EXPLORING THE POTENTIAL MARKETING VALUE OF TRADE PERFORMANCE INDICATORS IN DRIVING THE INTERNATIONALISATION EFFORTS OF SELECTED INDUSTRIES IN SOUTH AFRICA

by

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DECLARATION

Name: Cornelius Henry Bothma
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I declare that this dissertation entitled "Exploring the potential marketing value of trade performance indicators in driving the internationalisation efforts of selected industries in South Africa" was submitted in fulfilment of the requirements for the degree of Master of Commerce in the field of Business Management (Marketing) at the University of South Africa (UNISA). The submitted dissertation is my own work and all sources/intellectual property used within this research study that is not my own, have been acknowledged by means of a complete reference. The dissertation was professionally edited – see Appendices F and G. The dissertation was also submitted to Turnitin for similarity checking (see Appendix H). Should it occur that plagiarism be detected, I acknowledge that I will be held accountable.

I declare that I have not previously submitted this work in its entirety for examination at UNISA for another qualification or for a degree at any other higher education institution. I do declare, as per point 7.6 in the Procedures for Masters and Doctoral Degrees, that the three articles that make up part of this dissertation have been submitted for consideration with accredited journals for publishing. The journal editors have been informed that the respective articles submitted to their journal forms part of this dissertation.

The article submissions in question are:

1. Article 1: Was submitted to the *South African Journal of Economics* on 6 June 2023. Feedback with requested changes was received on 9 August 2023. These requested changes have been addressed and the article has been resubmitted.
2. Article 2: Was submitted to the *Journal of International Trade and Development* on 17 October 2023. The editors felt that the journal did not meet the journal aims and scope, and the editor invited the authors to resubmit to a sister journal. The article was thus resubmitted to the *Journal of Applied Economics*.
3. Article 3: Was submitted to the *Management Dynamic* on 29 February 2024. No feedback has been received yet.

Finally, I declare that, although my supervisor appears as co-author of the three articles identified above, I have been primarily responsible for undertaking the research incorporated in the articles and the rest of the dissertation, as well as in writing the content of the articles/dissertation. I acknowledge that my supervisor has played an important role as mentor in this process and that I agree that he appears as co-author.

24 February 2024

SIGNATURE **DATE**

(Cornelius Henry Bothma)

26 February 2024

SUPERVISOR'S APPROVAL **DATE**

(Prof J.Chigada)

ABSTRACT

This interdisciplinary study explores the potential marketing application of trade performance indicators in the internationalisation endeavours of industries, with a specific focus on the footwear and leather industries in South Africa. The study posits that these indicators could contribute to the planning, implementing, and controlling of the international marketing management functions of industry bodies such as the South African Footwear and Leather Industries Association and the South African Footwear and Leather Export Council. An extensive search of academic bibliographies reveals that while some industries do make use of trade performance indicators in different ways, the research into the marketing usefulness of such indicators at industry level is limited. In addition, trade indicators are generally used on an ad hoc basis, oftentimes quite superficially, and mostly for macro-economic analysis. This study adopts an article-based approach and attempts to address the aforementioned shortcomings by way of three articles that make up the body of the study, supported by an introductory and concluding chapters.

The first article presents a concordance exercise that strives to match industry data from Statistics South Africa, with trade data originating from Customs and Excise, the two official respective sources of this data. The reason for this concordance exercise was to add value to two sets of data (activity data versus product data) which are currently classified in very different ways, by matching them in an objective and organised manner. With the outcome of article one being the concordance of these two sets of data, it is now possible to extract more meaning from the two sets of matched data. Also, the concorded data, made it possible to calculate several of the trade performance indicators that are used later in the study and that draw on both industry-output data and trade data. The findings from this article are used in the article number three.

The second article brings another dimension to the study, beyond the concordance exercise, by undertaking a scoping review of the academic literature to compile a comprehensive list of trade performance indicators at industry level. The article identified 101 trade performance indicators, considerably more than were found to be used in any one of the sources examined. This article’s outcome is the list of trade performance indicators (with supporting discussion) identified from the literature, prioritised according to their popularity in the

literature. A typology of these trade performance indicators was then compiled. The findings from this article were also used in article number three.

Article number three draws on the concordance exercise in article one, together with the 13 most widely used trade performance indicators identified in article two, to calculate or compute outcomes for these indicators for the footwear and leather industries in South Africa. These computations are considered in terms of their potential marketing application in driving the internationalisation endeavours of the two industries in question, addressing the main aim of the study. It was found that all indicators had some marketing value to contribute, although some were more useful than others. These conclusions led to several recommendations of how these trade performance indicators could be adopted more pragmatically by industries in South Africa.

The study's contribution to knowledge is (a) the concorded industry and trade classifications, (b) the scoping review of trade performance indicators which identified more than 100 trade indicators used at industry level, and (c) practical recommendations for wider and more meaningful use of trade performance indicators by industries in their international marketing efforts (and possibly by their member firms). All three articles have been submitted for publishing. The dissertation presents a single study based on a multi-method research design.

Keywords: trade performance indicators, industry level, industry internationalisation, concordance, international marketing

OPSOMMING

(Afrikaans)

Hierdie interdissiplinêre studie verken die potensiële bemarkingstoepassing van handelsprestasie-aanduiders in die internasionaliseringspogings van bedrywe, met ’n spesifieke fokus op die skoenbedryf en leerbedryf in Suid-Afrika. Die studie postuleer dat hierdie aanduiders kan bydra tot die beplanning, implementering en beheer van die internasionale bemarkingsbestuursfunksies van bedryfsliggame, soos die Suid Afrikaanse Skoen- en Leerbedryfsvereniging (South African Footwear and Leather Industries Association) en die Suid-Afrikaanse Skoen- en Leeruitvoerraad (Suid African Footwear and Leather Export Council). ’n Grootskaalse soektog na akademiese bibliografieë het getoon dat hoewel sekere bedrywe gebruik maak van handelsprestasie aanduiders op verskillende maniere, die navorsing oor die bemarkingsnut van sulke aanduiders op bedryfsvlak tog beperk is. Verder word handelsaanduiders gewoonlik op ’n ad hoc-basis gebruik; dikwels baie oppervlakkig en meestal vir makro-ekonomiese ontleding. Hierdie studie neem ’n artikelgebaseerde benadering aan en probeer om die bogenoemde tekortkomings aan te roer deur te kyk na drie artikels wat die liggaam van die studie vorm, ondersteun deur ’n inleidings- en slothoofstuk.

Die eerste artikel bied ’n ooreenstemmingsoefening aan wat probeer om bedryfsdata van Statistiek Suid-Afrika te laat pas by handelsdata wat afkomstig is van Customs en Excise, die twee amptelike onderskeie bronne van hierdie data. Die rede vir hierdie ooreenstemmingsoefening was om waarde toe te voeg tot twee datastelle (aktiwiteitsdata teenoor produkdata), wat tans op baie verskillende maniere geklassifiseer word, deur hulle te laat pas op ’n objektiewe en georganiseerde wyse. Met die uitkoms van artikel een wat die ooreenstemming van hierdie twee datastelle is, was dit moontlik om meer betekenis uit die twee stelle gepaste data te kry. Die ooreengekome data het dit verder moontlik gemaak om verskeie van die handelsprestasie-aanduiders te bepaal wat later in die studie gebruik is en wat gekry is van sowel bedryfsopbrengsdata as handelsdata. Die bevindings uit hierdie artikel is toe gebruik in artikel nommer drie.

Die tweede artikel voeg nog ’n dimensie by die studie buiten die ooreenstemmingsoefening deur ’n verkennende oorsig van die akademiese literatuur te onderneem om ’n omvattende lys handelsprestasie-aanduiders op bedryfsvlak saam te stel. Die artikel het 101

handelsprestasie-aanduiders geïdentifiseer, aansienlik meer as wat gebruik is in enige van die bronne wat genoem is. Die artikel se uitkoms is die lys handelsprestasie-aanduiders (met ondersteunende bespreking) wat uit die literatuur geïdentifiseer is, en wat geprioritiseer is volgens die gewildheid daarvan in die literatuur. ’n Tipologie van hierdie handelsprestasie-aanduiders is toe saamgestel. Die bevindings van hierdie artikel is ook in artikel nommer drie gebruik.

Artikel nommer drie maak gebruik van die ooreenstemmingsoefening in artikel een, saam met die 13 mees gebruikte handelsprestasie-aanduiders wat in artikel twee geïdentifiseer is, om uitkomste vir hierdie aanduiders vir die skoen- en leerbedrywe in Suid-Afrika te bereken of te bepaal. Hierdie berekenings word oorweeg wat betref hulle potensiële bemarkingstoepassing om die internasionaliseringspogings van die twee bedrywe wat ter sprake is aan te dryf om die hoofdoelwit van die studie aan te roer. Daar is gevind dat al die aanduiders bemarkingswaarde gehad het om by te dra, hoewel sommige aanduiders van meer nut was as ander. Hierdie gevolgtrekkings het gelei tot verskeie aanbevelings oor hoe hierdie handelsprestasie-aanduiders meer pragmaties aangeneem kan word in bedrywe in Suid-Afrika.

Die studie se bydrae tot kennis is (a) die ooreengekome bedryfs- en handelsklassifikasie; (b) die verkennende oorsig van handelsprestasie-aanduiders, wat meer as 100 handelsaanduiders geïdentifiseer het wat op bedryfsvlak gebruik word; en (c) praktiese aanbevelings vir ’n wyer en meer betekenisvolle gebruik van handelsprestasie aanduiders deur bedrywe in hulle internasionale bemarkingspogings (en moontlik deur hulle lidondernemings). Al drie artikels is ingedien vir publisering. Die verhandeling bied ’n enkele studie, gebaseer op ’n multimetode-navorsingsontwerp.

Sleutelwoorde: handelsprestasie-aanduiders, bedryfsvlak, bedryfsinternasionalisering, ooreenstemming, internasionale bemarking

OKUCASHUNIWE

(IsiZulu)

Lolu cwaningo lwezinhlaka ezihlukene luhlose ukuthola izindlela ezingasetshenziswa ezimakethe njengezinkomba zokusebenza kwezohwebo ukuze izimboni zisebenze ngokwamazwe ngamazwe, ngokugxila ngokukhethekile embonini yezicathulo neyesikhumba eNingizimu Afrika. Ucwaningo lubona ukuthi lezi zinkomba zingafaka isandla ekuhleleni, ukuqalisa ukusebenza, nokulawula imisebenzi yezokuphathwa kwezimakethe zamazwe ngamazwe ezinhlakeni zezimboni, njengeSouth African Footwear and Leather Industries Association kanye neSouth African Footwear and Leather Export Council. Uhlolo olunzulu lwezincwadi zezifundo luveza ukuthi, nakuba ezinye izimboni zizisebenzisa ngezindlela ezihlukile izinkomba zokusebenza kwezohwebo, kodwa kuba nemikhawulo mayelana nocwaningo ngokusebenziseka kwezimaketha ngokwalezi zinkomba ezingeni lezimboni. Ukwengeza, izinkomba zohwebo zivame ukusetshenziswa njengendlela yesikhashana; ngezikhathi ezithile, zikhe phezulu, futhi ikakhulu uma kuhlaziywa umnotho omkhulu. Lolu cwaningo lusebenzise uhlelo lokuhlaziya imibhalo futhi luzama ukubhekana nokusilela okukhulunywe ngakho ngenhla ngokusebenzisa imibhalo emithathu eyakha indikimba yocwaningo, ngokwesekwa yisahluko sesingeniso nesiphetha.

Umbhalo wokuqala umelele imvumelwano ekufaniseni imininingwane yemboni yabakwaStatistics South Africa, nemininingwane yohwebo yabezeCustoms and Excise, okuyimithombo emibili esemthethweni yale minininingwane. Isizathu sale mvumelwano ukwengeza ubumqoka bale minininingwane yomibili (imininingwane yomsebenzi uma iqhathaniswa neyomkhiqizo), nehlukaniswa ngezindlela ezihluke kakhulu, ngokuthi iqhathaniswe ngendlela ehlelekile futhi enenjongo ethile. Ngokwemiphumela yombhalo wokuqala omayelana nemvumelwano yalawa maqoqo amabili emininingwane, kube lula ukuphuma nencazelo ezwakalayo uma kususelwa kulawa maqoqo amabili emininingwane eqhathanisiwe. Imininingwane yemvumelwano iphinde futhi, yakwenza kwaba lula ukubala izinkomba ezimbalwa zokusebenza kohwebo nokusetshenziswe kamuva ocwaningweni nokukhishwe ngaphansi kwemininingwane yemiphumela yokusebenza neyohwebo. Imiphumela yale mibhalo isetshenziswe embhalweni wesithathu.

Umbhalo wesibili uhlinzeka ngokunye okuhlukile ocwaningweni ngaphezu kwemvumelwano ngokuthi ubuyekeze imibhalo yezincwadi zezifundo ukuze kuhlanganiswe uhlu olubanzi

lwezinkomba zokusebenza kwezohwebo ezingeni lemboni. Umbhalo uhlonze izinkomba zokusebenza kwezohweba eziyi-101, eziningi zazo kutholakale ukuthi zisetshenziswe kunanoma yimiphi imithombo ehloliwe. Umphumela walo mbhalo uwuhlu lwezinkomba zokusebenza kwezohwebo (nezingxoxo eziseka lokhu) ezihlonzwe ezincwadini, ezibekwe ngokwedumela lazo. Lapha kuye kwahlanganiswa lokho kwehlukana kwalezi zinkomba zokusebenza kwezohwebo. Imiphumela yale mibhalo nayo isetshenziswe embhalweni wesithathu.

Umbhalo wesithathu ukhuluma ngemvumelwano esembhalweni wokuqala, kanye nezinkomba eziyi-13 ezisetshenziswa kakhulu kwezokuhweba ezihlonzwe embhalweni wesibili, ukuze kubalwe noma kuhlanganiswe imiphumela yalezi zinkomba embonini yezicathulo nesikhumba eNingizimu Afrika. Lezi zibalo zihlanganiswe ngokohlelo lwazo lokumaketha olungase lusebenze ekuqhubekiseni imizamo yokosebenza ngokwamazwe ngamazwe kulezi zimboni ezimbili okukhulunywa ngazo ukuze kubhekwane nenhloso enkulu yocwaningo. Kutholakale ukuthi zonke izinkomba zinokuthile okungafaka isandla kwezezimakethe, nakuba ezinye ziwusizo kakhulu kunezinye. Lezi ziphetho ziholele eziphakamisweni ezimbalwa zokuthi lezi zinkomba zokusebenza kwezohwebo zingamukelwa kanjani ngendlela enempumelelo ezimbonini zaseNingizimu Afrika.

Igalelo lalolu cwaningo olwazini (a) yimboni enemvumelwano nokuhlukaniswa ngezigaba zohwebo; (b) ukubuyekezwa kwezinkomba zokusebenza kohwebo, okuhlonze izinkomba zohwebo ezingaphezu kwe-100 ezisetshenziswa ezingeni lemboni; kanye (c) nezincomo ezisebenza kakhulu futhi ngokunenjongo ngokwezinkomba zokusebenza kohwebo lwezimboni emizamweni yazo yokumaketha kumazwe ngamazwe (kanjalo futhi mhlawumbe nangamafemu okusetshenziswana nawo). Yomithathu le mibhalo ithunyelwe ukuze ishicilelwe. Inkulumo ebhaliwe echazayo yethula ucwaningo olulodwa, olususelwe ekwakhiweni kocwaningo lwezindlela eziningi.

Amagama amqoka: izinkomba zokusebenza kwezohwebo, izinga lemboni, ukusebenza ngokwamazwe ngamazwe kwemboni, imvumelwano, ukumaketha kumazwe ngamazwe

DEDICATION

I dedicate this dissertation to my beloved wife of 38 years who worked tirelessly to help me layout the dissertation and check my references.

Hopefully, this year will be the start of a new adventure together.

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LIST OF ACRONYMS AND ABBREVIATIONS

AAGR	Average Annual Growth Rate
AIEC	Automotive Industry Export Council
BEC	(Classification of) Broad Economic Categories
C&E	Customs and Excise
CAGR	Compounded Annual Growth Rate
CGE	Computable General Equilibrium
CI	Competitiveness Index
CN	Combined Nomenclature
Comtrade	Commodity Trade Statistics Database
CPC	Central Product Classification
DESA	UN Department of Economic and Social Affairs
DSM	Decision Support Model
DTIC	Department of Trade, Industry and Communication
EC	European Commission
ECIm	Export Concentration Index (market)
ECIp	Export Concentration Index (product)
EDI	Export Diversification Index
EGIESC	Expert Group on International, Economic and Social Classifications
EII	External-Internal Index
ESI	Export Similarity Index
EXPY	Export Sophistication
GDP	Gross Domestic Product
GLI	Grubel-Lloyd index
GM	Gravity Model
GRX	Growth Rate of Exports
GVC	Global Value Chain
HS	Harmonised System
HTS	Harmonised Tariff Schedule
ICSE	International Classification of Status in Employment
IeIT	Inter-Industry Trade
IFR	International Federation of Robotics
IIT	Intra-Industry Trade
ILO	International Labour Organization
IMF	International Monetary Fund
IMS	International Market Selection
IMTS	International Merchandise Trade Statistics
I-O	Input-Output (tables)
IRTII	Intra-Regional Trade Intensity Index
ISC	International Standards Classification
ISIC	International Standard Industrial Classification
ISICv3	International Standard Industrial Classification version 3
ITC	International Trade Commission
LI	Lafay Index
MI	Michelaye Index
MPI (or IPI)	Import Penetration Index
MTSCI	Merchandise Trade Specialisation Correlation Index
NAICS	North American Industrial Classification System

OA	Open Access
OECD	Organisation for Economic Cooperation and Development
OSF	Open Science Framework
PRISMA	Preferred Reporting Items for Systematic Reviews
PRODCOM	Products of the European Community
PRODY	Revealed Income Content of a Product
PtSA	Production Technologies Association of South Africa
R&D	Research and Development
RAMON	Reference and Management of Nomenclatures
RC/RCI	Revealed Competitiveness Index
RCA	Revealed Comparative Advantage
RCHI	Revealed Human Capital Index
R-CTFL	Retail-Clothing Textile Footwear Leather Master Plan 2030
RHI	Regional Hirschman Index
RIT	Regional Intensity of Trade
ROI	Regional Orientation Index
RPCI	Revealed Physical Capital Index
RTII	Regional Trade Introversion Index
RXA	Revealed Comparative Export Advantage
SA SIC	South African Standard Industrial Classification
SA-TIED	Southern Africa - Towards Inclusive Economic Development Programme
SACU	South African Customs Union
SAD500	Single Administrative Document
SAEEC	South African Electrotechnical Export Council
SAFLEC	South African Footwear and Leather Export Council
SAFLIA	South African Footwear and Leather Industries Association
SAISI	South African Iron and Steel Institute
SARS	South African Revenue Service
SARS-NT	South African Revenue Service – National Treasury
SIC	Standard Industrial Classification
SIG	Special Interest Group
SITC	Standard International Trade Classification
SME	Small and Medium Firms
StatsSA	Statistics South Africa
TDI	Trade Dependance Index
TI	Theil Index
TII	Trade Intensity Index
TIPS	Trade and Industry Policy Strategies
TOI	Trade Overlap Index
ToT	Terms of Trade
TSI	Trade Specialisation Index
TSI	Trade Share Index
TT	Total Trade
UN	United Nations
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNCEISC	United Nations Committee of Experts on International Economic and Statistical Classifications
UNCTAD	United Nations Conference on Trade and Development
UNESCAP	United Nations Economic and Social Commission for Asia Pacific

UNISA	University of South Africa
UNSD	United Nations Statistics Division
UNU-WIDER	United Nations University World Institute for Development Economics Research
US	United States
USCB	United States Census Bureau
USSIC	United States Standard Industrial Classification
WCO	World Customs Organisation
WITS	World Integrated Trade Solution
WoS	Web of Science
WOSA	Wines of South Africa
WTO	World Trade Organisation

CHAPTER 1
INTRODUCTION AND BACKGROUND TO STUDY

1.1 INTRODUCTION

This study explores the potential marketing value of computing key industry-level trade performance indicators underpinning the internationalisation endeavours of the footwear and leather industries in South Africa. The extensive literature on the benefits and importance of international trade (Kalita & Gogoi 2021; de Andrade Junior & da Silva 2024:1; Kose & Mulabdic 2024) serves as a backdrop to the study. To support the internationalisation efforts of an industry association and its members, and of the industry as a whole, a variety of marketing-related activities specifically aimed at internationalisation may be required. These activities may include promoting visits to international trade fairs and expositions, arranging outgoing selling missions, facilitating incoming buying visits from foreign firms or industries, promoting the image of the industry abroad, collating and distributing information on foreign markets, providing export training, striving to identify trade partners, and undertaking international marketing research, and more, all to the benefit of their members (Xaba 2009:22; Viviers & Cuyvers 2012:2; Massyn, Bezuidenhout & Kleynhans 2021:161; Veinbergs & Skadina 2021:3-5; Frontier Economics 2022:29,68&82). As part of an overall service to members, the industry association may undertake a statistical analysis of trade between the home country and the rest of the world. In this process, a host of trade statistics incorporating trade performance indicators may be compiled, to identify trade opportunities abroad and to track the trade performance of the industry in question (Viviers & Cuyvers 2012:2&40). While there is evidence of industry associations doing this type of trade analysis, the academic literature is not very comprehensive on this topic, as will be highlighted in the literature review that follows.

