy, management skills, science and technology capabilities and facilities, and human capital (including skills and access to education, unemployment levels, working hours, welfare and social services, equality of opportunity, quality of life, and attitudes toward work) (O'Neill, 1997).

The indicator serves as a guide for investors and banks when making decisions about investment locations and when evaluating country-specific risks, respectively. Identifying the specific strengths and weaknesses of a country can provide valuable information for policymakers (Siggel, 2006).

The existing reports by the World Economic Forum (WEF) and the International Institute for Management Development (IMD) lack a strong theoretical foundation (Cho and Moon, 2000). These organisations utilise a combination of "hard" data, which refers to published statistics, and "soft" data, which involves survey responses from executive opinion surveys (O'Neill, 1997). However, qualitative measures based on subjective executive opinions have been criticised for being vague, redundant, and erroneous (Fossey, et al., 2003). Despite operating under a broad definition of competitiveness, the methodologies employed to establish competitiveness indices by the WEF and IMD have been deemed flawed and lack rigorous theoretical explanations (Lall, 2001; Cho & Moon, 2000).

5.5.2 The Real Exchange Rate (RER)

The real exchange rate (RER) is determined by calculating the ratio between the price index of tradable commodities (P^T) and the price index of non-tradable commodities (P^{NT}). While it can be utilised as a measure for specific sectors, the RER is typically employed to assess the overall economy (Frohberg & Hartmann, 1997).

It is computed as follows:

$$RER = P\frac{P_T}{\quad}_{NT} \tag{5.1}$$

The differences in prices of non-tradable inputs used in the production of commodities have a greater impact on the variation in costs of non-tradable goods produced between countries compared to tradable inputs (Frohberg & Hartman, 1997). This is

because differences in prices between countries are influenced primarily by trade policies, which have a greater effect on non-tradable inputs and less on tradable inputs, leading to significant divergences in non-tradable goods costs. Given the limited availability of prices for non-tradable goods, the real exchange rate (RER) is often approximated by using the ratio of foreign to domestic price indices (Frohberg & Hartman, 1997). This is typically achieved by dividing the nominal exchange rate by the purchasing power parity (PPP), as demonstrated in the equation below.

$$RER = \frac{NER}{\text{PPP}} = NER = \frac{P_{\text{D}}^{\text{F}}}{P} \quad (5.2)$$

where:

NER= the nominal exchange rate is the value of one unit of domestic currency in terms of the foreign currency for which it can be exchanged.

P^{F}=foreign price deflators

P^{D} = domestic price deflators

The real exchange rate (RER) provides an implicit comparison between the nominal exchange rate and the purchasing power parity rate, thus assessing the extent of currency misalignment based on the assumption of purchasing power parity (Siggel, 2006). Detecting currency misalignment is generally straightforward, but it can become challenging under fixed exchange rate regimes (Siggel, 2006). Undervaluation of a currency enhances the international competitiveness of domestic producers, while overvaluation diminishes it. Although the RER is primarily a macroeconomic indicator that captures currency value distortions, it can be transformed into a microeconomic indicator of price competitiveness when the price indices used pertain to specific products or industries (Siggel, 2006). At the macro level, it reflects the distortion in currency value rather than real competitiveness factors, making it more of a monetary indicator (Siggel, 2006).

5.5.3 Unit Labor Costs

Unit labour costs (ULCs) are a measure of the average cost of labour per unit of output. They are derived by dividing total labour costs by real output or by dividing mean labour costs per hour by labour productivity (output per hour). The ULC connects productivity and the cost of labour in the production process (McKenzie & Brackfield, 2008; Ark, et al., 2005). The variables necessary for calculating ULC include wages, product prices, outputs, and exchange rates (Esterhuizen, 2005). An increase in ULC indicates that average employee compensation is growing faster than labour productivity, potentially putting pressure on producer prices (McKenzie & Brackfield, 2008). Conversely, an increase in productivity can offset the impact of rising compensation per hour on unit labour costs (Ark, et al., 2005).

The OECD frequently uses this methodology to construct annual and quarterly unit labour costs (ULCs) and associated indicators for cross-country comparisons. These series encompass various sectors, such as the total economy, manufacturing, construction, trade, transport and communication, finance and business services, market services and the business sector excluding agriculture (Freeman, 2007). By employing ULC ratios, it becomes possible to establish comparable trends in unit labour costs or economic activities over time.

The comparability of unit labour costs (ULCs) across countries and economic activities poses a significant challenge due to the lack of uniformity in earnings and labour cost data available on a sub annual basis for different economic sectors within and between countries (McKenzie & Brackfield, 2008). This challenge becomes even more pronounced when dealing with quarterly costs. Additionally, derived statistics, such as unit labour costs often exhibit high volatility due to poor coherence with quarterly indicators of real output (McKenzie & Brackfield, 2008). The use of compensation of employees (COE) in ULC calculations presents two main issues. COE does not include certain relevant components of total labour costs, such as employee training, welfare amenities, recruitment expenses, payroll taxes, fringe benefits taxes, and labour costs related to self-employed individuals (McKenzie and Brackfield, 2008).

5.5.4 Domestic Resource Cost

Domestic resource cost (DRC) is a metric used to assess the relative advantages of different policy choices. This indicator quantifies the opportunity cost associated with producing and allocating resources to the production of tradable goods instead of saving them for foreign exchange purposes (Frohberg & Hartman, 1997). The DRC can be understood as the value of domestic non-tradable factors required to produce one unit of tradable value added (Frohberg & Hartman, 1997). By comparing different sectors, DRC calculations offer insights into which sector can more efficiently utilise domestic resources than others (Kotchoni & Adoho, 2021).

The DRC calculations may yield biased results because of their focus on specific enterprises, making them unrepresentative of the overall picture. Therefore, for meaningful regional or country comparisons, representative firms within the corresponding spatial entity should be selected (Frohberg & Hartman, 1997). Additionally, detailed information is needed on the key characteristics related to the competitiveness of companies and using an appropriate sampling method. Another drawback is the neglect of price repercussions resulting from changes in input demand. The exclusion of distribution and marketing costs in the measurement of international competitiveness is a disadvantage, as these costs can significantly hinder trade, particularly for bulky goods (Frohberg & Hartman, 1997). The presence of domestic resource abundance and transport costs can lead to higher import prices compared to domestic prices of tradable inputs, despite the availability of the latter at international prices, thereby establishing transport costs and domestic resource abundance as sources of comparative advantage (Siggel, 2006). Finally, collecting the required input-output coefficients for analysis is often a challenging task (Frohberg & Hartman, 1997).

5.5.5 Competitiveness Coefficient

The competitiveness coefficient, which is the reciprocal of the DRC, offers a more intuitive appeal than does the DRC (Frohberg & Hartman, 1997). It can highlight the

policy alternatives with the highest values, indicating the highest returns to fixed resources and suggesting a competitive advantage.

5.6 Review of Previous Studies on Competitiveness

The studies discussed below are believed to be representative of the extensive economic literature on the issue of South Africa's citrus industry's international competitiveness. However, this list should not be considered exhaustive. The discussion will focus on the basic methodologies and competitiveness measures used in these studies, rather than on their conclusions for the industries considered.

Edwards and Lawrence (2006) focused on company and government strategies in the global petrochemical industry over the past ten years. No explicit definition of competitiveness is provided, but there is some discussion of changes in country trade balances and shares of global petrochemical exports. Additionally, chemical systems, which rank companies based on the relative cost, product mix, and geographic location of their facilities, are mentioned favourably. Because of low transportation costs and homogeneous products, the appropriate market is taken to the global level. Changes in currency values are regarded as critical. The emphasis is on political factors in determining country responses to international pressures, with market forces responding slowly (Edwards & Lawrence, 2006).

A series of papers investigates the causes of changes in the US share of global exports. The first two are not explicitly about competitiveness but rather about determinants of demand for US exports of machinery and transportation equipment. They discover that changes in US export prices relative to competitors have a significant effect on relative export quantities (and thus shares of the global export market), but that the full effect may take up to four years to be felt. This finding suggests that the beneficial effects of currency depreciation on the trade balance may take several years to manifest (Lipsey & Kravis, 1986).

The final two papers examine trends in South Africa's export share as an indicator of the country's competitiveness. The comparative advantage of South Africa and its multinational corporations is measured in terms of the distribution of exports across industries (for example, industries with larger shares of South African exports than of world exports are industries in which South Africa has a comparative advantage

relative to the rest of the world). Lipsey and Kravis (1986) distinguish between factors influencing the competitiveness of the United States as a manufacturing location and those influencing the competitiveness of US firms (Lipsey & Kravis, 1986). They noted two limitations of using export share movements to measure international competitiveness: (1) a decline in South Africa's share of global trade has accompanied declines in the country's share of global population and income, implying a constant share; and (2) this measure of competitiveness ignores distortions in trade composition caused by government intervention (Lipsey & Kravis, 1986).

According to Zysman and Tyson (1983), a series of industry case studies depict the problems of adjustment and change in response to international competition in seven sectors. They stated that the well-being of firms in these sectors is dependent on defending home markets against foreign firms and selling in international markets (Zysman & Tyson, 1983). This implies international competitiveness in terms of export share and import penetration. They define comparative advantage as the relative strength of exports of one sector compared to other sectors in the same country. Competitive advantage, on the other hand, is defined as a firm's relative export strength in comparison to that of firms from other countries selling in the same sector in international markets (Zysman & Tyson, 1983). As a result, the purpose of this study is to compare the competitiveness of South African orange exports in Asian markets to that of competitors (see Section 7.4 for more information).

It has also been criticized for investigating constant market share analysis, both theoretically and practically. Richardson (1989) examines the characteristics of any change in a country's exports in a specific sector that is caused by a change in "competitiveness" rather than market growth (Richardson, 1989). He also questions the use of relative prices to measure relative competitiveness (ignoring differences in quality, services, and financing between competing products) and suggests that a measure of a country's true competitiveness might be whether the country was increasing its export shares in rapidly growing commodities and markets (Richardson, 1989).

The additional measure of competitiveness of this study was to focus on the domestic orange industry, although this measure is highly sensitive to government-imposed import barriers and export subsidies. Finally, net domestic investment is an indicator

of competitiveness as well as a predictor of future profitability and market share. These latter two measures are likely to be more directly influenced by the overall state of the domestic economy than by the share of global consumption or exports (although this may also be influenced by macroeconomic factors influencing exchange rates and inflation).

However, there are exceptions; in general, all three of these competitiveness indicators will move together and will be similarly affected by changes in supply and demand conditions (IMF, 2018). For example, an increase in the cost of producing an additional unit of domestic oranges could be due to increases in resource costs, inefficiencies in management techniques, the use of outdated or inappropriate technologies, rising interest rates, high regulatory costs, or depreciation of the domestic currency value. Cost increases will result in less supply and higher prices for domestic products. As a result, a higher price will stimulate increased global demand for internationally produced goods (IMF, 2018).

Finally, the nature of domestic competition may have an impact on industry success in global markets. In this study, a Porter analysis is used to assess factors that limit or enhance the competitiveness of the domestic orange industry in international markets. Cost factors are also considered when assessing competitiveness; for example, transportation costs are an important consideration in world trade because they allow the domestic industry to enjoy a cost advantage, which translates into increases in world export shares.

5.7 Summary

In conclusion, the intricate web of factors influencing competitiveness necessitates ongoing research that can bridge theoretical constructs with empirical reality. Future studies should aim to explore quantitatively and qualitatively the relationships between the measures discussed, particularly how they play out across different sectors and geographical contexts. Furthermore, adaptable frameworks that consider both established economic theories and the realities of global trade are essential to developing more robust definitions and measures of competitiveness. With continuously changing market conditions, political landscapes, and technological advancements, the pursuit of competitiveness remains a dynamic challenge that will

require innovative thinking and collaborative efforts across disciplines. This chapter lays the groundwork for subsequent analyses, positing that a deeper dive into the empirical correlations of these measures can yield actionable insights for boosting competitiveness at both the national and industry levels.

CHAPTER 6
GRAVITY "DIAMOND" THEORETICAL FRAMEWORK AND REVIEW

6.1 Introduction

The first part of this chapter provides the WTO perspective on export determinants and discusses its impact on exports. A brief overview of the theoretical models of export determination was then given. These theories clarify various models that explain the connection between the exports of a given country to the rest of the world.

The third section examined theories clarifying global trade patterns in addition to providing potential theoretical underpinnings for the gravity trade model. A review of related studies is provided in the last part of the chapter.

6.2 Theoretical Framework for Export Determination

King (1997) tried to distinguish different types of models to clarify the connection between a given country's exports to the rest of the world, and most researchers apply this technique to determine the exports of a country or a region under consideration. These include the export demand model, export determination models, and tworegime models (King, 1997).

6.2.1 Single-Equation Export Demand Model

The export demand model is the least difficult method of analysing the demand-side determinants of the exports of a country or region by assuming that the supply side is perfectly elastic. As indicated by King (1997), this model assumes that the supply side either has an idle productive capacity or that the economy exhibits increasing returns to scale. It is additionally assumed that the price elasticity of the supply of exports will, in general, be limitless, yet these assumptions of increased return to scale or the assumption of full productive capacity do not suit the export sector of SSA (King, 1997). In most developing countries, most of the constraints from the export sector are associated with supply-side factors. In addition, exports are found to be highly inelastic.

Since this model works under highly restrictive assumptions, it cannot be adopted for the establishment of a model for the exports of developing countries within this framework. For this reason, researchers are limited from using a single equation model to explain the export sector for developing countries (King, 1997).

6.2.2 Export Determination Models

The export models are established by combining the theoretical assumptions of the export demand and export supply models, which are estimated as a single equation using common ordinary least squares (OLS) estimation (King, 1997)

According to King (1997), as cited by Ibrahim (2007), domestic demand pressure (DDP) is regarded as a potential explanatory variable that helps to analyse the implications of domestic activity on exports for a country or region (Ibrahim, 2007). Therefore, the DDP changes, and as a result, income also changes. If incomes increase due to increasing DDP, there is a call to hire laid-off staff, stand-by equipment, hire new workers, and increase employment. The impact of profitability in exports is also related to the DDP. Therefore, theoretically, including the DDP as well as the profitability indicator in the supply equation of the export determination model is assumed to capture the impact of supply-side variables on agriculture, services and manufacturing exports of a country or region.

6.2.3 Two-Regime Model

The two-regime models are constructed on the assumption that either exporters are not just a gathering of homogeneous firms or that the environment in which they operate may show crucial change regularly. Exports from EA countries are primary commodity exports with little differentiation of products. Additionally, for centuries, all EA countries were engaged in trading in and in a very small manufactured and primary commodities and service sector (Mytelka, 1989). The economies of most of the countries are static both in production and in trade. Thus, the model is not fitted to explain the export sector of developing countries, and nothing is done empirically because of its bold assumption (Mytelka, 1989). This approach was adopted for modelling total exports, agricultural raw material exports, service exports, and manufacturing exports of EA. A detailed explanation of this model will also be given in the next section.

6.3 Theories Explaining International Trade Patterns

There are two expansive subjects in the theory of global trade. Initially, one is qualitative, worried about the pattern of trade, for example, which country will trade which products. The standard theory relates this to similar preferred standpoints, for example, to global contrasts in relative opportunity costs, after which it tries to explain the comparative advantage of differences in technologies, factor supplies, and so on (Mussa, 2000). This section is also concerned with how trade returns affect such determinants of comparative advantage. The second theme is more quantitative and aims to clarify the terms of trade, for example, the relative prices of exports and imports in a trading world. It additionally looks at how changes in different determinants, such as factor supplies or technology, and policies, will affect trade (Dixit & Norman, 1980). The following two subsegments focus on different trade theories related to international trade patterns.

6.3.1 New Trade Theory (NTT)

The new trade theory recommends that a basic factor in deciding international patterns of trade is the extremely significant economies of scale and system influences that can occur in key industries (Gouwa, 2005). Another component of the new trade theory is that firms that have the upside of being early participants can become dominant firms in the market. This is because principal firms increase economies of scale significantly, implying that new firms can compete against existing firms (Gouwa, 2005).

6.3.2 Patterns of Demand

A pattern of demand is based on the dimension of income. Therefore, consumers in developed countries demand less advanced goods. At whatever point a country exports a specific product, it plans the product considering the flavour of foreign consumers (Linder, 1961). Fulfilling the needs of consumers is an essential concern. Manufacturers expand production to achieve economies of scale, and at exactly that point they can export the product. Exports are sent to comparable countries or countries with similar dimensions of income since they will not be acknowledged in

countries with different dimensions of income (Sailors, et al., 1973). In other words, international trade in manufactured goods is affected by the closeness of interest. For example, if the income levels of South Africa and Botswana are similar, South African manufactured goods will be exported to Botswana. South African goods may not be in demand in West African countries because the living standards and consumption patterns there are quite different from those of South Africa (Abrego et al., 2020).

6.3.3 Mercantilist Version

In this study, fresh fruit could best be accumulated through a trade surplus. To achieve a trade surplus, governments monopolise trade activities, provide subsidies and other incentives for exports, and restrict imports (Heckscher, 1935). The theory of mercantilism aims to create a trade surplus, which in turn contributes to the accumulation of wealth in a nation. Between the sixteenth and nineteenth centuries, European colonial powers actively pursued international trade to increase their treasury of goods, which were in turn invested in building a powerful army and infrastructure (Heckscher, 1935).

6.4 The Gravity Trade Model

6.4.1 The Historical Setting of Gravity and its Establishments

As indicated by Beghin and Bureau (2010), different techniques in the literature can be used for extensive analyses of the determinants of duty barriers and other trade barriers in international trade. The two origins have immediate results as far as the effect of trade, and they result in diverse ways of dealing with realistic estimates (Beghin & Bureau, 2010). From one perspective, if definite trade-arranged non-duty barriers are identified, the conceivable strategies to gauge their effect on exports include methods dependent on surveys, gravity, and price wedge estimates. However, NTB techniques such as general equilibrium and cost-benefit analysis may be utilised in a case where the measurement is welfare orientated (Beghin & Bureau, 2010).

Moreover, as indicated by Beghin and Bureau (2010), a typical approach is used when attempting to evaluate tariff barriers and FDI to investigate the residuals and factors of cost-effective regression models of trade streams on the different determinants of exports. In this manner, the gravity trade model is exceptionally compelling to

economists, and these models have been used for quite some time as an approach to approximate different variables that hinder exports (or international trade) (Beghin & Bureau, 2010).

During the 1970s and 1980s, the famous 'gravity' trade mode felt disfavoured. Deardorff (1998) suggested that the gravity model has questionable hypothetical foundations to some degree (Deardorff, 1998). It was further shown that a gravity model reflects the relapse of internal variables (Baldwin & Taglioni, 2006). The associated subsection concentrates on the historic improvement of the gravity trade model and its establishment.

In the 1960s, a Dutch analyst clarified the observation application and numerical plan of a gravity condition (Tinbergen, 1962). He was the first to publish a gravity model with an observation application. He was supervised by Linnemann (1966) on his Ph.D. which resulted in an ordinary reference to the formation of the gravity condition. Most applications of the gravity model include bilateral trade flows, despite its application to complex economic phenomena (Linnemann, 1966).

Leamer and Stern (1970) noted that the significance of such theoretical fundamental research must be found in the context of seeking a broader understanding of the empirical base of the pure theory of international trade flows (Leamer & Stern, 1970). However, various studies have neglected to elucidate this phenomenon. According to Van Bergeijk and Brakman (2010), the gravity model can distinguish extraordinary instances of fake boundaries as part of the distance and the impacts of enrolment in different agreements (Van Bergeijk & Brakman, 2010). It was discovered that the small-scale establishment of the gravity model was additionally critical regarding the asserted speculations (Deardorff, 1998). The interest originates from the consistently sold empirical explanatory intensity of the gravity trade model, with R^2 values ranging from 65 to 95%, depending upon the sample, which has been a powerful inspiration for its use (Bergstrand, 1985).

Anderson (2011) indicated that ancient research has applied the gravity model and has sought to assess the effect of different factors notwithstanding the fundamental gravity condition. Additionally, it was discovered that the values of trade and the determinants or factors of trade are significantly correlated in the gravity model,

representing numerous fluctuations that are not clarified in the simple gravity calculation. The model unmistakably correlates with a geographical perception of trade; however, some hypothetical validations have been proposed for the model. After composing a powerful literature review, it was discovered that the list of empirical applications of and contemplates on the gravity trade model is broad (Anderson, 2011). Specialized practical or mechanical particulars may contrast crosswise models; however, gravity conditions on bilateral trade have been built or created from numerous small-established models of trade (Jacks et al., 2011). The factors resulting in bilateral trade erosion are not understood adequately. Therefore, it is very risky, as trade costs for NTBs might be critical, as they are the customary determinants of trade, or might not be progressively vital (Jacks et al., 2011).

Various reviews of the literature have indicated that the absence of robust and sound theories for the gravity trade model deteriorates its reliability and has led to a questionable status among scholars, presenting a level of bias in the elucidation of the assessed factors of the model. Along these lines, the model has been broadly utilised despite being incredibly realistic and practical. Currently, the search for a solid small establishment for the gravity trade model continues.

6.4.2 Gravity Conditions: Theoretical Basis

The current segment properly introduces the gravity trade condition, acknowledged by different economists within the trade field, as an international trade analysis and evaluation of the impacts of various variables.

It was found that the originator of the gravity condition attempted to clarify the extent of bilateral trade, which can be approximated by the Newtonian theory of gravitation (Chaney, 2011). The theory argues that any two countries in the universe attract each other with a force that straightforwardly corresponds to the result of their masses and, conversely, is related to the square of the separation between them. The theory has been simply articulated by Beghin & Bureau (2010) with equation 6.1:

$$F_{ij} = G\mathrm{x}\frac{[Mi \times Mj]}{Dij2} \quad \text{..... (6.1)}$$

Where

F_{ij} is the appealing power between objects *i* and *j*,

G is the gravitational steady,

$Mi\ and\ Mj$ are the multitudes of the respective objects and $D_{ij}{}^2$

is the separation between objects.

This set up the premise for which economists, for example, Tinbergen (1962), found that this condition performed well in clarifying bilateral trade flows (Beghin & Bureau, 2001; Chaney, 2011). This Newtonian condition can be used in an economic setting by clarifying trade flows (shaping the basis of the gravity trade model), where Fij is the trade flow between the countries of origin *i* and the country of destination *j*. *G* is a consistent economic structure. Mi & Mj are the individual economic sizes (i.e., GDP) of more than one economy or country, and Dij is the separation in terms of distance among trading nations (Hillman, 1986).

As already mentioned, Novy (2013) shares the same sentiment by arguing that the gravity trade condition is a portrayal of an experimentally steady relationship of bilateral trade from one perspective, and the extent of economies of the individual GDPs (Novy, 2013) and their separated distance. Tinbergen (1962) brought the fundamental gravity condition into international trade standards and in writing.

Equation 2.2 of the gravity trade was presented by Tinbergen (1962):

$$T_{ij} = a_0 \frac{X_{ia1}X_{ja2}}{D_{ija3}} \quad \text{.....} \quad (6.2)$$

Where

T_{ij} = Exports of country *i* to country *j*

$X_i{}^{a1}$ = Gross domestic product (GDP) of country *i*

$X_j{}^{a2}$ = Gross domestic product (GDP) of country *j*

$D_{ij}{}^{a3}$ = Distance between country *i* and country *j*

a_0 = the general constant

Tinbergen (1962) expressed that the principal factors deciding the span of the trade flows between any pair of countries are the economic size of the exporting country (as

far as GDP), the economic size of the importing country, and the separation between them. A gravity model is commonly communicated as a log-linear relationship in which trade between two countries is communicated as an element of the following:

- The two countries' income dimensions of economic size regarding their gross domestic product.
- Two countries' population estimates.
- The distance between two countries.
- Factors of trade bending.

In addition, Paas (2000: 13) clarified the essential type of gravity model for the examination of international trade flow as follows:

$$X_{ij} = \mathrm{a}Y_i^{b1}Y_j^{b2}N_i^{b3}N_j^{b4}D_{ij}^{b5}P_{ij}^{b6} \quad \text{..... (6.3)}$$

Where

X_{ij} – is the estimation of the trade flow of country *i* to country *j a*-constant

$b_1, b_2, b_3, b_4, b_5, b_6$ – coefficients of weighted geometric midpoints

Y_i & Y_j – countries (*i & j*) GDP's

N_i *and* N_j – populations of countries *i* and *j*;

D_{ij} – the distance between countries *i* and *j*;

There is no unmistakable contrast between the fundamental gravity trade models introduced by Tinbergen (1962) and that of Beghin and Bureau (2001). The essence of this trade model depends on Newton's law of attractive energy; however, it is characterized as an arrangement of trade between countries that is fundamental to clarify the degree of trade between them. As referenced previously, in addition to the functional structure of the gravity trade model, two-sided trade should be closely related to the livelihoods of the two economies or the size of the economy as far as their gross domestic product (GDP) and contrarily related to the distance between

them. Transportation costs, which are coherently comparable with the geographic separation between two countries, can likewise be viewed as a principal trade barrier.

It is obvious from the literature that the gravity trade model serves as an unrealistic analytical tool that can be used to evaluate the effect(s) of different explanatory factors on bilateral trade.

6.5 Empirical Literature Review

In this section, an empirical review of some related studies is presented. The farming sector employs 62% of the population of SSA (excluding South Africa) and produces 27% of the GDP of these countries, and most of the poor live in rural areas (Staatz & Dembele, 2007). However, the continent still records an extremely low share of world trade. Anlader (2010) studied the determinants of exports to Jordan and found that there is a positive relationship between the measures of GDP and exports and the relative population in these countries. It was further discovered that an increase in income or population in those countries drives export growth. The results of the model also show that the size of exports in Jordan decreased with increasing distance and foreign exchange rates (Alnader, 2010).

Tay (2014) used the gravity model to inspect trade in education using a nexus of international trade theories. The study revealed that conventional determinants of bilateral trade, for example, population and common language, have a profoundly positive and large effect on education trade (Tay, 2014). Greene (2013) additionally utilized the gravity model to look at government strategies and different proportions of market access for US exports of trend-setting innovation products to India. The study found that the per capita income coefficient for the exporting (United States) and importing (India) countries had positive impacts, not surprisingly, and that the population has a negative and insignificant coefficient (Greene, 2013).

Iqbal and Islam (2014) also agreed with Tay (2014), as they analyzed bilateral trade between Bangladesh and its 15 noteworthy trading partners of the European Union (EU). Their study covered the period 1980-2010. Their investigation revealed that Bangladesh's GDP is strongly correlated with its exports, although EU GDP is inversely correlated with Bangladesh’s exports. The study also showed that the coefficient of the real exchange rate and distance negatively affects Bangladesh's exports (Iqbal &

Islam, 2014). Pham et al. (2014) evaluated the trade service flow between Vietnam and the EU. This study also showed that the population and GDP *per capita* are expected to have effects on the complete services trade. Likewise, the distance variable was measured according to expectations but was not statistically significant (Pham et al., 2014). Suvankulov and Ali (2012) found a sizeable beneficial outcome of population and GDP *per capita* both in the country of origin and in the destination of exports. The study also revealed that a common language between trading partners has a solid positive effect on bilateral trade (Suvankulov & Ali, 2012).

Studies have been conducted, for example, by Eita and Joordan (2007) as well as Jordaan and Kanda (2011), in a South African setting that incorporates a gravity model to analyze South Africa's export flows. On the other hand, studies on the determinants of exports of agriculture, forestry, and fish products in South Africa are limited or nonexistent (Eita & Joordan, 2007). These studies explored the determinants of South African agricultural, forestry, and fishing exports to SADC trading partners (Jordaan & Kanda, 2011). Similarly, Mosikari (2016) analyzed the determinants of South Africa's exports of agriculture, forestry, and fishing products to the SADC, and used the gravity model approach. The outcome showed that the exporter's GDP, importer's population, South African inflation, and exchange rate have a negative association with South African exports of agriculture, forestry, and fishing. However, the importer's GDP and the exporter's population significantly affected South African exports of agriculture, forest, and fish products. The outcomes imply that the expansion of GDP is independent and that there is less need for exports, and the GDP of SADC countries is vital for the exports of these products (Mosikari, 2016).

Denekew (2016) examined the determinants of absolute exports in East African countries, agricultural raw materials, services, and production exports. This study used panel data to experimentally analyze these determinants and demonstrated that both internal and external aspects are responsible for poor exports in the EAC. FDI and trade openness have an impact on total exports in a region. Furthermore, for model two (fixed effect), the agricultural raw material exports in this region are not affected, as expected (Denekew, 2016).

Research has shown that internal determinants are imperative components in improving the exports of a country (Gbetnkom & Khan, 2002; Abolagba et al, 2010). Confirmations also show that improving internal determinants, for example, production capacity, infrastructure, and the availability of agricultural inputs, help expand exports, while different determinants, such as domestic consumption, remain consistent. Consequently, the degradation or depreciation of the domestic currency has positive effects on exports since it decreases the cost of exported commodities and increases the volume of a commodity (Abolagba et al., 2010). As indicated by Gbetnkom and Khan (2002), a great trade policy results in high exports in a country and allows for improving the supply chain mechanism within a country (Gbetnkom & Khan, 2002).

Santos-Paulino (2003) found that when the income of trade partners improves, the exports of commodities increase. Simultaneously, if the world costs increase, it empowers a greater number of exports than when the costs are low or falling (SantosPaulino, 2003). In reality, internal determinants are supported by progressive experimental evidence that impacts exports (Mesike et al., 2008), although different studies observe that exports are affected by external determinants (Santos-Paulino, 2003), and another study by Anwar et al (2010) additionally find that exports are affected by both internal and external determinants (Anwar et al., 2010).

Furthermore, Bestbier (2016), in analyzing variables that influence trade patterns, showed that GDP, population, distance, and the *ad valorem* tariff rate were measurable and significant for South African apple exports. He recognized that factors related to apple exports contrasted with those related to absolute exports from South Africa (Bestbier, 2016).

6.6 Scientific contribution

The successful export of South African oranges to key Asian markets hinges on a complex interplay of food safety standards and market competitiveness while extant literature has extensively covered various aspects of agricultural exports, including trade dynamics, demand patterns, and economic patterns, significant research gaps remain in the specific context of South African oranges in Asia. Most studies focus broadly on agricultural exports without delving into the unique compositions and trends

of specific products such as oranges in targeted Asian markets. While trends in global citrus exports have been documented, detailed analyses of South African oranges in Asian countries are limited.

Existing literature often assesses competitive performance from a macroeconomic perspective, but few studies analyze the competitive dynamics of South African oranges in Asian markets over the two decades from 2003 to 2022. A nuanced examination of market share fluctuation and comparative assessment of South African producers relative to competitors is lacking, making it difficult to draw strategic lessons from this period. Whereas food safety standards are recognized as critical factors influencing agricultural export success, there is limited research dedicated to identifying and analyzing the specific food safety requirements for imported oranges in Asia. Moreover, while some studies have touched upon general food safety measures, in-depth explorations of the constraints faced by South African orange producers in meeting these standards and how these constraints affect their competitiveness edges are notably absent.

Finally, addressing these literature gaps presents an opportunity for advancing understanding and practical insights into the competitiveness of South African oranges in strategic Asian markets. This study aims to fill these gaps through detailed analyses of market dynamics, food safety requirements, and their implications for export strategies.

6.7 Summary

In conclusion, Chapter 6 lays the groundwork for understanding the inherent complexities of export determinants and international trade patterns, advocating for a nuanced interpretation of gravity models that may allow for refined strategies that enhance competitive positioning in global markets. The chapter's insights serve as a vital reminder that while existing frameworks like the gravity model provide substantial analytical leverage, the ongoing evolution of global trade necessitates continual adaptation and inquiry into the unique variables shaping trade success in specific contexts. This theoretical and empirical exploration ultimately contributes to a deeper understanding of the mechanisms driving trade flows and underscores the necessity

of integrating rigorous analysis into policy formulation aimed at bolstering export performance, particularly in developing economies.

CHAPTER 7
RESEARCH METHODOLOGY AND DATABASES

7.1 Introduction

This chapter provides a systematic and theoretical analysis of methods applied to the field of study or a theoretical analysis of the body of methods and principles associated with a branch of knowledge. It commonly includes concepts such as paradigms, theoretical models, and quantitative and qualitative techniques. (Irny & Rose, 2005) illustrated that research methodology provides direction for understanding rather than solutions. It also specifies which method is best suited to the study (Irny & Rose, 2005). Baskerville (1991) stated that the analysis of the principles of methods, rules, and postulates employed by a discipline is called methodology (Baskerville, 1991). The present database research required a variety of data, purely based on quantitative and qualitative data collected from different sources. Primary data was collected by a survey method. For this purpose, detailed and comprehensive information is prepared and gathered from role players from the orange industry.

7.2 Area of Study

This study focused on the orange industry in South Africa. The study area is South Africa, and 10 Asian markets were identified. According to World Atlas, 'Asia is the world’s largest and most populous continent, bordering Europe and Africa to the west, Oceania to the south and North America to the east.' Asia covers approximately 30% of the land surface of the Earth. The 10 strategic markets identified include the Philippines, Indonesia, Vietnam, India, China, Malaysia, South Korea, Hong Kong, and Indonesia (**see map below**). South Africa is a country on the southern tip of the African continent.

Figure 7. 1: Summary of strategic Asian market destinations Source: Map Chart (2024)

7.3 Research Design

The analytical units of this study are for exporters of oranges and exporters of the export market. To fulfill the wide range of goals covered by the study, primary and secondary data were collected. A pertinent questionnaire was used to gather primary data from orange export farmers. To gather information from export farmers, this project used the Citrus Growers Association email list. For orange exporters who are difficult to reach in orange-growing regions, physical visits are possible. The advantages of using a questionnaire over other methods include cost, privacy, the potential for improved results, and less prejudice. To identify and describe key limitations and improvements to the competitive success of local oranges, it is crucial to collect primary data.

To measure objectives 1, 2, and 4, secondary data was used. This involved extracting trade-related variables from a variety of databases, including the Trade Map of the

International Trade Centre (ITC), which is based on the United Nations Commodity Trade Statistics Database (COMTRADE), which is maintained by the United Nations Statistical Division (UNSD) from 1992 to 2022. Many studies have used shorter time frames or more limited data sets, potentially missing long-term trends or shifts in patterns. Additionally, the paper includes newer emerging markets in Asia not covered extensively impact research. Previous studies have focused on European markets as traditional markets omitted potential trade with Asian markets and also focused on bilateral trade. A combination of quantitative and qualitative designs was also used to cover open-ended and closed-ended questions.

7.4 Population

There are approximately 91 registered citrus exporters in South Africa. Therefore, the 91 citrus exporters and five enumerators (or key informants) who have in-depth knowledge of the industry make up the study population. Justin Chadwick, the CEO of the Citrus Growers Association, was crucial in establishing connections with relevant industry role players for this project. The second group included the 10 designated important markets in Asia, and most of the data used were secondary data from various web platforms.

7.5 Sampling

Due to their importance in terms of goods shipped, all South African citrus exporters were considered for this study. Their participation in the study also relied on their availability and responsiveness to the survey that was given to them. The inclusion of the other five key informants was based on their availability and willingness to participate, as well as their expertise and understanding of the sector. There are about 102 orange exporters in South Africa. A non-probability method was utilized to send out 91 questionnaires by email and 67 questionnaires were returned by the respondents and were used in the analysis.

7.6 Data Collection

Semi-structured questionnaires and online databases were used to collect both primary and secondary data on citrus exports. The survey included both qualitative and quantitative research.

7.7 Data Analysis

Objective one: Composition and trends of South Africa's orange in Asian strategic markets. This objective is a descriptive objective to provide or analyze South Africa's orange export trends to strategic Asian markets. The study used descriptive statistics (frequencies, percentages, and means) to analyze the data through Microsoft Excel, which shows trends by plotting figures and charts.

Objective two: To analyze South Africa's competitive performance concerning its competitors in the identified markets. We used data on production, exports, and imports for South Africa and major competitors in the Asian strategic markets for the period 2003–2022 to calculate competitiveness. The revealed comparative advantage (RCA), net export index (NXi), and relative trade advantage (RTA) were used to measure export performance.

Revealed comparative advantage (RCA) - This index has been used globally as an index in the economic and business literature to measure the comparative advantage of a product by country (Maksymets & Lönnstedt, 2016). Several studies have applied the revealed comparative advantage (RCA) index, first coined by (Balassa, 1965), to measure and analyze industry or sectoral comparative advantage. The country and commodity under consideration are excluded when total exports are calculated. For the $i\text{-}_{th}$ country and $j\text{-}_{th}$ commodity, the original expression of the RCA is as follows:

$$RCA_{IJ} = RXA_{IJ} = (X_{IJ}/X_{IK})/(X_{nj}/X_{nk}) \quad \ldots\ldots (1)$$

The Relative Trade Advantage (RTA) - Index **Invalid source specified.** extends Balassa's index (RCA) to measure competitiveness and avoids double counting when comparing countries (OECD, 2010; Sangu & Antwi, 2014). This index determines the country's share in the world market of one commodity relative to its share of all traded commodities. It is calculated as the difference between relative export advantage (RXA), which equates to the Balassa index, and its counterpart, relative import advantage (RMA).

The RTA index is mathematically expressed as follows:

$$RTA_{ij} = RXA_{ij} - RMP_{ij} \text{----------(2)}$$

$$RXA_{ij} = (X_{ij}/\Sigma_l,\ l \neq j\ X_{il})/(\Sigma_k,\ k \neq j\ X_{kj}/\Sigma_k,\ k \neq i\ \Sigma_l, l \neq j\ X_{kl}) \text{----------(3)}$$

$$RMP_{ij} = (M_{ij}/\Sigma_l,\ l \neq j\ M_{il})/(\Sigma_k,\ k \neq i\ M_{kj}/\Sigma_k,\ k \neq i\ \Sigma_l,\ l \neq j\ M_{kl}) \text{----------(4)}$$

Net export index (NXi) - According to Vollrath (1991), with differentiated products, interindustry trade, and flows of exports and imports, net trade effects should be considered. Balassa also proposed an alternative measure called the **net export index (NXi),** where net exports are exports minus imports. To calculate the index, net exports are divided by the total value of the trade (exports plus imports) of the commodity in question.

The NXi index formula is expressed mathematically as:

$$NX_i = [(X_i - M_i)/(X_i + M_i)] \times 100 \text{ ----------(5)}$$

For this objective, constant market share (CMS) will be more appropriate, as changes in market share are interpreted on the assumption that they are purely a reflection of competitive conditions. According to Fragerberg (1987), "**Constant market shares (CMS) analysis** is a method aimed at providing insight into the underlying reasons for a country's comparative export performance" (Fragerberg, 1987).

The CMS model is defined as follows:

$$\Delta q = \sum\sum S_{ij}^{0}\,\Delta q_{ij} + \sum_{ij}\sum_{i\,j} Q_j^0 \Delta S_{ij} + \sum\sum \Delta S_{ij}\,\Delta_{Q_{ij}}$$

Where

q = target country's orange exports by value

S_{ij} = an exporter country's export market share of orange i in country j.

Q_{ij} = Imports of market j.

Δ = Annual change.

0 = Base year.

Objective three. Identify and describe key limitations and improvements to the competitive success of local oranges. This objective complements the previous objective by using Porter's diamond model (Porter 1990b) to identify the key limitations and improvement factors that affect local export competitiveness and the extent to which they affect industry performance. As mentioned above, Porter's diamond model was adopted to identify the main challenges affecting the competitiveness of local orange exporters. This was measured on a 10-point Likert scale throughout the survey.

Objective four: Assessing the food safety standards of South African oranges in strategic markets. The model has incorporated advanced econometric techniques of the gravity model such as including three dimensional-data, while previous studies have relied on simpler gravity models, and a two-dimensional approach leading to less comprehensive findings. (Metri, et al., 2018) utilized a basic model to measure determinants of export in a small open economy and identified a need to explore more dimensional data to get relevant sights. The gravity model is a widely recognized tool for modeling trade between countries (Zhang & Christensen, 1995). The gravity model was a valuable tool to assess the food safety standards of South Africa's oranges in identified Asian strategic markets. In this empirical analysis, fluctuating food safety standards are included in the hope that these standards would make South Africa's orange exports less competitive.

Thus, the following functional form was adopted for the gravity model used in this research:

$$lnXijt = \beta 0 + \beta 1(lnGDPit) + \beta 2(lnGDPjt) + \beta 3(lnDISij) + \beta 4(lnEPIit) + \beta 5(lnIPIjt) + \beta 6(lnFSSi) + \varepsilon i + \eta t$$

Table 7. 1: Variable description and expected influence.

Variable Name	Description	Sign
Exports	The quantity of fruits exported in tons	
GDP_{ti}	Value of GDP of country i at time t	(+)
GDP_{jt}	Value of GDP of country j at time t	(+) or (-)
EPI_{it}	export price index of country i at time t	(+) or (-)
jt IPI	import price index of country j at time t	(+)
DIS_{ij}	distance between country i and j	(-)
FSS_i	food safety standards in terms of maximum allowable level imposed on imports by country i	(-)
ε_{ijt}	An error term assumed to be normally distributed.	(-)

Source: Authors' construction supported by the literature

Objective five: Develop strategies and recommendations to improve the export performance of oranges in the strategic markets of the Asian continent. This objective depends mainly on the previous objective of developing recommendations, which is the main purpose of this study.

7.8 Summary

In concluding this discussion, Chapter 7 serves as a vital foundation for the broader research objectives. It integrates various methodologies and analytical tools, reflecting the complex nature of the global citrus trade. Moving forward, the insights and frameworks presented will guide subsequent chapters, ensuring that the exploration of the orange export market not only advances academic understanding but also informs practical strategies for enhancing South African competitiveness on the international stage.

CHAPTER 8
RESULTS FINDINGS AND DISCUSSIONS

8.1 Introduction

This chapter will discuss the statistical approaches used in examining the results to attain the goal of the study. This study attempts to assess South Africa's orange exports to key nations in terms of competitiveness and food safety requirements for the country to prosper in a highly competitive climate. The findings are presented concerning the study's objectives, namely, to explain the composition and trends of South Africa's oranges in key Asian markets, analyze South Africa's competitive performance of oranges relative to its competitors in the identified markets, identify and describe key limitations and improvements to the competitive success of local orange producers and exporters, evaluate the food safety requirements for South African oranges, and develop strategies and recommendations to enhance the performance of orange exports to key Asian markets.

8.2 Analysis of Hypothesis 1

The composition and patterns of South Africa's orange exports to Asian markets cannot be explained.

South Africa's citrus cultivation area has steadily increased over the last decade, propelled by continued investments in relatively high-earning export markets. As a result, South Africa is on track to export 2.7 million tons of citrus in the marketing year 2021/22. South Africa sells oranges to more than 100 countries around the world, but the EU remains the country's largest export market, accounting for approximately 40% of total orange exports. Despite a free trade agreement with the EU that allows dutyfree access to citrus exports, South Africa continues to face phytosanitary issues in the EU market due to the prevalence of citrus black spot (CBS) and false codling moth (FCM). According to industry estimates, the citrus industry will spend more than R4 billion (US$232 million) to comply with CBS and FCM regulations on the EU market.

After a nearly 40% increase in 2021/22, China is now South Africa's second-largest orange market. The export of citrus from Mozambique's Maputo port, which began in 2023, is a breakthrough that reduces shipping time and costs. Significant volumes of South African oranges are produced in the country's northeastern regions, which are

much closer to Maputo Port than to Durban Port. The Maputo port has improved the access of South African citrus to markets in Asia and the Middle East. As a result, this document explains the composition and patterns of South Africa's oranges in important Asian markets.

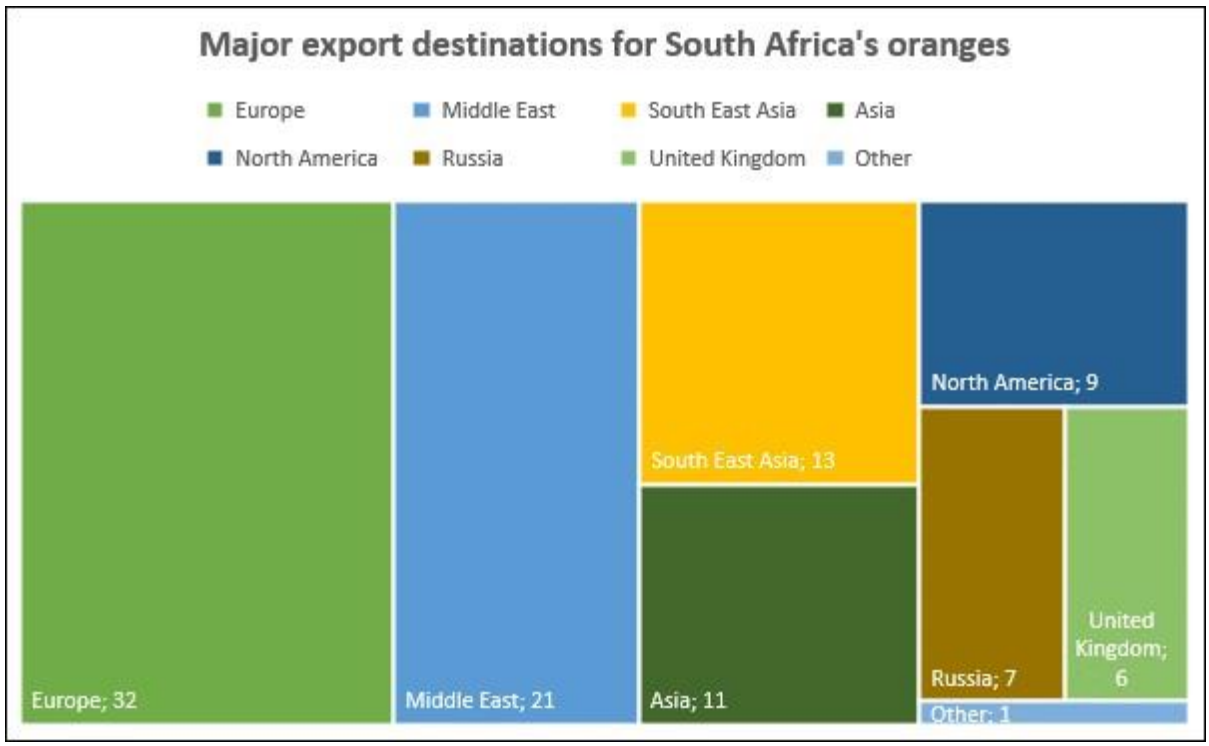


Figure 8. 1: Shares of volumes of oranges exported to various regions.
Source: CGA, 2023

South Africa exports to more than 100 countries around the world, while the Asian market is dominated by rapidly developing countries. It is critical to note that the everincreasing habit of eating healthy, which has been a hot topic in developed countries, has spread to people in developing countries such as the Middle East and Far East countries in Asia. This phenomenon has had a significant impact on most Asian nations as food systems are evolving, resulting in increased food availability and diversity due to urbanization, rising affluence, market liberalization, and foreign direct investment. **Figure 8.2** highlights the performance of South Africa's orange trade with the rest of the world (share volume) and Asian markets (volume in tons) from 2003 to 2022. During the examined time, both the global and Asian markets steadily expanded their orange imports from South Africa, corroborating the premise of changing consumption trends in developing countries.

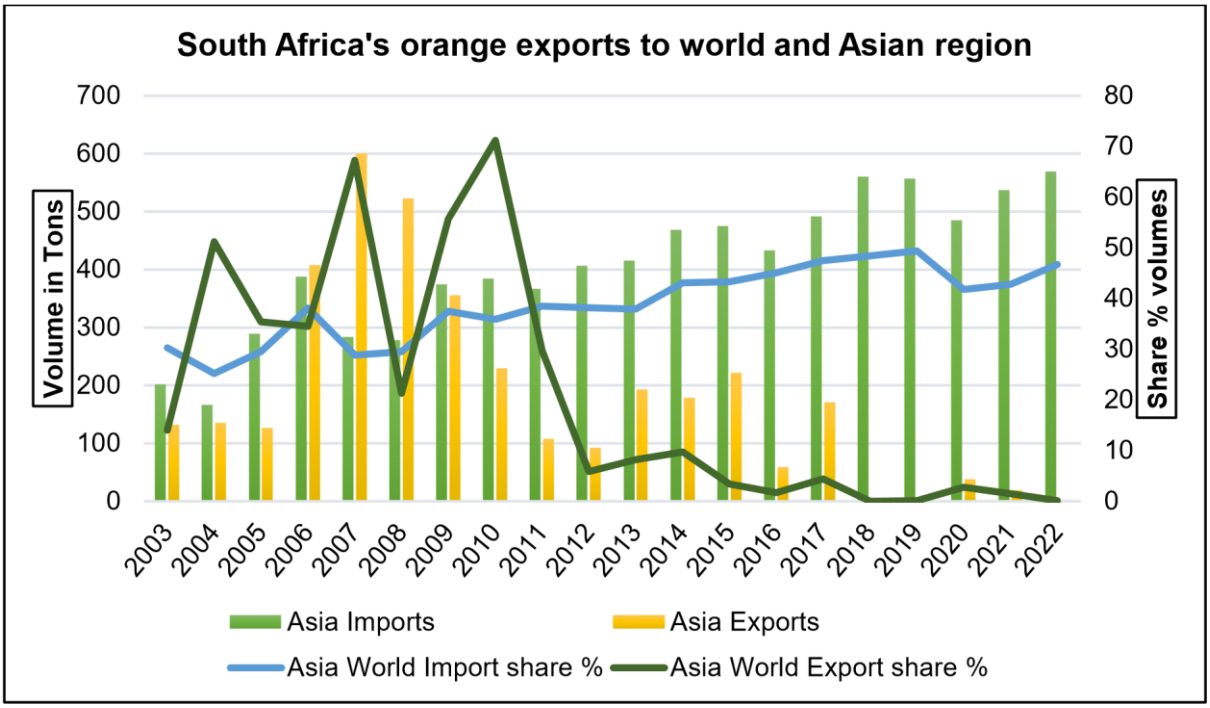


Figure 8. 2: South Africa's oranges trade with the world and Asian market
Source: ITC, 2023

The figure shows South Africa's orange export performance in identifying Asian strategic markets. The two patterns are discussed in terms of exported volumes and the percentage share of the global market. As shown in **Figure 8.3** below, the performance of Asian strategic markets has improved over the years and improved exceptionally well in 2019, with 256,009 tons of imports. Furthermore, the Asian market did well in 2005, when it surpassed the European market in orange imports (above 600 thousand tons to Asia versus slightly more than 500 thousand tons to Europe) and in 2006 (above 500 thousand tons to Asia versus slightly more than 500 thousand tons to Europe) before retreating again in 2007. The drop in exports between 2021 and 2022 was a result of covid-19 outbreak that restricted the movement of goods and services across the countries.

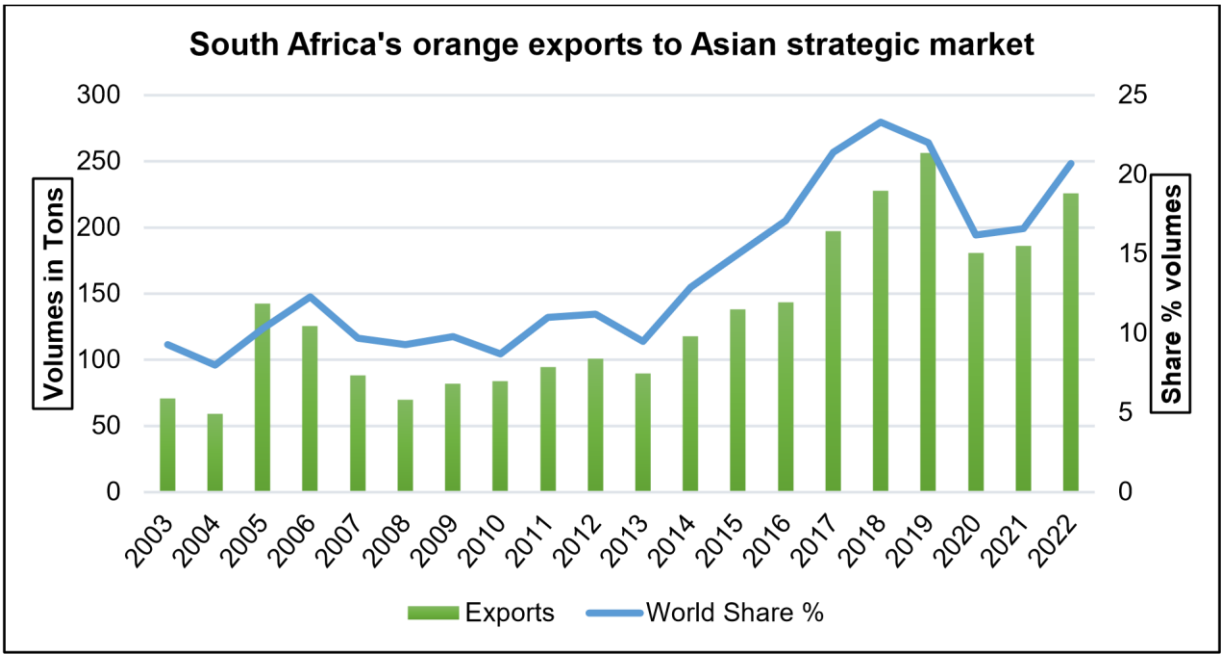


Figure 8. 3: South Africa's orange exports to Asian strategic markets Source: ITC, own calculations (2023)

8.2.1 Hong Kong

Hong Kong imports 26% of all South African oranges sold in Asia, although most of its oranges come from the United States, France, and Germany. This simply emphasizes the level of competition facing South African oranges in Hong Kong. According to USDA (2023), South Africa is expected to export approximately 48,000 tons of orange to Hong Kong, which is ranked 12th in the world, in 2022/23 (a 100% increase from 2021/22). It is crucial to remember that South African oranges compete for the Hong Kong market with those from the United States, France, and Germany. As a result, we must emphasize the advantages these competitors have over South Africa**. Figure 8.4** compares South Africa's orange export performance in Hong Kong with that of all other Asian strategic markets. In terms of fluctuations, two trends follow the same path. Hong Kong imports have been declining since 2020, with overall market imports increasing during the same period.

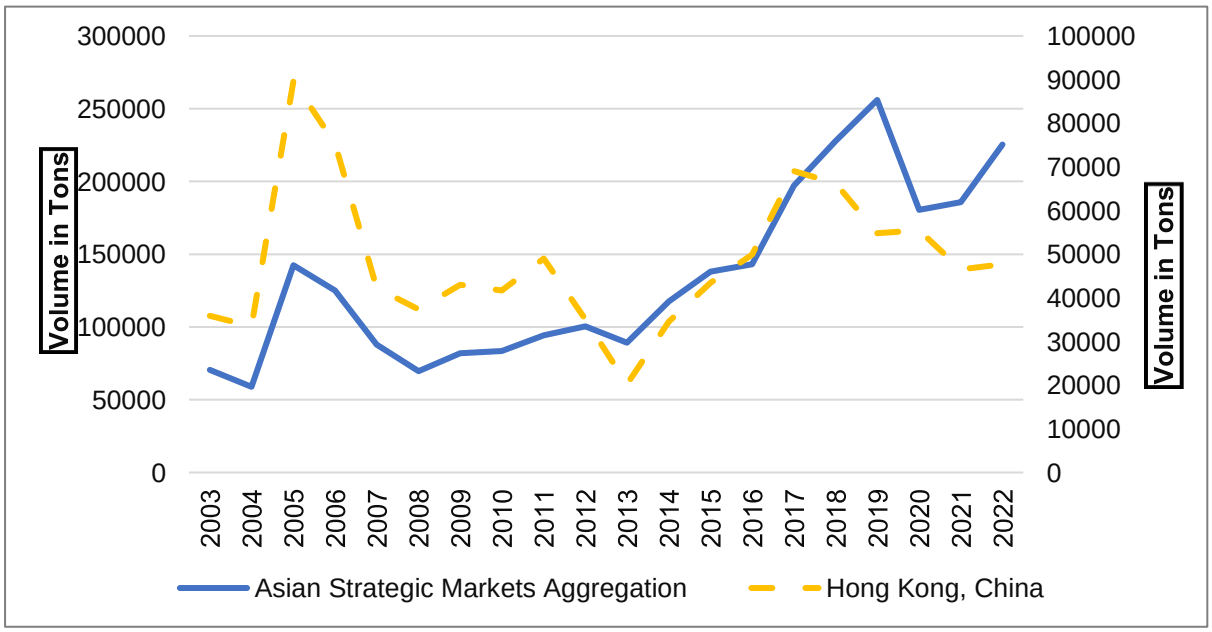


Figure 8. 4: South African orange trade patterns with Hong Kong "Asian strategic markets"
Source: ITC, own calculation (2023)

8.2.2 India

In the calendar year 2021, India's fresh fruit imports doubled to 721,493 tons, up from 359,716 tons in 2020. Compared to other countries, India is a very competitive market. South Africa plans to be the dominant supplier in Indian markets in the foreseeable future, with robust growth expected every year. The main competitors for South African oranges are Brazil, Israel, Egypt, and Australia. South African orange shipments increased by more than 80% annually to 19,811 tons. Australia was by far the third largest contributor, with volumes dropping marginally to 3,017 tons. The graph in **Figure 8.5** shows the import performance of oranges to India and the average Asian markets over time. The Indian markets have been critical for South African oranges with increasing import performance. With improving import performance, Indian markets have become essential for South African oranges.