1.2 BACKGROUND AND LITERATURE REVIEW

The use of trade performance indicators to identify trade opportunities abroad and to track the trade performance of an industry, by an industry association or other interested parties such as government and industry members, raises several considerations in need of addressing, the first being the role of trade indicators at industry level. This consideration is at the core of this study. The second consideration is the link between

the trade activities of an industry as a subset of the manufacturing production activities of that industry, justifying a compilation of the trade indicators and manufacturing analytics for the industry in question. The third consideration requires clarity on the terminology used, such as ‘industries’, ‘industry organisation’ and ‘industry associations’ The fourth consideration that needs addressing requires an exploration of the use of trade indicators by industry associations to promote their industry as a whole, as there are both commonalities and substantial variation in the indicators used in the literature, and no evidence of a single complete and comprehensive list or source of trade indicators. The final consideration addressed in this section, is about the marketing focus of this study.

1.2.1 Trade indicators at industry level

The trade measures or metrics used to measure trade potential or trade performance are commonly referred to as 'trade indicators'. Drawing on several sources, the following definition has been distilled from the literature: Trade indicators are observable phenomena captured as metrics, or formulae, usually quantitative in nature, but they could be qualitatively described as well, that incorporate raw data or other inputs, to generate statistics, analytics, measures, indices or descriptions, that assess or reflect the potential, development, performance and changes associated with the trade endeavours of a country, industry, region, or the world as a whole (Mikic & Gilbert 2009; Keita-Ouane 2011; USAID 2013; Totalitarion 2018). Trade indicators are not models (such as the gravity model [GM] or the computable general equilibrium [CGE] model) or complex algebraic functions comprising multiple indicators.

The measurement of trade at a macro level using trade indicators (or formulae), is widely discussed in the literature. At a supra-macro level many multinational organisations are involved in measuring trade performance across countries around the globe using trade indicators (OECD 2010; WTOa 2010; UNStats 2011). At the same time, governments of countries also strive to measure their macro trade performance in various ways, with this insight driving national trade policymaking (Armstrong 2011; Fontoura & Crespo 2015; Stern & Ramkolowan 2021; Kang & Park 2022). The widespread use of trade indicators cannot be disputed.

There is also extensive evidence in the literature of the use of trade indicators at industry level (Pekarskiene 2014:393; International Labour Organization [ILO] 2021:7; Mutambara

& Ndzabukelwako 2021; Tampubolon & Nababan 2022:49; Quantec 2023; Zhang & Chatwin 2023:64). Some governments may strive to measure the trade potential and/or performance within the country's industries through their national statistics services (StatsSA 2023)[1]. In addition, or alternatively, industry associations may take on this challenge on behalf of the industry stakeholders in question (which may include government) (Bopage and Sharma 2014; Department of Trade, Industry and Communication [DTIC] 2017:56; Mhonyera, Steenkamp & Matthee 2018:7). In the South African context, the DTIC (2023) supports several export councils focusing on specific industry sectors, and these export councils will often make trade information available for their members, incorporating several trade indicators. One such example is the South Africa Footwear and Leather Export Council (SAFLEX) that produces a quarterly report that includes performance-related trade figures (Gonyora 2023). To a greater or lesser extent, this is true of many industry associations in South Africa – the extent of trade information and specifically trade indicators, available from local industry associations, however, vary quite considerably. These export councils and industry associations can be accessed on the DTIC website – their list is not a complete list.

The focus of this study is on the industry-level trade indicators. Trade indicators used to measure trade performance at macro and meso levels are often very similar, except that the industry-level indicators are industry specific at the meso level, while they are aggregated for a country at the macro level. Thus, one might use export/import growth for a country as a macro trade indicator or export/import growth for an industry as a meso trade indicator (Mikic & Gilbert 2009). Similarly, one might use exports/imports as a share of total GDP at macro level, or industry exports/imports as a share of total industry output at meso level. Other examples of trade indicators include, the absolute growth of exports and imports, the comparative growth of exports and imports, export/import volumes versus values, shares of exports and imports of the country's gross domestic product (GDP) (or industry output), and shares of world exports or imports, revealed comparative advantage, as well as relative trade terms (Mikic & Gilbert 2009). The work by Mikic and Gilbert (2009), entitled *Trade Statistics in Policy Making: A handbook of commonly used trade indices and indicators*, is a comprehensive source of trade indicators that served

1 It is worth noting that Statistics South Africa (StatsSA), South Africa's official statistics authority, has produced reports related to trade performance (namely measuring export and import unit values), but only twice over the years; in 2013 (StatsSA 2013) and 2023 (StatsSA 2023).

as inspiration for this study, and is therefore used as a benchmark source for this study. As the scoping review in Chapter 3 of this study will reveal, there are other similarly comprehensive sources of trade indicators.

At an industry level, trade indicators provide different perspectives of and insights into the trade (or foreign market) potential of, or trade performance within, that industry. These indicators may enable industry stakeholders (industry association leaders and member firms within the industry) to assess, plan, operationalise, lead and measure/control the industry's or firm's internationalisation efforts. In the case of an industry association, this may involve identifying which markets or regions for the industry to focus on, and/or tracking the industry's trade performance (such as evaluating the export growth and competitiveness of an industry in each country or region, or changes in trends).

The indicators may also serve as input into the planning and management of member firms' export endeavours. While trade indicators have a role to play in the process of international market selection (IMS) and market entry (Swoboda, Schwarz & Hälsig 2007:273-274; De Pin & Fiore 2022:11&16), many firms (especially smaller firms) may, because of a lack of resources or skills, neglect the broader statistical evaluation of trade between countries, seeing such information as not being relevant to them and instead "often rely on their instincts" when selecting countries to enter (Cederqvist 2018:4). If industry associations computed a range of trade indicators on various foreign markets for their members, the insight gained from these trade indicators could prove useful to member firms in their IMS efforts. The focus of this study is on the broader industry, and not on industry members as such, although it is acknowledged that industries are made up of firms and firm efforts have a significant impact and influence on the industry and on any industry body that may exist.

1.2.1.1 Defining trade performance

In the above discussion, the term ‘trade performance’ has been used on several occasions and requires defining. A search on Google and Google Scholar reveals more than 723 000 and 44 200 mentions[2] respectively for ‘trade performance’. However, after examining the results, no succinct definition could be found for this term. It is a

2 As of 22 February 2024.

combination of two terms ‘trade’ and ‘performance’. Trade, in this study’s context, has to do with the exports and imports of a country (it could be for the country as a whole or for sub-sectors such as a specific industry).[3,4] Performance, in turn, can be defined as the activity of doing a job well (Cambridge Dictionary 2022). Combining these two explanations, ‘trade performance’ can be explained as reflecting how well trade is undertaken by a country, or industry.

1.2.2 Linking trade to production

While the focus of this study is on selected industries and more specifically, the associations representing the industries in question, examining the trade of the industry alone without examining the productive output of that industry would mean that many of the indicators could not be measurable. For example, one indicator from the UNESCAP handbook mentioned earlier, is export propensity. This metric calculates total bilateral exports as a percentage of the GDP of the country in question at macro level. At industry level, one could calculate total bilateral exports of an industry as a percentage of the output of that industry. For this reason, it is essential not only to measure the trade of an industry, but also the output of that industry. This has important implications for this study as the two activities – trade and manufacturing output – are recorded by different organisations in South Africa, namely Customs and Excise (C&E) and Statistics South Africa (StatsSA). Not only are they recorded by different organisations, but they are also captured according to different classification systems (the Harmonized System [HS] for trade, and the Standard Industrial Classification [SIC] for industry output). These two systems are not directly compatible and a concordance table that matches the two systems would first need to be developed for this purpose. This is the focus of Chapter 2 and is briefly introduced later as part of the problem statement and again under the research methodology section.

3 The term 'trade' could have different meanings such as 'doing a trade' use in the context of electrical, plumbing, or other similar services, or in the context of the retail and wholesale trade. Thus 'trade performance' could have a different meaning other than in context of global trade.

4 It is worth emphasising that trade includes both imports and exports, and many of the trade indicators will include both exports and imports, while other trade indicators may focus on exports separately from imports.

1.2.3 Industries, industry organisation and industry associations

Before defining an industry association, it is important to clarify the concept of an 'industry'. One of the earlier researchers on the topic of industry is Richardson (1972:883) who defined the term as "… a dense network of cooperation and affiliation by which firms are inter-related." His subsequent discussion suggests this network of 'commonality' (firms that have common activities, processes, target audiences, suppliers, methods, and products) exists – or is positioned – between the firm and the market (or economy).

There are several ways of describing the organisation of industries. Perhaps the most widely used method is the United Nations (UN) International Standard Industrial Classification (ISIC) system that organises the industries according to:

> "… a coherent and consistent classification structure of economic activities [also referred to as "industries"] based on a set of internationally agreed concepts, definitions, principles and classification rules. It provides a comprehensive framework within which economic data can be collected and reported in a format that is designed for purposes of economic analysis, decision-taking and policymaking. The classification structure represents a standard format to organize detailed information about the state of an economy according to economic principles and perceptions" (Hernandez 2021:online).

Turning to industry associations, these can be defined as "… a collective body of members of industry (companies) who work together for the mutual benefit of the members and for the economy as a whole" (Production Technologies Association of South Africa [PtSA] 2019:slide3). Thomas and Potts (2018) offer a more detailed description of the tasks of an industry association. They see an industry association as member-based institution that represents the collective internal and external interests of a particular industry and that:

- Lobbies and negotiates with government to shape government policy and regulation.
- Promotes technical standards and industry self-regulation.
- Promotes the industry as a whole.
- Coordinates industry-relevant training.

Other authors would add further tasks to this list of services, including trade promotion (Wilkinson, Mattsson & Easton 2000:288), providing internationalisation assistance to members (especially small and medium [SME] firms) (Costa, Soares & de Sousa 2020:1; Singh et al 2022:116), and measuring the "internationalisation performance" of members of the association (Singh et al 2022:126).

1.2.4 The use of trade indicators by industry associations

As the emphasis of this study is on the use of trade indicators at industry level, especially by industry associations, a search was done on the Scopus and Web of Science (WoS) bibliographies, as well as Google Scholar, for the key-phrases "industry associations" and "trade indicators". The results are presented in Table 1.1 below.

Table 1.1: Search results for the key-phrases search algorithm: *"industry associations" AND "trade indicators"*[5]

Row	Key phrase	Scopus	Web of Science	Google Scholar
1	"industry associations"	3 745	686	85 800
2	"trade indicators"	122	69	8 560
3	"industry associations" AND "trade indicators"	0	0	106

Sourced on 21 October 2023

The search results in Table 1.1 suggested that while "industry associations" (row 1) and "trade indicators" (row 2) have quite substantial results as individual search phrases, when combined (see row 3), the results are significantly less. This suggests that the use of the term "trade indicators" in combination with the term "industry associations", is not common in the academic research. The most recent of the Google Scholar results (since 2019, which translate into 18 results) were examined more closely. Of the 18 results, three were not accessible or in a foreign language and so only 15 articles were examined. Of these, the majority discussed 'trade indicators' and 'trade associations' in very separate contexts. For example, one source discussed 'industry associations' (one mention only) as the source of the data for the planned research, while 'trade indicators' (one mention only) was part of a broad phrase, namely "time-to-trade indicators" – neither use of the two terms was relevant to this study (Sharafeyeva 2021:48&50). Another

5 Both singular and plural terms were explored. It was found that plural had more results. For example, on Google Scholar, the following results were obtained; “industry association” AND “trade indicator” (40), “industry associations” AND “trade indicator” (30), “industry association” AND “trade indicators” (90), “industry associations” AND “trade indicators” (116).

example is the study by Desta (2021:19) that has one mention of 'industry associations' highlighting their value in facilitating the export competitiveness of their members (a point that is relevant to this study), and another separate point where they refer to a different study that used 'trade indicators' to measure export competitiveness. Again, the two issues are discussed in separate contexts.

None of the articles identified, specifically discussed the use of trade indicators by industry associations to assist their members in their exporting endeavours or to measure the performance of the industry's internationalisation efforts as a whole. The one article by Yu, Hlibko, Petrova and Loktionova (2020) does use trade indicators as a measure of high-tech trade in Ukraine, which is indicative of the use of trade indicators to measure and promote trade within industries as is envisaged in this study. There were a few 'take aways', however. Several studies alluded to the role of industry associations as channels for reaching the international trade community (Kathuria 2018:530; Frederick & Daly 2019:48-49, Mtanga & McCamel 2019:2; UNCTAD 2021:115&175). The importance of industry associations serving as a way of promoting the internationalisation of the industry in question, as well as of the firms in that industry, is an important justification for this study. This argument is supported by the research of Kweka and Sooi (2022:16), who posit that industry associations serve as an important partner for local industry firms planning to, or already going global.

From a practical perspective, an online review of websites of the industry associations and export councils in South Africa (available on the DTIC website)[6], reveals that several of these organisations are providing trade statistics and a few of the organisations draw on a limited range of trade indicators. Examples of these associations include the Automotive Industry Export Council (AIEC) (AIEC 2022), the South African Electrotechnical Export Council (SAEEC) (SAEEC 2023), the South African Iron and Steel Institute (SAISI) (SAISI 2023), and Wines of South Africa (WOSA) (WOSA 2023).

6 It is concerning that the DTIC, the lead government department that promotes trade in South Africa and that funds many of the export councils, as well as supporting many industry associations does not display all of these organisations' website addresses on the DTIC website. Twenty-six out of 40 named organisations do not have websites on the DTIC website, even though most of these the organisations do indeed have websites.

The AIEC is a good example of the role of an industry association's impact on the internationalisation efforts of the sector and the use of trade indicators to this end. The AIEC provides several downloadable reports, including *SA-EU, UK and EFTA trade analysis* and *Localisation and export development matrix 2017-2021* (AIEC 2022). There are more. These are clearly valuable research reports for the members of the automotive industry. While the reports provide basic import and export data, the reports do not feature many trade indicators per se. Examples include basic indicators such as "automotive imports as % of region's imports", "trade surplus", and "% of total export value". However, some of the figures presented in the report suggest that there are trade indicators 'behind' the figures. Notwithstanding the dearth of trade indicators in these reports, the imports and exports are quite detailed and would be of considerable value to industry members. It is posited that if more trade indicators were used, interpreted, and presented to members, even richer insights could be extracted from the data underlying this report. There are several other similar reports on their website.

WOSA is another industry association that is also providing extensive support and statistical analysis to their members, and they have a dedicated site to promote and distribute information and statistics on the wine sector (SAWIS 2023). The SAISI and the SAEEC are further examples of industry associations that provide a variety of statistics, including trade statistics, to their members. In most of these cases where industry associations provide trade statistics, the statistics are useful and relevant, but these statistics do not represent the typical trade indicators that are the focus of this study. Furthermore, in the case of many if not most of the export councils and local industry associations, very little trade statistics are available, if at all. This shortcoming points to a gap that needs to be addressed.

‘Industry internationalisation’ or ‘internationalisation of industries’ or ‘internationalisation at industry level’ are indeed topics discussed in the academic literature, with 83 results on Google Scholar, 34 on Scopus or WoS. When ‘trade indicators’ or ‘trade performance’ are added to the search algorithm, however, the literature is far less forthcoming with articles. Only three articles were found, and all were dated – 1989 to 2001. While this may lead one to believe that this topic – the measurement of trade performance indicators at industry level – is unworthy of study. There is evidence to suggest differently. Osgood

(2017:642&657) argues, supported with evidence from the United States, that firms within industries “regularly part ways over trade policy, choosing to lobby or publicly comment on their own rather than collectively via their industry association”. This is notwithstanding the benefits that industry cooperation could offer firms. There is also evidence from China how industry clusters, by working together, can offer greater benefit to firms compared with working alone (Peng & Peisi, 2017:69). A more recent investigation by UNESCAP on the benefits of Mekong value chains, also highlights the benefits of industrial clustering and the positive impact on trade (Abe, Kim & Jahan, 2020:1-7). Other researchers have found similar results (Charykova, Sanikova & Polunina 2019:1; Fu, et al. 2019:1; Qiu & Yang, 2021:1; Chakraborty, 2024:3&5). Gawe (2021:14), who undertook a study in Zimbabwe, points out that for industrial clustering to work, there must be investment in infrastructure. In addition, such investment must be supported by a clear vision of how industry cooperation will work to the benefit of participating firms, which was lacking in the Zimbabwean case. With this evidence of the benefits of industry-level internationalisation activities, this study adopts the premise that such endeavours are an important responsibility of industry associations, and that trade performance indicators and related industry metrics, can play a key role in this effort.

1.2.5 The emphasis is on marketing

The study explores the marketing value of trade performance indicators to industry associations in their internationalisation efforts for the industry, which places this study in the realm of marketing. It is recognised that the trade indicators mentioned above are also important tools in economic analysis at the meso and macro levels. As such, this study could be seen as straddling two disciplines, namely marketing and economics. However, this study views trade performance measures as key inputs to be used not only by industry associations, but also by their member firms within given industries in their individual internationalisation efforts, pointing to a marketing activity.

Internationalisation is a key concept in international marketing management as argued by Berndt, Altobelli and Sander (2023:3-13). This view is supported by other authors such as Donthu, Kumar, Pattnaik and Pandey (2020:849-857) who undertook a bibliometric review of the International Marketing Review, a leading journal in the international marketing space (a journal in the top quartile of journals [87%], with 1 807 citations, and

a CiteScore of 8.5). The authors specifically refer to the internationalisation of industries as a key focus area of articles reviewed, and they find that “internationalisation seems to be the consistent thrust in the journal”, which they identify as the number one cluster stemming from their review (Donthu et al. 2020:849&850). They also highlight international performance measurement as a “hot and evolving” theme (Donthu et al. 2020:861). Coudounaris (2018:286), Solberg (2018:73), as well as Ashley, Mbuya and Vögel (2022:2413), also focus on internationalisation in the context of international marketing. This study is thus seen as an interdisciplinary study, given that it straddles the marketing and trade economics fields – this topic is revisited later in this chapter.