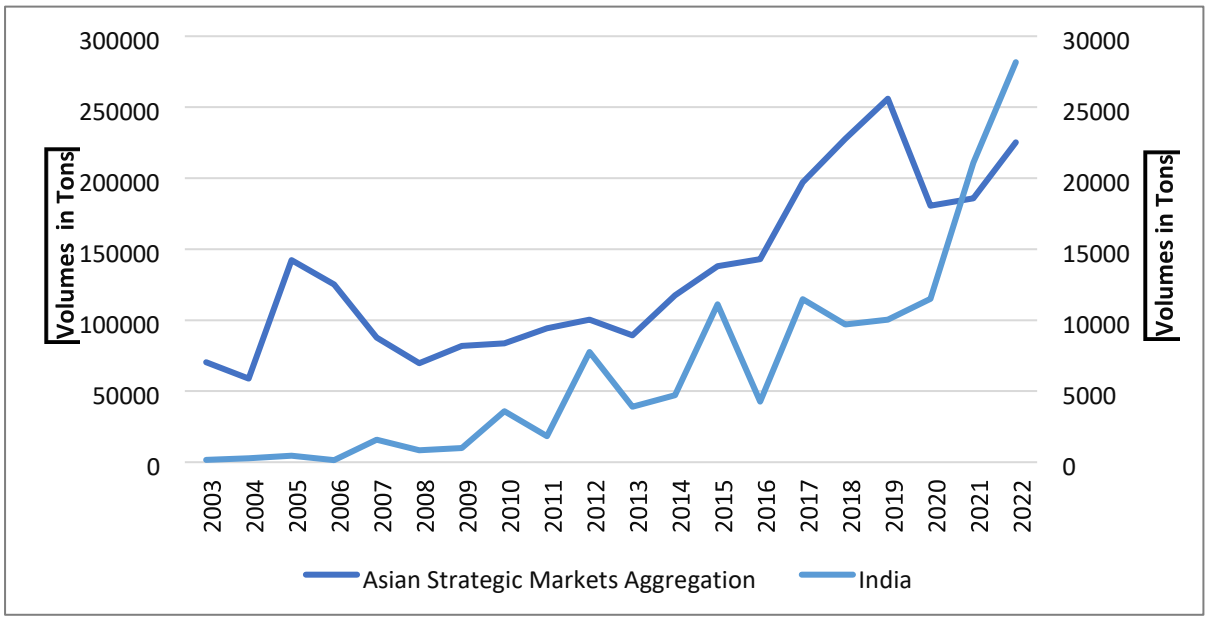


Figure 8. 5: South African orange trade patterns with India's "Asian strategic markets"
Source: ITC, own calculation (2023).

8.2.3 Indonesia

In 2022, orange imports to Indonesia decreased by 7% compared to the previous year. With a combined 70% share of total imports, Australia, Egypt, and China were the leading exporters of orange imports to Indonesia. The United States and South Africa were slightly behind, accounting for a further 30%. From 2012 to 2022, the United States had the highest increase rate in terms of purchases among the major providers (with a CAGR of +1.4%), while imports from the other leaders exhibited varied trend patterns (see **Figure 8.6** for the South African mixed pattern). In terms of value, Australia, the United States, and South Africa were the top three orange suppliers to Indonesia, accounting for 74% of total imports. The graph below shows the fluctuating trend pattern for South African oranges imported by Indonesia over the years. South African oranges face strong competition from oranges in Australia, Egypt, and China. The reason for South Africa's varied trend pattern was that it was subject to health inspections and verifications, particularly through the Jakarta port.

Figure 8. 6: South African orange trade patterns with Indonesia "Asian strategic markets".
Source: ITC, own calculation (2023).

8.2.4 China

China is the only strategic Asian country that has exhibited a persistently steady increase in the imports of South African oranges, with no ‘up and down’ fluctuations The import quantities increased nearly fivefold in the last five years, from less than 10,000 tons in 2010 to 47,000 tons in 2015. **Figure 8.7** reflects Chinese consumers' strong regard for South African citrus, as well as the efficient procedures in ChinaSouth Africa commerce. As China begins to remove some of the onerous transportation regulations associated with COVID-19, orange imports are estimated to reach 230,000 tons in 2022-23, up from 223,000 tons in 2021-22. South Africa, Egypt, Australia, the United States, and Spain are major orange exporters to China. South
Africa remains the top orange producer. Because they follow a similar trend pattern, **Figure 8.7** shows that China is the overall determinant of the total Asian import trend pattern.

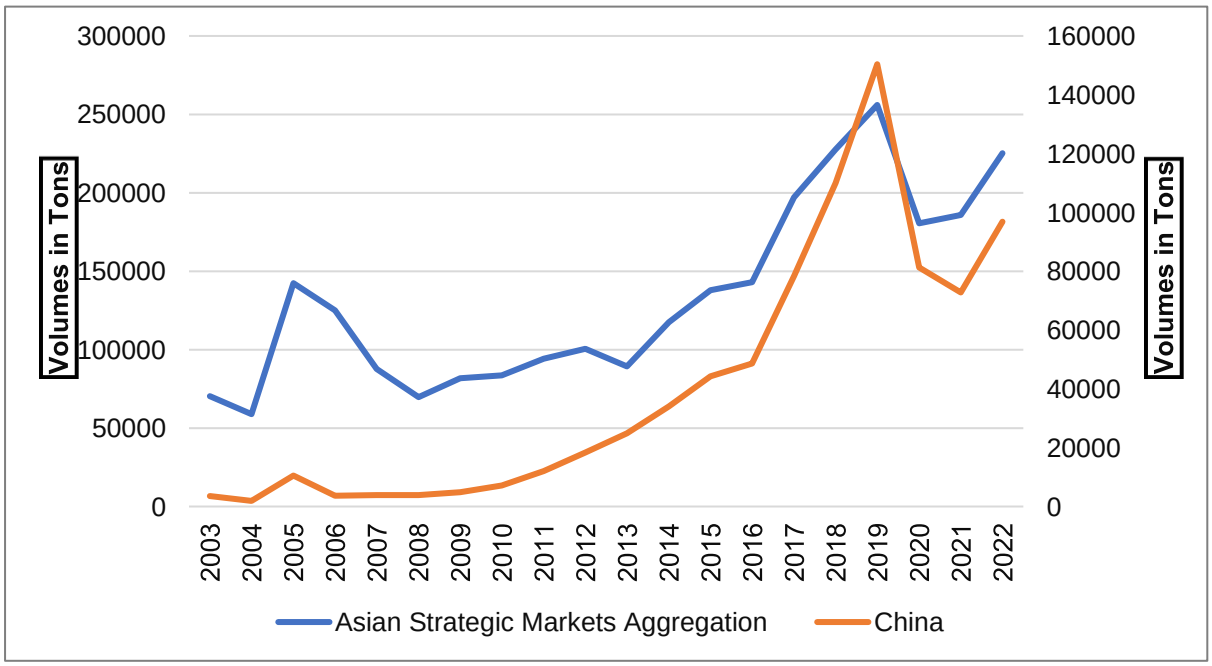


Figure 8. 7: South African orange trade patterns with China "Asian strategic markets"
Source: ITC, own calculation (2023)

8.2.5 Thailand

Since the 1990s, the Department of Agriculture, Forestry and Fisheries (DAFF) announced the establishment of a new market for the export of fresh citrus fruit from the Republic of South Africa to the Kingdom of Thailand, local oranges have become competitive. Import conditions for this market included a list of quarantine pests that were a concern for the Kingdom of Thailand. Among the requirements was phytosanitary treatment (cold treatment) for false codling moth, Mediterranean fruit fly, and Natal fruit fly, which could be performed either before export (on land) or during transit. The Thailand tariff regimes provided by the WTO include least-developed nation levies, ASEAN free trade agreements, comprehensive regional economic cooperation agreements, and the Free Trade Agreement with the European Union. This non-MFN partner was discovered through orange trading. Because there is no legal link, 30% MFN tariffs must be charged to South African orange imports. **Figure 8.8** shows a slight inverse relationship between volumes exported to Asian strategic markets and those consumed by Thailand.

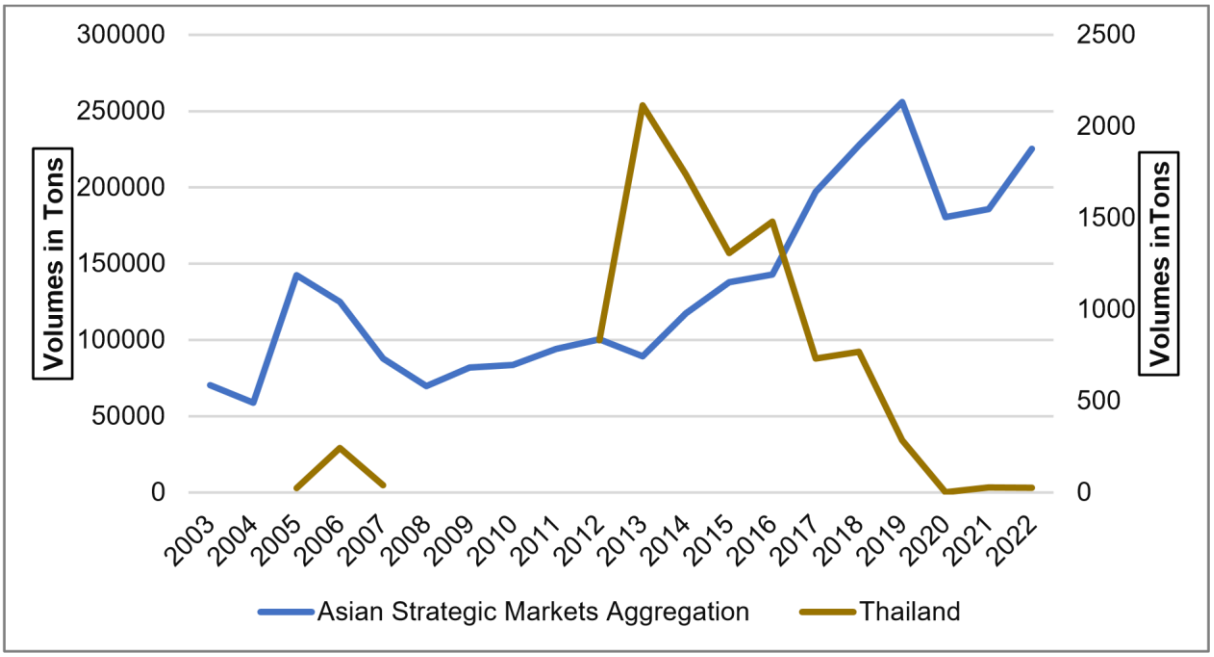


Figure 8. 8: South African orange trade patterns with Thailand's "Asian strategic markets"
Source: ITC, own calculation (2023)

8.2.6 Japan

Japan's fresh orange production for 2022/23 was expected to reach 5600 tons, a 2% decrease from that of the previous year. Furthermore, the harvested area is expected to decrease by 1.2% to 400 hectares. Imports account for almost 93% of the country's fresh orange consumption and are expected to decrease by 11.1%. For the first time in recent years, the United States was not the largest volume provider for the Japanese orange market in 2021/22. The United States contributed 40.3% of Japan's imports, while Australia contributed 51.4%. South Africa is a major grapefruit supplier to Japan. **Figure 8.9** shows that South Africa's orange exports to Japan have been decreasing over the years, while strategic market aggregation in Asia has been expanding. As a result, it is worthwhile to examine the elements that contribute to this reduction.

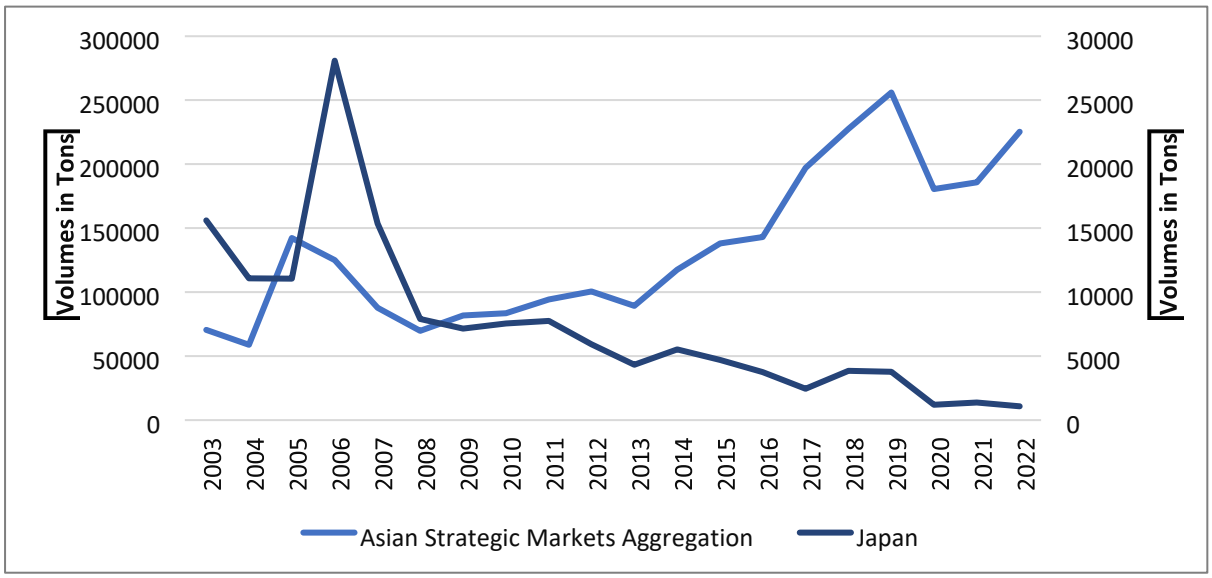


Figure 8. 9: South African orange trade patterns with Japan's "Asian strategic markets"
Source: ITC, own calculation (2023).

8.2.7 Malaysia

South Africa has built a strong reputation as a fruit supplier country to Malaysia, where products are increasingly competitive in terms of price and quality. The Malaysian market has enormous prospects for South Africa, as it has relatively few phytosanitary restrictions on entering Singapore, Hong Kong, and Malaysia. Furthermore, the High Commissioner noted that between 2020 and 2021, South African fruit exports to Malaysia increased from 18% to 30% of total bilateral imports. There are no import charges on citrus, and other types are subject to a 4.5% duty. **Figure 8.10** supports the statements made above. South African orange exporters have equal market access in Malaysian markets. The number of oranges in Malaysia has increased in tandem with the total quantity of the Asian key market aggregate over the years. Surprisingly, WTO data show that Malaysia does not have a trade regime in place for oranges and citrus, although there is a 2.5% MFN duty in place.

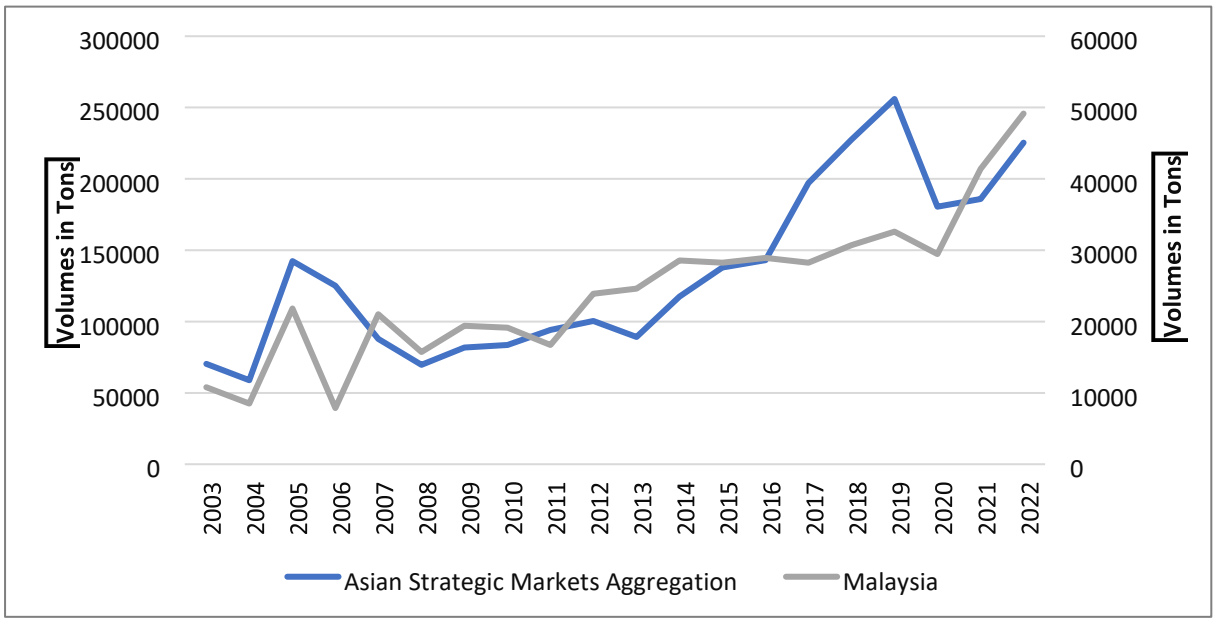


Figure 8. 10: South African orange trade patterns with Malaysia's "Asian strategic markets"
Source: ITC, own calculation (2023)

8.2.8 Philippines

South African orange exports to the Philippines have underperformed other Asian strategic markets in the last eight years (**see Figure 8.11**). However, the new Philippine market may provide South African producers with the opportunity to export up to 20,000 tons of citrus fruits per year. The momentous export ban was implemented at the end of last year after 12 years of discussions between South Africa and the Philippines. Over the next five years, the South African citrus industry is projected to increase by 500,000 tons. The given opportunity will improve the decreasing export trend shown in the graph below. The Philippines trades more under the ASEAN free trade agreements, AJCEPA, and a few other free trade agreements.

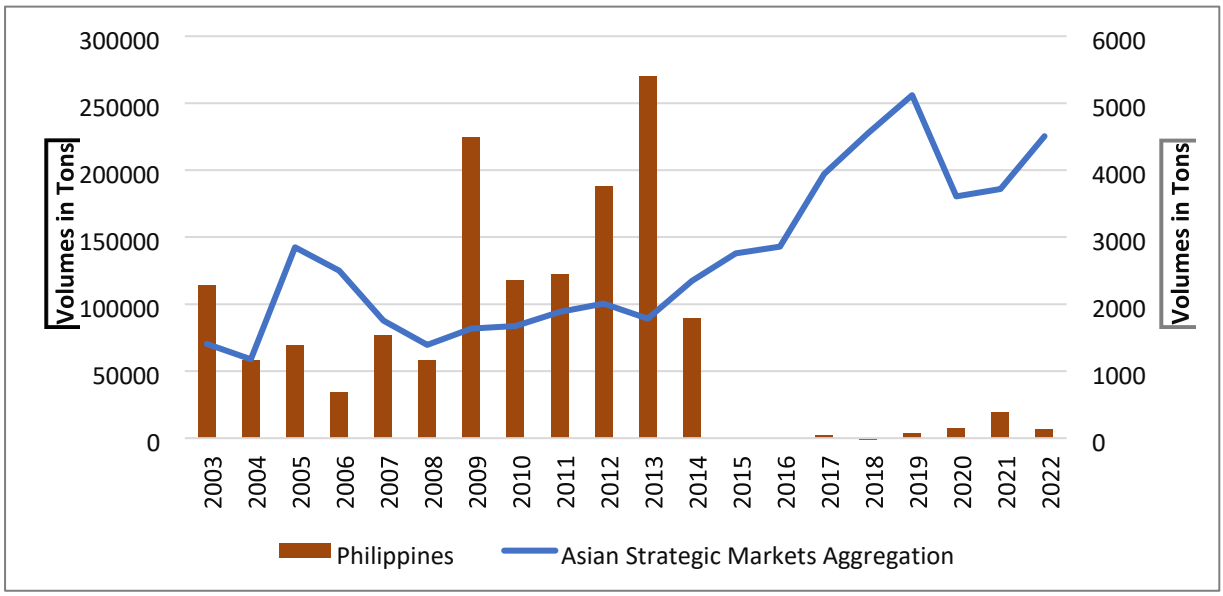


Figure 8. 11: South African orange trade patterns with Philippines "Asian strategic markets"
Source: ITC, own calculation (2023)

8.2.9 Vietnam

South African oranges were unable to enter the Vietnamese market in 2013 due to category uncertainty and other issues. The issue seems to be with the definition of citrus, namely, whether oranges are citrus. Following that, the Vietnamese authorities requested that South Africa give the data package for oranges, followed by the other citrus types. These difficulties have resulted in a downward trend in South African orange exports to Vietnam (**see Figure 8.12**). As a result, it is critical to boost and diversify South African exports to Vietnam to cover a wider range of items. Citrus has been highlighted as a commodity worth exporting to Vietnam in the future to diversify South Africa's exports to Southeast Asia. The two countries' commerce was valued at R23.8 billion in 2022, up from R16 billion in 2018.

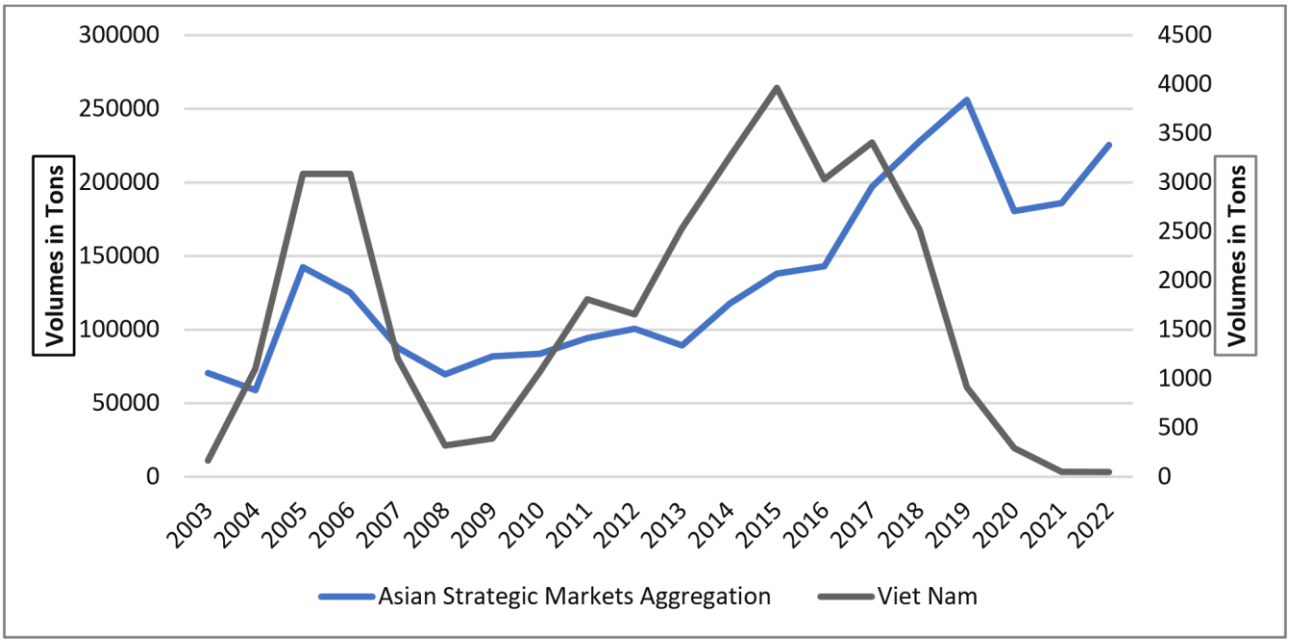


Figure 8. 12: South African orange trade patterns with Vietnam "Asian strategic markets"
Source: ITC, own calculation (2023).

8.2.10 South Korea

CGA reported a six-fold increase in citrus shipments to South Korea in 2015, with volumes more than doubling since 2012. The South Korean orange market decreased by 19.6% in 2022 compared to the previous year. However, South Korean orange imports are expected to decrease by 28.9% in 2022 compared to 2021. Overall, imports suffered a sharp decline. The growth rate was the fastest in 2016, with an increase of 39%. The United States was the main orange supplier to South Korea, accounting for 86% of total imports; additionally, orange imports from the United States outnumbered those from the second largest provider, Australia, tenfold. With a 2.4% proportion of total imports, South Africa ranked third. As a result, South Africa must evaluate the comparative advantage that US and Australian oranges have over them. However, it is crucial to note that South Korea trades under LDCs and the global system of trade preferences for developing nations, and interestingly, the top three suppliers do not fall under any of the tariff regimes.

8.3 Analysis of Hypothesis 2

South African oranges are not competitive in the specified strategic markets (results of the constant market share (CMS) analysis)

This section employs the constant market share methodology to assess South Africa's orange competitiveness in the ten designated Asian strategic markets. However, it is necessary to present an overview of the performance competitiveness of the South African trade components. **Table 8.1** below provides indicators of South Africa's overall profile, the country's position, and a breakdown of the country's change in global market share.

The International Trade Commission (ITC) created the Trade Performance Index (TPI) to analyze and monitor the multifaceted characteristics of export performance and competitiveness by sector and country. The TPI currently covers 184 countries and 14 different export industries. The index assesses the competitiveness and diversity of a certain export sector by comparing it to other countries around the world. It highlights increases and losses in global market shares and sheds light on the factors behind these shifts. It also tracks the progress of export diversification for items and markets. The solely quantitative methodology of the TPI limits it, but it does provide a systematic assessment of sectoral export performance as well as comparative and competitive advantages.

The analysis for this study focuses on annual competitiveness effects, suggesting a change from 2017 to 2021 for the existing index. This index shows a percentage of the ‘relative change in global market share’. The competitiveness effect depicts the percentage change in competitiveness of South Africa's fresh food sector exports in the global market during the time under consideration. This corresponds to hypothetical gains or losses in South Africa's aggregate market share that would occur if changes occurred solely because of fluctuations in South Africa's market share in import markets, regardless of export structure. South Africa has achieved a positive competitive effect of 2.4600%, showing a market gain due to the increasing competitiveness of the world's fresh food sector.