1.3 DELINEATING THE PROPOSED STUDY

As the proposed study is seen as an exploratory study, two closely related manufacturing industries were purposively selected within which to explore the usefulness of industry-level trade performance indicators for the internationalisation efforts of these two industries. The industries selected are the footwear and leather industry. The use of these two industries is justified as follows:

- These are two small industries with a small share of the local economy but that are both labour intensive and active. They represent different industries, yet are closely aligned, as the one industry is a key supplier to the other.
- Larger industries, such the automotive sector, typically have the financial resources and expertise to monitor their industry’s trade performance, while smaller industries do not.
- The leather and footwear industries have taken strain as a result of the impact of the pandemic and have not reached their combined 2019 pre-COVID volumes as yet. With total sales of R14.3 billion from September 2021 to August 2022, this represents a mere R0.1 billion (or 0.13%) increase over the previous 12 months from 2019 to 2021 for the two industries together. These are two small, struggling industries that would provide valuable insight as to whether industry-level trade indicators could help the industries and export firms within the industries in their internationalisation efforts.
- There is a single, active industry association representing both industries – the two industries clearly see themselves as aligned.

- The industry association – the South African Footwear and Leather Industries Association (SAFLIA) – is an active association with an up-to-date industry website (SAFLIA 2023) to serve as a springboard for members.
- Both industries are served by a formal export council supported by the DTIC, namely the South African Footwear and Leather Export Council (SAFLEC 2024).
- The industry association has a statistics manager as a potential point of contact for possible feedback on industry-level trade indicators.

Although other sectors such as agriculture, mining, construction, retailing, and services also have the potential for trade indicators to be used to measure their trade performance, this study only focuses on manufacturing. To begin with, the nature of these broad sectors is very different from manufacturing and to examine multiple sectors would require time and financial resources beyond the scope of the researcher. In addition, the South African manufacturing sector has been experiencing profound deindustrialisation since the 1980s, with manufacturing's share of GDP falling from just over 25% in the late 1970s to around 12% in 2022 (Fortunato 2022:3-6). In addition, the growth in South Africa's average manufacturing value added per capita is 0.5%, compared with countries such as Mauritius (1.6%), Namibia (2.0%), Thailand (2.9%), India (5.7%) and Vietnam (8.0%), highlighting the poor performance of manufacturing in the country (Andreoni & Tregenna 2021:237; Bowden 2021). Together, these concerns justify the need to focus on trade performance within manufacturing as a first step, and then to delineate the study even further to focus on the two industries identified above.

1.4 STATEMENT OF THE PROBLEM

The aforementioned literature review reveals three related challenges. Firstly, in South Africa there is a lack of concordance between the manufacturing data and trade data produced by StatsSA and C&E respectively. This means that it is not possible to bring together the data needed to calculate several of the trade indicators that exist, especially at industry level. This first challenge can be captured as a research question, namely: How can the industrial and trade classification systems in South Africa be concorded to enable industrial and trade data to be brought together to compute various trade performance indicators to enhance the internationalisation efforts of local industries?

Secondly, an initial review of the literature found no single comprehensive or complete list of trade indicators. There are sources that list numerous trade indicators, and many of these metrics are common across sources, but there also appear to be deficiencies between the various sources visited. These deficiencies include missing or differently named, described, or ordered indicators in the various sources considered in this initial literature review. This suggests that there is a need to scope the literature more thoroughly and to compile a single comprehensive and complete (as possible) list of trade indicators. This challenge can also be captured as a research question, namely: What indicators exist in the academic literature that could be used to compute the trade performance of local industries in South Africa?

Thirdly, no academic or publicly-available evidence could be found where a variety of trade indicators have been computed for and used to describe the trade performance or internationalisation efforts of the footwear and leather industries in South Africa. This gap points to an opportunity to undertake an analysis of the trade performance of these two industries, using a range of trade indicators. This shortcoming can also be captured as a research question, namely: What is the trade performance of each of the two industries selected for this study, as measured by the key trade performance indicators identified in the study?

It should be clear that these three challenges are interdependent. The concordance is needed to be able to calculate many of the indicators. A comprehensive list of trade indicators is required to explore the usefulness of trade indicators – it does not make sense to use an incomplete list of such indicators. To test the usefulness of the indicators at industry level, the trade indicators need to be calculated for a specific industry. Each of these tasks was undertaken and reported on in the form of three separate articles (discussed later in this chapter), the outputs of which feed into the conclusions and recommendations of the study. Taking the above-mentioned three challenges into account, the problem addressed is therefore: *The lack of research into the trade performance of the footwear and leather industries in South Africa, points to the need to compile and compute a comprehensive list of trade indicators to measure said trade performance of the industries in question.*

1.5 STUDY RESEARCH QUESTION

With the information gaps described and integrating the three sub-research questions identified above, the overall research question that this study will attempt to answer is: *By compiling and computing a comprehensive list of trade indicators and reporting on the trade performance for a given industry, what can be learnt from this insight to assist members and association leaders in planning, managing, and controlling their respective internationalisation efforts?*

1.6 RESEARCH AIM AND PURPOSE

The *aim* of this study is to take a pragmatic approach, based on a series of articles, to address the longer-term goal of guiding industry associations and industry member firms in using quantitative tools in the form of trade performance indicators for the planning, implementing, and controlling (PIC)[7] of the industry's (or firm's) internationalisation efforts. The *purpose* of this study is to contribute to this aim by developing the building blocks that can be used beyond this study, to achieve this longer-term aim.

1.7 RESEARCH OBJECTIVES

The research objectives for the proposed study can be divided into primary and secondary objectives. These are outlined below:

1.7.1 Primary objective

Based on the research question outlined earlier, the research objective that the proposed study will strive to achieve will be:

> *To explore the potential marketing value of using trade performance indicators in the internationalisation efforts of the footwear and leather industries in South Africa.*

7 The academic literature on 'management functions' is extensive, with over 168 000 mentions on Google Scholar. The tasks that make up the management function are described in many different ways by different authors, although there is often some similarity between the descriptions of the tasks that are involved in 'management'. These vary from 'planning, implementing, and controlling' (PIC) (Baur, Ladner & Bertschinger 2023:19), through planning, organising, leading, and controlling' (POLC) (Gordon, Raymond, Rose, Dennis and Bushel 2009), to 'planning, organising, staffing, directing, and controlling' (POSDC) (Prasad 1993). For the sake of simplicity, this study uses the acronym 'PIC' with the understanding that it covers the full range of management tasks or functions, especially in an international marketing context (see Houshmandrad & Fetanatfardhadhighi 2023:2).

1.7.2 Secondary objectives

Based on the primary objective identified above, the following secondary objectives can be identified:

1. To concord the Standard Industrial Classification system with the Harmonized System trade classification, both of which are used in South Africa, to enable the production and sales statistics captured by StatsSA to be brought together with the trade statistics captured by the C&E in South Africa, allowing industry-level trade performance indicators to be calculated for the footwear and leather industries by drawing on these two data sets.
2. To undertake a scoping review of the academic literature with the aim of compiling a comprehensive list of trade performance indicators, together with their formulae and definitions, that can be used at industry level.
3. To calculate a quantitative outcome for each of the most common trade performance indicators identified under secondary objective 2, using the trade and manufacturing output data identified under objective 1, for the footwear and leather industries respectively, and to extract and interpret the potential marketing value of these outcomes in the internationalisation efforts of the industries in question.
4. To recommend how these trade performance indicators could be used by the relevant industry body going forward to drive the internationalisation efforts of the footwear and leather industries in South Africa.
5. To identify further research opportunities in this field.

These five secondary objectives lead to very different research tasks and methodologies that build on each other to achieve the overall primary objective.

1.8 RESEARCH METHODOLOGY

In broad terms, this study was exploratory in nature and, in striving to achieve the objectives outlined in section 1.7 above, the study adopted a three-stage multi-method[8] research design, with each stage being presented as a journal article. These three articles address the first three of the secondary objectives, with the third stage dependent

8 This term can be written as ‘multimethods’ or ‘multi-methods’. In this study, the latter option is used, unless referring to its use by another researcher/author.

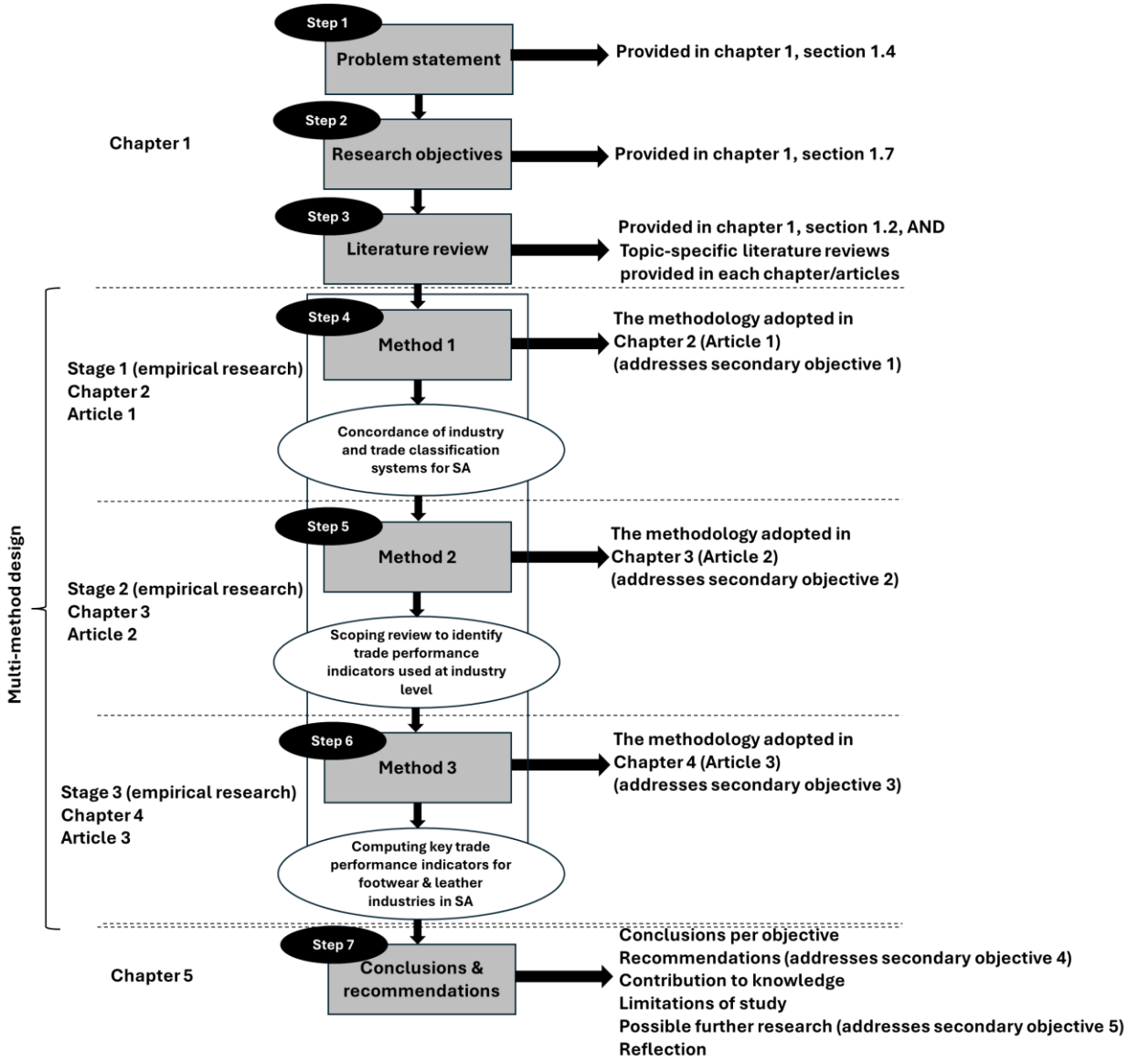
on the first two stages, and with the third stage leading to practical recommendations for the industry association and for further research, thereby addressing the remaining secondary objectives. A graphic depiction of the overall research 'roadmap' used for this study, starting with the research problem statement, and ending with the conclusions and recommendations, is provided in Figure 1.1.

The research roadmap begins with the problem identified in section 1.4, which led to the research objectives outlined in section 1.7. The problem, in turn, was distilled from an initial overview of the background and literature in section 1.2 of this chapter. This broad overview, together with the various literature reviews captured in each of the three articles, makes up the body of literature that supports the study. The study takes an interdisciplinary approach, which is discussed below. The three articles each adopted a different methodology.

The first stage of the empirical research design, discussed in Chapter 2 (Article 1), was focused on developing a concordance table that matched South African industry codes (based on the SIC classification) with trade codes (based on the HS classification). Because industrial activity and trade activity are measured according to different classification systems in South Africa and these two classifications had not yet been matched in the South African context, a concordance table was required to address secondary objective 1.

The second stage of the empirical research design, discussed in Chapter 4 (Article3), involved undertaking a scoping review of the academic literature to identify a comprehensive list of trade performance indicators (addressing secondary objective 2). This stage is discussed in Chapter 3 (Article 2). The third stage of the empirical research design computed the various trade indicators for the footwear and leather industries in South Africa, using (i) the concordance table (Article 1) to map trade data to industry sectors, and (ii) drawing on the list of trade indicators identified in the scoping review (Article 2). In so doing, secondary objective 3 was addressed. Finally, practical recommendations extracted from the indicators computed in Article 3, were pro-offered in Chapter 5, to drive the internationalisation endeavours of the two industries in question. This addressed secondary objective 4. Possible areas for future research were also

identified in Chapter 5, addressing the final secondary objective 5. In this way, these outcomes contributed to addressing the overall primary objective presented in section 1.7.1.



Source: Author's own compilation

Figure 1.1 Research methodology roadmap for study

The specific article-based methodologies are discussed in more detail in sections 2.6 in Chapter 2, 3.2 in Chapter 3, and 4.2 in Chapter 4.

1.8.1 Study scope

The scope of this study strives to understanding how trade performance indicators can serve as possible input to the internationalisation endeavours of industry associations in

South Africa, by combining trade data with industry data. While all possible trade performance indicators are of interest to this study, the scope of application is delimited to the footwear and leather industries in the country. The study strives to identify all possible trade indicators from the literature and then considers the most popular of these in the context of the two industries identified by drawing on trade and industry data to calculate the indicators in question for the two industries. To achieve this, the study needs to begin with a concordance exercise that enables trade data to be matched to industry data, to be used in computing the trade indicators for the industries in question.

1.8.2 An article-based approach

In discussing the broad methodology used in this study, it is important to note that this study is presented as an **article-based study**[9] comprising three separate articles in Chapters 2, 3, and 4. Each article is presented as a chapter with its own methodology (this is in contrast with traditional dissertation studies that have a single, all-encompassing research chapter/design). The three articles capture the three related activities (as described previously) that together contribute to achieving the stated primary research objective. Each of the articles included in this study incorporated literature relevant to the focus of the article, combined with unique research objectives and methodologies appropriate for the article concerned. Similarly, they included findings, a discussion, and conclusions. All three articles were submitted to accredited journals as part of the study. The complete dissertation, however, reads as a 'logical whole', with an introduction, the three articles, as well as conclusions, and recommendations in the final chapter. These conclusions and recommendations highlight the marketing value of the trade performance indicators investigated in the study, in driving the internationalisation efforts of the two industries in question.

1.8.3 The research design in the context of the ‘research onion’

In support of the research roadmap outlined above, the research design is also discussed in the context of the ‘research onion’. Using Melnikovas’ (2018:33-34) six-layer version of the ‘research onion’, originally proposed by Saunders (2016), the research philosophy, approach to theory development, methodological choice, research strategy, time horizon

9 All three articles have been submitted for consideration by various journals. Please refer to the declaration on page ii.

and research techniques and procedures are briefly discussed below. To begin with, the research philosophy adopted to guide this study is pragmatism. As Saah (2019:125) posits, 'pragmatism' leads to "real-world or practical applications"; the philosophy behind this study, as the findings and discussion in the three articles presented in this study, allude to a real-world application.

In adopting an approach to deal with the theory underpinning this study, an abductive approach is followed. An abductive approach "is a method of reasoning in which the researcher selects explanations that …best explain the relevant evidence" Visconti (2010:31). Paavola, Hakkarainen and Sintonen (2006), in turn, argue that abductive reasoning draws on a 'best guess' or makes conclusions based on available evidence. This abductive approach fits with the 'best judgement' approach to concordance development as used in Article 1 and which is also acknowledged by the UNSD – see section 2.6.2 in Chapter 2. In addition, the articles can all be argued to be abductive in their reasoning in that they strive to 'weigh up' the evidence collected and to propose a way forward, be it in the form of a typology in Article 2 or marketing internationalisation strategies as proposed in Article 3. Roriz and Feletto (2012:14) similarly use an abductive approach in studying the internationalisation process of Northeast Italian small businesses.

The objectives outlined in section 1.7 lead to very different research tasks and methodologies that built on each other using an interdisciplinary approach to achieve the overall primary objective. As this study strived to draw on trade indicators, trade data, and industry data with the aim of exploring the possible role of these indicators in the PIC of the internationalisation efforts of an industry, this study is argued to fall within the realm of interdisciplinary research. It is argued that in this study there is integration between the economic sciences, from where concorded industry and trade are drawn and combined with trade performance measures, and the marketing sciences, where this aforementioned input is used to reflect on the role of these indicators in industry internationalisation, an international marketing topic (Thai, Turkina & Simba 2022:226-228).

From a methodological perspective, the study uses a multi-method approach that included both qualitative and quantitative methods, but that are not necessarily linked to each other. Consider that the three articles that form the basis of this study are separate 'building blocks' leading to an outcome. Hunter and Brewer (2016:185) explain that "multimethods involve combining any different methods" and that "by combining different methods one has compensating strengths leading to more credible results". It should be said that there is no consensus on the definition of multi-method research (Roller & Lavrakas 2015:228). Given that this is a multi-method study, three different methods were used, namely (i) a concordance exercise, (ii) a scoping review, and (iii) computing a selection of key trade performance indicators for the footwear and leather industries in South Africa. The concordance exercise was essentially a qualitative study in which two classification systems were matched, but some quantitative values were calculated as an outcome, drawing on the concordance results. The scoping review was entirely qualitative, while the computation of trade performance indicators for the footwear and leather industries was a quantitative study. Thus the study comprised a mix of qualitative and quantitative methods as part of the multi-method methodological choice made.

The research strategies involved archival research (a scoping review), a concordance exercise, and formula computations. As this is a multi-method study, it also draws on cross-sectional (point-in-time) data as in the case of the concordance study and scoping review, but the computing of trade performance indicators draws on time-series data and can therefore be described as longitudinal research. As far as the data collection is concerned, for all three studies the population can be said to include the industry sectors in South Africa, with a specific focus on the footwear and leather industries in the country. The study draws on secondary data and as such, no traditional sampling was undertaken and is therefore not discussed.

1.8.4 An interdisciplinary study

Multidisciplinary, interdisciplinary and transdisciplinary (MIT) research have been popular themes in academic research since the 1980s. Choi and Pak (2006:356) explain that multidisciplinary research draws on knowledge from different disciplines with resultant research staying within a given discipline boundary, whereas interdisciplinarity "analyses, synthesises and harmonises" links between disciplines into a coordinated and coherent

whole. Transdisciplinary research, the authors argue, integrates disciplines in such a way that the results transcend traditional boundaries, leading to adapted or new disciplines. The literature is replete with mentions of the "problem of terminology" (Dalton, Wolff & Bekker 2021:1; also Uwizeyimana & Basheka 2017:3; Hardy et al 2021:1125).

The literature on interdisciplinary research involving international business and marketing reveals the importance of interdisciplinarity. Manrai (2015:1) posits that:

> "There is a great deal of interest among marketing scholars in conducting international and interdisciplinary research. Such research is highly relevant to assess global market opportunities, risks, rapidly changing geo-politics and other environmental dynamics. The international and interdisciplinary research could help understand the way these variables affect country selection and mode of entry decisions, design of global value chain, use of Internet and social media, and assessment of competitive threats."

Manrai (2015:1) also argues that international and interdisciplinary research is important to industries. Liesch et al (2011), in turn, make numerous mentions of interdisciplinarity in their article on the evolution of the international business field, while Ribau, Moreira and Raposo (2018:290) also argue for an interdisciplinary approach to the internationalisation of small businesses. Reddy (2014:267-269) warns that a simple mix of interdisciplinary streams is not enough, but that a more rigorous interdisciplinary research approach is required to bring different disciplines together to benefit international business. He outlines a "two-band model". The research of Reddy suggests that one might need to explore the role of trade performance indicators in the internationalisation of industries in greater depth going forward.

1.8.4 Ethical considerations

Unethical practices will ultimately lead to results that are not meaningful, thus negating the value of the study. To this end, it is important to adopt an ethical research approach. This involves being objective, diligent, honest, and fair as possible. The study was subject to ethical clearance by the University of South Africa's ethics committee and the various ethical requirements as set by the University were met as far as possible. Only secondary sources were used, and no actual participants were approached. In addition, at all stages

of the study, the approach used was as objective as possible and all contributions and sources were duly acknowledged. At every step of the way, effort was made to ensure that the results were carefully recorded, edited, analysed and interpreted without the influence of bias as much as is humanly possible. The ethical procedures followed in this study were approved by UNISA's ethics committee. The ethics certificate is attached as Appendix A.

1.9 CHAPTER OUTLINE

A chapter outline for the study is presented below.

1.9.1 Chapter 1: Introduction to the study (this chapter)

In the first chapter, the study is introduced and the various issues that serve as a background to the study, are discussed, supported by evidence from a broad literature review related to the topic under discussion. The background and literature review lead to a problem statement and research question, which is followed by the study aim, purpose, and objectives. Thereafter, the research methodology, ethical considerations, as well as chapter outline are presented.

1.9.2 Chapter 2: Article 1: Concording trade data with industry data for richer industry-level trade insights in South Africa

As no concordance exists between industry output measure according to SIC codes and trade measured according to the HS codes in the South African context, this concordance first needed to be created. This chapter presents Article 1 that explains the process that led to a concordance table, enabling industry and trade data to be linked. The concordance table, and resultant industry/trade data, served as input to Chapter 4 (Article 3).

1.9.3 Chapter 3: Article 2: The use of trade indicators in measuring trade performance at industry level: A scoping review

Chapter 3 presents Article 2 which describes a scoping review, drawing on the PRISMA process, to identify a comprehensive list of trade indicators that can be used to measure trade performance at industry level. These trade indicators are presented in tabular form, with each formula defined, formulae compiled, and a short description provided. The

chapter also discusses a proposed typology that can serve as a roadmap when using these trade indicators.

1.9.4 Chapter 4: Article 3: Calculating and interpreting key of trade performance indicators for the footwear and leather industries in South Africa

This Chapter draws on the list of trade indicators identified from the scoping review presented in Chapter 3 (Article 2), combined with the data obtained from the concordance exercise described in Chapter 2 (Article 1), to present Article 3 that calculates and briefly interprets the trade indicators for the footwear and leather industries in South Africa from a marketing perspective.

1.9.5 Chapter 5: Conclusions and recommendations

Finally, in this chapter, the conclusions that can be drawn from the findings for the study as a whole are presented. This is followed by a discussion of practical recommendations that could be adopted by the industry body in question (addressing secondary objective 4). The contribution to knowledge of the study, the limitations of the study and the potential for further research (addressing secondary objective 5) are also outlined in this chapter. The chapter ends with some reflection on the knowledge and experience that the researcher has gained from this study.

1.10 CONCLUSION

The study considers the use of the trade indicators in measuring the trade performance of selected industry sectors in South Africa. The role of trade indicators in measuring trade performance by industry association leaders in the PIC trade performance of the industry as a whole, is the focus of the study. The literature review highlights gaps in the literature with respect to (a) the lack of concordance between industry output data and trade data, making it difficult to calculate trade indicators, (b) the lack of a truly comprehensive and complete single list of trade indicators, and (c) the lack of computed trade indicators for the footwear and leather industries in South Africa. The footwear and leather industries were selected as industries for this study, with justification provided. These information gaps were translated into a research objective, and specific secondary objectives, leading to a discussion of the methods used for achieving these objectives. The discussion included ethical issues and a chapter outline.

PRELUDE TO ARTICLE 1

In this next chapter the first objective outlined in Chapter 1 is addressed. As explained in Chapter 1, Chapter 2 presents an article (Article 1) submitted to the South African Journal of Economics on 6 June 2023. Feedback was obtained from the article reviewers in August 2023. This feedback resulted in the article being extensively revised and resubmitted. The revised article is currently under review. The article outlines a concordance exercise to enable the trade data captured by C&E in South Africa to be linked to the manufacturing output data generated by StatSA. Using this linked data, the article presents a 'snapshot' of the combined data. This article will serve as input to a later article presented in Chapter 4 (Article 3).

It should be noted that the content of this article (including the abstract and keywords) is exactly as submitted to the journal in question, except that the heading numbers (including figure and table numbers [as well as the references to these tables and figures in the text]) have been changed to accommodate the chapter and heading numbering of this study, and the font style and spacing is in keeping with the style/spacing used for the dissertation as a whole, rather than for the journal. The reason for this is to keep an element of consistency across the dissertation. However, recommended examiner changes have also been addressed, as is required by the University. The footnotes are numbered per chapter, not across the entire dissertation. The references and appendices for Article 1 are presented at the end of the dissertation together with the other references for the other chapters/articles, as single combined reference list, so not to disrupt the readability of the dissertation.

CHAPTER 2
(ARTICLE 1)

CONCORDING TRADE DATA WITH INDUSTRY DATA FOR RICHER INDUSTRY-LEVEL TRADE INSIGHTS IN SOUTH AFRICA

ABSTRACT

A lack of a concordance table between the 1993 version of the South Africa standard industrial classification and the more recent 2017 harmonized system of trade statistics has until now prevented the integration of manufacturing output data, produced by the national statistics authority in South Africa, with trade data captured in the country's customs and excise authorities. The concordance exercise reported on in this article brings together two disparate classifications, making it possible to link industry production data based on an old classification system, with trade data based on a newer and different classification system. The concordance of the old and new classification systems creates the potential for richer insights into the economic activity at industry level in South Africa.

Keywords: Concordance analysis, Harmonized System, manufacturing data, South Africa, Standard Industrial Classification, trade data, industry level.

2.1 INTRODUCTION

The field of economics is replete with classification systems. Examples include the Central Product Classification (CPC), the Classification of Broad Economic Categories (BEC), the Standard International Trade Classification (SITC), and the International Standard Industrial Classification System (ISIC), all from the United Nations (UN) Statistics Division (UNSD). In Europe, there is the Combined Nomenclature (CN) and the Products of the European Community (PRODCOM), while the Harmonized System (HS), the most widely used trade classification system in the world, is administered by the World Customs Organization (WCO). The United States (US), in turn, uses the US Standard Industrial Classification (USSIC or just SIC), the North American Industrial Classification System (NAICS), and the US International Trade Commission's (ITC's) Harmonised Tariff Schedule (HTS) (WCO 2023a; BLS 2024; Eurostat 2024; UNSD 2024; USITC 2024).

There are also many country-level versions of classification systems. The UNSD provides a document listing national classifications, sorted by country. There are 125 countries listed in this document ranging from the largest, the US, to some of the smallest such as Sao Tome and Principe and Micronesia (UNSD 2021). South Africa, however, is not listed in this document. South Africa uses the South African SIC (SA SIC) for classifying industrial activity, which is slightly different from, but based on, the ISIC (Statistics South Africa [StatsSA] 2012). The SA SIC is also different from the USSIC, which, although having the same name, has a different lineage.

The USSIC was originally developed in the 1930s and has been refined over the years (Pearce 1957). The US version of the SIC has been replaced by the NAICS. In Europe, an international version of the SIC (the ISIC) – different from the SIC used in the US – was developed in 1948 (UN 2008: iii). As alluded to earlier, South Africa's SIC is based on the ISIC and not the USSIC. The original version of the ISIC was v0 (or often just referred to as the ISIC). The South African SICv5 is based on the 1990 ISICv3 (StatsSA 2024:16).

The UN defines ‘classification’ as “a set of discrete, exhaustive and mutually exclusive observations which can be assigned to one or more variables to be measured in the collation and/or presentation of the data” (Hancock 2013[1]; UNSD 2018:3[2]), resulting in a classification system. In the literature on classification systems, the term ‘nomenclature’ is sometimes encountered. The UN suggests that terms ‘classification’ and ‘nomenclature’ are often used interchangeably, even though they are strictly speaking different concepts (UNSD 2018:3). The UN defines a nomenclature simply as “a convention for describing observations” (UNSD 2018:15). A classification, in comparison, brings structure and codes to the observations (UNSD 2018:15). The core of this study revolves around the matching (or concording) of codes across two different classification systems.

1 This report is currently under review to be updated.
2 There are examples of other industry classifications such as the NAICS (US Census 2022), but the SIC/ISIC are widely used.

To incorporate and analyse data from differing classification systems for the sake of economic analysis, correspondence or concordance tables are typically used. The term 'correspondence' is defined in the Cambridge Dictionary as a "connection between two things" (Cambridge Dictionary 2023). The UN Committee of Experts on International Economic and Statistical Classifications (UNCEISC), sees the terms 'correspondence'[3], 'concordance', and 'correlation' as having the same meaning (in their glossary; the terms, 'concordance table' and 'correlation table', link to 'correspondence table', and the definition provided for a "correspondence table" is:

> "…a tool for the linking of classifications. A correspondence table systematically explains where, and to what extent, the categories in one classification may be found in other classifications, or in earlier versions of the same classification. Tables are important for the development and harmonisation of international classifications. There are many different circumstances under which one may want to establish relations between classifications, and many forms which these relations may take" (UNSD 2018)[4].

This article reports on a concordance exercise that attempts to bring an outdated but still officially-used industrial classification in South Africa (StatsSA 2024:21) – the 1993 SIC version 5 (SICv5) – together with the newer 2017 Harmonized System (HS2017) trade classification. By bringing the old together with the new, it is possible to concord trade data with industry data for use in industry or firm-level economic trade research. The resultant concordance table provides the potential for richer and more meaningful insights for industry stakeholders in respect of trade within industries in South Africa.

2.2 BACKGROUND

The field of international trade research has been widely written about as evidenced by a search for the topic "international trade" on Google Scholar which generated more than 2.9 million[5] results. On browsing through these results, it is evident that the topic has been examined from a variety of perspectives. One such perspective is focused on

3 In this article, the term 'concordance' is mostly used, but occasionally 'correspondence" is used as an alternative.
4 In this article, where a quote is used but no page number is provided, it is because the source is online. Online sources use the year of copyright, or, if there is no copyright year, the current year.
5. Search conducted on 29 January 2024.

compiling international merchandise trade statistics (IMTS) on which there are over a 1 110[6] articles on Google Scholar. The importance of IMTS is that it is a key economic input in the balance of payments of nations, which, in turn, feeds into the macro-economic planning and policymaking of countries (Lal 2021). The 2013 Balance of Payments Manual (version 6) produced by the International Monetary Fund explains that IMTS "measure quantities and values of goods that, by moving into or out of an economy, add to or subtract from a nation's material stock of goods" (Valdivia-Velarde & Razin 2014:73). IMTS values represent the export and import figures that populate most research on international trade, often under the guise of merchandise 'exports' and/or 'imports'.

The view taken in this study is that the use of IMTS (reflected in the exports and imports of a country) in broad economic and business planning, as well as in policy and strategy development, is not enough. It is posited that trade statistics need to be combined with other economic, as well as with sectoral/industry, statistics to make the IMTS more meaningful to a wider range of users of these statistics, especially export firms in these industries. When trade data is combined with other economic data such as interest rates, inflation rates, exchange rates, growth rates, and more, and is examined at an industry level in combination with other industry-level data (such as manufacturing output), then the value of the data and the statistics extracted from the analysis thereof, gains significant traction. In this study, the focus is on bringing manufacturing data together with trade data by concording the industrial and trade classification systems in use in South Africa. In bringing these two classification systems together it means that manufacturing data and trade data can be combined at industry level for more meaningful research.

*2.*2.1 Industrial classification in South Africa

StatsSA is the official statistical authority in South Africa responsible for the gathering, compiling, analysis, and publication of a range of statistics for further consumption by government and other interested parties. As part of their responsibilities, StatsSA collects data and compiles a monthly report on manufacturing production and sales. The report is entitled: *P3041.2 – Manufacturing: Production and sales*. The challenge with this report is that StatsSA still use the SIC codes published in the 1993 *Standard Industrial Classification of all Economic Activities (SIC) fifth (5th) edition* (SICv5) for their report

6. Search conducted on 29 January 2024.

(StatsSA 1993; StatsSA 2024:21)[7]. This is so, even though StatsSA have introduced a newer version of the SIC codes as published in the *Standard Industrial Classification of all Economic Activities (SIC) Seventh (7th) edition* (SICv7) in 2012 (StatsSA 2012)[8]. StatsSA still has not adapted its P3041.2 reports to this newer version (StatsSA 2024:21). The SICv5 codes introduced in 1993 are now essentially outdated, yet widely used for analysis in the country (Budlender & Embrahim 2020:4).

The reason for this situation could be ascribed to the funding challenges reported in the press recently that threaten the functioning of the organisation (StatsSA 2020; Price 2021; Erasmus 2022). This lack of funding suggests that South Africa is unlikely to move to the newer SICv7 (StatsSA 2012) in the foreseeable future. Another development that may further delay the adoption of the newer SICv7 codes is that, while the SICv7 codes are based on the ISICv4 codes which have been the latest available ISIC codes, the UN plans to launch their version 5 of the ISIC codes in March of 2024[9] (UNCEISC 2023:2). This development would arguably make it illogical to adopt the SICv7, based on a soon-to-be-outdated version of the ISIC. Instead, it would make logical sense to develop a newer version of the South Africa SIC based on the ISICv5, but this takes time and resources. This development, together with the lack of resources that state organisations such as StatsSA face, suggests that the lack of concordance between the dated SICv5 and the newer ISIC and HS classifications may continue for some time.

Although based on an outdated classification, the P3041.2 report is a valuable and publicly-available source of industry data. Production is disaggregated according to third-level (three-digit) SIC codes for industry sectors, making it more relevant to industry associations and firms in these industries. StatsSA produces similar reports on agriculture and mining, as well as services, but this article focuses on manufacturing to serve as proof of concept and to serve as input for further research on trade performance in the country. The data in the P3041.2 report does not refer to exports or imports; it is concerned only with manufacturing data. StatsSA also produces occasional exporter-

7 The 1993 SICv5 is based on the even older ISIC classification from 1990.
8 There is a SICv6 also available based on the ISICv3.1
9 The complete structure of the ISICv5 was endorsed by the 54th session of the UN Statistics Council (UNSC) in New York in March 2023. The explanatory notes, introductory text and implementation plan will be presented for approval at the 55th session of the UNSC in March of 2024.

related reports that may examine trade issues, such as its report number P1042.6[10] on export and import price indices (StatsSA 2014) using Customs and Excise (C&E) export and import data.

2.2.2 Trade classification in South Africa

South Africa, one of the original participants in the HS committee and working party in 1988 (WCO 2018:48), helped develop the HS. While there are other trade classification systems besides the HS, such as the SITC, the HS is seen by the UN Statistical Commission as "the commodity classification for Compilation and Dissemination of international merchandise trade statistics" (UNSD 2007:slide 4). The HS is regularly revised and has undergone six revisions to date beyond the first version in 1988, namely in 1996, 2002, 2007, 2012, 2017, and the newly introduced 2022 version. The version name is commonly referred to by the launch date of the version (or revision). Thus, the latest version is referred to as HS2022.[11] As a member of the Harmonized System (HS) Convention, South Africa adopts the current version in place. Thus, until the end of 2021, South Africa used the HS2017 to report its exports and imports to the UN (Comtrade) Commodity Trade statistics database as part of the country's UN membership responsibilities. The UN Comtrade manages the largest depository of international trade data in the world.

From 2022 onwards, C&E, a division of the South African revenue services, adopted the HS2022 for recording trade activities (SARS 2022). However, as there is only one full year's worth of data based on the new HS2022 (as of January 2024), this study focuses on the previous HS2017 version of the HS classification, providing five years of similar data.

The C&E captures the details of a consignment moving into or out of the country on a Single Administrative Document (SAD500) form (ExportHelp 2023). The exporter, the buyer, the destination, the HS product code, and the value and volume of the trade are captured on this form, together with other relevant information. Aggregated trade figures are published monthly by C&E on their website according to the HS2022 classification

10 This report is somewhat dated.
11 There are other trade classification systems such as the SITC (Hungerland & Altmeppen 2021), but the HS is one of the mostly widely used (Altaheri 2019).

(previously the HS2017) (SARS 2022). Like many other countries, C&E publicly reports only broad aggregated trade data based on HS codes, together with the countries of destination/supply, without any deeper producer/buyer/seller/product/transportation details (SARS 2024). This information is also formally adopted by StatsSA, the National Treasury, the Reserve Bank, and the Department of Trade, Industry and Competition (DTIC). There are presumably agreements in place to enable this information sharing. Researchers can access and use this broad trade data as they wish from the C&E website, the UN Comtrade databank, the DTIC, or the Reserve Bank.

2.2.3 The challenge

While trade data is important at a macro (country) level, trade data's true value is arguably realised at a micro (company) or meso (industry) level (Abeysinghe & Arangala 2020). It is at the micro- or meso-level where industries and industry stakeholders can use this trade data, combined with manufacturing output, for strategic decision making and international marketing purposes. It is the relational dynamics between trade and manufacturing output for a country that is so useful to industry leaders and firms within the industries. Thus, if the intention is to leverage value from trade data, the focus needs to shift to where this data will be most useful. That is, to industries, associations, and firms within the industry. In so doing, it is possible to bring greater value to the usefulness of the data and its concomitant analysis. This is where concordances become valuable because they allow different data types to be matched so that their interrelationships can be analysed, and value extracted from these interrelationships. In the South African context, this involves bringing together trade data captured according to the HS by C&E, with industrial production figures captured according to the SIC by StatsSA. The first challenge with the above two classification systems, however, is that trade and industrial data are not directly comparable, because manufacturing data is collected according to the type of industrial activity involved, while trade data is collected according to a product's physical characteristics (Alvarez, Kreiter & Dolabella 2016).

The SIC classifies industrial activity in the country according to a five-level structure broadly organised as depicted in Table 2.1 below (a sample extract only). Each level is supported with a descriptor applicable to the level in question. Table 2.1 below illustrates a small extract from the SIC classification.

Table 2.1: An example of how the SIC is structured

Section	**A**	**AGRICULTURE, FORESTRY AND FISHING**			
Division		01	Crops and animal production, hunting and related service activities		
Group			011	Growing of perennial crops	
Class				0111	Growing of cereals (except rice), leguminous crops and oil seed
Class				0112	Growing of rice
Class				0113	Growing of vegetables and melons, roots and tubers
Etcetera					
Section	**B**	**MINING AND QUARRYING**			
Division		05	Mining of coal and lignite		
Group and Class			051	0510	Mining of hard coal
Group and Class			052	0520	Mining of lignite
continued					
		07	Mining of iron ores		
Group and Class			071	0710	Mining of iron ores
Group			072	Mining of non-ferrous metal ores	
Class				0721	Mining of uranium and thorium ores
Class				0729	Mining of other non-ferrous metal ores

The ISIC and SIC are similar – mainly the headings, codes and descriptions may vary.
Source: SIC version 5 (StatsSA 1993)

The international HS system, in comparison, comprises six digits at its most detailed level. However, individual countries (South Africa included) may use even more detailed codes to classify products that are exported and imported, down to eight or even ten digits of detail. The global standard is six digits, and it is the 6-digit code that is the focus of this study. Currently, more than 212 countries use the HS (WCO 2023a). At the 6-digit level of detail, the HS2017 has 5 387 items in its database. The HS classification is divided into sections (21), chapters (99), and HS codes ranging from 2-digit codes to 4-digit and 6-digit codes (each expansion of the codes represents greater product detail). The codes expand in levels of 2-digits each time (that is, 2, 4, 6, etc.). The HS system has a similar structure to the SIC and is depicted in Table 2.2 below.