Table 8. 1: Trade performance index of fresh food

		Indicator's Description	Fresh food (Value)	Fresh food (Rank)
	N	Number of exporting countries for the ranking in the sector	179	
	G1	Value of exports (in thousand US$)	7,600,124	
	G2	Export growth in value, p.a. (%)	6%	68
General Profile	G3	Share in national exports (%)	6%	
	G4	Share in national imports (%)	3%	
	G5	Relative trade balance (%)	39%	
	G6	Relative unit value (world average = 1)	1.3	
	P1	Net exports (in thousand US$)	4,341,959	21
	P2	Per capita exports US$/inhabitant)	128.0	78
	P3	Share in world market (%)	0.77%	30
Position in 2021 for Current Index	P4a	Product diversification (N° of equivalent products)	21	24
	P4b	Product concentration (Spread)		24
	P5a	Market diversification (N° of equivalent markets)	20	6
	P5b	Market concentration (Spread)		6
	C1	Relative change of world market share p.a (%)	0.7700 %	
	C1a	Competitiveness effect, p.a. (%)	2.4600 %	60
Change 2017 - 2021 for Change Index	C1b	Initial geographic specialization, p.a. (%)	-1.2200 %	139
	C1c	Initial product specialization, p.a. (%)	0.4700 %	67
	C1d	Adaptation effect, p.a. (%)	-0.9300 %	114
	C2	Matching with dynamics of world demand		37
	A	Absolute change of world market share (% points p.a)	0.0058 %	35
Indicators included in the chart	P	Average Index: Current Index		10
	C	Average Index: Change Index		80

Source: Market Access Map, own calculation (2023)

The RCA, NXI, and RTA equations are used to assess competitiveness based on trade performance. According to this quantitative method, competitive advantage can be indicated by the trade performance of 'traded' individual commodities, value chains, and countries, in the sense that a commodity's trade pattern reflects relative market costs as well as differences in nonprice competitive factors such as subsidies,

government policies, and other public support measures, that is, the true cost of doing business by trading a commodity. RTA is the most appropriate technique to measure industry competitiveness, which is why it is utilised in this study. The RCA# and NXI procedures are only partial assessments of an industry's competitive state.

8.3.1 Relative comparative advantage (RCA)

Pilinkiene (2014) mentioned that the RCA index is a widely accepted and comprehensive measure in the literature for evaluating a country's export competitiveness in specific commodities. Appendix C provides a detailed table that includes all the numbers (average scores) used to generate the RCA indices for all the countries. **Table 8.2** compares the South African orange sector with its competitors in the Asian critical markets from 2003 to 2022. All South African values are greater than one, with closer to twenty; this merely indicates that South Africa has a good comparative advantage in the production of oranges, which reached its highest value in 2022. Overall, this is a positive indicator of long-term competitiveness performance. **Table 8.2** shows that Egypt and Greece are the largest competitors, with average values of 16.9 and 19.7, respectively.

Table 8. 2: RCA indices of South African oranges from 2003-2022

	2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
South Africa	20.30	22.30	22.90	25.30	25.70	23.40	22.40	24.20	20.70	23.10
Spain	19.1	20.8	18.1	19.8	19.5	18.5	17.5	16.5	16.7	17.9
Egypt	19.1	28.5	279.1	20.1	25.8	58.1	61.7	60.5	64.1	60.6
US	1.5	1.7	1.5	1	1.3	0	1.4	1.6	1.7	1.6
Turkey	3.8	2.7	4.1	4.9	3.6	2.9	5	4.5	7.3	5.9
Greece	29.9	19.9	22.7	21.7	24.5	21.7	21.5	24.4	24	17.8
	2013	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
South Africa	23.10	27.30	27.00	27.10	29.30	30.70	28.70	29.30	26.40	32.20
Spain	18	17	17.5	14.8	14.6	13.6	14.4	14.6	14.9	15.1
Egypt	63.8	69.1	80.7	75.6	72.2	80.6	83.5	76	71	68.9
US	1.4	1.4	1.5	1.5	1.3	1.2	1.3	1.4	1.3	0.9
Turkey	4.2	4.8	4.3	4.3	3.5	3.4	2	2.5	1.9	2
Greece	19	19.9	15.7	23.8	13.7	14.6	12.9	16.7	15.8	13.1

Source: Authors' calculations (2023)

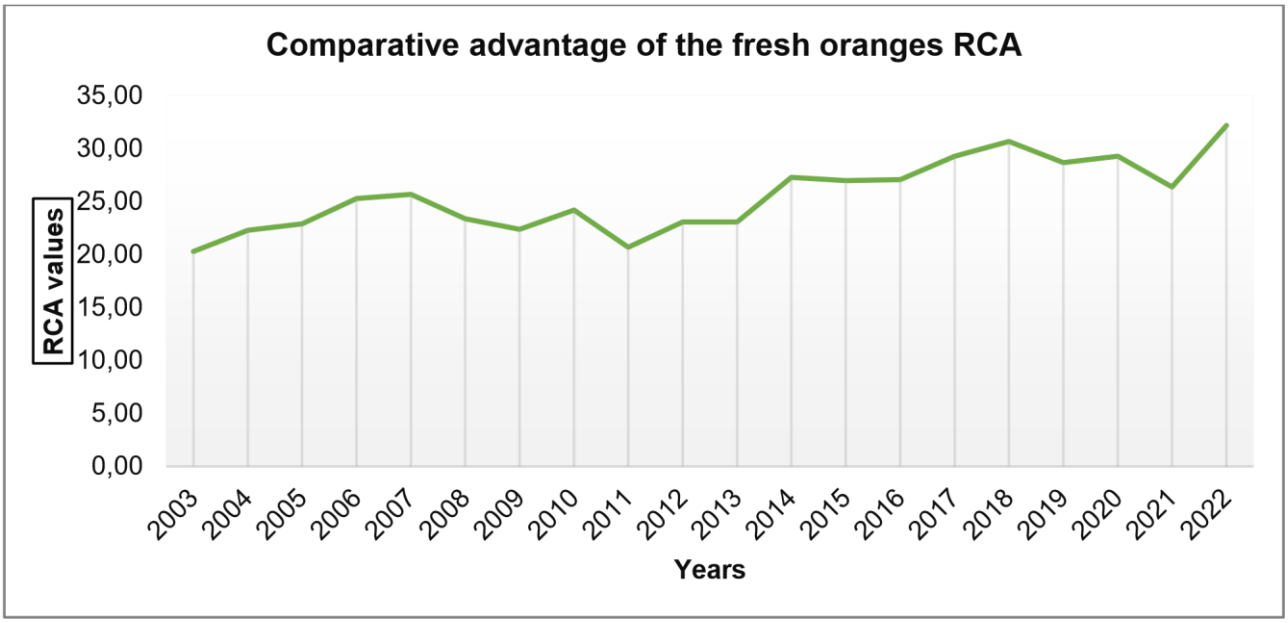


Figure 8. 13: Comparison of the advantages of the fresh oranges RCA Source: Authors' calculations (2023).

8.3.2 Net Export Index (NXi)

The NXi is the value of South Africa's total exports minus the value of total imports, which is equal to the country's net exports. A positive net export figure implies a trade surplus, whereas a negative figure indicates a trade deficit. Appendix C provides a detailed table that includes all the numbers (average scores) used to generate the NXi indices for all the countries. The NXi for oranges is reported in **Table 8.3** and **Figure 8.14**. A limit of 100 indicates that there are no imports, while a limit of -100 indicates that there are no exports. Currently, the South African orange industry has shown favourable net export performance, with values typically near 100 (highlighted in red). This demonstrates that South Africa is a net exporter of oranges and has a persistent comparative advantage. The competitors also have a favourable NXi, with Egypt and Greece showing some resistance in the Asian markets. The graph shows that the NXi changed over time, reaching a low value of 98.7 in 2015.

Table 8. 3: Net Export Index of South African oranges from 2003-2022

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
South Africa	99.5	99.9	99.8	99.5	99.7	99.1	99.7	99.9	99.9	99.6
Spain	86,5	87,1	80,8	85,7	76,6	81,0	88,3	82,7	86,8	86,1
Egypt	100,0	99,9	100,0	100,0	99,9	100,0	100,0	99,9	99,9	99,8
US	71,8	68,2	64,8	60,0	30,3	67,7	-99,2	64,2	69,5	67,4
Turkey	80,3	79,6	74,2	89,8	77,7	81,8	89,5	89,8	90,6	90,1
Greece	93,0	52,5	87,2	90,6	75,1	85,2	92,4	93,4	95,5	95,0
	2013	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
South Africa	99.3	99.4	98.7	99.2	99.6	99.7	99.6	99.7	99.6	99.8
Spain	85,3	86,6	84,9	81,9	80,4	80,4	83,2	77,3	82,3	85,2
Egypt	99,9	100,0	100,0	100,0	100,0	100,0	100,0	99,9	100,0	100,0
US	57,8	57,0	53,8	59,1	53,9	43,9	46,7	44,0	40,8	30,7
Turkey	88,6	92,5	88,8	89,5	85,5	91,1	78,9	80,4	79,3	78,8
Greece	95,8	97,4	91,3	97,2	93,5	95,7	95,7	95,3	97,9	96,5

Source: Authors' calculations (2023)

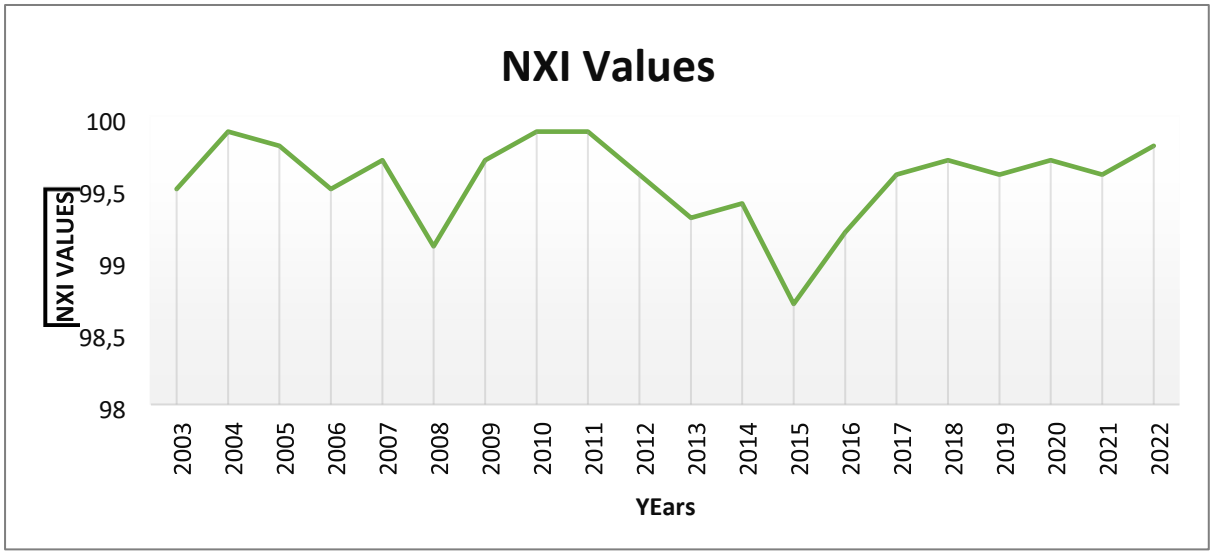


Figure 8. 14: Comparison of the advantages of the fresh oranges NXi Source: Authors' calculations (2023).

8.3.3 Relative Trade Advantage (RTA)

Table 8.4 and **Figure 8.15** show the competitive performance trends for the South African orange sector as evaluated by relative trade advantage (RTA). Appendix C provides a detailed table that includes all the numbers (average scores) used to generate the RTA indices for all the countries. The RTA index values are mainly positive, most of them above the value of 20 over the years under consideration. This illustrates that the South African orange sector did well in Asian markets and has maintained this performance since 2003, with the performance in 2022 considerably greater than that in the other years and expected to increase more in the following years. On the competitor side, Egypt had an average RTA of 70.1, which is significantly greater than any other country in our research and is considered the main competitor for South Africa. Greece and Spain came after Egypt, with an average RTA of 19.3 and 15.8, respectively.

Table 8. 4: RTA indices of South African oranges from 2003-2022

	2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
South Africa	20.2	22.2	22.9	25.2	25.7	23.3	22.4	24.2	20.7	23
Spain	18.1	19.9	17	19	18.1	17.3	16.7	15.3	15.7	16.8
Egypt	17.9	22.1	278	19.2	23.3	57.2	61.3	60	63.8	60.4
US	1.4	1.4	1.5	1.4	0.7	1.2	-0.2	1.2	1.5	1.5
Turkey	3.5	2.5	3.8	4.8	3.4	2.7	4.8	4.4	7.1	5.7
Greece	29.6	18.3	22.3	21.4	23.6	21.2	21.2	24.1	23.7	17.6
	2013	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
South Africa	23	27.3	26.8	27	29.2	30.6	28.6	29.1	26.4	32.2
Spain	16.8	16	16.3	13.6	13.3	12.4	13.3	13	13.6	14.1
Egypt	63.6	69	80.4	75.5	72	80.5	83.4	75.8	70.9	68.8
US	1.3	1.2	1.1	1.3	1.2	1	1	1	1.1	0.9
Turkey	4.1	4.7	4.1	4.2	3.3	3.3	1.8	2.3	1.7	1.9
Greece	18.7	19.7	15.3	23.7	13.5	14.4	12.8	16.5	15.7	12.9

Source: Authors' calculations (2023)

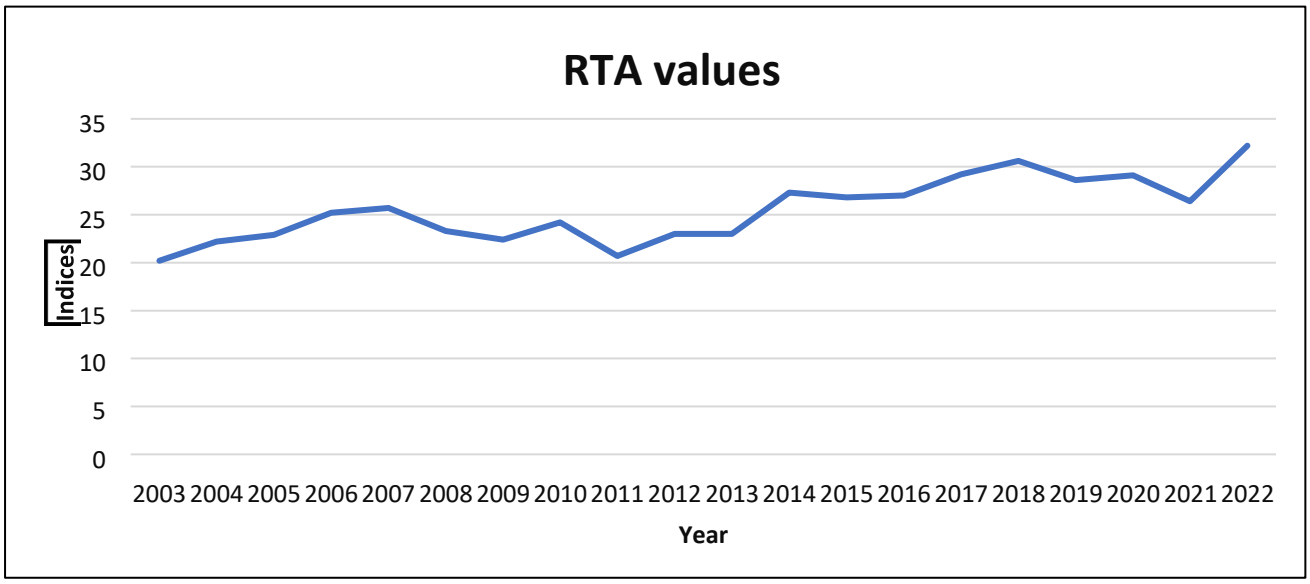


Figure 8. 15: Comparison advantages of the fresh oranges RTA
Source: Authors' calculations (2023).

8.3.4 Constant Market Share (CMS) Analysis

CMS is an important approach for studying trade patterns and trends for policy creation. Constant market share (CMS) analysis was used to examine three aspects that explain the causes of a country's export growth. These are the factors related to the export market's growth relative to global export growth (structural effect), improvements in the exporting country's competitiveness (competitive effect), and the combined effect of competitiveness and structure (second-order effect) (Barbaros et al., 2007). A positive index indicates a competitive environment.

According to the CMS analysis, export growth is treated as a compact of four factors: the global market growth effect, the commodity composition effect, the market share effect, and the change in competitiveness. The country's statistics can be divided into structural, competitive, and second-order effects. **Table 8.5** shows the structural, competitive, and second-order effects of South Africa's orange exports in the Asian strategic market (by country). Between 2003 and 2013, South Africa saw a negative competitiveness effect for Hong Kong, India, and South Korea, indicating that South Africa's orange exports grew more slowly in those countries than the global average, and therefore, the economy lost its market share. However, these markets improved,

resulting in a favourable competitive effect (exports increased) during the period between 2014 and 2022.

However, the most recent competitive effect showed a loss of value for Thailand and Vietnam, resulting in a loss of market share due to slower export growth.

Table 8. 5: CMS analysis of South African oranges from 2003-2022

	2003: 2013			2014: 2022		
	Structural Effect	**Competitive Effect**	**Second order effect**	**Structural Effect**	**Competitive Effect**	**Second order effect**
Hong Kong	-0.57	-0.13	0.36	0.00	0.24	-1.64
India	0.17	-0.04	-0.03	-0.02	0.26	-0.08
Indonesia	0.26	0.25	-0.11	-0.78	0.13	-4.66
China	-9.43	0.06	1.29	-6.62	0.39	0,25
Thailand	0.49	0.24	-1.16	2.16	-0.07	-1.75
Japan	0.14	0.35	-0.12	-0.90	0.16	-8.81
Malaysia	0.18	0.22	0.28	0.18	0.15	0.03
Philippines	0.51	0.00	0.24	-0.04	-0.23	0.76
Vietnam	0.11	3.18	0.25	-0.32	-3.35	-0.76
South Korea	-0.34	-0.25	-0.01	20.06	0.00	-156.56

Source: Authors' calculations (2023)

8.3.5 Adjusted market share decomposed by technology, skill, or processing stage.

The decomposition pattern presented below illustrates the adjusted estimated market share by technology, expertise, and stage of processing. It should be noted that the effects are determined using different regressions; the estimated coefficients for each category have been normalised to ensure that they add up to the total adjusted market share. The figures presented are log-first differences. They roughly approximate the percentage change in the variable of interest.

The percentage change in variable Y at period t is defined as

(Y (t)-Y (t-1))/Y(t-1), which is approximately equal to *LOG(Y(t)) - LOG(Y(t-1))*

The approximation is almost exact if the percentage change is small.

Table 8. 6: Adjusted market share decomposed by technology, skill, or processing stage.

Labour	Log first diff, y/y	Technology	Log first diff, y/y	Processing state	Log first diff, y/y
High skill manufacturers	-0.27	High technology manufacturers	-0.08	Consumption products	-0.45
Medium skill manufacturers	-0.26	Medium technology manufacturers	-0.23	Intermediate Products	-2.03
Low skill manufacturers	-1.24	Low technology manufacturers	-0.38	Primary products	-1.47
Resource based manufacturers	-0.28	Resource based manufacturers	-0.53	Capital products	-0.57
Primary products	-0.97	Primary products	-0.31		
Others	-1.49	Others	-2.99		

8.4 Analysis of Hypothesis 3

No significant limitations or success factors are influencing the competitiveness of South African oranges – An application of Porter methodology.

This section examines empirically determined factors that affect the competitiveness of the citrus fruit sector using the Porter approach, which is explained in Section 4.2.2. Increased prices for agricultural input, increased shipping rates, new phytosanitary rules imposed by the European Union, inflationary pressures on consumers in major markets, and infrastructure inefficiencies are all putting pressure on South Africa's orange exports. These issues are lowering the sector's profitability, resulting in less investment in the industry. Porter's (1990, 1998) competitiveness determinants were used to examine the important success elements that establish the competitive advantage and restraints that harm the competitiveness of South African orange exports.

The information in this section was acquired from the industry via a questionnaire (**see Appendix A**). As a result of the unknown population size, the decision was made to employ the nonprobability method to establish the sample size. The survey was delivered by email. It is vital to note that 102 (sample size) questionnaires were

distributed to various orange producers and exporters. A total of 67 questionnaires were returned, reflecting a response rate of 65.7%. The determined response rate was representative enough to derive some specific findings and conclusions about this target.

A 5-point Likert scale was used to assess how much each of the determinant factors influenced the competitiveness or performance of local oranges earmarked for export. Scores ranging from 1 to 5 were assigned to each determinant factor based on simple arithmetic means calculated from the responses of the sampled respondents, with a higher score indicating a greater enhancing factor and a lower score indicating a greater constraining factor for the industry's competitiveness.

8.4.1 Factor of Competitiveness

The Porter model has a starting point at which governments should intervene directly as little as possible. However, Porter's competitiveness analysis does not see the government as an independent factor but rather as an actor that has an important role in the field of indirect policy measures. Therefore, all kinds of policy in the fields of education, R&D, taxation, standardisation, consumer protection, transport, communication, etc., must be designed in such a way that they enhance competition. **Table 8.7** summarises the factors that improve the competitiveness of the orange industry (including the previously explained government factor).

The factor conditions in this study refer to the natural, capital, and human resources available to drive the competitiveness of the orange industry. Human resources created a factor condition such as a skilled workforce, a good infrastructure, and a scientific knowledge base. Therefore, this section also provides input for grouping such factors as the major determinants for analysis in the Porter Model. This will guide stakeholders in the orange industry to develop strategic approaches to ensure the sustainability of the industry. The ratings determined from the Likert scale are classified as enhancing factors (rating from 4, enhancing to 5, highly enhancing), constraining factors (rating of 1, as highlighted constraining and 2 less constraining), or neutral factors rated as 3 in terms of their impact on competitiveness (**see Table 8.7**).

Table 8. 7: Analysis of the competitiveness of oranges

FACTORS OF COMPETITIVENESS	RATING*
Factor Conditions	**3.21**
Quality of infrastructure	**3.86**
Cost of infrastructure	2.86
Cost of doing business	**3.14**
Quality of technology	**4.14**
Availability of technology	**3.29**
Cost of technology	2.00
Availability of capital	**3.14**
Availability of Skilled labor	2.43
Quality of Skilled labor	**3.86**
Cost of Skilled labor	2.43
Availability of Unskilled labor	**4.43**
Quality of Unskilled labor	1.29
Cost of Unskilled labor	**4.14**
Weather condition	**4.00**
Condition Soils	**4.14**
Rainfall Condition	2.86
Water availability	2.57
Demand And Market Factors	**3.05**
Size of Local market	3.43
Local buyers	2.86
Growth in the market	2.86
FACTORS OF COMPETITIVENESS	**RATING***
Related And Supporting Industries	**3.25**
Financial services institutions	2.71
Availability Scientific research institutions	4.29
Collaboration with scientific research institutions	3.00
Electricity suppliers	1.71
Telecommunications firms	3.29
Specialized technology services	3.43
Availability of local input suppliers	4.43
Quality of local input suppliers	3.14
Sustainability of local input suppliers	4.14
Availability of storage facilities	4.14
Cost of using storage facilities	2.14
Availability of transport	2.57

Firm Strategy, Structure and Rivalry	**3.43**
Industry's spending on R&D	3.43
Flow of information from primary suppliers to industry	3.71
Flow of information from customers to industry	3.43
Competition in the local market	3.29
Entry of new competitors	2.71
Competition in international market	4.00
Government Support and Policies	**2.70**
South Africa's trade policy	3.29
South Africa's land reform policy	1.86
South Africa's labor policy	2.43
South Africa's macroeconomic policy	2.71
South Africa's competition law	3.57
South Africa's BEE policy	1.86
Trust in the honesty of politicians	1.57
Regulatory standards	4.00
Administrative regulations	2.43
Tax system	2.57
Political changes affected planning	2.29
Environmental regulation	3.57
Complying with environmental standards	3.00
Chance Factors	**2.14**
Crime	1.86
Health (HIV/AIDS. TB)	1.71
Economic development and growth	1.86
Exchange rate	3.14

Source: Survey results and own calculations (2023)
Notes: 1 = most constraining; 3 = neutral; 5 = most enhancing

8.4.2 Constraint factors

Table 8.8 highlights the main constraining factors that impact South African oranges' competitiveness. Constraint factors were ranked according to their ranking, and it is evident that the factors ranked are well aligned with the situation facing the citrus industry. The main constraint factors ranked were the 'quality of unskilled workers', 'trust in the honesty of politicians', 'electricity suppliers', 'health', 'South Africa's land reform policy', 'South Africa's BEE policy', and 'crime', which are among the main factors that constrain the competitiveness of the orange industry in South Africa.

Table 8. 8: Factors constraining South African orange competitiveness.

Constraining factors	Rating
Quality of Unskilled Labour	1.29
Trust in the honesty of politicians	1.57
Electricity suppliers	1.71
Health (HIV/AIDS. TB)	1.71
South Africa's land reform policy	1.86
South Africa's BEE policy	1.86
Crime	1.86
Economic development and growth	1.86
Cost of technology	2.00
Cost of using storage facilities	2.14

Source: Survey results and own calculations (2023)

Notes: 1 = most constraining; 3 = neutral; 5 = most enhancing

8.4.3 Enhancing Factors

Enhancement factors are recognised as the major aspects that boost industry competitiveness in both domestic and international markets. **Table 8.9** describes the primary elements that positively drive the competitiveness of the South African orange sector. The availability of unskilled workers, local input suppliers, scientific research institutions, technological quality, cost of unskilled workers, soil conditions, and sustainability of local input suppliers all require increased attention to ensure that their improving status is maintained.

Table 8. 9: Factors enhancing South African orange competitiveness.

Enhancing factors	Rating
Availability of Unskilled labour	4.43
Availability of local input suppliers	4.43
Availability Scientific research institutions	4.29
Quality of technology	4.14
Cost of Unskilled labour	4.14
Condition Soils	4.14
Sustainability of local input suppliers	4.14
Availability of storage facilities	4.14
Weather condition	4.00
Competition in international market	4.00
Regulatory standards	4.00

Quality of infrastructure	3.86
Quality of Skilled labour	3.86

Source: Survey results and calculations (2023).
Notes: 1 = most constraining; 3 = neutral; 5 = most enhancing

8.4.4 Determinants of Competitiveness in the South African Oranges Industry

8.4.4.1 Factor Conditions

The factor conditions include the state of accessible production factors in South Africa's orange sector. The widely accepted definition of factors of production describes them as the productive resources used to produce oranges (e.g., land, labour, money, and technology). According to Porter's model, South Africa's endowment of orange production characteristics plays a role in determining competitive advantage. According to Porter, a country's exporters gain a competitive edge not only by obtaining low-cost or high-quality variables that are important to the competitiveness of a specific industry but also by deploying them in a specific way.

As a result, how South Africa mobilizes its factors, and the technologies used to do so has a significant impact on the competitiveness of the orange sector. Furthermore, shifting from relying on inherited basic factors (i.e., natural resources, unskilled and skilled labour) to relying on created advanced factors (i.e., modern communication infrastructure, highly educated personnel, research institutes) is a critical step toward increasing competitiveness. Certain basic components, such as unskilled labour, can easily be reduced or eliminated through innovation. The results of **Table 8.10** indicate a mean aggregate score of 3.86 for general orange producers' infrastructure competitiveness enhancement.

Table 8. 10: The impact of the production factor condition on competitiveness

Production Factor Conditions	Mean	Standard deviation	Standard error
The general infrastructure used by your company is:	3,857	0,900	0,340
The cost of infrastructure is:	2,857	1,464	0,553
The cost of doing business is:	3,143	0,900	0,340
The quality of technology for your industry:	4,143	1,069	0,404
5. Quality of technology for your industry is:	3,286	1,254	0,474

6. The cost of quality technology is:	2,000	0,816	0,309
7. Obtaining credit for your company is:	3,143	1,215	0,459
8. Skilled labour is:	2,429	1,512	0,571
9. Skilled labour is:	3,857	1,069	0,404
10. Skilled labour is:	2,429	0,976	0,369
11. Unskilled labour is:	4,429	1,134	0,429
12. Unskilled labour is:	1,286	0,488	0,184
13. Unskilled labour is:	4,143	0,900	0,340
14. Climate, weather is:	4,000	0,577	0,218
15. Soils:	4,143	0,378	0,143
16. Rainfall:	3,333	0,816	0,333
17. Water availability:	2,571	0,787	0,297

Source: Survey results and own calculations (2023).
Notes: 1 = most constraining; 3 = neutral; 5 = most enhancing

The radar highlights the factors that, according to respondents, improve the competitiveness of the South African orange industry, such as the availability of unskilled workers (4.43). Because most positions in the orange sector do not require technical knowledge, unskilled labour must be readily available. In practice, unskilled labour is less expensive, and the respondents responded that the cost of unskilled labour improves the competitiveness of the orange industry (4.14). Most unskilled labourers earn a minimum salary of R25.42 per hour, which does not appear to be a significant cost for the orange sector.