Table 2.2: An example of how the HS is structured

Section	**I**	**PREPARED FOODSTUFFS; BEVERAGES, SPIRITS AND VINEGAR; TOBACCO AND MANUFACTURED TOBACCO SUBSTITUTES**			
Chapter		01	Live animals		
Heading			01.01	Live horses, asses, mules and hinnies	
HS code				01.01.21	Pure-bred breeding animals
HS code				01.01.29	Other
HS code				01.01.30	Asses
HS code				01.01.90	Other
Etcetera					
Section	**V**	**MINERAL PRODUCTS**			
Chapter		26	Ores, slag and ash		
Heading			26.01	Iron ores and concentrates, including roasted iron pyrites	

HS code				26.01.11	Iron ores and concentrates, other than roasted iron pyrites – non-agglomerated
HS code				26.01.12	Iron ores and concentrates, other than roasted iron pyrites - agglomerated
HS code				26.01.20	Roasted iron pyrites
Heading and HS code			26.02	26.01.00	Manganese ores and concentrates, including ferruginous manganese ores and concentrates with a manganese content of 20%or more, calculated on the dry weight
Heading and HS code			26.03	26.03.00	Copper ores and concentrates

Source: World Customs Organisation (WCO 2018).

Comparing Table 2.1 (based on industrial activity- discussed earlier) and Table 2.2 (based on products – see above) reveals that the classifications have similarities. They are both structured according to levels and divided into broad sections, followed by increasingly specific categories. The numbering (or codes) becomes larger and larger as the detail increases. In these two examples, both have four levels, but the HS classification, in practice, may have two further levels (namely 8-digit and 10-digit codes). The SIC is clearly aimed at *activities* within the economy, while the HS is aimed at specific *products*, rather than activities, and adopts a meso view of the products in an industry. Both classifications start with basic products (for example, foodstuffs or animals) or basic activities (processing foodstuffs or animal meats), and then progress to more sophisticated products (for example, electronic equipment or ships and motor vehicles) or more sophisticated activities (the manufacture of furniture or laboratory equipment or service provision, retailing, or electricity production). In these examples, the focus on the SIC has only been on manufacturing. The SIC covers much more than manufacturing; it covers agriculture, mining, manufacturing, retail and wholesale, and other services.

Smet (2013:519), in his study on modelling regional heterogeneity of South Africa's trade, attempted to link HS trade data to disaggregated industry data. The author used data for the period 1993 to 2006 obtained from Trade & Industry Policy Strategies (TIPS 2009) and explained that "*By means of a list of concordance between the six-digit HS classification and this industry classification* [SIC], *it was possible to obtain trade data at industry levels*" (Smet 2013:519). Smet does not explain in any detail how this is done, nor is it clear at what level of detail (two-digit or three-digit) he draws on industry data. He also draws on Quantec data – a recognised and leading source of commercial economic data in South Africa. Smet adds, though, that "*Because of different trade classification*

methods, these data are not really comparable over time, but can only be used to indicate some general trends" (Smet 2013:521). This comment supports the need for this study.

Given the differences between the classification systems, to make comparisons possible, concordance tables that bring these different classification systems together do exist (UNSD 2023), but in the case of the South African SICv5 and HS2017 data, a review of the literature reveals that a concordance table does not exist[12]. A discussion with officials at StatsSA suggests that they have not had the opportunity or resources to do this concordance themselves, as yet.[13] This lack of a concordance table linking trade data to manufacturing data is the challenge that economic researchers face in South Africa, leading to the information gap and research objective for this study.

2.3 INFORMATION GAP AND STUDY OBJECTIVE

This study addresses the information gap pertaining to the lack of a concordance table that maps South Africa's trade data, captured according to the HS classification by C&E, to manufacturing data, captured according to the SICv5 by StatsSA.

Given this information gap, the objective of the study is to develop a concordance table that enables the mapping of trade data captured by the C&E according to the HS2017 trade classification to be linked to the manufacturing data compiled by StatsSA (in their P3041.2 report) according to the SICv5 classification. The ultimate aim of linking trade data to manufacturing data is to enable trade analysis to be undertaken at industry level. It is acknowledged that this information gap, and hence the reason for this study, is a uniquely South African topic.

2.4 THE ACADEMIC LITERATURE ON CONCORDANCE TABLES

The academic literature on the task of developing concordances is scarce. A search of the Scopus bibliography found 114 English articles or conference papers that contain the phrases "concordance tables" OR "correspondence tables". Of these, only 17 fell into the economics/business/management field. In the case of the Web of Science (WoS)

12. There is not any publicly available concordance that the researchers could find after extensive searching. Private-sector data firms in South Africa such as Quantec have possibly developed a concordance for their own use (and for customers).
13. Refer to the earlier references to funding constraints faced by StatsSA.

bibliography, only three articles fell into the relevant fields of which two were the same as in the Scopus bibliography. In browsing through these results, it was found that only seven of the articles were of interest. None of the articles identified directly addressed the problem dealt with in this article, namely the use of concordance or correspondence tables in trade and industry. Nevertheless, each of the seven did touch on various aspects of the concordance process, in some instances proposing alternative methodologies that could be used. The research is discussed chronologically. Some of the articles reviewed below were extracted from the bibliographies of the articles identified and not directly from Scopus or WoS.

To begin with, Hoffmann and Chamie (1999), in a capstone report on *Standard Statistical Classifications: Basic Principles* presented at the 3rd meeting of the Expert Group on International, Economic and Social Classifications (EGIESC), set out comprehensive classification standards and methods (referred to as international standard classifications or ISCs) accepted by the EGIESC and which was presented to and accepted by the 30th Session of the UN Statistical Commission in New York in 1999. This report is an important reference for anyone working with classifications, including researchers striving to concord different classifications.

In the report, the authors present the difference between reference, derived, and related classifications (Hoffman & Chamie 1999:6-7). A reference classification, they argue, is one which has typically been developed by a supranational organisation such as the UN or the WCO, on which there is wide official agreement and broad global acceptance (Hoffman & Charmie 1999:6-7). The ISIC and the HS are two such examples (Hancock 2013). A *derived* classification, the authors posit, is one that is based on the reference classification, while a *related* classification is only partially linked to the reference classification at an aggregated level with subsequent levels of detail that may differ from the reference classification. The authors explain that national adaptations of ISCs, referred to as national standard classifications (NSCs), may be derived or related. The SICv2 is thus a derived classification of the ISICv3 as it has mostly the same structure but has more detail than the ISIC, in that the SIC has five levels of detail whereas the ISIC has only four levels of detail (StatsSA 2024:16; UNSD 2023).

In as far as creating correspondence tables is concerned, Rainer (1997), also one of the contributors to the above report, explains that correspondence tables indicate to what extent concepts, and categories in one classification (a) match other categories in other different classifications (for example, the ISIC matches the HS), or (b) match earlier versions of the same classification (for example, the HS2022 matches the HS2017). Hoffmann and Chamie (1999:19) state that "correspondence tables are one of the important topics for the development and harmonisation of international classifications". Correspondence principles include the level of detail to be matched, whether the differences in terminology are real or semantic, and how the detail is structurally matched (for example, what happens when one category in one classification must be matched to multiple categories in another classification (Rainer 1997; Hoffman & Chamie 1999:19-21).

The work of Pierce and Schott (2009) from the National Bureau of Economic Research in the US, is one of the earlier studies that strive to work with concordances between the ten-digital HS codes and the SIC/NAICS product classes and industries. They use existing concordances between the HS and SIC, and the HS and the NAICS, developed by the US Census Bureau (USCB), which they refer to as 'baseroots', to create a longer-term concordance from 1989 to 2006 (USCB apparently only published a ten-digit mapping for 1992). In the process, they adopt a three-step approach. In steps 1 and 2, they use Stata© to (1) assign SIC codes to any unassigned ten-digit HS codes if all other HS codes with a category have the same SIC assignment, and (2) to find unassigned SIC codes and if the gap is preceded and succeeded by the same SIC code, they use this SIC code for any unassigned ten-digit codes in the gap. Finally, in step 3, they hand-match unmatched HS codes where possible (Pierce & Schott 2009:4). Given that this current article is attempting to do something similar, a comparable structured approach, albeit different in aim to that used by the Pierce and Schott, was adopted, and adapted.

Muendler (2009:2) discusses the construction of a "novel" concordance between the SITC and the ISIC. The SITC is an alternative trade classification system developed by the US prior to the introduction of the HS (Oliver & Yataganas 1987). The concordance exercise by Muendler is similar in aim to what is being posited in this current article, except that the author used the SITC instead of the HS. To unpack the detail of his

concordance exercise is not appropriate for this study, except to note that the SITC to the ISIC through the HS was mapped, a task referred to as a “crosswalk”. This is done because there are already existing ‘mappings’ (or concordances) for him to use – mappings of the ISIC to the HS and of the SITC to the HS (Muendler 2009:3-4). In addition, Muendler does so in several stages, referred to as ‘treatments’ in his article (Muendler 2009:3). The result is a file that maps 768 4-digit SITC codes to 40 ISIC-3-digit codes.

Dorner and Harhoff (2017) propose a methodology to develop a technology-industry concordance table based on inventor-establishment data. While not relevant to the current article, given that completely different classifications were being compared by the researchers, namely patent data with economic activity data, their research points to the potential of using intensity/heatmaps to highlight the extent of ‘matching’ of one category to another. This could work if combined with ontological or semantic analysis that explored the similarities and differences using an ‘algorithmic links with probabilities’ (ALP) methodology, as proposed by Lybbert and Zolas (2014). Such an approach might prove a useful method for automating the concordance process.

Another interesting methodology was proposed by Neuhäusler, Frietsch, Mund, and Eckl (2017). They made use of Levenshtein’s distance algorithm to measure dissimilarity between two text strings, when comparing patent-data-by-technology with R&D-by-industry, leading to company level data on R&D expenditures and patents. This in turn led to the authors being able to track patents by industry sectors and R&D by technology fields, the outcome of their study. Their study highlighted the value of concordances and brought to the fore an alternative methodology for tracking similarities and differences. It is possible that this method could be used in conjunction with the heatmaps, and semantic ontologies referred to in the previous paragraph.

Ito and Aoyagi (2019), in turn, explored whether least-developed countries have benefitted from duty-free and quota-free access to the Japanese market. The researchers undertook a multi-period concordance exercise of Japan’s 9-digit HS codes from 1996 to 2014. The authors claim this to be one of the first such attempts and see this as a key output of their research. They draw on the three-step approach used in the work of Pierce

and Schott (2009) for their study. The authors note that while most codes were kept and were able to be matched, some codes were still dropped. This was "because some codes are intrinsically unable to be concorded for reasons such as the unknown goods and the ambiguously defined goods" (Ito & Aoyagi 2019:33).

Other researchers who proposed an alternative methodology include Cai and Rueda-Cantuche (2019), who use a count-seed RAS[14] method. Their proposed methodology is based on the world of input-output tables, where 'RAS' is a well-known term. They strive to estimate an unknown output matrix (the new concordance) by proportionally scaling an 'initial guess' (the 'seed' matrix or original concordance). The seed matrix, they argue, drawing on the work of Lenzen and Lundie (2012) and Cai (2016), could be based on a readily available qualitative table of correspondences between classifications.

One of the more recent concordance exercises identified was the work of Jurkat, Klump and Schneider (2022). The researchers developed a concordance table between the International Federation of Robotics (IFR) industry classification and the ISICv4 industry classification, to better understand the depreciation rates of robots. There is an existing concordance, but between the IFR classification and the older ISICv3. The IFR is outdated, and the authors attempted to update the concordance table in their research. They present a concordance table that they indicate is their "own research" drawing on "basic set theory". Reviewing their table, one can see that for IFR code 13-15 (textiles), they appear to bring together or combine *Manufacture of textiles* with *Manufacture of wearing apparel* combined with *Manufacture of leather and related products* from the ISICv4. In place of 'combine' one could read 'union' as in set union.

Finally, there is evidence of researchers who have developed software solutions that facilitate concordances. Liao (2020) developed a product concordance package using R. This is a useful tool, but the software enables a researcher to map only single instances or categories of one classification with another, not in total. The tool matches HS codes from various versions to ISIC codes also from various versions. Karlberg et al. (2023)

14 The authors have tried to find evidence of the meaning of 'RAS', but without success. Trinh and Phong (2013) addressed the question of "Why is it called RAS?" Their answer was "No one knows".

have also used R to generate correspondence tables between classifications. As this is a preprint, the detail available on the process used is limited.

It is also worth noting that countries such as Nepal have started reviewing their national statistical system and emphasise the importance of the "construction of correspondence tables linking the revised national statistical classifications with formal national statistical classification may [be] necessary for comparison" (Central Bureau of Statistics 2017:63). Australia, in turn, in a meeting with the UNCEISC (2022:4-5) discussed the challenges of adopting the ISIC in the Australian context, although no decision was taken. The proposals put forward at the meeting were either for Australia to fully adopt the most recent version of the ISIC, or to create a regionally specific version of the ISIC to address local Australian needs, or to review and update the Australia-New Zealand Standard Industrial Classification (ANZSIC) together with New Zealand or independently. The decision would occur after the endorsement of the revised ISIC (not stated, but presumably v5) (UNCEISC 2022:6). In October 2023, at a meeting in New York of UNCEISC, it was confirmed that a new revision of the ISIC, revision 5 (ISICv5), would be released in 2024 at the 55th meeting of the UN Statistical Commission from 27 February to 1 March 2024 (UN Department of Economic and Social Affairs [DESA] 2023]. In this presentation (DESA 2023:slide12), it was mentioned that work was still required on correspondences between the NACEv2.1, the CPCv3, and between the ISICv4 and v5.

2.5 LINKING TRADE TO MANUFACTURING IN SOUTH AFRICA

In support of this study, a search of the academic literature was undertaken drawing on the Scopus and WoS bibliographies, together with Google Scholar. The aim of the search was to find whether academic literature examined the use of *both* the 'harmonized system' and 'standard industrial classification' data in a South African context. The following key-phrases were combined into a single search algorithm, namely "harmonized system" AND "standard industrial classification" AND "South Africa". The results are presented in Table 2.3 below.

Table 2.3: Results obtained from search algorithm

Search algorithms	Scopus	Web of Science	Google Scholar
"harmonized system" AND "standard industrial classification" AND "South Africa"	0	0	107

In the case of Google Scholar, the most recent five years were examined

A review of the 107 articles identified in the above search exercise using Google Scholar, suggests that most of the articles are not relevant to this study, as they pertained to a non-manufacturing sector (such as agri-products) given that this study focuses on the manufacturing sector, or were too narrow (for example, focusing on carbon tax within trade), or too broad (pertaining to trade and manufacture at macro level). There were some articles, however, that were found to have some relevance to this study. A recent agreement between the National Treasury in South Africa and the United Nations University - World Institute for Development Economics Research (UNU-WIDER)[15] has led to several industry and trade-related articles focusing on South Africa, that draw on classifications such as SIC, ISIC and the HS. One such article is by Torreggiani and Andreoni (2019) investigating Chinese import penetration in South Africa, and the performance of local manufacturing firms. In their work the authors allude to undertaking a similar conversion or concordance process as is proposed in this study, but they provide no specific details on how this was done.

The work of Budlender and Ebrahim (2020), in turn, document the industry classification variables in the anonymised tax microdata available for research at the National Treasury Secure Data Facility in Pretoria, South Africa. This article is focused on unpacking the South African tax data from the perspective of the data's implications in the context of industry, trade, and development research. The authors specifically discuss industry classification systems, namely the ISIC, the SIC, and the HS, in the context of the tax microdata (referred to as the SARS-NT panel [the SARS acronym has already been defined and NT stands for National Treasury]). This is clearly a pertinent article in the context of the current article. The discussion of the ISICv4, SICv7 and SICv5 classifications in the article is quite detailed, but does not require repeating in this current discussion, except to say that this article is in keeping with the views of the authors.

15 This research cooperation falls under the *Southern Africa - Towards Inclusive Economic Development* (SA-TIED) programme sponsored by the South African National Treasury.

Budlender and Ebrahim (2020:3-4) note that SARS-NT use the ISICv4 which they see as "extremely similar" to the SICv7. Although, the SARS-NT panel data is based on the ISICv7, the authors instead chose to use the SICv5 for their study. Their argument was that it:

> is currently used for almost all South African economic datasets in which industries are classified, including the Quarterly Labour Force Surveys (QLFS), National Income Dynamics Study (NIDS), Quarterly Employment Statistics (QES), Quarterly Financial Statistics (QFS), Input-Output data, October Household Surveys (OHS) 1996–1998, and 2011 Census.[16]

What is most relevant in the article by Budlender and Ebrahim (2020:3-4) is that their study is about matching the SARS-NT panel variables with the various SICv5 industries, and they present a comprehensive discussion on how they undertook this exercise. They highlight the lack of concordances between the SARS-NT and SICv5 classifications, and the fact that the SICv5 and SICv7 correspondence tables required "significant manual adjustment to be useful for our purposes" (Budlender & Ebrahim 2020:14-15). They further mention several important points that are relevant to the current study. Firstly, the authors posit that the problem with the SICv7 and the ISICv4 is that they are not used in any South African data except by SARS, thus limiting their comparability. Secondly, the SICv5's advantage is that it is widely used as the classification system in numerous data sets in South Africa. Thirdly, the challenge with SICv5, they argue, is that it is outdated. Fourthly, they manually created concordance tables from the SARS data to the SICv5 using the SICv7 as 'bridge' or 'crosswalk' (discussed later). Finally, they used the most granular category descriptions (usually at five-digit level, but at least at three-digit level) in the manuals for assigning codes across the two classifications. As the discussion moves to the methodology section in this article, similar approaches were used.

The study by Bezuidenhout, Matthee and Rankin (2021) also, under the auspices of and in collaboration with the National Treasury and SARS, was able to draw on newly available tax data to better understand the dynamics of South African export firms. Besides drawing on job-level tax data and company income tax data, the study was also

16 In a footnote (5) the authors note that there are some incongruences with the classifications used for the above surveys.

able to access customs data – data not previously available. While the authors do not indicate which HS version they used, it is presumably HS2017, given that the article was published in 2021. The authors report that they used the ISICv4 “used by SARS” to select the firms in the manufacturing sector for the study.[17] Their study is an interesting and relevant study given their access to such granular data.

Besides the articles identified from the search conducted above, additional research was identified from the references of articles and from other avenues searched separately. The earlier-mentioned article by Smet (2013) is an example of an article that is relevant to this study. The findings, as outlined at the end of section 2 above, point to the dearth of practical and public solutions in bringing manufacturing data together with trade data. Other researchers that use SIC and HS data are Edwards and Schoer (2001) who brought together the SICv3 with HS data. They used concordances developed by Jon Haveman (the service of Haveman is no longer available), but they caution that various adjustments had to be made to ensure consistency. Although similar in approach to what is presented in this study, the sources are very dated (pre-2000) and are not relevant today. Other researchers such as Co (2023) draw on different sources of industry data (there are many – see the lists of classifications referred to earlier). In the case of Co, the author uses the BEC classification scheme, a classification system not used by StatsSA. This approach ignores the value embedded in the StatsSA Manufacturing p3041.2 report.

2.6 MATERIALS AND METHODS

Given that the aim of this study was namely, to bring together the old and new classifications in the case of South Africa (that is, the older SICv5 with the newer HS2017), a multistep research methodology was followed. This approach is described below.