The respondents also stated that the quality of technology and infrastructure was one of the factors that contributed to the competitiveness of the South African orange industry. The weather and conditions of Limpopo, Eastern Cape, and Western Cape (South Africa's main producing areas) are considered excellent for producing most citrus fruits, including oranges. The drought damaged the orange business, causing a 21% decline in orange production, and the respondents shared the same sentiment, indicating that the weather conditions hampered the industry's competitiveness. Furthermore, respondents claimed that the cost of technology, infrastructure, skilled personnel, and doing business had a detrimental impact on the competitiveness of the orange industry.

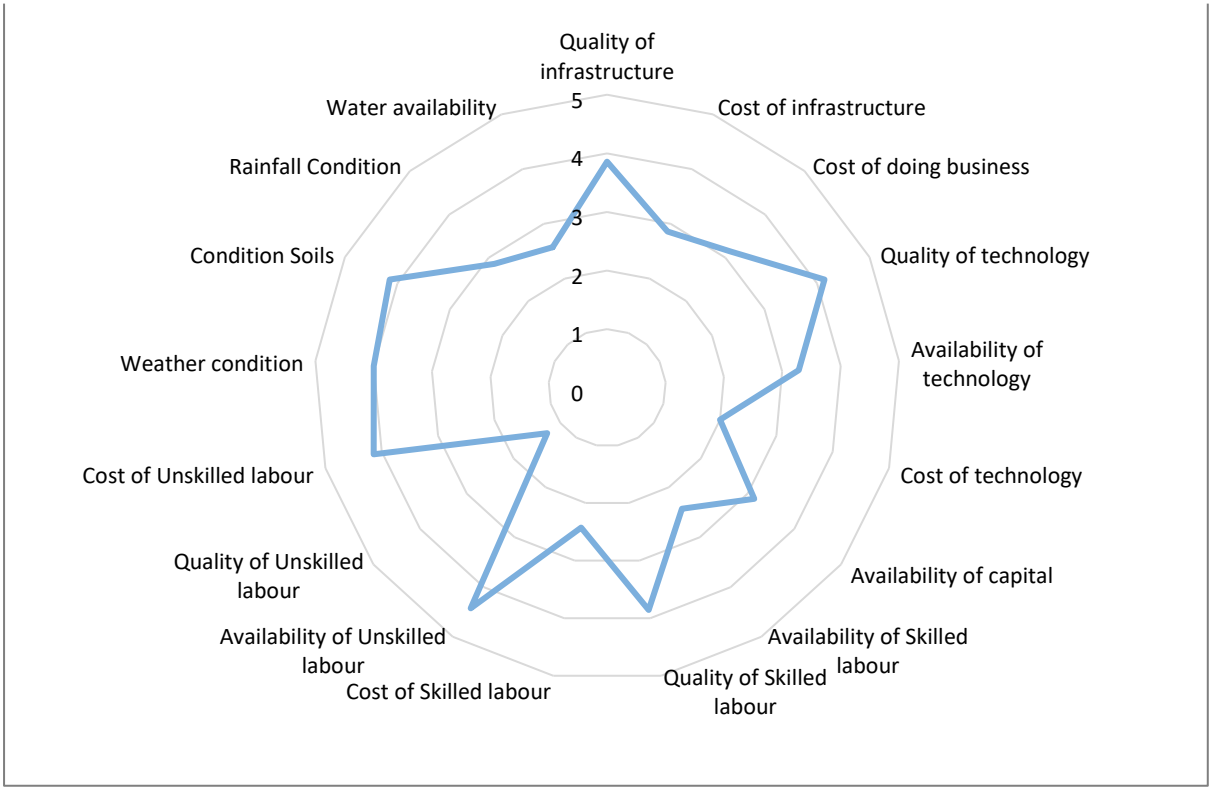


Figure 8. 16: Factor conditions determining the competitiveness of SA oranges Source: Survey results and own calculations (2023).
Notes: 1 = most constraining; 3 = neutral; 5 = most enhancing

8.4.4.2 Demand Factors

The demand circumstances in Porter's model indicate the local demand of the orange industry. Porter was more interested in the quality impact of local demand conditions than in the quantity impact for competitive advantage. In South Africa, a competitive advantage occurs when local demand provides a clearer sense of buyer demand than imported oranges (Porter 1990:86). The disparities in competitive advantage between countries can be attributed to variances in local demand. The structure of the demand segment is crucial to focus attention and define priorities, and it exists in most countries.

The variety of products affects the segmented demand. One key implication of segmented demand is that South Africa can be competitive in categories that represent a large share of local demand but a small share elsewhere. Having a diverse variety of segments in the local demand structure can help the orange sector gain a competitive edge by exposing it to more diverse markets for oranges. However, while high local demand is beneficial for economies of scale, it may result in less orange

upgrading and innovation than a relatively limited local demand that forces the company to compete in foreign markets. **Table 8.11** shows the local size scored an aggregated mean of 3.429, aimed to assess the influence of local market barriers to entry on competitiveness.

Table 8. 11: The impact of the demand factor condition on local orange competitiveness

Demand And Market Factors	Mean	Standard deviation	Standard error
18. Local market size is:	3,429	1,718	0,649
19. Local buyers of oranges are:	2,857	0,900	0,340
20. Is the growth in the market.....:	2,857	1,464	0,553

Source: Survey results and own calculations (2023).
Notes: 1 = most constraining; 3 = neutral; 5 = most enhancing

The radar shows the demand factors identified by respondents in the orange industry. Using the ratings of the respondents, elements that influence demand conditions as determinants of the competitiveness of the South African orange sector were identified through a structured survey. The size of the local market (3.42) was rated as a demand condition having a neutral influence, as shown in **Figure 8.17** below. This can be attributed to the fact that most of the oranges produced in the country are exported to global markets. According to the CGA (2023), approximately 70% of the 1,633,200 tons of oranges produced in 2022 were exported and about 7% were consumed locally as fresh. Market growth (2.86) and local purchasers (2.86) were identified as demand conditions that improve orange competitiveness in local markets, due to the export orientation of the orange industry. local markets, due to the export orientation of the orange industry.

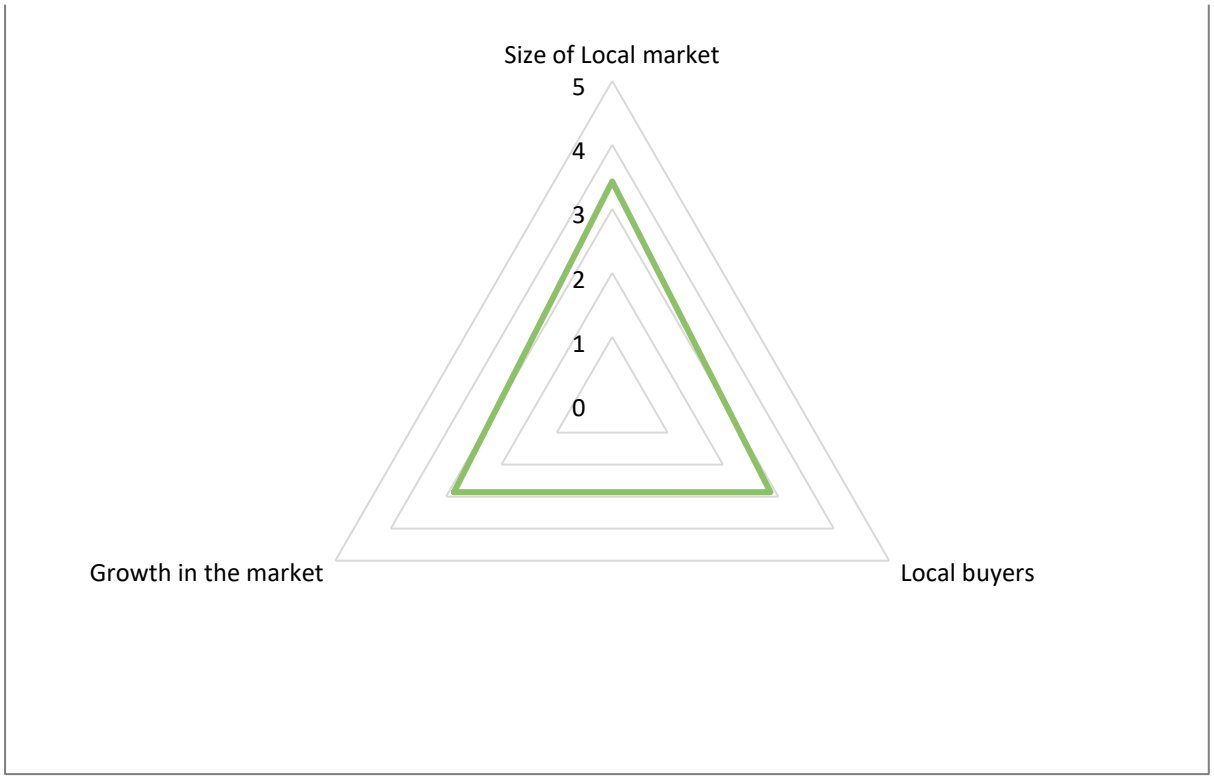


Figure 8. 17: Demand conditions determining the competitiveness of SA oranges
Source: Survey results and own calculations (2023)
Notes: 1 = most constraining; 3 = neutral; 5 = most enhancing

8.4.4.3 Related and Supporting Industries.

Related s that provide complementary products or services to one another. They may share or coordinate certain tasks such as distribution, technological development, manufacturing, or marketing while competing based on their value management within their product or service-specific industry (Porter, 1990). Competition-related sectors can facilitate technical exchanges and possibly promote the establishment of competitive local supplier businesses that serve both sectors. The more inventive and competitive South African companies are, the better they can support downstream industries in achieving a competitive edge through superior tools or inputs. The financial services generally constrain the competitiveness of South African oranges with a mean aggregated score of 2.714 driven mainly by electricity suppliers (**see table 8.12**)

Table 8. 12: The impact of the related and supporting industries on the competitiveness.

Related And Supporting Industries	Mean	Standard deviation	Standard error
Financial services generally:	2,714	0,951	0,360

Scientific research institutions are:	4,286	0,488	0,184
Your company's collaboration with scientific research institutions in their R&D activity is:	3,000	1,414	0,535
Electricity suppliers are a:	1,714	1,496	0,565
Telecommunications firms are a:	3,286	1,254	0,474
Specialised technology services are:	3,429	0,976	0,369
Availability of local suppliers of primary inputs:	4,429	0,535	0,202
The quality of local suppliers of your industry primary inputs is:	3,143	0,900	0,340
The sustainability of local suppliers of your industry primary inputs:	4,143	0,378	0,143
Availability of storage facilities:	4,143	0,690	0,261
The cost of using storage facilities:	2,143	1,069	0,404
Availability of transport:	2,571	0,787	0,297

Source: Survey results and own calculations (2023).
Notes: 1 = most constraining; 3 = neutral; 5 = most enhancing

Furthermore, for an orange business to seek a competitive advantage, access to competitive supporting industries with the most cost-effective inputs is critical. However, cooperation between downstream sectors and their local input sources is the key to utilizing industry-specific innovations emerging from competitive support industries. According to the graph below, a few of the supporting industries are identified as improving because they positively contribute to the orange industry's competitiveness (4.14/4.43). These include the availability of scientific research institutions, local input suppliers, storage facilities, and the sustainability of local input providers, all of which contribute to the competitiveness of the orange industry.

The quality of local input suppliers, specialized technological services, communications companies, and partnerships with scientific research institutions had a rating indication (average rate) of 3.5, indicating a neutral impact on competitiveness. The neural impact factor represents the ability to influence or improve the competitiveness of the orange industry. Another key underperforming industry is the energy supply, which had a rating of 1.71, indicating a restricting impact on the competitiveness of the orange industry. South Africa's energy supply system is rapidly

failing, posing a serious threat to the fruit export industry, especially the orange industry.

The load shedding has already reached level 6, which means that the orange industry would be without power for up to 10 hours each day. As a result, the orange industry is already suffering from skyrocketing production costs, as diesel generators are required to power cold rooms and packing facilities. As a result, electrical supplies are aligned with the current scenario that South Africans are facing, which inhibits the orange industry's competitiveness in worldwide markets.

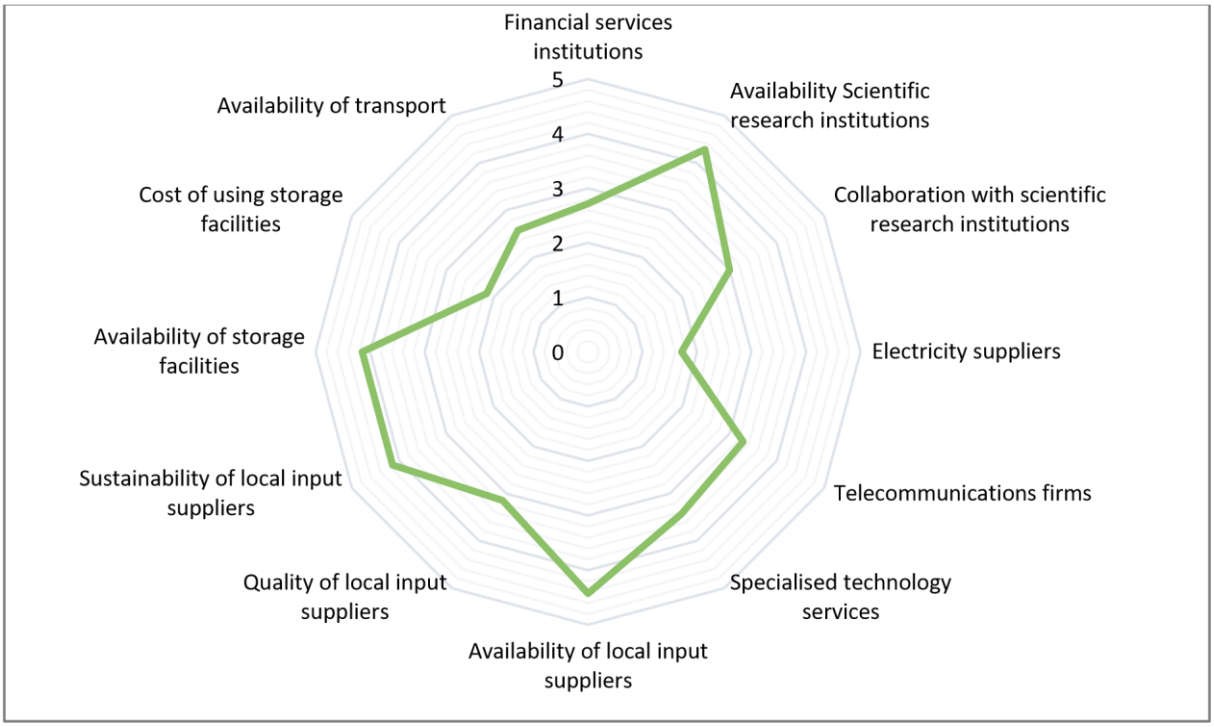


Figure 8. 18: Related and supporting industry conditions on the competitiveness of SA oranges
Source: Survey results and own calculations (2023)
Notes: 1 = most constraining; 3 = neutral; 5 = most enhancing

8.4.4.4 Firm Strategy, Structure, and Rivalry

Firm strategy, structure, and rivalry explore the diverse approaches to genesis, organization, and management that create the setting for local competition and competitive advantage. Orange exporters' strategy and structure incorporate cultural and socioeconomic concepts. Their local advantage derives from aligning these concepts with the characteristics of accessible competitive advantage in certain

sectors. Local rivalry has an important role in the process of invention as well as local and international commercial success. One of Porter's most important empirical findings (Porter, 1990) demonstrated a strong correlation between local rivalry and the establishment and maintenance of competitive advantage.

Table 8. 13: The impact of the firm strategy, structure, and rivalry factor on the competitiveness

Firm Strategy, Structure and Rivalry	Mean	Standard deviation	Standard error
Industry's expenditure on R&D:	3,429	0,787	0,297
The information flow from primary suppliers to your company is:	3,714	0,951	0,360
The flow of information from customers to your company is:	3,429	1,397	0,528
Competition in the local market is:	3,286	1,113	0,421
Entry of new competitors:	2,714	1,254	0,474
Competition in international market is:	4,000	0,577	0,218

Source: Citrus Fruit Experts and Exporters Survey (2023)

Furthermore, Porter found that competition with domestic companies is more helpful in terms of innovation and improvement than competition with international sectors. Local competitors forced each other to pursue effective cost-cutting strategies, product innovation, and organizational improvements. Direct collaboration between competitors, according to Porter, tends to erode competitive advantage by reducing variety, incentives, and the rate of innovation. According to the graph below, respondents ranked international market competitiveness as (4/5), indicating that the recent creation of new products has increased competition for retail shelf space and that the costs of these substitute items influence orange demand. This pattern represents both a threat and an opportunity for orange providers, as it indicates a loss or increase in existing retail markets for oranges.

Market information, comprising information flow from both suppliers (3.71/5) and customers (3.43/5) to the industry, is vital for strengthening the competitiveness of the orange industry, as shown in **Figure 8.19**. Furthermore, spending on R&D (3.43/5) was identified as one of the elements influencing industry competitiveness. Local market competition (3.29/5) encourages the industry's competitiveness, while new competitors impede it.

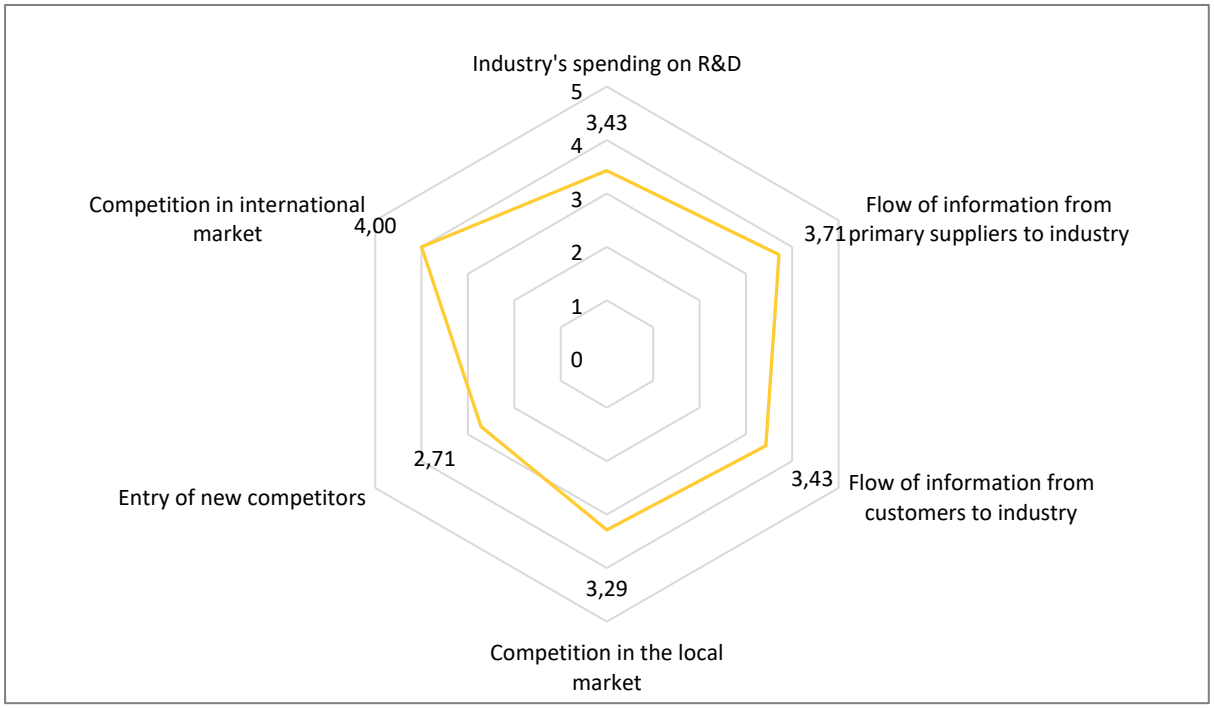


Figure 8. 19: Industry strategy and rivalry conditions on the competitiveness of SA oranges
Source: Survey results and own calculations (2023)
Notes: 1 = most constraining; 3 = neutral; 5 = most enhancing

8.4.4.5 Government Support and Policy

Some of the employment restrictions enacted in the 1990s are considered to limit the industry's competitiveness by the AES. The main legislation mentioned is labour laws, specifically the Basic Conditions of Employment Act of 1997 and the Employment Equity Act of 1998. Although these regulations help employees, they frequently result in greater transaction and salary expenses for businesses, particularly for low-skilled workers.

Table 8. 14: The impact of government support and policies on the competitiveness

Government Support and Policies	Mean	Standard deviation	Standard error
South Africa's trade policy is a:	3,286	1,254	0,474
South Africa's land reform policy is a:	1,857	0,378	0,143
South Africa's labour policy is a:	2,429	0,976	0,369
South Africa's macro-economic policy is a:	2,714	0,756	0,286
South Africa's competition law is a:	3,571	0,787	0,297
South Africa's BEE policy is a:	1,857	0,690	0,261
Your trust in the honesty of politicians is:	1,571	1,134	0,429
Regulatory standards (e.g., products standards, energy, safety, and environment) in your opinion are:	4,000	0,577	0,218
Administrative regulations are:	2,429	1,134	0,429
The tax system:	2,571	1,272	0,481
Have legal or political changes over the past five years undermined your company's planning?	2,286	1,254	0,474
Environmental regulations are:	3,571	0,787	0,297
Complying with environmental standards:	3,000	1,291	0,488

Source: Citrus Fruit Experts and Exporters Survey (2023)

Subsidies and policies impacting education and capital markets are examples of how the government changes factors. Government laws have an impact on product standards, which establish demand conditions. They also have an impact on the linked and supporting industries, such as advertising restrictions. Government tax policies and antitrust legislation have significant impacts on strategy, structure, and rivalry. Finally, as a buyer of goods and a provider of inputs, the government has a direct impact on the fundamental drivers of competitive advantage.

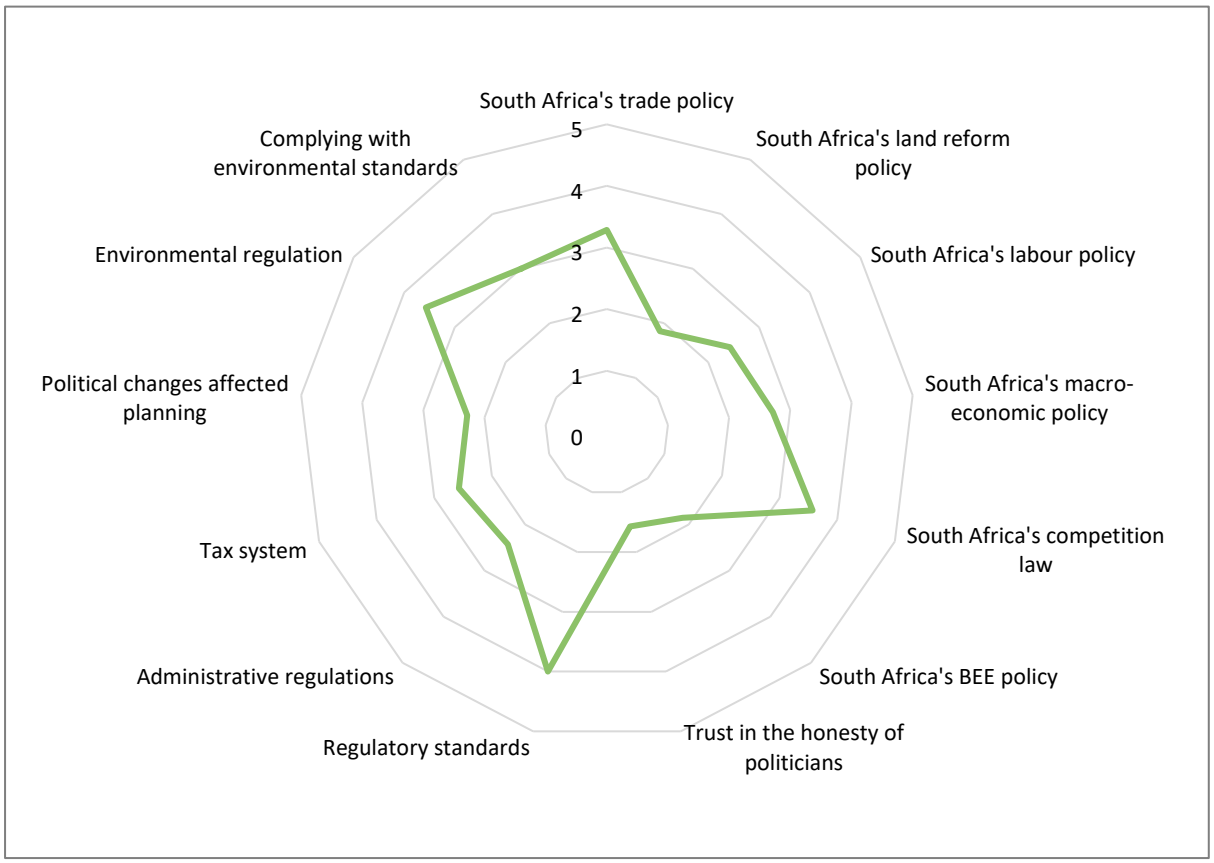


Figure 8. 20: Government and policy conditions on the competitiveness of SA oranges

Source: Survey results and own calculations (2023)

Notes: 1 = most constraining; 3 = neutral; 5 = most enhancing

8.4.4.6 Chance factors

Chance occurrences are crucial in determining microeconomic conditions. Warfare and natural catastrophes (i.e., storms, earthquakes, drought, flooding) are two major examples. Other examples include significant adjustments in global financial markets, input pricing, worldwide demand, and large technical discoveries. Unforeseen circumstances cause disruptions, discontinuities, and opportunities. Some industries will fail in their attempts to adapt to random events, while others will prosper. Porter (1990: p 128) observed that competitive sectors functioning in microeconomic contexts with the most robust drivers of advantage should have a better chance of rebounding from the negative repercussions of random events and possibly gaining new competitive advantage. **Table 8.15** shows that crime is one of the external factors constraining the competitiveness of the industry with a mean aggregated score of 1.857, this includes health (1.714) and economic development (1.857).

Table 8. 15: The impact of the external chance factor on the competitiveness

External Factors as Experienced by Firm	Mean	Standard deviation	Standard error
52. Crime:	1,857	1,215	0,459
53. Health - HIV/AIDS. TB, etc:	1,714	0,951	0,360
54. Economic development and growth in South Africa is a:	1,857	1,215	0,459
55. Is the current exchange rate a:	3,143	1,464	0,553

Source: Citrus Fruit Experts and Exporters Survey (2023)

The reactions to the chance variables determining competitiveness, which are judged to be the most restrictive, are depicted in the graph below. This reflects a prevalent belief that certain variables are beyond the control of the orange industry and severely limit competitiveness performance. The health factors related to HIV/AIDS and other chronic diseases were assessed as the main factors that restrict the chance (1.71/5). Strategies to improve the health of industrial workers, as well as investments in recruiting and training workers, are available.

Crime (1.86/5) and economic development (1.86/5) are both evaluated as the second most restricting chance, with implications for a steady labour force and investment expectations. Furthermore, the fluctuations in the exchange rate (3.14/5) were identified as the only factor boosting the competitiveness of the South African orange industry. The orange sector is export-orientated, and fluctuations in the Rand's exchange rate versus the world's major currencies have a significant impact on the ultimate returns of growers. The current weaker South African currency boosts orange exports, making the orange sector more competitive.

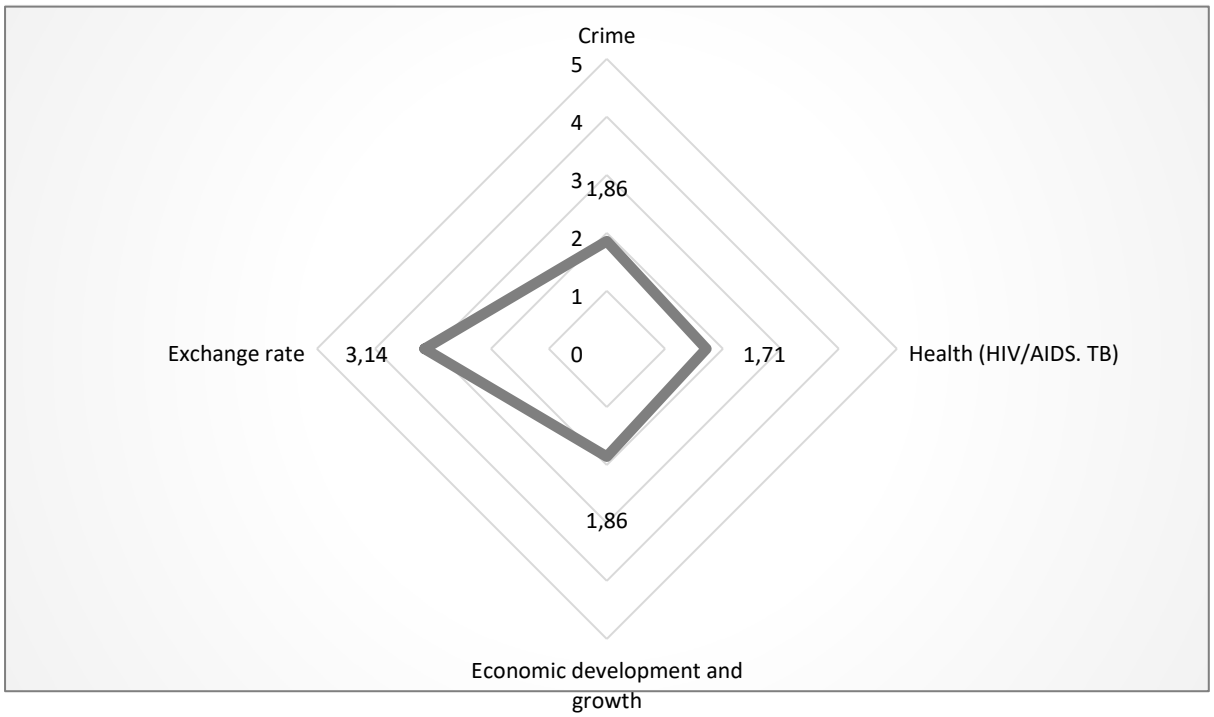


Figure 8. 21: Chance factor conditions on the competitiveness of SA oranges
Source: Survey results and own calculations (2023)
Notes: 1 = most constraining; 3 = neutral; 5 = most enhancing

8.4.5 Porter Analysis

Table 8.16 and **Figure 8.22** summarise the competitiveness variables and their impacts on the orange sector in South Africa. Most of the circumstances have neutral factors, whereas only two have less restrictive factors. This underlines South Africa's open economy and the necessity of being as competitive as possible. According to the table, government support and opportunities are less restrictive, although factor conditions, demand, and market variables, linked and supporting industries, and firm strategy have a neutral influence on competitiveness, implying that they have an unexpected effect on competitiveness.

Table 8. 16: Porter's analysis of factors of competitiveness

Factors of Competitiveness	Rating
Factor Conditions	3.21
Demand And Market Factors	3.05
Related And Supporting Industries	3.25
Firm Strategy, Structure, and Rivalry	3.43
Government Support and Policies	2.70

Chance Factors	2.14

Source: Survey results and own calculations (2023)
Notes: 1 = most constraining; 3 = neutral; 5 = most enhancing

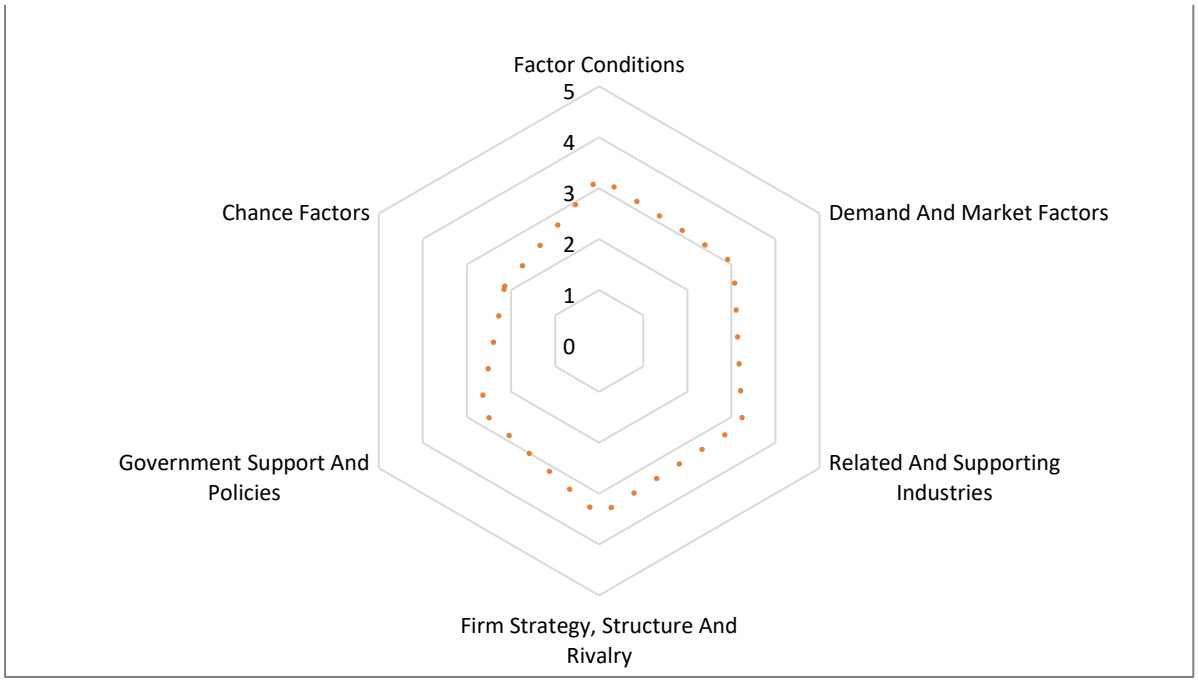


Figure 8. 22: Porter's summary conditions on the competitiveness of SA oranges
Source: Survey results and own calculations (2023)
Notes: 1 = most constraining; 3 = neutral; 5 = most enhancing

8.4.6 Summary of the Key Informants

This section summarises the open-ended questions from the survey and a formal conversation with important actors in the orange business. As a result, it is critical to recognize that world-class research support for production and market access, good production practices, and expertise in creating world-class fruits are recognized as the primary components that boost the competitive performance of the orange industry.

However, there is a lack of excellent infrastructure (roads, railways, and ports), as well as bilateral agreements with trading partners. The two main difficulties are the poor performance of ports compared to their global counterparts, which increases freight charges and causes shipment delays, affecting quality and financial returns. The industry's competitiveness is being hampered by South Africa's inability to identify market access and the use of Blanket Trade Agreements without fully knowing the true impact of each market/country.

Egypt, Peru, Chile, Argentina, Spain, Australia, Egypt, and Morocco are among the main rivals in international markets. As a result, it is critical to address the issues that limit the competitiveness of the orange industry, which benefit the entire industry. Most of the limiting constraints do not generate the financial returns required to sustain and grow the industry and all people involved in it.

Because we rely on the availability of good infrastructure (roads, trains, ports) and bilateral trade and/or phytosanitary agreements with trading countries to remain competitive and prosper, the government wields enormous power. The Government's cadre deployment policy and the resulting 'State Capture', which are intertwined inextricably, have destroyed infrastructure that was among the best in the world, as well as the numerous efficiencies we had in the global market.

8.5 Analysis of Hypothesis 4

South Africa's orange exports to key Asian markets are not significantly affected by food safety regulations.

Many countries have begun to produce nontraditional agricultural products to diversify their exports and enhance their foreign currency revenues. To gain access to developed country markets (strategic Asian markets in this example), the oranges must surpass food safety standards, including pesticide residue controls, field and packing house operations, and traceability. Faced with stringent food safety rules, countries that create production centres in low-income countries may reject poor farmers, harming the poor. As a result, this component of the analysis provides a comprehensive overview of the food safety criteria enforced by individual strategic Asian markets, followed by estimated gravity model results.

8.5.1 Food Safety Regulation and Non-Tariff Measures imposed by selected Asian markets.

The evaluation of the top ten most imposed measures focuses on the frequency and coverage ratio, the effect product count, and the total gross imports affected by one or more measures. This section will exclude analyses for China, Hong Kong, and South

Korea because these nations are not covered in the database (World Integrated Trade Solution) used for this study.

8.5.1.1 Japan

For non-tariff measures, Japan's imports have a coverage ratio of 76.18% and a frequency ratio of 61.20%. The coverage ratio is calculated by computing the value of each commodity subject to non-tariff measures, aggregating by the applicable HS commodity group, and expressing the value of covered imports as a percentage of total imports in the HS commodity group. Although the frequency ratio accounts for the presence or absence of an NTM, the proportion of traded products that have one or more NTMs reflects the percentage of traded products that include one or more NTMs. The coverage ratio for orange imports into Japan is 99.53% (percentage subject to NTM), and the frequency ratio is 98.79%.

Table 8.17 lists the top 10 import restrictions enforced by Japan. TBTs are enforced for transport and storage, as shown in the table, with 50.82% of imported items subject to this regulation. The traceability and authorization requirements affected approximately 47.6% and 45.38% of the imports, respectively. With a coverage ratio of 26.48%, taxes and charges for sensitive product categories are the least imposed NTM.

Table 8. 17: Japan's top imposed food safety measures on oranges

Measure	NTM Coverage Ratio	NTM Frequency Ratio	NTM affected product - Count	NTM affected Trade – US$
TBT regulations on transport and storage (B420)	50.82	25.21	1263	348,430,638.98
Traceability requirements, n.e.s. (B859)	47.6	24.55	1230	326,310,949.55
Authorization requirement for TBT reasons (B140)	45.38	25.15	1260	311,141,373.36
Added charges n.e.s. (F690)	44.04	23.37	1171	301,935,782.22
Export technical measures, n.e.s. (P690)	39.69	28.38	1357	247,179,239.34
Export taxes and charges (P500)	39.39	23.86	1141	245,339,162.39
Product quality or performance requirement (B700)	31.24	18.64	934	214,159,779.44
Labelling requirements (B310)	30.59	36.83	1845	209,708,697.76
Excise taxes (F720)	26.67	0.64	32	182,830,779.03
Taxes and charges for sensitive product categories (F730)	26.48	0.74	37	181,518,753.35

Source: WITS database and authors' calculations (2023).

8.5.1.2 Vietnam

For non-tariff measures, Vietnam imports have a coverage ratio of 37.99% and a frequency ratio of 47.04%. According to the WITS database, 99.98% of Vietnam's imported fresh fruits (including oranges) are NTM, for a frequency ratio of approximately 99.07%. According to the graph, 42.24% of imported commodities are subject to technical export measures, followed by inspection and testing requirements. The SPS compliance evaluation applies to 10.99% of imported commodities.

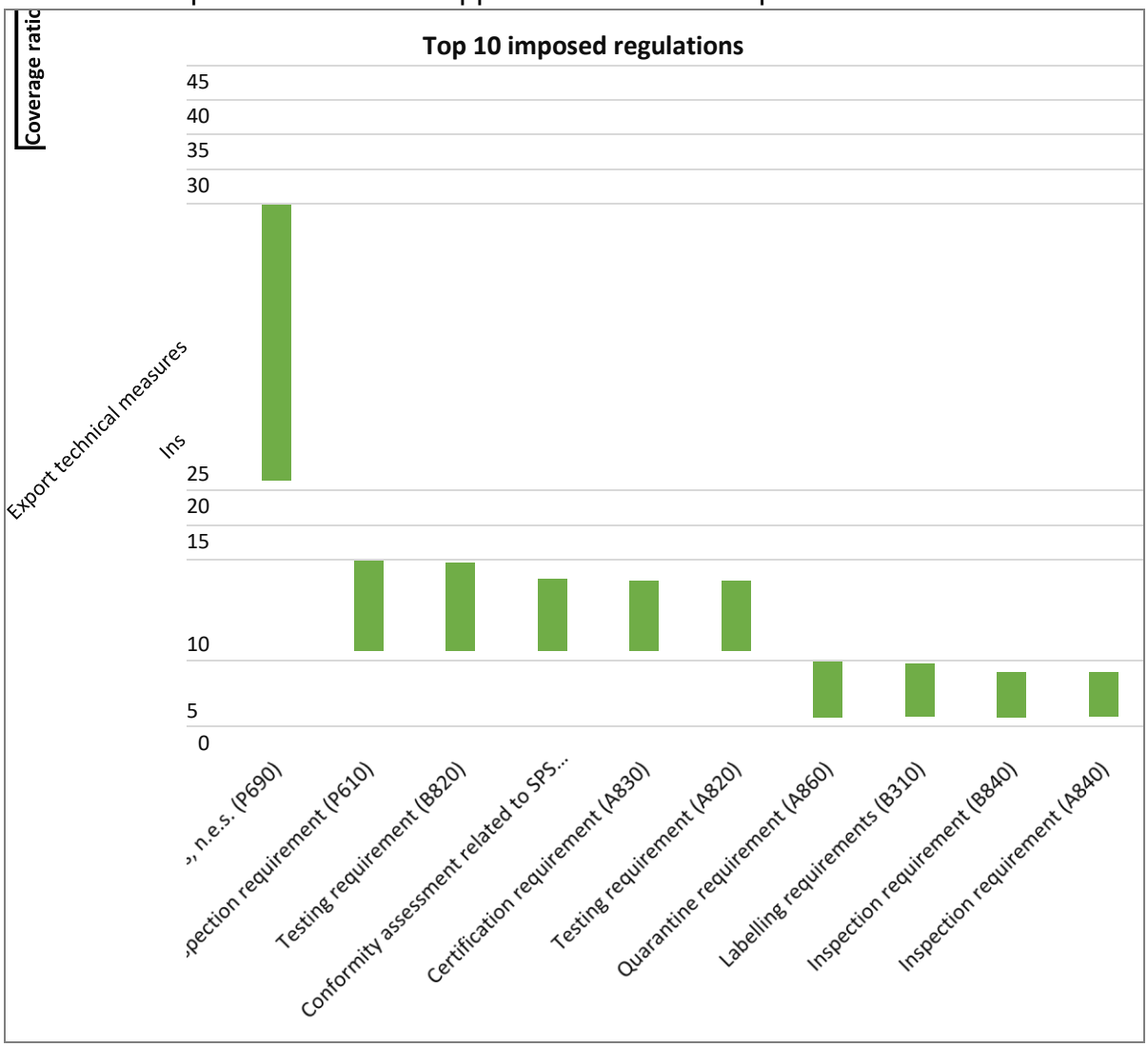


Figure 8. 23: Vietnam's top imposed food safety measures on oranges Source: WITS database and authors' calculations (2023).

8.5.1.3 Thailand

Thailand's total imported commodities face 31.09% non-tariff barriers, which is less than the 71.98% imposed by all 75 nations listed in the World Integrated Trade Solution

(WITS). Thailand imposed a limited coverage ratio on imported commodities, demonstrating that there were no restrictions on imports, and the coverage ratio for fresh fruits was 76.14% (lowest among countries already examined). The main measures adopted in Thailand include authorization requirements for TBT (11.97%), traceability requirements (10.48%), and labelling requirements (8.66%), as indicated in **Figure 8.24**. With a coverage ratio of 7.54%, there was also an additional registration need for importers for TBT reasons and packing requirements (5.26%) were the least common of the top 10 imposed measures.

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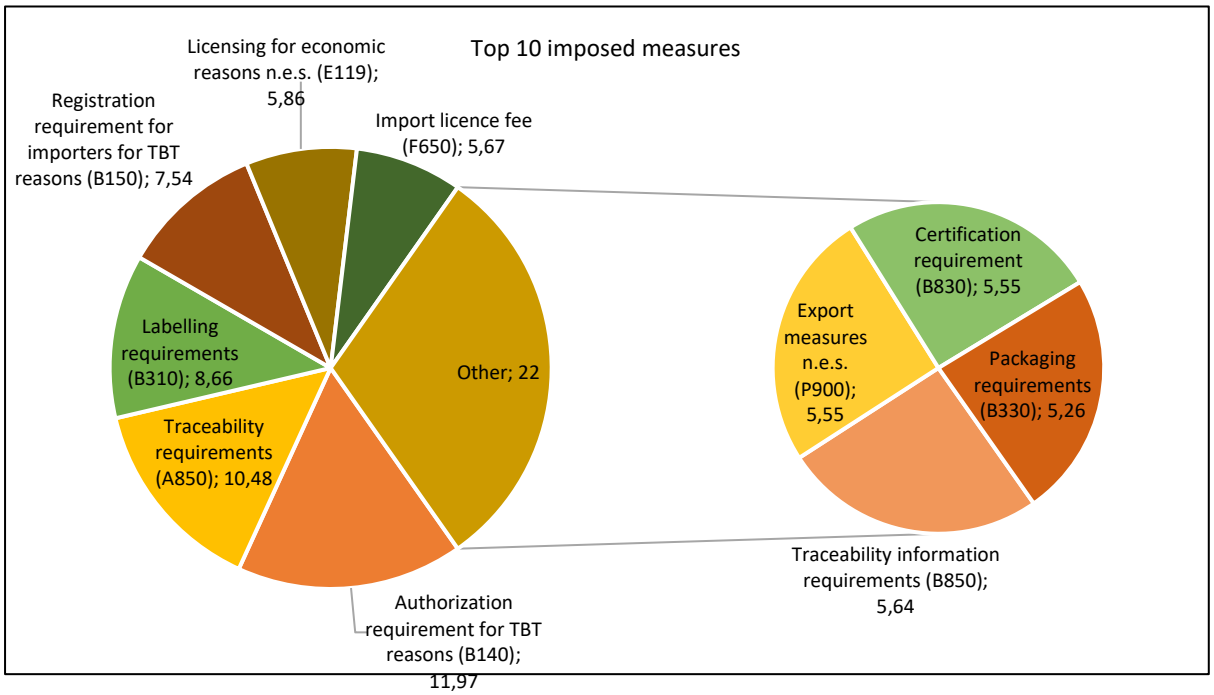

Figure 8. 24: Thailand's top imposed food safety measures for oranges Source: WITS database and authors' calculations (2023).

8.5.1.4 Philippines

The Philippines is a member of the World Trade Organization (WTO) and has removed quantitative limitations on all food imports, including rice. Tariff-rate quotas (TRQs) continue to be applied to several sensitive products, including maize, poultry meat, pork, sugar, potatoes, and coffee. For several commodities, minimum access volumes (MAVs) have been defined. All agricultural commodities, including feeds, live animals, meat and poultry products, plant and plant products, seafood, and fisheries, require sanitary and phytosanitary import clearances that also act as import licenses.

Furthermore, for products entering at the lower in-quota duty, such as pork, poultry, maize, coffee, and coffee extract, a minimum access volume import certificate is needed. In all situations, agricultural and food items must be received by a registered importer. The Philippines imports goods at a rate of 84.76%, which is greater than the average of the 75 countries. Oranges, among other fruits, are subject to 100% of measures with a frequency ratio of 100%, which means that 100% of oranges imported into the Philippines are subject to the imposed measures. **Figure 8.25** depicts Thailand's top ten imposed measures. With a coverage ratio of 70.55%, imported commodities are subject to license permission requirements for export, followed by export quotas and registration requirements for importers for TBT.

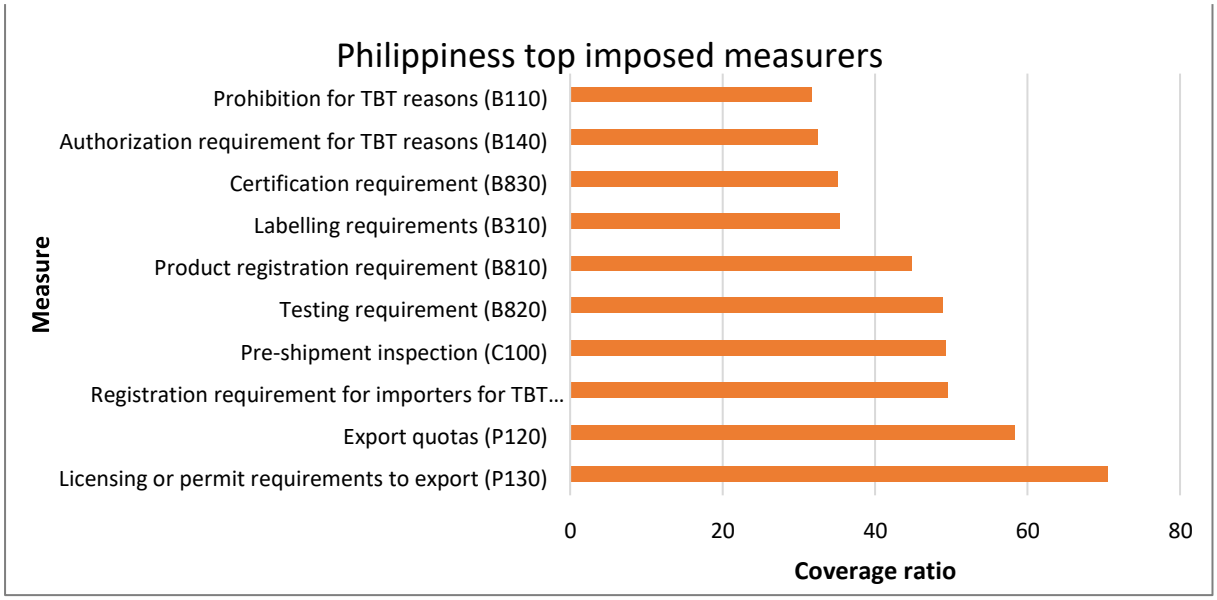

Figure 8. 25: Philippines' top imposed food safety measures for oranges Source: WITS database and authors' calculations (2023).

8.5.1.5 Malaysia

Almost all tariffs in Malaysia are enforced ad valorem, with a simple average applied tariff rate of 7.4%. Duties for tariff lines with significant local output are frequently greater. The tariffs on raw materials are generally lower than those on value-added commodities. Many Malaysian tariff lines are subject to non-automatic import licensing because they are associated with import-sensitive or important industries (mostly the construction equipment, agricultural, mining, and motor vehicle sectors). Malaysia also maintains performance standards that must be met to acquire a customs exemption for operations in foreign trade zones.

Malaysian imports have a coverage ratio of 54.96%, which is lower than the coverage ratio of the 75 nations included in the analysis. Overall, Malaysia's safety measures are very concentrated, as they are only spread throughout seven of the sixteen chapters. Fresh fruits face 99.58% nontariff barriers and a frequency ratio of 99.42%. Technical measures (the authorization requirement, TBT requirements for transit and storage, and conformity evaluation) were predominant among the NTMs, accounting for 71.42% of all reported NTMs. The second most important imposed measure is labelling, followed by import license fees and permit restrictions.

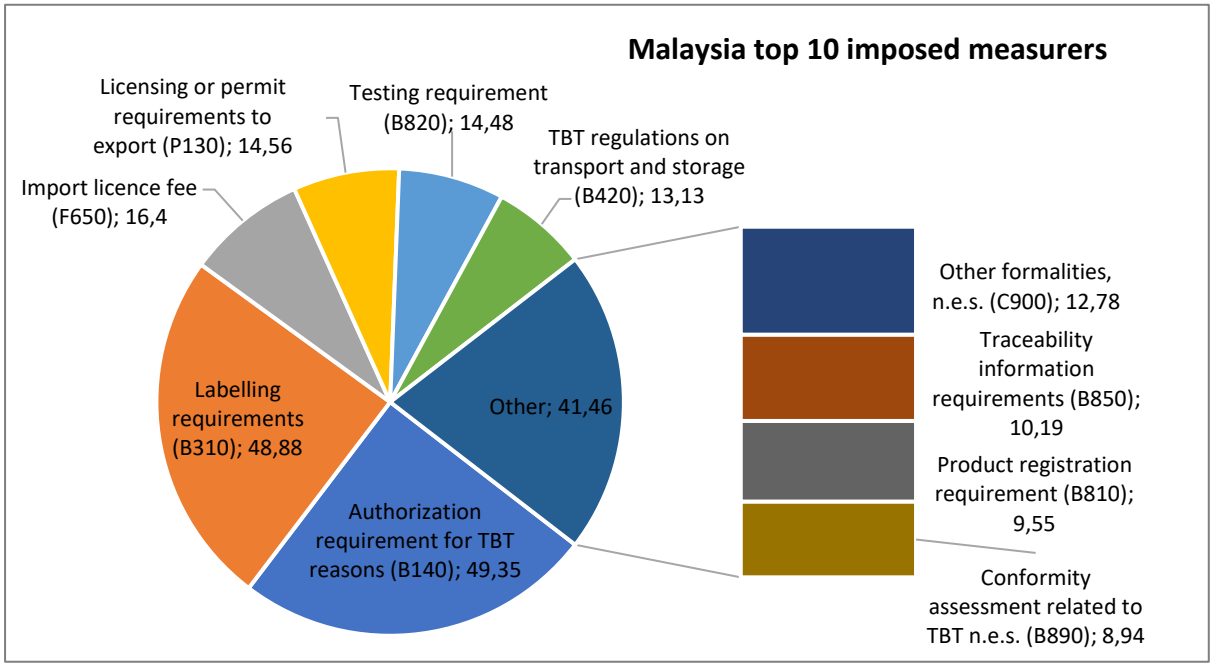

Figure 8. 26: The top imposed food safety measures for oranges in Malaysia Source: WITS database and authors' calculations (2023).

8.5.1.6 Indonesia

Despite the importance of food trade, Indonesia employs more nontariff trade barriers (nontariff measures or NTMs) in the food and agriculture sector than Singapore, Malaysia, and Vietnam. NTMs are nontariff measures placed on international trade. As of January 2021, there were 466 coded NTMs managed by eight distinct Indonesian ministries and agencies, covering nearly all food and agricultural items. NTMs impose additional expenses on food and beverage (F&B) manufacturing enterprises for enforcement, sourcing, and process adaptation, limit company access to the global market, and may diminish productivity and competitiveness. NTMs can thus operate as costly trade barriers, even having a greater impact than tariffs.

By November 2019, 15 WTO dispute proceedings had been filed against Indonesia, seven of which concerned regulations on animal, vegetable, and food products (World Trade Organisation, 2019). These examples show that trade obstacles in the agrofood sector are viewed as violations of world trade norms by Indonesia's trading partners. The chart shows the main measures imposed by Indonesia on imported goods. Indonesia's total imports have a coverage ratio of 68.95%, with imported fruits accounting for 99.27% of NTMs.