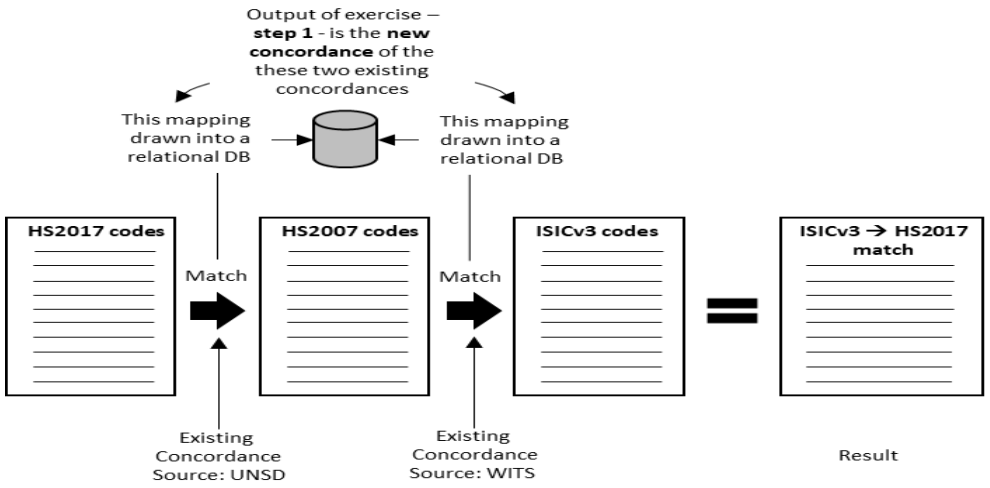
2.6.1 Step 1: Mapping the ISICv3 to HS2017 using HS2007 as a 'bridge'

To bring the HS2017 together with the SICv5, the first step involved mapping the HS2017 to the ISICv3. The closest ISIC version to the SICv5, is ISICv3 (StatsSA 2024:21), but there are still differences. The SICv5 comprises four levels of detail starting from 2-digit

17 The codes they provide are: 1010-1033. This is presumably an error, as the ISICv4 codes for manufacturing run from 1010 to 3320 in both the ISICv4, and the SICv7 in South Africa.

codes down to 5-digit codes. The ISICv3, in comparison, also starts with 2-digit codes but only provides three levels of detail down to 4-digit codes. In short, while quite similar, they are not directly comparable and use different codes, making it difficult to simply replace one with the other without some form of concordance table.

To achieve this, the study draws on existing concordances from the UNSD and the World Integrated Trade Solution (WITS). Their respective websites have concordance tables that link the HS2017 to the HS2007 (UNSD 2023) and the ISICv3 to the HS2007 (WITS 2023). The author decided to undertake a relational comparison of the existing ISICv3-to-HS2007 concordance table to the HS2017-to-HS2007 concordance table using Access© with the aim of ultimately linking the ISICv3 to the HS2017, using the HS2007 classification as a bridge, or 'crosswalk' (Muendler 2009:3) -.see Figure 2.1 below.



Source: Authors' own compilation

Figure 2.1: Graphic depicting relational mapping exercise of HS2017 with ISICv3

In this exercise, there were two parts. The first part focused on adapting the UN HS2007-to-HS2017 concordance table to ensure that the concordance table included a complete matching of the entire official 5 052 HS2007 list of codes (WTO 2010:5), to the entire official 5 387 HS2017 list of codes (WCO 2018:17). The second part focused on adapting the WITS HS2007-to-ISICv3 concordance table to include the HS2017 codes identified from the adapted UN HS2007-to-HS2017 concordance table described above.

2.6.2 Step 2: Concording the SICv5 to the ISICv3

With the HS2017 now concorded with the ISICv3 as explained in step 1, the next step was to undertake a manual concordance of the SICv5 with the ISICv3. The ISICv3 is similar in structure to the SICv5, but only has four levels of detail. The codes and descriptions also differ at times between the SICv5 and the ISICv3.

In the process of this exercise, a deliberate and considered comparison of the different descriptors from the SICv5 and ISICv3 classification systems was undertaken, with an aim of matching (that is, concording,) these descriptors as objectively as possible. This process required manual mapping, which was done by the authors, with an external review by an experienced colleague trained as a research psychologist. The aim of these two separate reviews was to ensure a degree of objectivity and reliability in the outcome. The results of the two reviews, in particular the differences, were examined, discussed and a 'best judgement made' (UNSD 2022:1) as how best to solve the categorisation, where anomalies were encountered.

In undertaking this concordance exercise, the manuals for the SICv5 classification, as well as for the ISICv3 classification, were used as the primary sources of data. The SICv5 manual (in HTML format) was obtained from the StatsSA website (StatsSA 1993), while the ISICv3 manual was obtained from the UN (UNSD 2023). Because of its age, the 1992 ISICv3 manual is available only as a PDF. Effort was made to convert this document to MS Word. Given the age of document, this was undertaken with considerable manual intervention as using optical character recognition software was only partially successful. Once the process was completed it was possible to compare the two classifications side by side in a table. The exercise involved comparing the different descriptors at the different levels across the two industrial classifications and subjectively deciding whether they matched or not. It is important to note that not only were the level descriptors or headings used to do the concordance, but the detail contained under each heading in the manuals was also used to this end.

For example, it can be seen from Table 2.4 below that the more detailed descriptions available in the manuals for each of the two nomenclatures, make it possible to allocate 'meat pies' to 1541 in the ISICv3 and to 3011 in the SICv5. Meat pies thus fall into different groups across these two classifications systems – there were a few of these instances.

In most cases, at the 4-digit level (Level 3) codes from different headings were generally collapsed into a common 3-digit level (Level 2), and products that appeared in different 4-digit groups inevitably ended up in the same group at 3-digit level. With these guidelines in mind, the concordance between the two classification systems was undertaken. The authors of this study attempted to initially do the matching at the 4-digit level. The relevant 3-digit codes were then used to match the manufacturing statistics with trade statistics (see step 3 that follows), as the data in the P3041.2 report from StatsSA is only available at 3-digit level.

A challenge with the approach described in the paragraph above, was that the ISICv3 provides detail only to a 4-digit level, while the SICv5 provides detail to a 5-digit level. Regrettably, greater detail for ISICv3 could not be found in the literature. Greater detail would have made the task of matching the categories in both classification systems easier and more accurate. Fortunately, the official UN manual for the ISICv3 (UNStats 1990) does provide limited descriptions (beyond just a heading) of each 4-digit category, which proved useful in making the required concordance. Similarly, the HTML version of the SICv5 provided more detail for each category in the SICv5 (StatsSA 1993), making it possible with these additional descriptions to make an educated and objective match. Table 2.4 (comparison of detailed descriptions) and Table 2.5 (mapping of headings) below, provide examples of such descriptors and the approach to matching the SICv5 with the ISCIv3

Table 2.4: Extracts from SICv5 and ISICv3 manuals with descriptors for processing and manufacture of food products

SICv5	ISICv3
301 Production, processing and preservation of meat, fish, fruit, vegetables, oils and fats	151 Production, processing and preservation of meat, fish, fruit, vegetables, oils and fats
3011 Production, processing and preserving of meat and meat products	1511 Production, processing and preserving of meat and meat products
This group includes the operation of slaughterhouses, killing, dressing or packing meat of cattle, hogs, sheep, goats, horses, poultry, rabbits, game or other animals. Included is the processing of whales on land or on vessels specialised for this work. The production of fresh, chilled or frozen meat or poultry. Preservation and preparation of meat and meat products by such process as drying, smoking, salting, quick-freezing, immersing in brine or canning. Sausage production and manufacture of natural sausage casings are included.	This class includes operation of slaughterhouses killing, dressing or packing meat of cattle, hogs, sheep, goats, horses, poultry, rabbits, game or other animals including whales processed on land or on vessels specialised for this work. Production of fresh, chilled or frozen meat or poultry. Preservation and preparation of meat and meat products by such processes as drying, smoking, salting, immersing in brine or canning. Sausage production is included. Rendering and refining of lard and other edible animal fats. Production of

SICv5	ISICv3
Rendering and refining of lard or other edible animal fats. Production of meat meals or meat offal, packed meat pies, and biltong.* Slaughtering includes the production of by-products such as raw hides and skins, pulled wool, feathers or down, teeth or bones. Exclusions: The manufacture of extracts of meat and soup containing meat is classified under group 3049 (Manufacture of other food products n.e.c.). The rendering of inedible animal fats and oils is included in group 3014 (Manufacture of vegetable and animal oils and fats). Synthetic sausage casings are classified under group 3380 (Manufacture of plastic products). The slaughtering of poultry undertaken in conjunction with poultry farming is classified under group 1122 (Other animal farming; production of animal products n.e.c.).	flours and meals of meat or meat offal. Slaughtering includes the. production of by-products such as raw hides and skins, pulled wool, feathers or down, teeth or bones. Exclusions: Manufacture of soup containing meat is classified in class 1549 (Manufacture of other food products n.e.c.).
304 Manufacture of other food products	154 Manufacture of other food products
3041 Manufacture of bakery products	1541 Manufacture of bakery products
This group includes the manufacture of fresh, frozen or dry bakery products: Fresh bread or rolls. Pastry, cakes, pies, tarts or other fine bakers' wares. Biscuits and other dry bakery products. Exclusions: The manufacture of dry, fresh or cooked farinaceous products of the kind known as pastas is classified under group 3044 (Manufacture of macaroni, noodles, couscous and similar farinaceous products). The production of packed meat pies is classified under group 3011 (Production, processing and preserving of meat and meat products).	This class includes manufacture of fresh, frozen or dry bakery products: fresh bread or rolls, bread. Pastry, cakes, pies, tarts or other fine bakers' wares. Biscuits and other "dry" bakery products. Exclusions: Manufacture of prepared, blended dough is classified in class 1531 (Manufacture of grain mill products). Manufacture of dry, fresh or cooked farinaceous products of the kind known as pastas is classified in class 1544 (Manufacture of macaroni, noodles, couscous and similar farinaceous products).

*While packed meat pies, and biltong are included under section 3011 Production, processing and preserving of meat and meat products), in the SICv5, in the ISICv3, pies are included under section 1541 (Manufacture of bakery products) and the South African staple, biltong, is not mentioned at all in the ISICv3 but is mentioned in the SICv5 in addition to the process of drying meat in the same section
Source: Extracts taken from the SICv5 manual (StatSA 1993) and the ISICv3 manual (UNSD 1990).

Table 2.5 provides a short extract comparing the two coding systems focusing on examples of three sections where the descriptions are not exactly in concordance with each other (see asterisk). Of particular importance to the concordance exercise undertaken, is the existence of different headings in both SICv5 and ISICv3 suggesting possible differences between the relevant sections across the two concordance tables. For example, the heading *Manufacture of sugar, including golden syrup and castor sugar* in the SICv5 differs from its counterpart in ISICv3 (*Manufacture of sugar*). In the SICv5, wine is brought together under the heading *3051 Distilling, rectifying and blending of spirits ethyl alcohol production from fermented materials*, whereas in the ISICv3, wine is classified under a separate heading just for wine – *1552 Manufacture of wines.* Also in

the ISICv3, tobacco products are captured under a separate division from food and beverages, whereas in the SICv5, tobacco products are part of the food and beverages division.

Table 2.5: Comparison of the SA SICv5 and the ISICv3

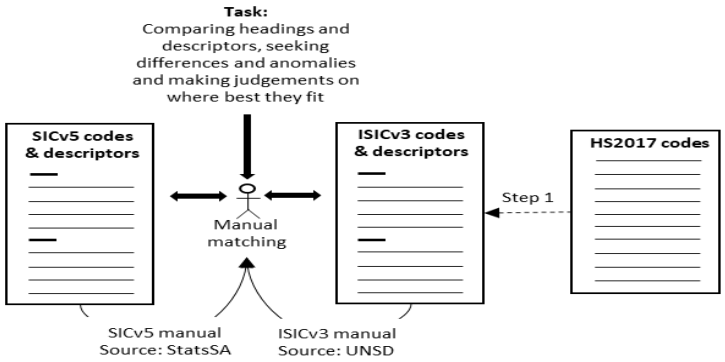
SICv5						ISICv3			
Descriptor	*Division*	*Major Group*	*Group*	*Sub-group*		*Division*	*Group*	*Class*	*Descriptor*
MANUFACTURE OF OTHER FOOD PRODUCTS	30	304				15	154		MANUFACTURE OF OTHER FOOD PRODUCTS
Manufacture of bakery products			3041	30410				541	Manufacture of bakery products
Manufacture of sugar, including golden syrup and castor sugar			3042	30420				1542	Manufacture of sugar
Manufacture of cocoa, chocolate and sugar confectionery			3043	30430				1543	Manufacture of cocoa, chocolate and sugar confectionery
Manufacture of macaroni, noodles, couscous and similar farinaceous products			3044	30440				1544	Manufacture of macaroni, noodles, couscous and similar farinaceous products
Manufacture of other food products n.e.c.			3049					1549	Manufacture of other food products n.e.c.
Manufacture of coffee, coffee substitutes and tea				30491					
Manufacture of nut foods				30492					
Manufacture of spices, condiments, vinegar, yeast, egg products, soups and other food products n.e.c.				30499					
MANUFACTURE OF BEVERAGES		305					155		MANUFACTURE OF BEVERAGES
Distilling, rectifying and blending of spirits; ethyl alcohol production from fermented materials; manufacture of wine			3051	30510				1551	Distilling, rectifying and blending of spirits ethyl alcohol production from fermented materials
								1552	Manufacture of wines

SICv5						ISICv3			
Manufacture of beer and other malt liquors and malt			3052					1553	Manufacture of malt liquors and malt
Breweries, except sorghum beer breweries				30521					
Sorghum beer breweries				30522					
Manufacture of malt				30523					
Manufacture of soft drinks; production of mineral waters			3053	30530				1554	Manufacture of soft drinks production of mineral waters
						16			MANUFACTURE OF TOBACCO PRODUCTS
MANUFACTURE OF TOBACCO PRODUCTS		306					160		MANUFACTURE OF TOBACCO PRODUCTS
Manufacture of tobacco products			3060	30600				1600	Manufacture of tobacco products

Legend: Identical headings in both SICv5 and ISICv3 | Different headings in both SICv5 and ISICv3 | Headings that are not directly concorded between the two classifications.

Source: Author's own compilation drawing from the SICv5 (StatsSA 1993) and ISICv3 (UNSD 1990).

Figure 2.2 below depicts the approach followed in step 2.



Source: Authors' own compilation

Figure 2.2: Step 2 - Graphic depicting the mapping exercise of SICv5 to ISICv3 undertaken by the authors

In undertaking this exercise, the manual provided by the UN statistics division accompanying their concordance efforts was used as a procedural guide (UN 2017). In this manual, the authors note that:

> "… users should be aware that the very nature of a revision of a classification does not allow the establishment of a clear 1:1 correspondence for all codes (subheadings) of a new [revision] to the codes of previous versions of a

classification and should bear in mind the potential shortcomings (different contents than indicated, break in series) for certain subheadings when using converted instead of original data (UN 2017)."

The UN indicates that conversions are based on the “best judgement of staff” (UNSD 2022). The statistics division further notes that the conversions have “no binding character whatsoever” and countries are free to make their own conversions. With these guidelines in mind, the authors of this article acknowledge that, while every effort was made to be as objective as possible in concording the SICv5 to the ISICv3, an element of subjectiveness inevitably clouds this effort and that readers and users of the resulting concordance table should (a) critically interrogate the resultant table, and (b) should use this table with caution. In an effort to practically validate the tables, peer critique is welcomed.

In a final effort to judge the value of this concordance effort, an analysis of the manufacturing versus trade activities of the sectors in question was undertaken in step 3 and the findings presented as part of this study. This analysis should help decide whether the concordance effort was realistic or not.

2.6.3 Step 3: Mapping the SICv3 to the HS2017

With the new concordance HS2017-to-ISICv3 table produced in step 1, and the new SICv5-to-ISICv3 concordance table created in step 2, the next task was to bring the SICv5 together with the HS2017, using the ISICv3 as crosswalk. As a full ISIC listing appears in the first table, with the same ISIC codes appearing in the second table, the process was a relatively simple relational mapping exercise, with manual oversight. Both the researchers and an external reviewer worked through this list.

2.6.4 Step 4: Linking the trade data to the manufacturing production and sales data using the SICv5-to-HS2017 concordance table

Using the SICv5-to-HS2017 concordance table compiled in steps one, two, and three, the trade data from C&E (captured according to the HS2017) was brought together with the manufacturing data for South Africa from StatsSA (captured according to the SICv5). For each SICv5 3-digit code, the manufacturing data from the P3041.2 *Manufacturing: Production and sales* report was captured in an Excel© spreadsheet. For each of these

codes, the aggregated HS2017 trade data downloaded for South Africa from TradeMap[18] was also captured in the same spreadsheet using the SICv5-to-HS2017 concordance table.

The data accessed on TradeMap is available according to 6-digit HS codes, providing considerable detail on the products being exported and imported. The export and import data correspond with the 5 387 HS2017 codes referred to earlier, except that not every code had an export or import value associated with it for South Africa. This is understandable as South Africa does not export or import goods under every single code. Although only annual data was used for this study for illustration purposes (because of the ease of presenting annual data), the data is available monthly and annually since 1962, and can be downloaded for all the countries in the world. Data can even be sourced for countries that are not members of the UN, as the member countries report their export to and imports from these countries, and 'mirror' data is thus available for these countries.

2.7 FINDINGS

The findings are discussed in the context of the three steps discussed in the methodology section above. All the support documents and spreadsheets that capture the data and findings from this study, are available the Open Science Framework [OSF] repository at https://osf.io/8e74c. See Appendix B for a summary of the files contained in this repository.

2.7.1 Step 1: A ‘crosswalk’ from ISICv3 to HS2017 using HS2007 as a 'bridge'

Based on the relational database manipulation using Access©, described in section 5.1 earlier, the HS2017 was mapped to the ISICv3 using the HS2007 as a crosswalk. In the first part of this process, the mapping of the UN HS2017-to-HS2007 concordance – a key input to this study (see document 5 in the OSF repository, described in Appendix B) – needed to be adapted because it was found to be that there were 65 missing HS2007

18 See www.trademap.org. Trademap is a service offered by the International Trade Centre (ITC), established under the mandate of the World Trade Organization and the UN Conference on Trade and Development in 1968 (UN 1967, 27-28). Trademap is an easily accessible source for the export and import data available on the UN Comtrade database (ITC 2014). As all member countries of the UN, including South Africa, are required to report their trade data to Comtrade each year, the Comtrade databank and the Trademap service are thus seen as reliable sources of global trade data. South Africa's export and import data are provided by SARS C&E to the UN Statistic's Division which is captured by UN Comtrade (SARS 2017, 4-5). Until 2022, this data was compiled according to the HS2017 classification for South Africa (the newer HS2022 classification was launched in 2022) (SARS 2021).

codes in the UN concordance table, even though the two classifications appeared to match. The HS2007 list in the UN table included only 4 987 unique codes, whereas the official number of HS2007 codes is 5 052. These 65 missing HS2007 codes (5 052 minus 4 987) were identified and then matched manually to their corresponding HS2017 codes using the WCO HS2017 and HS2007 nomenclatures as source documents (WCO 2007; WCO 2017). This resulted in a 'mini' interim concordance table that matched the 65 missing HS2007 codes with 95 additional HS2017 codes – see document 7 in the OSF, described in Appendix B, for this interim table. The reason why there are 95 additional HS2017 codes and only 65 additional HS2007 codes is that for some HS2007 codes, more than one matching HS2017 code was found.

The HS2017 and HS2007 codes from this interim concordance table were then added to the original UN HS2017-to-HS2007 concordance table from the UN, resulting in a new HS2017-to-HS2007 concordance table containing the full spectrum of HS2017 (5 387) and HS2007 (5 052) codes in the table, in addition to duplicates mentioned above. Given that the original UN HS2017-to-HS2007 concordance table already included all official 5 387 HS2017 codes, all 95 additional HS2017 codes identified in the above process were thus duplicates. The updated version of the original UN concordance table, which did not include all 5 052 official HS2007 codes, now reflected all 5 052 HS2007 codes in addition to duplicates. In the original UN concordance table, there were 400 HS2007 duplicates, and after this process, a further 30 duplicates were added to the HS2007 list of codes, resulting in 430 duplicates (this is in addition to the 65 missing codes). The resultant new concordance had the same number of matching codes on both sides of the table, namely 5 482 codes (5 387 HS2017 codes plus 95 duplicates, and 4 987 HS2007 codes plus 495 duplicates). Bearing in mind that there are officially 5 387 HS2017 codes and 5 052 HS2007 codes, this outcome meant that both lists of codes in the newly adapted concordance have duplicates; 95 duplicates in the case of HS2017, and 430 duplicates in the case of HS2007. It is common in concordances to have duplicates.