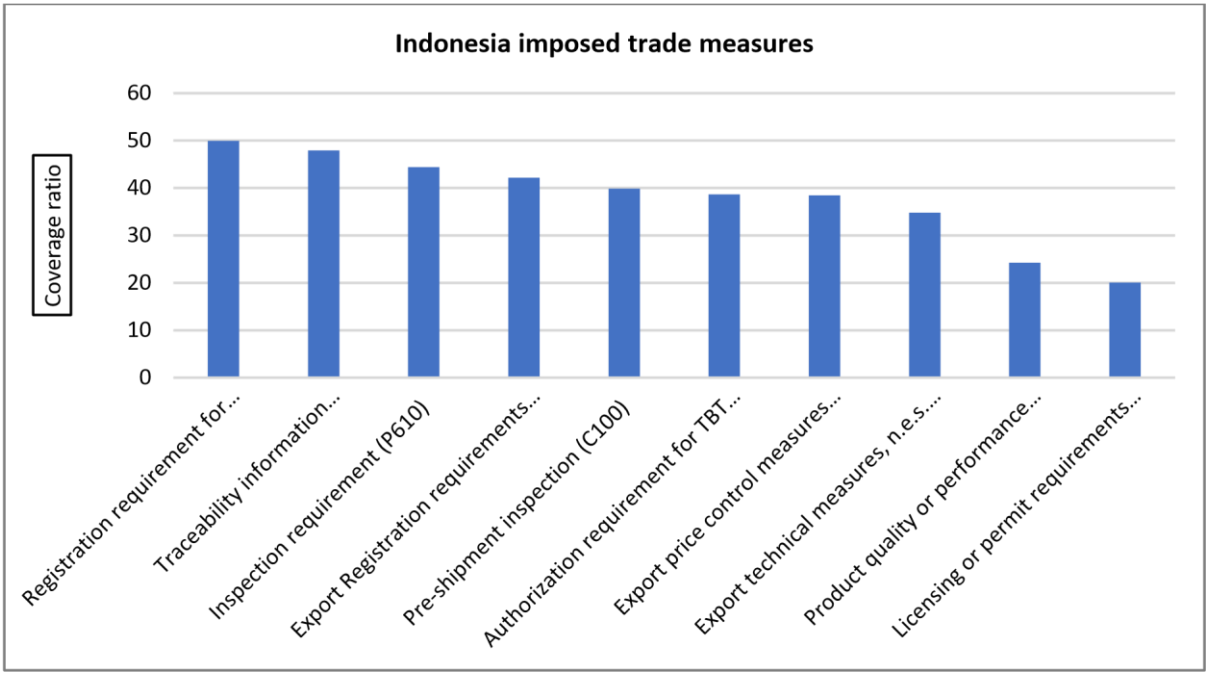

Figure 8. 27: Indonesia's top imposed food safety measures for oranges Source: WITS database and authors' calculations (2023).

8.5.1.7 India

Certain import restrictions may be applied by specific GATT regulations. These include limits based on safety, security, health, public morals, etc. Article XX of the GATT agreement provides general exclusions to protect public morals; human, animal, or plant life or health; national assets of artistic, historic, or archaeological importance; and so on. Food safety regulations in India are defined as restrictions implemented by government agencies that have mandated standards and norms in terms of handling and distribution of food products. Most notably, the main goal is to protect the consumer's health by preventing any diseases or risks that could endanger the consumer's health.

For non-tariff measures, India's imports have a coverage ratio of 45.52% and a frequency ratio of 43.71%. The total percentage of fruits imported from India was 99.88%, with a frequency ratio of 96.86%. The main measures with a high coverage ratio are customs fees, certification, and registration requirements for imports. Furthermore, hygienic practices during production and residue tolerance limitations are only featured in India's top-imposed measures when compared with other Asian countries analyzed.

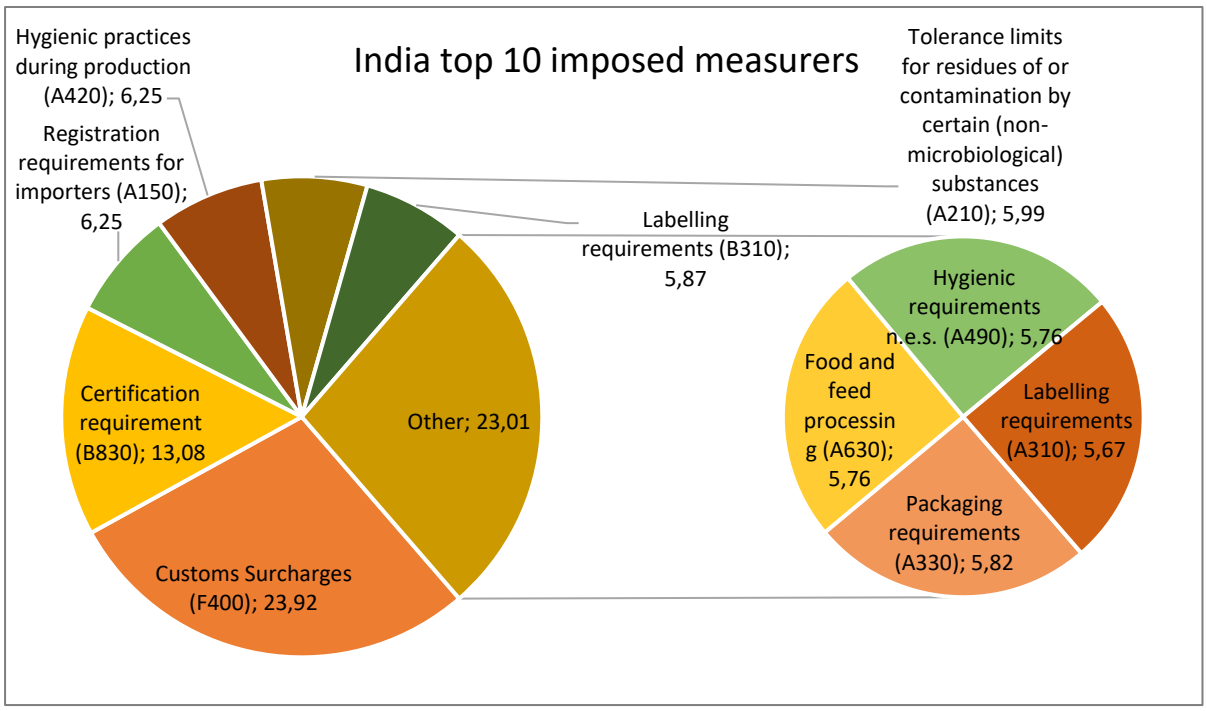

Figure 8.28: India's top imposed food safety measures for oranges
Source: WITS database and authors' calculations (2023)

8.5.2 Gravity Model Estimations

This section includes the major analysis of the fourth objective, which studies and evaluates the impact of food safety standards on South Africa's orange destined for 10 Asian strategic markets, with estimations made using a gravity trade model. The results and dimensions of the effect of each factor on the overall orange exports.

8.5.2.1 Estimation procedure

In panel information estimation, three models can be evaluated. These models include pools, fixed, and random impacts. Because unique effects are combined with relapses, it is necessary to decide whether they should be viewed as random or fixed. When assessing transaction streams between arbitrarily picked samples of swapping

accomplices from a large population, an irregular effects model can be gradually fitted. When evaluating the progress of commerce between an ex-risk predetermined selection of states, a fixed effects model is the dominant model (Eita & Joordan, 2007). Meanwhile, as this investigation manages trade progress between South Africa and its ten Asian strategic markets, the fixed impact model will be better suited than the random impact model.

The preparation of panel variables is strongly balanced during the period under review at a delta of 1.

xtset country1 Year

*Panel variable: country1 (**strongly balanced**)*

Time variable: Year, 2003 to 2022 Delta:

1 unit

Table 8. 18: Study variables description

Variable Name	Description
Xjt	SA orange exports
POPjt	Importers population
EPIit	SA export price
GDPjt	Importers value of GDP
GDPsat	SA value of GDP
IPIjt	Importers import price index
DISTsaj	Distance between country I and j
TBTsaj	Im porters imposed Technical Barriers to Trade level
REXRsat	SA Exchange rate
REXRjt	Importers Exchange rate
Infla	Inflation rate
SPSsaj	Importers imposed Sanitary and Phytosanitary level
PROD	The production level of oranges

Source: previous studies

Ten (10) important Asian markets were selected as part of the study area from 2003 to 2022. This study used the Hausman test to determine which model would produce the most accurate results, and the fixed model appeared to be more proficient. A descriptive analysis of the data in **Table 8.19** was carried out. Typically, factors that are routinely transmitted outperform factors that are not commonly diffused. The normality test of the variables is shown in the table. As indicated in **Table 8.19**, some

of the information or data are not distributed regularly. The mean, standard deviation, maximum, and minimum values are associated with the appropriate variables.

Table 8. 19: Descriptive statistics of variables influencing SA orange exports.

Variable	Obs	Mean	Std. Dev.	Min	Max
Year	200	2012.5	5.781	2003	2022
logXjt	200	7.1554	3.426	0	11.92
logPOPjt	200	18.548	1.525	15.72	21.07
logEPIit	200	4.568	0.299	3.81	5.03
logGDPjt	200	27.320	1.364	24.4	30.52
logGDPsat	200	26.582	0.198	26.01	26.85
logIPIjt	200	4.461	0.445	2.72	5.3
logDISTsaj	200	9.111	0.470	7.78	9.5
logTBTsaj	200	6.355	0.770	4.17	8.21
logREXRsat	200	2.297	0.332	1.85	2.8
logREXRjt	200	4.760	2.877	1.12	10.05
logInfla	200	1.650	1.246	-2.590	4.393
logSPSsaj	200	4.035	2.008	-3.219	8.156
logPROD	200	4.567	0.246	3.967	5.158
id	200	5.5	2.879	1	10
_est_fe	200	0.795	0.405	0	1
_est_re	200	0.795	0.405	0	1

Source: Gravity model and STATA calculation (2023)

A correlation matrix is a statistical tool that is used to assess the relationship between two variables in a data collection. The matrix is a table in which each cell has a correlation coefficient, where 1 represents a strong association between variables, 0 represents a neutral relationship, and -1 represents a weak relationship. The presence of the statistical problem of multicollinearity, which can make identifying the independent effects of various explanatory variables difficult, can often be predicted if

a simple correlation matrix of explanatory variables is examined before parameter estimation.

The correlation matrix for the explanatory factors utilized in the analysis is shown in **Table 8.20**. The goal here is to demonstrate the correlation between a number of these factors. In the table, there is one association between the importers' exchange rate and South African GDP that has a neutral relationship. Apart from a few exceptions, most of these variables are highly connected, such as SA exports versus the exporters' exchange rate (and SA inflation), the export price index vs. SPS, and the importers' GDP vs. SA inflation (and the importers' exchange rate). As a result, the coefficients in the table indicate that multicollinearity is not an issue for model determination.

Table 8. 20: Correlation matrix of explanatory variables

	logXjt	logGDPjt	logGD~at	logTBT~j	logSPS	logRE~jt	logInfla	logPROD	logDIS~j	logPOPjt	logIPIjt	logEPIit	logRE~at
logXjt	1												
logGDPjt	0.1113	1											
logGDPsat	0.0739	0.2503	1										
logTBTsaj	0.2465	0.2844	0.011	1									
logSPS	0.2763	0.1127	0.0205	0.4316	1								
logREXRjt	-0.3778	-0.14	0.0002	-0.0758	-0.0251	1							

logInfla	logPROD	logDISTsaj	logPOPjt	logIPIjt	logEPIit	logREXRsat
-0.2256	-0.0314	-0.3036	0.0605	0.0402	0.0622	0.0276
-0.2132	-0.0331	-0.4827	0.6171	0.3756	0.276	0.2654
-0.0404	-0.0311	0	0.0232	0.7665	0.9452	0.3834
-0.1754	0.3781	0.2017	0.0738	0.1748	0.0164	0.0362
0.0646	0.4801	0.0844	0.0489	0.0442	0.0138	0.012
-0.0253	0.0415	0.339	0.1068	-0.0793	0.0024	0.0214
1	-0.1566	0.2475	-0.2455	0.0025	-0.0394	0.0079
	1	0.0117	0.0166	-0.0406	-0.0094	0.0447
		1	-0.6466	0.0824	-0.0005	0
			1	-0.0223	0.0266	0.0313
				1	0.8326	0.6416
					1	0.5403
						1

Source: Gravity model and STATA calculation (2023)

8.5.2.1 Gravity Model Estimation Results and Discussion (Panel Data)

The gravity model estimates the regression using panel data analysis with three more independent approaches (*pooled OLS*, *fixed effects*, and *random effects*), and the selection between these methods depends on the objective of the analysis and the problems concerning the exogeneity of the explanatory variables. In this study, all three methods were adopted to measure the impact of food safety standards on South African oranges destined for 10 critical markets in Asia. Therefore, the appropriate methods were chosen based on the Hausman test, and the results of each method are further analyzed in the section below.

8.5.2.1.1 Pooled Ordinary Least Squares (OLS)

The pooled OLS model applies the ordinary least squares (OLS) methodology to panel data and assumes that there are no unobservable effects, which means that all data

sets are considered to have the same underlying features. Therefore, estimating the pooled OLS model obtains unbiased estimates of the regression coefficients under the condition that other assumptions are satisfied. The Stata results presented below include some summary statistics and estimates of regression coefficients. The upper part reports an analysis of variance (ANOVA), sum of squares (SS), degrees of freedom (df), and the mean sum of squares (MS). The results show that the total sum of squares is 1964.2788, of which 970.77469 accounts for the model, and 993.504114 is left unexplained (residual). The degrees of freedom have a total degree of 158, out of which the model accounts for 12 and the residual for 146. The mean sum is obtained by dividing the sum of squares by the respective degrees of freedom.

The R-squared for the regression model represented the measure of goodness of fit or the coefficient of determination. Therefore, 0.4523 explained approximately 45% of the investment in variation, leaving 55% unexplained. However, most variable coefficients are highly significant in the 1% confidence interval, i.e., for technical barriers to trade, phytosanitary measures, orange production capacity, and distance.

The significant variables are in line with trade theories, especially when looking at the coefficients.

Table 8. 21: Pooled OLS on panel data - gravity regression

logXjt	**Coef.**	**Std. Err.**	**t**	**P>t**	**[95%Conf.**	**Interval]**
logGDPjt	-0.726	0.249	-2.91	0.004**	-1.218	0.233
logGDPsat	6.746	3.690	1.83	0.070*	-0.547	14.039
logTBTsaj	- 2.002	0.433	4.62	0.000***	1.146	2.859
logSPS	- 0.675	0.128	5.27	0.000***	0.422	0.928
logREXRjt	-0.166	0.103	-1.62	0.107*	-0.369	0.037
logInfla	-0.589	0.187	-3.15	0.002**	-0.959	-0.219
logPROD	-6.084	1.180	-5.16	0.000***	-8.416	-3.751
logDISTsaj	-4.356	0.823	-5.29	0.000***	-5.984	-2.729
logPOPjt	-0.500	0.243	-2.01	0.046**	-0.970	-0.009
logIPIjt	-1.624	1.080	-1.5	0.135*	-3.758	0.510
logEPIit	-1.689	2.759	-0.61	0.541	-7.141	3.763
logREXRsat	2.185	0.943	2.32	0.022*	0.321	4.048
_cons	-79.580	88.731	-0.9	0.371	-254.942	95.783
Source	**SS**	**df**	**MS**	**No of obs**	=	200

Model	970.775	12	80.898	F(12,146)	=	11.89
Residual	993.504	146	6.805	Prob>F	=	0.000
Total	**1964.279**	**158**	**12.432**	R-squared	=	0.494
				Adj Rsquared	=	0.453
				Root MSE	=	2.609

***/**/* Significant at the 1%/5%/10% level.

8.5.2.1.2. Fixed effects

A fixed effect model examines the group differences in intercepts, and there are various methods to measure the model. This study adopted the estimation 'within', which does not use dummy variables and therefore has greater degrees of freedom and smaller standard error parameters. According to the results table, the command reports correct parameter estimates, with standard errors of the regressors of F 3.56 and R^2 of 0.792. The p>value for the fixed effects model is 0.0002, indicating the robustness of the model. It is important to note that the coefficients of the variables included in the estimation are mostly significant (indicating how much change in orange exports over time, on average per 10 strategic Asian markets) aligned with the theory measures.

The outcomes from the fixed effects model, outlined in **Table 8.22**, indicate that a 1% growth in the GDP of both South Africa and importing countries correlates with a boost in South Africa's orange export performance. In simpler terms, when the GDP of South Africa and its trading partners increases, the export of oranges from South Africa also increases. The influential factors demonstrate a consistently positive relationship, aligning well with economic principles. (Sumiyati, 2020) find that the GDP on lag 1 has a positive impact on the manufacturing export in line with the theoretical expectations. Consequently, a rise in GDP for key Asian nations contributes to a higher production volume, leading to an increased demand for imported fruits specifically intended for further processing. The outcomes concluded that a rise in GDP influences the Pakistan currency to appreciate and enhance Pakistan’s exports ((Dalango, 2020)

The effect of food safety standards is interpreted in detail as determined by the relevant objectives and hypotheses. The food safety standards imposed by countries could impede orange exports from South Africa. As mentioned, the coefficients corresponding to TBT and SPS, which contain information on the ratio of orange exports to Asian strategic countries, are negative and statistically significant. The negative coefficients illustrate that a decrease in the number of imposed TBTs and SPSs would lead to an increase in the export volume of oranges. This provides robust statistical support, as TBT tends to become an impediment to trade in Asian countries instead of reducing transaction costs and trade friction, resulting in export promotion.

Table 8. 22: Fixed-effects regression results - panel data

logXjt	Coef.	Std. Err.	t	P>t	[95%Conf.	Interval]
logGDPjt	2.537	0.972	2.61	0.01***	0.615	4.459
logGDPsat	4.174	2.241	1.86	0.065*	-0.257	8.605
logTBTsaj	-1.464	0.415	-3.53	0.001***	0.644	2.285
logSPS	-0.0482	0.096	-0.5	0.016**	-0.142	0.238
logREXRjt	3.120	1.449	2.15	0.033**	0.255	5.986
logInfla	-0.238	0.123	-1.94	0.054**	-0.480	0.005
logPROD	-2.611	0.941	-2.78	0.006***	-4.471	-0.751
logDISTsaj	0	(omitted)				
logPOPjt	-20.553	5.402	-3.8	0.000***	-31.235	-9.871
logIPIjt	-1.789	1.039	-1.72	0.087*	-3.843	0.266
logEPIit	-0.639	1.733	-0.37	0.713	-4.066	2.788
logREXRsat	0.736	0.8481	0.87	0.387	-0.941	2.413
_cons	207.441	97.579	2.13	0.035	14.499	400.384

sigma_u1.636905 sigma_e1.5197067 rho .99769787			
FIXED-EFFECTS REGRESSION Group variable: id R-sq:	No of Obs No of Group Obs per group:	= =	200 10
Within = 0.2212 Between = 0. 792 Overall = 0. 656 corr(u_i, Xb)=-0.9948	Min = 12 Avg = 15.9 Max = 19 F(11,138) = 3.56 Prob>F = 0.0002		

***/**/* Significant at the 1%/5%/10% level.

8.5.2.1.3 Random effects

A random effect model examines how time influences the error variance. This section discusses the generalized least squares (GLS) method. In the following output, R^2 0.7111 is reported under the label between and correlation of 0 under *corr(u_i, X)*. The first differences between the food safety standards and the orange export volume were used in the regression models to account for the identified non-stationarity. According to the results tabulated for the random effect model, the coefficients show that there is a positive relationship between export volumes and SA GDP and the real exchange rate for South Africa. Therefore, the positive coefficients illustrate that an increase in the SA GDP and the real exchange rate would increase South African orange exports destined for strategic Asian markets.

The table indicates that there are significant effects of the independent variables on the exported orange volume in the random-effects model. The results show an Rsquare of 0.7111, which implies that the independent variables included in the model are significant and relevant. The importer GDP, population, real exchange rate, inflation, production capacity, distance, import and export price index show significant p-values with a negative correlation. This implies that any increase in these independent factors will negatively affect the volume of oranges exported from South

Africa. However, South Africa's GDP and the real exchange rate are positively correlated with the volume of orange exports, which implies that there is a positive relationship. This shows that an increase in those variables also increases the volume of oranges exported to strategic Asian markets.

Food safety standards are an important form of measurement for this subsection; therefore, the impacts of technical barriers to trade and sanitation (phytosanitary) on South African orange exports are evaluated in detail. The coefficients corresponding to TBT and SPS, which contain information on the ratio of orange exports from South Africa to several Asian countries, are positive and statistically significant at the 1% level (meaning that 99% of the oranges exported are explained by food safety standards). This counters some literature, such as that by Brenton and von Witzke (2020), which argued that high food safety standards often create significant barriers, especially for emerging economies, limiting their export volumes. Crespo and Rojas (2021) found that food safety regulations are crucial for protecting consumer health, they can simultaneously serve as covert trade barriers, making it harder for countries to compete. The positive coefficient illustrates that an increase in the number of food safety standards would lead to a decrease in orange export volumes. The negative impact of food safety standards could emerge since strategic Asian countries may deliberately design food safety measures that impose a cost or other disadvantage on South African orange exports to provide protection. The suggestion that some Asian countries may purposively impose stringent food safety measures to protect local industries is echoed in research by (Otsuki, et al., 2001).

Table 8. 23: Random effect GLS regression - panel data

logXjt	Coef.	Std. Err.	t	P>t	[95%Conf.	Interval]
logGDPjt	-0.726	0.249	2.91	0.004***	-1.214	-0.238
logGDPsat	6.746	3.690	1.83	0.068*	-0.486	13.978
logTBTsaj	-2.002	0.433	4.62	0.000***	1.153	2.852
logSPS	-0.675	0.128	5.27	0.000***	0.424	0.926
logREXRjt	-0.166	0.103	1.62	0.105*	-0.368	0.035
logInfla	-0.589	0.187	3.15	0.002**	-0.956	-0.222

logPROD	-6.084	1.180	5.16	0.000***	-8.397	-3.771
logDISTsaj	-4.356	0.823	5.29	0.000***	-5.970	-2.743
logPOPjt	-0.490	0.243	2.01	0.044**	-0.966	-0.013
logIPIjt	-1.624	1.080	1.5	0.133*	-3.740	0.492
logEPIit	-1.689	2.759	0.61	0.540	-7.096	3.718
logREXRsat	2.185	0.943	2.32	0.020**	0.337	4.032
_cons	-79.580	88.731	0.9	0.370	-253.488	94.329

sigma_u 0 sigma_e 1.5197067 rho 0	
RANDOM-EFFECTS GLS REGRESSION	Number of obs = 200
Group variable: id	Number of groups = 10
R-sq:	Obs per group:
within = 0.0768 between = 0.7111 overall = 0.4942 corr(u_i, X) = 0 (assumed)	min=12 avg=15.9 max=19 Wald chi2(12)=142.66 Prob > chi2=0.000

***/**/* Significant at the 1%/5%/10% level.

8.5.2.1.4 Hausman test

The panel data was subjected to fixed- and random-effects panel regression modeling. The coefficients were then subjected to the Hausman test to check whether the coefficients from both methodologies were consistent or whether there was a systematic difference between the coefficients. Therefore, the test assumed that the difference between coefficients is not systematic. The test produces a chi-square value of 251.88, which gives a p-value of 0.0000, which is acceptable at the 1% percent level of significance.

The test rejects the null hypothesis, as the p-value (Prob>Chi2) is less than 5%. It is important to note that the Hausman test is a test of:

H_0: random effects would be consistent and efficient, versus

H_1: Random effects will be inconsistent.

Therefore, the null hypothesis is rejected, and it is concluded that the two models produce coefficients with differences that are systematic and consistent. The test suggests the selection of FEs, as it implies that the country effects, though present in the data set, are correlated with the explanatory variables and can very well be taken

as fixed; the FE estimators will be consistent and efficient. The fixed-effects model is used in the analysis because the random-effects model does not add significant value. After all, the coefficients it produces are not significantly different from the coefficients produced by the fixed-effects model.

Table 8. 24: Hausman Test - Fixed and Random effects

Coefficients	**(b)** **Fe**	**(B)** **re**	**(b - B)** **Difference**	**sqrt(diag(V_b-V_B))** **S.E.**
logGDPjt	2.537	-0.726	3.263	.
logGDPsat	4.174	6.746	-2.572	2.932
logTBTsaj	1.464	2.002	-0.538	0.125
logSPS	0.048	0.675	-0.626	0.085
logREXRjt	3.120	-0.166	3.287	.
logInfla	-0.238	-0.589	0.351	0.141
logPROD	-2.611	-6.084	3.473	0.713
logPOPjt	-20.553	-0.490	-20.063	.
logIPIjt	-1.789	-1.624	-0.165	0.293
logEPIit	-0.639	-1.689	1.050	2.146
logREXRsat	0.736	2.185	-1.449	0.412
b =	= consistent under Ho and Ha; obtained from xtreg.			
B =	= inconsistent under Ha, efficient under Ho; obtained from xtreg.			
Test: Ho:	= difference in coefficients not systematic			
chi2(11)	= (b-B)'[(V_b-V_B)^(-1)](b-B) = 251.88			
Prob>chi2	= 0.0000			

The Hausman-Taylor model uses a ‘mixed’ structure to handle a situation that needs to include a time-invariant variable and unobserved individual heterogeneity of the model. It is ‘mixed’ in the sense that it is between a fixed effect and a random effect or a mixture of both. When the p-value <0.0006, the null hypothesis that the difference in coefficients is not systematic is rejected. Therefore, the random-effects equation is rejected according to the Hausman-Taylor test, meaning that the model is better explained with the fixed-effects approach. From the preceding analysis, it is found that the GDP of SA and importers and the real exchange rate show a positive influence in terms of the volumes of oranges exported. **Table 8. 25: Hausman-Taylor regression results 'mixed'**

	[95% logXjt	Coef.	Std. Err.	z	P>z	Conf.	Interval]
TV exogenous							
logPOPjt	-12.695	4.095	3.1	0.002***	-20.720	-4.670	
logEPIit	-0.961	1.697	0.57	0.571	-4.288	2.365	
logGDPjt	2.095	0.938	2.23	0.026**	0.257	3.934	
logGDPsat	3.798	2.211	1.72	0.086*	-0.535	8.132	
logIPIjt	-1.491	1.005	1.48	0.138*	-3.461	0.479	
logTBTsaj	- 1.162	0.386	3.01	0.003***	0.405	1.919	
logREXRsat	0.209	0.779	0.27	0.788	-1.316	1.733	
logREXRjt	2.313	1.269	1.82	0.068*	-0.175	4.801	
logInfla	-0.225	0.121	1.86	0.063*	-0.463	0.013	
logSPS	- 0.068	0.095	0.72	0.474	-0.118	0.254	
logPROD	-2.086	0.887	2.35	0.019**	-3.824	-0.347	
logDISTsaj	-30.915	16.708	1.85	0.064*	-63.663	1.832	
_cons	367.852	199.514	1.84	0.065	-23.189	758.893	
sigma_u 19.695481 sigma_e 1.4625348 rho .99451608 (fraction of variance due to u_i)							
HAUSMAN-TAYLOR ESTIMATION Group variable: id Random effects u_i ~ i.i.d.			Number of obs =			200	
			Number of groups =			10	
			Obs per group: min =12 avg =15.9 max =19 Wald chi2(12) =34.52 Prob > chi2 =0.0006				

Note: TV refers to time-varying; TI refers to time-invariant.

8.5.3 Summary

Table 8.26 summarises the effects of the various approaches of the gravity model. The table illustrates the effects of pooling, fixed effects, and random effects as determined by the STATA software tool. The results of the three impacts are amazing and, since the fixed impacts model demonstrates heterogeneity by analyzing the national impacts, the Hausman test was used to test the capacity of the introduced models and their results. According to Eita's (n.d.) research, the Hausman test indicates whether an erroneous theory is not connected between components in the model.

Furthermore, this approach is used to distinguish between fixed and random impact models. As a result, if the incorrect hypothesis is not rejected, the irregular impacts are preferable unless the fixed impacts model is appropriate. In the case of this inquiry, the Hausman test demonstrates that the incorrect hypothesis is rejected, indicating that the nation's specific effects are recognized. As a result, fixed influences are appropriate for deciphering the results.

Table 8.26 shows the empirical results of the analysis of Equation 3.6 with a pooled model, fixed effects regression (inside), and random effects. This demonstrates that the F-statistic is significant at the 1% level, hence eliminating the null assumptions. In other words, an F statistic of 3.56 suggests that the illustrative variables influence exports simultaneously. Furthermore, the adjusted R-squared, which measures the appropriateness of the components, is sufficiently extensive, demonstrating that descriptive factors explain 0.792% of the differences in fruit export.