With the first part of step 1 complete, the focus turned to the second part of step 1. In this exercise, the WITS HS2007-to-ISICv3 concordance table (see document 9 in the OSF, described in Appendix B) was adapted to include all 5 482 HS2017 and HS2007 codes identified in part 1 of the exercise as described above. This process was quite simple and

resulted in a newly adapted concordance table. The existing 4 987 HS2007 codes in the original WITS table were extended to include the missing 65 original HS2007 codes together with 400 HS2007 duplicates identified from the original WITS table, as well as 30 newly added duplicates. For each duplicate, the corresponding ISICv3 code to the existing HS2007 code matching the duplicate was used. All descriptions from the ISICv3 were retained and duplicated as appropriate. This resulted in 5 482 HS2007 codes in the adapted concordance. Drawing in the HS2017 codes was then a simple process, as a perfect match already existed from part 1 of the crosswalk exercise. The adapted concordance table now provided a HS2017-to-ISICv3 concordance with the HS2007 codes serving as the crosswalk (see document 10 in the OSF, described in Appendix B), a key finding of this article.

2.7.2 Step 2: Developing a SICv2-to-ISICv3 concordance table

As a result of the concordance exercise of the South African SICv5 with the UN ISICv3, as discussed in the research methodology (step 2), a new concordance table was developed. The results, presented in an Excel© spreadsheet, are made available as document 11 in the in the OSF repository, as described in Appendix B. This aforementioned concordance table was another of the primary outcomes in this study and is used as the source for step 3 of the study. This concordance table is supported by a side-by-side tabular match of the headings and code descriptors for the SICv5 and ISICv3, captured in document 12 in the OSF, and described in Appendix B. Given that the literature review revealed that no comprehensive or readily available concordance table exists between the SICv5 and the ISICv3, or indeed, with any other newer HS classifications, this new concordance table is argued to be a useful new contribution to the economic literature, specifically from a South African perspective.

2.7.3 Step 3: Creating a HS2017-to-SICv5

Step 3 of the methodology resulted in another new correspondence table, namely a HS2017-to-SICv5 concordance table based on a combination of the HS2017-to-ISICv3 correspondence table presented in step 1 and the SICv5-to-ISICv3 correspondence table presented in step 2. In so doing, the ISICv3 codes served as a crosswalk. This new correspondence table is available as document 13 in the OSF repository, described in Appendix B.

2.7.4 Step 4: Linking the trade data to the manufacturing production and sales data using the SICv5-to-HS2017 concordance table

With the new concordance table presented in step 3 as framework and using manufacturing data from the StatsSA P3041.2 report, as well as trade data from TradeMap, an Excel© spreadsheet was created incorporating the trade and manufacturing date. The six-digit HS trade data from TradeMap was mapped to the production and sales data from StatsSA, according to the 3-digit SICv5 codes discussed in step 2. Given that the HS2017 data is captured according to 5 387 codes[19] while the P3041.2 report presents data only for 49 manufacturing industry sectors[20] at three-digit level, the trade data had to be aggregated for each of these sectors. See document 14 in the OSF, as described in Appendix B. The data structure of the result spreadsheet is outlined in Table 2.6 below.

Table 2.6: Resultant spreadsheet extracted using the concordance obtained from this study

SICv5 codes (sectors) as per the P3041.2 report	Manufacturing sales values per sector	Export per sector	Imports per sector
Sector descriptors	Sales in rands '000s for 2017 to 2021	Exports in rands '000s for 2017 to 2021	Imports in rands '000s for 2017 to 2021

Source: Final master sheet_manufacturing_imports_exports.xls (see Appendix B)

Interpreting the data was now possible because of the concordance. Seven industries were selected to report on, and these industries provided enough variety to reflect on insights that the concordance and resulting data could provide a researcher. The industries selected are listed in Table 2.7 below, together with their SICv5 code and descriptions as used in the P3041.2 report.

19 There were slightly fewer codes for South Africa, given that the country does not export or import under very single code

20 The P3041.2 report does not provide data on all SICv5 three-digit categories (some are sensitive trade such as nuclear fuel and arms and ammunition, while others we are not big traders in such as fur and fur products and tobacco).

Table 2.7: The industries selected to report on for this study

SICv5 code	SICv5 description	P3041.2 code	P3041.2 description
303	Manufacture of grain mill products, starches and starch products and prepared animal feeds	MPI30300	Grain mill products
316	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery and harness	MPI31600	Leather and leather products
317	Manufacture of footwear	MPI31700	Footwear
338	Manufacture of plastic products	MPI33800	Plastic products
354	Manufacture of structural metal products, tanks, reservoirs and steam generators	MPI35400	Structural metal products
361	Manufacture of electric motors, generators and transformers	MPI36100	Electric motors, generators, transformers
381	Manufacture of motor vehicles	MPI38100	Motor vehicles

Source: P3041.2 Manufacturing: Production and Sales report (StatsSA 2023)

These seven industries were chosen as they represented 16.8% of the value of total manufacturing sales (R2 469,4 billion) in South Africa, and 13.5% of all exports, as well as 10.7% of all imports, for the year 2021. The total of all manufacturing exports as indicated in Table 2.8, represent 72.7% of all exports, while manufacturing imports represent 82.0% of all imports. Table 2.8 outlines the rand value of these sectors and their respective international trade activities. The two industries of interest in this study are highlighted in bold.

Table 2.8: A summary of the manufacturing sales, exports, and imports for the seven industries in question

SICv5 code	Short description	Manufacturing sales 2021		Manufactured exports 2021		Manufactured imports 2021	
		R'000	% of total	R'000	% of total	R'000	% of total
	Total trade, manufactured and other	NA	NA	1826058015 (100%)		1268033913 (100%)	
	Manufacturing only	2649414272 (100%)		1327537429 (100%)	72.7	1040134426 (100%)	82.0
303	Grain mill products	105188599	4.0	9383741	0.7	12683166	1.0
316	**Leather and leather products**	**5546756**	**0.2**	**2776036**	**0.2**	**12699536**	**1.0**
317	**Footwear**	**8665167**	**0.3**	**2433038**	**0.2**	**12699536**	**1.0**
338	Plastic products	82621422	3.1	10684880	0.8	21145449	1.7
354	Structural metal products	43143596	1.6	5548857	0.4	3299428	0.2
361	Electric motors, generators, transformers	10923136	0.4	3397425	0.3	12127982	1.0
381	Motor vehicles	194170201	7.3	144061325	10.9	61079285	4.8
	Total of above industries	444712121	16.8	175509266	13.5	123034846	10.7

Source: Based on own calculations drawing on data compiled from Final master sheet_manufacturing_imports_exports – see Appendix B

Table 2.9 reports on the sales, exports and imports in addition to their percentage growth. Growth was calculated from 2017 to 2021 and is reported for a five-year period, as well as reporting the growth over the previous year (2020 to 2021).

Table 2.9: Growth in manufacturing sales, exports and imports for the local sectors concerned

SICv5 code	Short description	Manufacturing sales 2017-2021		Exports 2017-2021		Imports 2017-2021	
		Growth 5-yrs (%)	Growth prev. yr. (%)	Growth 5-yrs (%)	Growth prev. yr. (%)	Growth 5-yrs (%)	Growth prev. yr. (%)
	Total for all manufacturing products	14,4	13,8	17.6	7.4	25,9	20,5
303	Grain mill products	37,2	10,6	46.3	-0.6	16,8	-10,7
316	**Leather & leather products**	**-0.17**	**9.0**	**-19.7**	**22.7**	**-12.7**	**15.9**
317	**Footwear**	**36,0**	**23,3**	**0.6**	**21.0**	**11,1**	**14,4**
338	Plastic products	21,4	14,9	29,5	18,2	23,2	14,1
354	Structural metal products	11,8	19,0	10,2	-5,6	63,0	-33,7
361	Electric motors, generators, transformers	-12,3	0,8	18,6	14,3	-25,6	-52,1
381	Motor vehicles	1,5	-0,8	20,1	14,8	-10,7	24,1

Source: Based on own calculations drawing on data compiled from Final master sheet_manufacturing_imports_exports – see Appendix B

2.8 DISCUSSION OF FINDINGS

There are several outcomes discussed in this article that contribute to the economics literature. The first is an adapted HS2017-to-HS2007 concordance table incorporating complete listings from the HS2017 (with 5 387 codes) matched to the HS2007 (with 5 052 codes), together with numerous duplicates in both lists to facilitate the complete matching (a many-to many [m:m] perspective). The second, is a new HS2017-to-ISICv3 concordance table where previously only the WITS HS2007-to-ISICv3 table was available. The third outcome is a new concordance table for the SICv5-to-ISICv3, a key output in this study that directly addresses the study objectives. The fourth outcome is a concordance table that maps the HS2017-to-SICv5, another important outcome that also directly addresses the study objectives. The final outcome is a mapping of the manufacturing output data from StatsSA for the period 2017 to 2021, to the HS2017 trade data for the same period.

The first four outputs make this last-mentioned trade-to-manufacturing output mapping possible. Linking trade to manufacturing output data should, in turn, make it possible for richer industry-level economic analysis incorporating a trade perspective, to be undertaken for South Africa. The last two outcomes are argued as being valuable in analysing trade performance at industry level. Although the literature is replete with articles that link trade to industry sectors, these articles either use more recent concordance tables developed by the UN and similar organisations (Brummund & Connolly 2019; Tan & Uprasen 2018; Lashkaripour 2020), or they link trade data to higher level, 2-digit ISIC codes which provide less detail for analysis (Lestari & Triani 2013; Borchert, De Haas, Kirschenmann & Shultz 2021). Authors may also analyse trade at industry level as separate unlinked entities (Chetty 1993), or they may have done a similar exercise as outlined in this study, such as Yoo, Seo, Jun, and Seo (2015) in South Korea.

It is hoped that the outputs in this study will prove useful in bringing the focus to bear on trade at industry level in South Africa. This should help researchers interested in South African economics, policy, trade, and industry, gain access to relevant data via the concordances presented in the article. The literature review highlights existing efforts locally and internationally to incorporate concordances in economic analysis emphasising the importance of concordances in opening new research opportunities. In particular, the recent work of Budlender and Ebrahim (2020) highlights some of the challenges researchers experience in working with concordances in South Africa. This study may hopefully stimulate further research on the work on concordances in a local context.

Limited research into the use and creation of concordances in a South African economic context, suggests that more can be done on this topic from a local perspective. A special interest group (SIG) focusing on the local development and cross-mapping of classification systems, is proposed. The focus need not only be on the SIC/ISIC/HS classifications discussed in this article but could also extend to many other economic-related classifications and concordances. Examples from the international literature suggest that this effort could include energy and economic classifications (Dirner & Pavelel 2016:28), intellectual property and economic classifications (Cohen & Rogers 2021:238-240), labour classifications (such the International Classification of Status in Employment (ICSE)) and economic classification (Loulanski 2023:30-39); the socio-

economic classifications used in Nigeria (Ibadin & Akpede 2021:26-27), and medical-product and economic classifications used as a planning tool in the COVID pandemic (Alonzi, Ambroselli & Valery 2020:57-60). It is envisaged that a SIG would focus on the *process* of classification and concordance creation, and seeking *new areas* where this expertise can be put to new use. Government and other interested stakeholders could be approached for their inputs and guidance, especially those that are involved in creating classifications such as SARS and StatsSA. Initially, it is proposed that further research into the broader use of classification systems in an economic context be undertaken in South Africa.

Linked to the above idea of a classification and concordance SIG, are new technologies that can be investigated to assist in this process. Machine Learning and artificial intelligence (AI) are two technologies that have obvious application in this arena. There are already numerous HS search facilities available online. These search facilities enable one to enter a description or code and find those codes with matching descriptions/codes. They may also make available export or import data linked to the code, as well as associated custom's tariffs. One such example is Cybex (2024) in India, while the WCO offers a similar tool as well as more advanced tools such as virtual reality and AI as part of their Bacuda Project (WCO 2023b). Researchers such as Liao, Kim, Miyano, and Zhu (2022) have developed an 'R'-based concordance package that matches products across different classifications, including different versions of the same classification. The drawback is that this is a one-at-a-time search facility, where academic researchers would want the entire matched database to use in their research. The use of Semantic Web technologies could also play a role in this field (Mansour & Al Taharwah 2023). Other examples were discussed in the literature review.

2.8.1 Limitations

Caution is required when interpreting the combined SICv5 and HS2017 figures. The many trade asymmetries as reported by Markhonko (2014), such as differences in statistical valuations, different systems of trade, and differences in partner attribution, could affect the accuracy of the data. At the same time, the inevitable subjective nature of concordances (UN 2017) obviously has an impact on the accuracy of trade data compiled and based on the concordances.

2.9 CONCLUSION

This study provides a contribution to the economic landscape in South Africa, in outlining a documented process for bringing together old classifications with new to enrich the economic insights gained from such a mapping-process. It also provides a contribution to the knowledge on the topic of concordances tables, both in South Africa and internationally, especially as input to linking trade data to industry data. It has been argued that an analysis of the manufacturing sector based on local sales only, albeit on a sectoral basis, is insufficient. The trade dimension provides a more complete view of the total marketplace (local and international) that was alluded to in the introduction to this article. The concordance exercise has opened the doors to further research opportunities that should enable better insight to be gained both from economic and marketing perspectives. More research is necessary, however, to explore other relationships, opportunities, and challenges, ranging from more detailed product and country perspectives to economic relationships such as comparative advantages. The P3041.2 report also provides insight on seasonal variations and indexed growth revealing real growth trends. Finally, a range of economic perspectives could be examined using a multitude of economic formulae, from the gravity model through comparative advantage measures, trade performance measures and other econometric measures. In summary, the concordance of the old SICv5 with the newer HS2017 presented in this study and its outputs, leads to deeper and richer insights that draw trade into data at industry level – an important input to international marketplace research.

PRELUDE TO ARTICLE 2

With Chapter 1 serving as introduction to the study, and Chapter 2 outlining the concordance exercise undertaken to enable trade data to be used in combination with industry data in the South Africa context, the study moves to the next stage of the research, which undertakes a scoping review of the literature on the role of trade performance indicators and their use at industry level. This stage of the study strives to address research objective number two.

This scoping review was captured as an article and submitted to the Journal of Applied Economics for review.

It should be noted that the content of this article (including the abstract and keywords) is exactly as submitted to the journal in question, except that the heading numbers (including figure and table numbers [as well as the references to these tables and figures in the text]) have been changed to accommodate the chapter and heading numbering of this study, and the font style and spacing is in keeping with the style/spacing used for the dissertation as a whole, rather than for the journal. The reason for this is to keep an element of consistency across the dissertation. However, recommended examiner changes have also been addressed, as is required by the University. The footnotes are numbered per chapter, not across the entire dissertation. The references and appendices for Article 2 are presented at the end of the dissertation together with the other references for the other chapters/articles, as a single combined reference list, so not to disrupt the readability of the dissertation.

CHAPTER 3
(ARTICLE 2)

THE USE OF TRADE INDICATORS IN MEASURING TRADE PERFORMANCE AT INDUSTRY LEVEL: A SCOPING REVIEW

ABSTRACT

This study examined the use of trade indicators in measuring trade performance at industry level. A scoping review was conducted on Ebscohost, ProQuest, Google Scholar, Scopus, and (WoS), to establish how researchers have engaged the subject of trade performance indicators. The PRISMA methodology informed the scoping review. A total of 144 articles were identified from the literature, with 82 articles found to be relevant. From these 82 articles, the researchers established that existing studies and bibliographies do not represent a complete list of the trade indicators available to industry to strategise and track trade performance of industries in their international endeavours. There appears to be limited research on trade indicators in the largest academic bibliographies — Scopus and WoS. There are varying definitions and discussions of trade indicators. The findings from this scoping review are invaluable to both industry leadership, industry members, and government to help internationalise the country's trade endeavours starting from an industry-upwards approach, rather than a government-downwards approach. Focusing on an industry will arguably have more meaningful outcome for the industry and its stakeholders. The recommendations are to have more research on the trade indicators identified, to enlighten practitioners on what internationalisation endeavours could be important in their respective industries.

Keywords: trade indicators, trade performance, industry level, typology

3.1 INTRODUCTION

Trade indicators have an important role to play in global trade research in terms of measuring and tracking a country's trade performance, arguably to guide future national trade policy measures to drive economic development, or to influence industry/company trade strategies, especially if these trade indicators are calculated at industry level (Mikic & Gilbert 2009). Researchers at the United Nations (UN) Economic and Social

Commission for Asia and the Pacific (UNESCAP) define a *trade indicator* as “an index or a ratio that can be used to describe and assess the state of trade flows and trade patterns of a particular economy or economies” (Mikic & Gilbert 2009:4). Thus, trade indicators can be used to monitor these flows and patterns over time or across economies/regions. An initial search of the academic literature using Scopus and WoS revealed that there are 105 Scopus and 64 WoS sources that refer to the key phrase *trade indicators*[1]. In order to obtain a better understanding of the role of trade indicators, the authors of this article explored literature on trade indicators as a measure of trade performance at industry level and adopted a scoping review to this end.

Trade indicators are observable phenomena captured as metrics, or formulae. They are usually quantitative in nature, but they could also be described qualitatively. Trade indicators incorporate raw data or other inputs, to generate statistics, measures, indices, or descriptions resulting in an assessment or reflection of the potential, development, performance, and changes associated with the trade endeavours of a country, an industry, a region, or the world as a whole (Mikic & Gilbert 2009; Barhoumi & Ferrara 2015:8-12; Martínez-Martín & Rusticelli 2021). Trade indicators are not models (such as the gravity model [GM] or the computable general equilibrium [CGE] model), or complex functions, or expressions comprising multiple indicators that use analytics such as regression analysis, or sources such as input-output (I-O) tables.

Heink and Kowarik (2010:584-592) provide a comprehensive literature review in their efforts to define trade indicators, albeit for ultimate use in the field of ecology and environmental planning. Their study differentiates between descriptive and normative indicators, as well as between measures and components. They argue that the term *indicator* ‘is frequently used at the interface between science and policy’ (Heink & Kowarik 2010:584). With this insight in mind, this study adopts the definition by Mikic and Gilbert (2009) of a trade indicator provided above and posits that trade indicators are primarily quantitative indices or formulae/metrics. The indices can be used to track the nature and performance of trade in a country or industry, that, in turn, can then be used to improve such performance, through policy initiatives or industry and company strategies, ultimately impacting on the development of a firm, industry and nation.

1. There was no difference in the results whether 'trade indicator' was used or 'trade indicators' (plural) was used.

The research by Mikic and Gilbert (2009) is captured in the UNESCAP *Trade Statistics in Policymaking – A Handbook of Commonly Used Trade Indices and Indicators* (2009) – hereafter just referred to as the Handbook. The Handbook comprehensively identifies 26 indicators (excluding tariff indicators) and provides a definition as well as a formula for each. While there are other sources that discuss a multitude of trade indicators such as the World Bank's World Trade Indicators (Islam & Zanini 2008), and the UN Conference on Trade and Development's (UNCTAD's) Key Statistics and Trends in International Trade 2022 (2023:17-26), the Handbook provides a clear, concise, and detailed discussion of the trade indicators in question. The indicators identified from the Handbook cover broad topics such as trade and the economy, the direction of trade, trade performance, structure of trade, and regional orientation. The other sources identified above, often have similar or the same indicators. It should be noted that the Handbook does not profess to cover all trade indicators, but just commonly used trade indicators (Mikic & Gilbert 2009:9).