Table 8. 26: Estimated results for South Africa's orange exports

Variables	Pooled OLS model	Fixed Effects	Random Effects Model
logGDPjt	-0.726(0.004**)	2.537 (0.01***)	-0.726 (0.004***)
logGDPsat	6.746 (0.070*)	4.174 (0.065*)	6.746 (0.068*)
logTBTsaj	- 2.002 (0.000***)	-1.464 (0.001***)	- 2.002 (0.000***)
logSPS	- 0.675 (0.000***)	-0.048 (0.016**)	- 0.675 (0.000***)
logREXRjt	-0.166 (0.107*)	3.120 (0.033**)	-0.166 (0.105*)
logInfla	-0.589 (0.002**)	-0.238 (0.054**)	-0.589 (0.002**)
logPROD	-6.084 (0.000***)	-2.611 (0.006***)	-6.084 (0.000***)
logDISTsaj	-4.356 (0.000***)	0 (omitted)	-4.356 (0.000***)
logPOPjt	-0.490 (0.046**)	-20.553 (0.000***)	-0.490 (0.044**)
logIPIjt	-1.624 (0.135*)	-1.789 (0.087*)	-1.624 (0.133*)
logEPIit	-1.689 (0.541)	-0.639 (0.713)	-1.689 (0.540)
logREXRsat	2.185 (0.022*)	0.736 (0.387)	2.185 (0.020**)
_cons	-79.580 (0.371)	207.441 (0.035)	-79.580 (0.370)
Prob>F	0.0000	0,0002	0,0000
No of observations	200	200	200
Adjusted R squared	0,453	0,792	0,711
F test			

		3,56***	
LM test			
Hausman test		0,0000***	

***/**/* Significant at the 1%/5%/10% level. Source: Gravity model and STATA calculation (2023)

TBTs can cause exporters to leave, as they make export procedures more difficult and expensive (Fontagné & Orefice, 2018; Curzi et al., 2020). Generally, underperforming or less productive exporters are more likely to leave the TBT-imposing market because they cannot afford the additional expense of adjusting the product to a harsher standard in the TBT-imposing country. TBT and SPS are the key variables affecting South African orange exports to strategic Asian nations. First, the TBT and SPS measures for orange exports were shown to be negative and statistically significant for pooled, fixed and random effects. This finding indicates that both food safety measures discourage South African orange exports. These findings run counter to fears that food safety regulations may stymie South Africa's orange exports.

In conclusion, the results from this chapter indicate that while South Africa's orange industry is well-positioned to capitalize on growth opportunities in Asia, it must navigate a complex landscape of competition, regulatory barriers, and infrastructural challenges. Future strategies should focus on enhancing compliance with food safety standards to mitigate negative impacts on exports, while also addressing domestic constraints through government and industry collaboration. Continued research and proactive policy measures will be vital in ensuring that South Africa remains competitive within the global orange market, particularly in its pursuit of expanding Asian market share. This comprehensive analysis not only serves as a resource for policymakers and industry stakeholders but also emphasizes the ongoing need for innovation and adaptation in the agricultural export sector.

CHAPTER 9
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

9.1 Introduction

This chapter summarises the study's research aims and methodology, as well as its conclusions and policy recommendations. This research examined the food safety standards and competitiveness of South African orange exports to strategic Asian markets. The chapter also discusses how well the various analysis tools and approaches addressed the objectives and hypotheses provided at the beginning of the study. The purpose of this final chapter is to provide the important findings of the study, make policy suggestions, and suggest areas for further research.

9.2 Summary

The study investigates the impact of food safety standards on the competitiveness of South Africa's orange exports in key Asian markets, addressing the critical challenges faced by the agricultural industry amid increasing global trade and regulatory pressures. The main objectives include assessing how food safety requirements affect export performance and informing policymakers and industry stakeholders about strategies to improve competitiveness. Utilizing a combination of primary data from questionnaires targeting orange producers to measure key constraining and enhancing factors for orange competitiveness using Porter analysis. While secondary data from official databases, the study employs a constant market share, relative comparative, net export index, relative trade advantage and gravity model for analysis, focusing on data from 2003 to 2022 in a panel data format.

Findings indicate that South Africa holds a strong comparative advantage in orange production, particularly in Asian markets, which saw a surge in imports, peaking at over 256,000 tons in 2019. While South African exports demonstrated robust performance overall, specific countries such as Hong Kong, India, and South Korea exhibited a negative competitiveness effect between 2003 and 2013, with a turnaround in trends observed from 2014 onwards. The study also highlights that economic factor, such as a 1% increase in both South Africa's GDP and the GDP of importing nations, positively influence export performance. Interestingly, while Technical Barriers to Trade are associated with promoting exports, Sanitary and Phytosanitary measures, however, display a negative and statistically significant correlation, indicating these regulations can inhibit export growth. This complex interplay of factors underscores

the need for nuanced strategies to enhance South Africa's competitiveness in the orange export market while managing regulatory challenges effectively.

9.3 Strategic Recommendations

To preserve the long-term viability of the industry, the orange industry and the government must work together to address the factors over which they have some control. The recommendations should not be viewed as the result of a full-fledged strategic planning process; rather, they are recommendations derived from the intelligence of the study. Such industry recommendations will be offered in terms of continuous market share, Porter's diamond model, and gravity model.

9.3.1 Measuring competitiveness

South Africa has a comparative advantage in orange production, making it wellpositioned to trade with Asian countries. However, its export composition largely consists of products with lower global demand, limiting the overall impact on market shares. The analysis suggests that changes in South Africa's export performance are influenced by factors beyond prices and product structure, indicating a need for improvement in its export strategy. To enhance competitiveness, South Africa should focus on transitioning to higher-demand products and restructuring its production base towards more technologically advanced industries. This shift would necessitate significant foreign investment. Moreover, South Africa could benefit from exploring more dynamic markets, particularly in Asia.

9.3.2 Key limitations and success factors

A. Factor condition

Respondents in the study highlighted concerns regarding the quality and availability of unskilled and skilled labor in the orange industry, noting that these limitations hinder competitiveness. Factors such as inadequate skill training and low wage levels fail to attract skilled workers. Certain tasks, like pruning, require skilled labor for sustained productivity, emphasizing the need for training programs in the sector. The responsibility for addressing these issues lies with both industry and government. Additionally, health concerns among the workforce, particularly related to HIV/AIDS, TB, and other disorders, were raised, stressing the need for improved health education and continued government investment in workforce health.

South Africa's capacity to compete in production is hindered by high availability and production costs, which encompass inputs like capital, land, water, energy, chemicals, labor, and managerial expertise. To enhance competitiveness, the sector should focus on reducing transaction costs in the supply chain. For instance, lowering transportation costs could significantly benefit South African orange businesses. Coordination among farmers for transporting goods, purchasing inputs collectively, and negotiating prices as a unified group can improve competitiveness through cost sharing and increased bargaining power.

B. Demand condition

The local orange industry in South Africa lacks diversity, making it essential to explore new markets. This aligns with the study's aim of enhancing fruit quality and utilizing innovation to gain a competitive edge. Traditional European markets are declining due to trade restrictions, while Asia presents a promising opportunity due to demographic growth and rising incomes. The study emphasizes the need for strategies to diversify South African oranges into Asian markets to ensure long-term competitiveness and sustainability for the sector.

To enhance the competitiveness of the South African orange industry, effective persuasion techniques are essential. One key strategy involves educating consumers about the health benefits of oranges, which can help increase demand. Addressing local purchasing habits can also play a role in improving profitability and sustainability for the industry.

C. Related and supporting industries.

The competitive advantage of a firm or industry hinges on how effectively it organizes and executes distinct activities within its value chain. In the context of the South African orange business, a well-structured value chain is essential for enhancing product transportation, processing, and distribution while minimizing costs and maintaining product quality. However, South Africa's power supply shortages pose a significant challenge to the competitiveness of its orange exports, as the long-term association between power consumption and exports indicates that inefficiencies can undermine competitiveness. To address these issues, it is crucial for the government to prioritize export-oriented industries during load shedding and to support those that invest in alternative energy solutions, like generators or solar systems, thereby improving electricity supply and potentially boosting export performance.

The competitiveness of the South African orange sector is hindered by the poor quality of local input suppliers. Deasy (2022) found that importing inputs can enhance productivity and boost exports. To address this issue, stakeholders should focus on improving local input quality standards, or the government could facilitate the import of high-quality inputs to support the industry's productivity and export potential.

D. Firm strategy, structure, and rivalry

Respondents indicate that the emergence of new competitors has negatively impacted the competitiveness of South African oranges in both domestic and international markets. Increased competition leads to reduced market share and client base, especially in low-demand situations. It often necessitates lower pricing, which can decrease profit margins. Consequently, to maintain competitiveness, the orange sector is motivated to enhance the quality of its exported oranges. Specifically, to thrive in Asian markets, significant investment in quality improvement is essential.

E. Government support and policy

The government plays a crucial role in enhancing the competitiveness of the orange sector by ensuring a well-functioning market. However, current initiatives such as land reform and Black Economic Empowerment (BEE) require modification, as respondents have expressed concerns about the prolonged land reform process discouraging agricultural investment. Therefore, the government must create a supportive environment for businesses, implement effective policies, and promote investment to bolster the industry's competitiveness.

The political situation of a country plays a crucial role in international business, particularly in attracting Foreign Direct Investment (FDI). Research indicates that factors such as political insecurity and corruption negatively impact FDI (Asiedu, 2000). Political instability leads to inefficient resource management and diminishes competitiveness, as seen in the case of South African orange exports. Studies show that political stability fosters higher export levels (Srivastava & Green, 1986) and enhances expected returns, while instability can lead to capital flight and disrupt exports (Fosu, 2003). A stable political environment correlates strongly with FDI, exports, and foreign portfolio investments, suggesting that maintaining policy continuity through stable governance is essential for fostering economic growth and investment.

F. Chance factors

Respondents indicate that high crime levels in South Africa significantly affect the orange industry by imposing additional costs and limiting its competitiveness. The impact of crime extends beyond robberies of produce, adversely affecting investment in the country. As a result, foreign investors are hesitant to engage in South Africa, further reducing the industry's competitive edge. Addressing crime is critical for enhancing the sector's performance and attracting investment. The high prevalence of HIV/AIDS is seen as a barrier to business competitiveness in South Africa, particularly affecting the orange sector. Since issues like crime and AIDS are largely external and beyond the industry's control, it emphasizes the need for government intervention. By addressing the HIV/AIDS pandemic, combating crime, and ensuring macroeconomic stability, the government can reduce associated risks, ultimately enhancing the competitiveness of the agricultural sector.

There is a significant relationship between South African orange exports and economic growth. Higher orange exports contribute to economic development, while rising income levels can also boost trade, fostering bilateral exchanges. However, high crime rates deter investment, potentially hindering long-term productivity in South Africa. Improving economic productivity could benefit the country's orange sector by enhancing export opportunities.

9.3 3 Effect of Food Safety Factors

The study utilizes panel data to analyze how food safety regulations impact South African orange exports to key Asian markets, employing the gravity model through STATA software. It suggests that compliance with sanitary and phytosanitary standards (SPS) and technical barriers to trade (TBT) should be viewed as opportunities to enhance quality and market sophistication, rather than obstacles. To address TBT restrictions in South Africa, it advocates for coordinated global initiatives beyond the WTO to secure additional financial and technical support. Additionally, leveraging marketing buyer channels would facilitate local orange exporters' entry into Asian markets, as these channels allow for effective negotiation on contracts regarding price, quantity, quality, and delivery between buyers and suppliers.

Advancements in agriculture can help poor countries meet food safety standards by enhancing land quality, irrigation infrastructure, and access to resources like fertilizers. Improving agricultural practices and technologies can lead to better production quality, more consistent yields, enhanced flavour and hygiene, and diversified crop/livestock options. Additionally, developing countries should address credit market inefficiencies to provide farmers and processed food enterprises with equal access to financing, which is essential for improving the agricultural sector and food industries.

9.4 Limitations of the study

It is important to show the factors or aspects that have reduced the validity, reliability, or generalisability of these study findings. Therefore, the author acknowledges these limitations to provide a more accurate and honest assessment of the strengths and weaknesses of this study. In the future, a large sample size should be used to strengthen the robustness of the study. The study captured a 65.7% response rate; therefore, it is important that the study included responses from all orange producers and exporters in South Africa. The rationale behind 65.7% of the responses was that data collection started later than expected, driven by many changes that had to be made in the survey questionnaire as guided by the supervisors. The survey was completed through Microsoft Forms, which require access to Internet connections and computers/smartphones. This is a limitation for some of the participants who completed the survey due to a lack of connection, and some other participants did not have access to computers or smartphones. This challenge also resulted in a delay in completing a survey, and alternative means were used to ensure that the survey was completed through telephone conversations. The additional limitation was that the survey was conducted during the harvest season, when most producers and exporters were busy sorting out logistics and packaging. The response rate might have improved if the survey had been conducted outside of the orange season.

This study used secondary information to measure objective 1, 2, and 4; therefore, it is important to acknowledge the limitations of data availability reported during this period. Consequently, this study is limited because it may not have been collected in the desired geographic region, in the years desired, or from the specific population of interest in the study. Additionally, some variables were initially included in the study; however, due to unavailability, these variables were excluded.

9.5 Future Research

Considering the study findings and the limitations identified, several potential topics for future research are identified: (1). Evaluation of the competitiveness of the local orange industry should consider full value chain analysis, which includes input suppliers, producers, transport, storage, packaging, processing, fresh produce markets, consumers, and exports. Value aspects are believed to be strongly linked and interdependent. The survey conducted can be spread throughout the value chain to provide a greater understanding of the factors that influence the competitiveness of the local orange industry. The additional aspect of the value chain that can be included in the analysis is the role of the government in ensuring that the local industry remains competitive in the local and global markets. This will help to provide a strong indication of where the weak or strong links in the value chain drive the overall competitiveness of the local orange industry. (2). The study focused on 10 Asian strategic markets; therefore, the strategic markets can be expanded to cover the entire Asian continent. This will help to determine the greater view about the competitiveness of South African oranges in that region. Assessment of the entire Asian region will play an important role in enhancing economic growth, and the framework used in this study may be useful to analyse the competitiveness of any industry by also considering the food safety standards imposed.

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APPENDIX A

: South African Orange Industry Survey 2022

PRODUCTION FACTOR CONDITIONS

1. **The general infrastructure used by your company is:**

Poorly developed and inefficient — as good as it can be

1	**2**	**3**	**4**	**5**

2. **The cost of infrastructure is:**

Extremely high — very affordable

1	**2**	**3**	**4**	**5**

3. **The cost of doing business is:**

Extremely high — very affordable

1	**2**	**3**	**4**	**5**

4. **The quality of technology for your industry:**

Generally, lags behind the most is among the world leaders

1	**2**	**3**	**4**	**5**

5. **Quality technology for you industry is:**

Difficult to obtain Easy to obtain

1	**2**	**3**	**4**	**5**

6. **The cost of quality technology is:**

Extremely high. very affordable.

1	**2**	**3**	**4**	**5**

7. **Obtaining credit for your company is:**

Extremely difficult. Easy

1	**2**	**3**	**4**	**5**

8. **Skilled labour is:**

Difficult to obtain by your company Easy to obtain by your

1	**2**	**3**	**4**	**5**

9. **Skilled labour is:**

Not of a very high quality Among the best in the world

	1	2	3	4	5
10.					

Skilled labour is:

Too costly very affordable

	1	2	3	4	5

11. **Unskilled labour is:**

Difficult to obtain Easy to obtain

	1	2	3	4	5

12. **Unskilled labour is:**

Not of a very high quality Among the best in the world

	1	2	3	4	5
13.					

Unskilled labour is:

Too costly very affordable

	1	2	3	4	5
14.					

Climate,weather is:

Adverse Favourable

1	2	3	4	5

15. **Soils**

Weak Favourable

1	2	3	4	5

16. **Rainfall**

Weak Favourable

1	2	3	4	5

17. **Water availability**

Weak Favourable

1	2	3	4	5

DEMAND/MARKET FACTORS

18. **local market size is**

Too small? large enough

1	2	3	4	5

19. **Local buyers of oranges are:**

Slow to adopt new products Actively seek out the latest product

1	2	3	4	5

20. **Is the growth in the local market...**

Too slow Fast enough

1	2	3	4	5

OTHER DEMAND FACTORS – RELATED AND SUPPORTING INDUSTRIES

21. Financial services are generally

Constraint to competitive success Enhancement to competitive success

1	2	3	4	5

22. Scientific research institutions are:

None-existent. The best in their fields.

1	2	3	4	5

23. Your company's collaboration with scientific research institutions in their R&D activity is:

None-existent Intensive and ongoing.

1	2	3	4	5

24. Electricity suppliers are a:

constraints competitiveness enhance the competitiveness

1	2	3	4	5

25. Telecommunication firms are a:

constraints competitiveness enhance the competitiveness

1	2	3	4	5

26. Specialised technology services are:

Not available. Available form world-class local institutions

1	2	3	4	5

27. Availability of local suppliers of primary inputs

Largely non-existing Numerous and include the materials

1	2	3	4	5

28. The quality of local suppliers of your industry primary inputs is:

Inefficient and little technological capacity Internationally competitive & assist

1	2	3	4	5

29. The sustainability of local suppliers of your industry primary inputs:

Huge problem. No problem at all.

1	2	3		4	5

30. Availability of storage facilities

Largely non-existing. Numerous with most important materials

1	2	3	4	5

31. The cost of using storage facilities

Extremely high. Affordable.

1	2	3	4	5

32. Availability of transport

not available readily available

1	2	3	4	5

FIRM STRATEGY, STRUCTURE AND RIVALRY

33. Industry`s expenditure on R&D

massive very low

1	2	3	4	5

34. The information flow from primary suppliers to your company is:

Very poor Very good.

1	2	3	4	5

35. The flow of information from customers to your company is:

Very poor Very good

1	2	3	4	5

36. Competition in the local market is:

Very limited Very intense

1	2	3	4	5

37. Entry of new competitors:

Almost never occurs in the local market Is common in the local market.

1	2	3	4	5

38. Competition in international market is

Very limited Very intense

1	2	3	4	5

GOVERNMENT SUPPORT AND POLICIES

39. South Africa's trade policy is a:

Constraint competitive success Enhancement to competitive success

1	2	3	4	5

40. South Africa's land reform policy is a:

Constraint competitive success Opportunity to increase competitive success

1	2	3	4	5

41. South Africa's labour policy is a:

Constraint competitive success Enhancement to competitive success

1	2	3	4	5

42. South Africa's macro-economic policy is a:

Constraint competitive success Enhancement to competitive success

1	2	3	4	5

43. South Africa's competition law is a:

Constraint competitive success Enhancement to competitive success

1	2	3	4	5

44. South Africa's BEE policy is a:

Constraint competitive success Enhancement to competitive success

1	2	3	4	5

45. Your trust in the honesty of politicians is:

Very low very high

1	2	3	4	5

46. Regulatory standards (e.g., Products standards, energy, safety, and environment) in your opinion are:

Lax or non-existent Among the world's most stringest

1	2	3	4	5

47. Administrative regulations are:

Burdensome. Not burdensome.

1	2	3	4	5

48. The tax system:

Hinder business investment Promote business investment

1	2	3	4	5

49. Have legal or political changes over the past five years undermine your company for planning?

Severely undermined planning capacity — Have had no effect

1	2	3	4	5

50. Environmental regulations are:

Not enforced — Enforced consistently and fairly

1	2	3	4	5

51. Complying with environmental standards:

Hurts competitiveness — Helps long-term competitiveness

1	2	3	4	5

OTHER FACTORS AS EXPERIENCED BY FIRM (EXTERNAL FACTORS)

52. Crime

Impose significant cost — Does not impose significant costs

1	2	3	4	5

53. Health -HIV/AIDS, TB, etc:

Impose significant cost — Does not impose significant costs

1	2	3	4	5

54. Economic development and growth in South Africa is a:

Constraint competitive success — Opportunity to increase competitive success

1	2	3	4	5

55. Is the current exchange rate a:

Constraint competitive success Enhancement to competitive success

1	2	3	4	5

A. Open-ended opinion questions

56. What are the main factors that enhance the competitive performance of your industry of SA?

.....
.....
.....
.....

57. What are the main factors that constrain the competitive performance of your industry?

.....
.....

58. Who are the most threatening competitors (both international and local)

.....
.....
.....

59. Do you think the current strength of the industry is sufficient to cope with competition? if not, what can be done?

.....
.....
.....

60. How does the government influence the competitiveness of your industry?

……
……

Thank you for your time, we really appreciate.

God Bless You

APPENDIX B

Publication 1: Lucius T Phaleng, Mmaphuti A Nkoana, and Jan J Hlongwane

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INVESTIGATING THE KEY LIMITATIONS AND IMPROVEMENTS INFLUENCING THE COMPETITIVE SUCCESS OF SOUTH AFRICA'S ORANGER EXPORTERS

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Abstract

The objective of identifying constraining factors is to reveal that the key obstacles affecting the competitiveness of South Africa's domestic orange industry include issues such as the "quality of unskilled labor," "trust in the honesty of politicians," "electricity suppliers," "health," "South Africa's land reform policy," "South Africa's BEE policy," and "crime." Additionally, challenges related to the lack of quality infrastructure, bilateral agreements with trading countries, and poor performance of ports relative to their global counterparts have been identified. The constraining factors were ranked, with the top issues aligning closely with the industry's current challenges. In contrast, enhancing factors play a crucial role in boosting industry competitiveness in both domestic and international markets. The key elements contributing positively include the availability of unskilled labor, local input suppliers, scientific research institutions, technological quality, the cost of unskilled labor, soil conditions, and the sustainability of local input suppliers. Attention to maintaining and improving these factors is crucial for the sustained competitiveness of the South African orange sector.

1. Introduction

The competitiveness of the South African orange industry is critical for its long-term survival. As a result of the changing regulatory and business environments that influence the way industries operate, this research study aims to investigate the factors influencing the competitive success of the domestic orange industry. The investigation of the industry's competitive success remains critical amidst the changes in the business environment, particularly those on the demand and market side, and rivalry (Ndou, 2012). This study adopted Porter's competitive diamond model to gather key success factors and constraints that continue to impact the competitiveness of the South African orange industry.

According to Pitts and Lagnevik (1998), this model measures the competitive potential or competitive process, which is often qualitative. It looks at the availability of superior inputs or factors impacting the competitiveness of the industry, which could be used to identify and improve competitiveness (Pitts & Lagnevik, 1998). Porter's Diamond model asserts that certain countries and industries exhibit greater competitiveness due to inherent factors. According to (Grant, 1991), Porter emphasizes the pivotal role of the home base in establishing a competitive advantage, particularly in industries where local government is dynamic and challenging. Porter (1990a) identified four key aspects within the domestic environment—factor conditions, demand conditions, related and supporting industries, and firm strategy, structure, and rivalry—that significantly shape the context enabling domestic

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COMPETITIVENESS OF SOUTH AFRICAN ORANGES IN ASIAN STRATEGIC MARKETS: THE CASE OF MAIN COMPETITORS

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Abstract

This study employed various descriptive, conceptual, and empirical models to measure South Africa's competitiveness in the Asian strategic markets concerning its competitors from 2003 to 2022. The competitiveness measurements included relative comparative advantage, the net export index, relative trade advantage, and constant market share analysis. The data were sourced from official databases such as the World Bank, FAO, ITC, export potential map, and World Integrated Trade Solutions (WITS). The South African competitiveness of oranges in the specified strategic markets realized a positive competitive effect of 2.46%, indicating a gain in the market due to increased competitiveness of the fresh food sector in the world market. The RCA values were above 1, with most of the values closer to 20 indicating that South Africa has a good comparative advantage in the production of oranges. Egypt and Greece were the competitors, with average values of 16.9 and 19.7, respectively. The South African orange industry has positive export performance, with values close to 100, which indicates that the country is a net exporter of oranges and is experiencing a sustained comparative advantage. The RTA index values were mostly positive.

1. Introduction

The ambiguities in the term "competitiveness" as applied to firms, industries, and countries are discussed in this chapter. It examines several empirical studies that have attempted to quantify "competitiveness" or "price competitiveness," interpreting the measures used as predictors of relative export quantities, relative export shares, or the balance of trade in an industry. Wholesale price index ratios, export unit values, relative unit labor costs, import prices divided by export prices, and relative profits are examples of these measures. Despite the title, there is no definition or strict measurement of international competitiveness. This study suggests that exports, import penetration, and production growth rates are important indicators of a country's "competitive position" or "importance" in the world at various points.

What exactly is competitiveness? Nabi and Luthria (2002) explained it at the most basic level; it is simply "success" in global markets, which can be measured by South Africa's combined market share in Asian markets; this appears to be the most widely used measure of international competitiveness. Clearly, any change that increases the global sales of South African products while decreasing the sales of foreign products implies an increase in South African competitiveness; however, competitiveness, as defined above, includes the effects of all government-imposed aid and sanctions affecting both South African and foreign industries (Nabi & Luthria, 2002).

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A SYSTEMATIC REVIEW OF THE GLOBAL AND SOUTH AFRICAN ORANGE INDUSTRY: COMPETITIVE CONDITIONS AND MARKET DYNAMICS

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Abstract

This systematic review analyzes the global and South African orange industries, with a focus on their competitive landscape and market dynamics. Oranges, which were initially cultivated in the Himalayan foothills, have evolved into the most widely produced fruit globally, characterized by significant production and export volumes. Employing a systematic literature review methodology, this study consolidates findings from research conducted between 2000 and 2023, highlighting challenges such as disease outbreaks, climate change, market regulations, and the increasing significance of sustainability in consumer preferences. The analysis identifies North America, particularly the United States, as the leader in the global orange market, while the Asia Pacific region demonstrates a rising demand for orange juice. South Africa, which boasts a rich citrus heritage dating back to 1654, exports the majority of its orange production but confronts challenges related to compliance with international standards and intensifying global competition. The review assesses critical factors influencing the industry, including the utilization of natural resources, regulatory frameworks, and government support. The findings underscore the necessity for innovative strategies and sustainable practices to sustain competitiveness. The study concludes with practical recommendations for stakeholders, advocating for enhanced research and development, improved disease management, and diversification into value-added products to meet evolving market demands. This review offers valuable insights for policymakers, industry participants, and researchers seeking to promote resilience and growth within the orange sector.

1. Introduction

The orange industry, a significant segment of the global agricultural market, plays a vital role in food security, economic development, and trade across various regions. As one of the most widely consumed fruits worldwide, oranges are not only a valuable source of nutrition but also a critical driver of employment and income for millions of people, particularly in developing countries. This systematic review aims to provide a comprehensive analysis of the competitive conditions and market dynamics that shape the orange industry on a global scale, with a specific focus on South Africa as a key player in the international market. In recent years, the orange industry has experienced substantial transformations driven by factors such as climate change, shifts in consumer preferences, technological advancements, and evolving trade policies. These changes have created both opportunities and challenges for producers,

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International food safety standards and South Africa's orange exports to key Asian markets: An analysis based on the gravity model using three-dimensional data

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Abstract

This paper aims to analyze the impact of food safety regulations imposed by strategic Asian countries on South Africa's orange exports to these markets. The analysis employed a gravity model with three-dimensional data from 2003 to 2022. The model indicates that the influence of descriptive variables is significant with an f-statistic significant at the 1% level and an adjusted R-squared of 0.580 suggesting that variables account for a considerable share of variation in orange exports. It was revealed that an increase in the importer's GDP of 1% decreases South Africa's export performance while a rise in South Africa's GDP enhances it. Population growth positively influences export volumes. Furthermore, the exchange rate volatility at the 5% level supports rather than hinders export growth suggesting resilience within the industry. Notably, TBT measures positively and significantly influence orange exports contrary to fears that food safety issues might impede exports. In contrast, the insignificant and negative coefficient for SPS measures suggests a counterproductive effect on South African orange exports about food safety standards. Findings highlight crucial factors that affect and enhance South Africa's orange export growth providing important insights for policymakers and stakeholders in the agricultural export sector to navigate food safety regulations and optimize export strategies.

Keywords: Asian strategic markets, Competitiveness, Food safety standards, Gravity model, Hausman test, Orange exporters, Phytosanitary barrier, Technical barrier.

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