Although Mikic and Gilbert (2009) do not specifically refer to the role of trade indicators in measuring trade performance in their definition, they do refer to the link between trade indicators and trade performance numerous times in the Handbook (Mikic & Gilbert 2009:2&7). Several other supranational organisations also provide a discussion of the role of trade indicators in measuring trade performance. Examples include the World Bank's World Integrated Trade Solution (WITS) which provides various trade indicators covering different dimensions of trade performance (Reyes, McKenna & Kaushik 2014), the Organisation for Economic Cooperation and Development (OECD) which provides a comprehensive discussion on the role of trade indicators in global trade specialisation with reference to trade performance (Johannsson & Olaberría 2014:27), and UNCTAD (UNCTAD 2022:16-26) that examines trade performance across the world using a range of trade indicators. A 2018 study by the European Commission (EC) that investigates the task of measuring competitiveness, highlights the importance of competitiveness at sector level and emphasises that such competitiveness is 'strongly related to … trade' (Blandinières, Dürr, Frübing, Heim, Pieters, Janger & Peneder 2017:18). The report acknowledges that 'there is no clear consensus on how to define competitiveness on the sector level' (Blandinières et al. 2017:18). The aforementioned authors turn to a

dated source – D'Cruz (1992) – who defines competitiveness on sector level as 'the collective ability of firms in a particular sector to compete internationally' (Blandinières et al. 2017:18). The same authors use a selection of trade indicators to measure trade performance and sector level competitiveness (Blandinières, et al. 2017:18). This study's researcher suggests that the purpose of measuring trade, is to reflect on past and current performance, so as to improve on future performance.

There is also evidence of trade indicators being used in other areas of trade analysis and economic development. One such example is the work of Pradhan, Arvin, Hall and Nair (2017) who use trade indicators to explore the finance-growth nexus in Eurozone countries. Other examples include Rana and Sharma (2019) who explored the pollution haven hypothesis in international trade, and Awad and Youssof (2016) who explore the impact of internationalisation on unemployment in Malaysia.

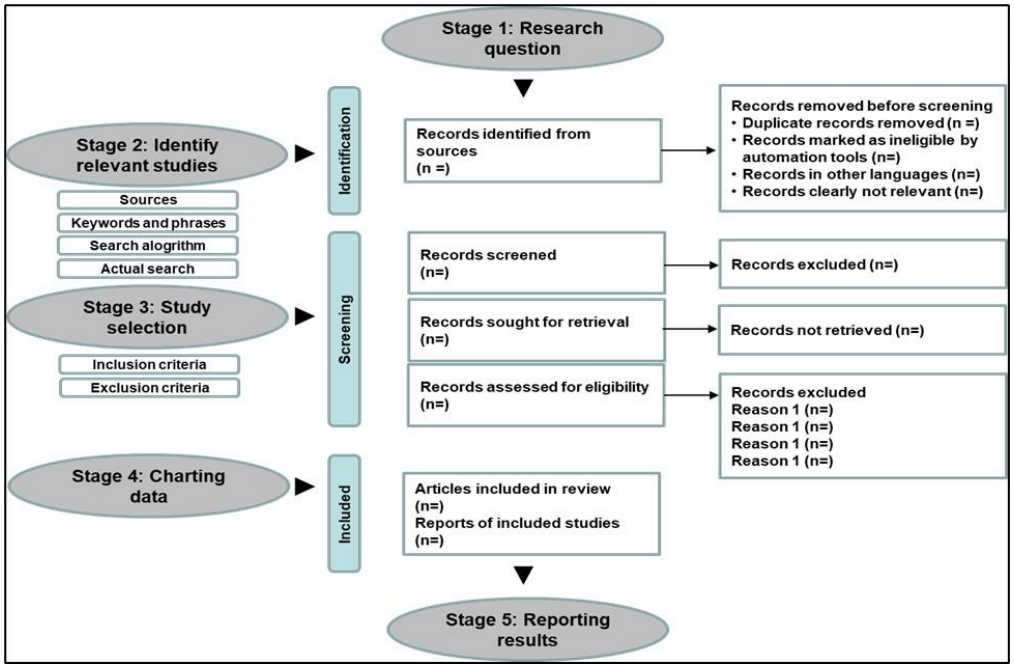
There appears to be less literature on the use of trade indicators in measuring trade performance at industry level, but such literature is still quite extensive. A good example is the recent work of Sujová, Simanová, Kupčák, Schmidtová and Lukáčiková (2021:6-9), who use trade indicators as a tool for studying the performance of the wood industry in Czechia and Slovakia. A further example is the work of Terán-Yépez, Santos-Roldan, Palacios-Florencio, and Berbel-Pineda (2020), who use trade indicators in foreign market selection in a specific industry sector. Although the literature appears to emphasise trade indicator use at macro level, trade indicators at industry level are arguably far more important for an industry's leaders or for companies within the industry, than macro trade indicators are. Knowing that a country's exports are growing, when an industry's exports are declining, may not be that useful for industry stakeholders. Therefore, the objective of this study is to review the literature on the use of trade indicators to measure trade performance at industry level.

3.2 MATERIALS AND METHODS

There are various alternative review methodologies that one could use to extract insights from the literature linked to the topic of interest. The work of Grant and Booth (2009:94-95) on creating a typology of reviews, identifies 14 review types, ranging from overviews and literature reviews, through rapid reviews, critical reviews, scoping

reviews and systematic reviews, to meta-analyses and umbrella reviews, amongst others.

Having examined these different types of reviews, it was decided to adopt a *scoping review*. Munn et al. (2018:2) compare a systematic review with a scoping review and posit that the scoping review is an 'ideal tool to determine the scope or coverage of a body of knowledge on a given topic and give clear indication of the volume of literature and studies available as well as an overview (broad or detailed) of its focus'. As the aim of the study was to review the literature on the use of trade indicators to measure trade performance at industry level, the broad focus of a scoping review is argued as being appropriate for this paper. The five-stage methodological framework of Arksey and O'Malley (2005:22-29) was adopted in this study to guide the actual review – see Figure 3.1 below.



Source: Adaptation of the work of Arksey and O'Malley (2005) incorporating the PRISMA process.

Figure 3.1: Depiction of methodological approach

3.2.1 Stage 1: The research question

Drawing on the research objective discussed earlier, the research question is: *What trade indicators are used in academic literature for measuring trade performance at industry level?*

3.2.2 Stage 2: Identifying relevant studies

This stage can be divided into three parts. The first is the selection of appropriate sources of academic research. The second is the selection of appropriate keywords/phrases to use. The third part is the actual search of the sources identified using the keywords/phrases identified.

3.2.2.1 Stage 2 - part 1: Selection of appropriate sources

The initial academic sources chosen were Scopus, WoS, ProQuest and Ebscohost[2]. Initially, the 'abstract', 'article title' and 'keywords' records were searched in, in the ProQuest and Ebscohost bibliographies. The reasoning was that if a full-text search was undertaken, too many peripheral results could obfuscate the findings. The study by Pranckutè (2021) provides a comprehensive discussion that serves as justification for the adoption of the first two bibliographies. The ProQuest bibliography, in turn, includes one of the most well-known bibliographies for theses and dissertations, supporting the use of this bibliography, while the Open Access Theses and Dissertations database option in Ebscohost was also selected together with other database options (see footnote) to be searched as part of the broader Ebscohost bibliography, another key source in this study.

3.2.2.2 Stage 2 - part 2: Selection of suitable keywords/phrases

The discussion in the background to this paper, provides direction for the selection of suitable keywords/phrases. This paper's interest is in *trade indicators*, justifying this phrase as the primary search keyphrase. However, to ensure maximum spread in terms of the search, the key-phrases *trade indices*, *trade formula*, and *trade metrics* were used as well. Initially *trade measures* was included as part of the search algorithm based on the logic that a measure is a form of quantification of something, but it soon became apparent that in the field of global trade, a *trade measure* is a policy initiative (see Leroy, Galletti & Chaboud 2016) and thus, this term was discarded, and the exercise was restarted.

2 The sub-directories selected for the Ebscohost research included: Africa-Wide Information, Business Source Ultimate, Core Curriculum, eBook Collection (EBSCOhost), eBook Open Access (OA) Collection (EBSCOhost), EconLit with Full Text, HBS Select Case Study Collection (eBook Sub) (EBSCOhost), Newspaper Source, Open Dissertations, Regional Business News, and SocINDEX.

Besides *trade indicators*, this study was also concerned with quantifying *trade performance*, so this keyphrase was included as part of the search algorithm. As an alternative to *trade performance*, *trade success* was also used to widen the search. Finally, the study aimed at examining trade indicators at industry level and so the keyphrase *industry level* was included as part of the search algorithm. Once again, it was felt that this term alone was not sufficient to enable an extensive source of inquiry, so the following alternatives were included, *industry perspective*, *industry focus* and *specific industry*. In the process of deciding on which specific keywords/phrases to use, many different keywords/phrases were initially explored – see Appendix C. Following this initial exploration, a search algorithm was formulated using what was considered to be the most suitable keywords and key-phrases from Appendix C, and using Boolean operators (Gusenbauer & Haddaway 2020:193-196) to create the search algorithm, namely:

> *("trade indicators" OR "trade indices" OR "trade metrics" OR "trade formula") AND ("trade performance" OR "trade success") AND ("industry level" OR "industry perspective" OR "industry focus" OR "specific industries")*

The double inverted commas indicate a search for the exact phrase, while the AND indicates the requirement that all the terms must be in the same target document, while OR means that any one of the terms can be in the target document.

3.2.2.3 Stage 2 - part 3: Search of the sources using the search algorithm

With the initial list of bibliographies identified (that is, Scopus, WoS, ProQuest and Ebscohost), and the search algorithm constructed as described above, the search process was initiated. It soon became evident, however, that this algorithm produced no results in any of the four selected academic bibliographies. A new tactic was then followed to broaden the search, which included using Google Scholar as a full-text source, as well as the *full-text* versions of ProQuest and Ebscohost – see discussion below. In these instances, the same algorithm as described above remained applicable. This search resulted in 218 initial results as outlined in Table 3.1 below.

The Scopus and WoS databases are not full-text bibliographies. One can search abstracts, titles and keywords, but not the full-text of the article. The ProQuest and

Ebscohost bibliographies can either be searched by abstract/title/keywords and/or full-text. As mentioned earlier, the non-full-text option was initially adopted for the sake of consistency across the four different bibliographies. However, this approach had to be abandoned when the search revealed no results, and a full-text search of these bibliographies, namely ProQuest and Ebscohost, was undertaken instead. In addition, a search of Google Scholar was included as noted above.

3.2.3 Stage 3: Study selection

With the bibliographies identified and the search key-phrases captured in the search algorithm, the next step was to adopt the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) process to identify suitable articles for review. Stages 1 and 2 in Arksey and O'Malley's framework (2005) served as input to the identification stage in the PRISMA process presented in Figure 3.1 above. In this stage, the focus turned to screening, retrieving, and reviewing the articles identified in stage 2. For this purpose, certain inclusion and exclusion criteria were adopted.

- **Inclusion criteria:** All academic articles that met the requirements of the search algorithm identified earlier, were included. To summarise, (i) the articles had to include one or more trade indicators, (ii) trade performance had to be a focus of the study in question, and (iii) the article needed to have a clear industry focus. In addition, articles had to be in English, and the focus of the articles had to be on global/foreign/international trade. The articles had to be accessible from the University of South Africa's library – the largest in Africa (UNISA 2023) – or from public/open sources.
- **Exclusion criteria**: Grey literature was not examined as part of this study, and thus any document that was not clearly an academic article, was excluded. However, reports and studies by multilateral/supranational organisations such as the UN, the World Bank, the International Monetary Fund, and other similar organisations were accepted to be of an academic nature. The justification for this view is that much of the international trade data available to researchers around the world is collected and distributed by these organisations. All non-English articles were excluded. Articles that included the keyword *trade*, but that were not about global/foreign/international trade, were excluded. For example, articles about trade and stock markets or forex trade, or about trades such as woodworking, plumbing and the electrical trade, or

about the retail or wholesale trade, were excluded. In addition, articles needed to have an obvious title and an abstract to evaluate as an initial step in selecting the article (those selected were still examined in greater depth by reviewing the actual articles for relevant trade indicators). The articles in question also needed to be available as downloadable documents, so that those articles found to be relevant could be scrutinised in more depth.

The tasks involved in this stage of the research included (i) reviewing each article, (ii) ensuring that articles included at least one or more trade indicators as defined for this study, (iii) identifying all mentions of trade indicators in the respective articles, as named in the article, and by page number in the article for easy cross reference, (iv) ensuring that the articles also discussed the issue of trade performance, (v) ensuring that the article had a clear industry focus (that is, that the research in question focused in part or in full on one or more industry sectors), (vi) capturing the citation details of each article, (vii) capturing an article number for easy reference in accessing the article, and (viii) making an initial judgement of the value of the article in terms of the width and depth of its discussion of trade indicators. In this last regard, articles were colour-coded highlighting the articles of considerable interest (green), articles of some interest (yellow), and articles of no interest (red). All this information was captured in a table – see file '*Trade indicator scoping review_Initial list of articles reviewed*, a Word© file, which is available on the Open Science Framework (OSF) repository at https://osf.io/9tx8f. Appendix D provides a description of the files saved on the OSF. Ultimately, only green, and yellow coded articles were further reviewed – see stage 4.

3.2.4 Stage 4: Charting the data

This stage of the process involved two tasks. The first task incorporated a review of the articles identified that were deemed to be relevant to this study (the green and yellow articles mentioned above). The two reviewers[3] independently extracted all trade indicators without prejudice, compiling them into a single table comprising a unique article number, the name of the indicator, an acronym (if one was used in the article), a

3 A colleague with a master's degree in research psychology assisted with the second review of the articles and trade indicator extraction.

proxy code as to whether the indicator was macro in nature, industry specific or both, and a definition of the trade indicator if one was available. This process went through several iterations. In the first iteration, no decision was made as to whether the trade indicator met the parameters of the definition of trade indicator as set out earlier, or whether the trade indicators were linked to trade performance at industry level or not. This was simply a continuous list of trade indicators as they were identified from a review of each source. This list contained quantitative measures that initially appeared to be trade indicators but that were later rejected as not meeting the set parameters (for example, they were formulaic functions or econometric models). The indicators were also rejected if they did not meet the trade performance or industry-level focus of the study, were direct duplicates of other indicators, or were differently named to other indicators yet measured the same thing (a common challenge). This initial iteration identified more than 400 trade indicators.

The second task, which built on the first task, involved a subsequent and more in-depth review of each article, from which a comprehensive table of all the trade indicators was compiled. In this table, every mention of the indicator across all the articles was captured using an article number together with the relevant page number(s). This allowed for the total references to a particular trade indicator to be counted across all articles. In addition, for every mention of an indicator in the various articles, an extract from the source article was captured that described the indicator in question, if such description existed. Some articles simply mentioned the trade indicator but did not provide any discussion of the indicator. In such cases this was simply noted, and with no description provided. If an indication was provided in the article of where the data was obtained from to calculate the indicator(s), this data source was noted in the table as well. There was an attempt on the part of the researchers to categorise the trade indicators in some way, in the form of a typology. This attempt at creating an organisational logic from the totality of trade indicators was based on the various descriptions linked to each trade indicator. This attempt at categorisation was captured in the table as well. Finally, as part of this second task, each trade indicator was coded as 'green' or 'red' or 'blue'. Green indicators were considered to have met the definition of trade indicator as set in this study. The red indicators did not meet the definition parameters and were discarded (they were formulaic expressions or functions or models, or they were macro in nature

or could be calculated only with input from input-output tables, firm-level data, or other data not easily accessible). The blue indicators involved growth or change in an indicator and were not included – they are referred to later in the discussion. The green indicators were deliberately kept apart and will be discussed separately in the findings.

The output from this exercise was charted by the researchers and compared and discussed amongst themselves with the aim of iteratively and objectively improving the results and process. The quality of the articles in question was not assessed during the scoping review, as the objective of this scoping review was simply to identify trade indicators in the literature and not to critique the studies in question. The final output of this second task was a table of indicators.

3.2.5 Stage 5: Collating, summarising and reporting the results

Finally, in this stage the list of trade indicators was examined more closely to extract policy and strategy suggestions, as well as recommendations for future studies on trade indicator use for measuring trade performance in an industry context. Common issues and information gaps were identified, where apparent. In this exercise, descriptive statistics were used in addition to narrative descriptions. This stage of the Arksey and O'Malley framework is reported under the findings below.

3.3 FINDINGS

The findings can be divided into two parts. The first part deals with the identification and download of articles to be reviewed (related to stages 2 and 3 of the PRISMA process), and the second part deals with the review of the downloaded articles and extraction of a list of trade indicators and their details as used in these articles (related to stage 4 of the PRISMA process).

3.3.1 Part 1: Search and identification of articles to be reviewed

As mentioned earlier, the initial search algorithm when applied to the recognised academic bibliographies such as Scopus, WoS, ProQuest (abstracts only) and Ebscohost (abstracts only), produced no results. This fact resulted in the study changing its focus to include full-text sources, namely ProQuest, Ebscohost, and Google Scholar

(also a full-text source). The results based on an adaptation of the PRISMA process, are presented in Table 3.1 below:

Table 3.1: Outcome from PRISMA process

Row #	PRISMA process	ProQuest	Ebscohost	Google Scholar	Total
Stage 2					
1	Records identified from sources	20	13	185	218
Stage 3					
2	Duplicate records removed	0	0	14	14
3	Records in other languages evidenced by search record, removed from review	0	0	6	6
4	Records screened	20	13	165	198
5	Records excluded - Records clearly not relevant from review of abstract	0	0	48	48
6	Records sought for retrieval	20	13	117	150
7	Records not retrieved – article is a duplicate even though search record suggests it is a different article (4), or foreign language article not evident from first review (2), or is not available via library or public databases (7)	0	0	13	13
8	Articles downloaded for review	20	13	**104**	137
9	Additional articles added to the list of articles reviewed after reading through the initially identified articles and finding references that appeared to be important/relevant	0	0	7	7
Stage 4					
10	Articles reviewed	20	13	111	144
11	Number of articles reviewed in which indicators were identified and reported on	9	0	73	82
12	Articles excluded after review (not relevant to study)	11	13	38	62

Source: Based on the PRISMA process and based on own study findings

3.3.1.1 Google Scholar

The exercise began with the **185 results** from Google Scholar, mainly because it was the largest set of results to work through. According to Google Scholar's classification of the different types of sources identified in the search, 95 books, 88 articles and 2 miscellaneous items were identified.[4] Working through all of these, 14 duplicate items were identified (8 books, 4 articles and 2 miscellaneous items), as well as 6 foreign language items (3 books and 3 articles), and these were removed. This left 165 items, 84 books and 81 articles. All the books were examined and only those deemed relevant

4 The Google Scholar repository revealed why Google is often frowned upon as a bibliographic repository. The records are not consistently documented, and the question as to what a book, working paper, thesis, journal article, or a report from a supranational organisation such as the World Bank or UN is, is missing.

to the study (36 books[5]) were kept for further analysis (48 books[6] were removed). This left 117 items. A further, more careful, investigation revealed an additional 4 duplicate articles, 2 foreign language articles, and 7 non-accessible articles. This exercise left **104 sources** from Google Scholar to be reviewed in more detail. All these sources were downloaded and stored in a folder for easy access. File '*Trade indicator scoping review_Initial Google Scholar results_Spreadsheet',* an Excel file®, on the OSF repository, described in Appendix D, serves as a listing of all the articles identified.

3.3.1.2 Ebscohost

The Ebscohost bibliography was found to have **13 sources** containing the search key-phrases in question. Working through the list of articles, all were deemed suitable to review and were downloaded – see file '*Trade indicator scoping review_Intitial Ebscohost results'* on the OSF repository, described in Appendix D.

3.3.1.3 ProQuest

A search of the ProQuest theses and dissertations database revealed **20 sources** on the database that contained the search key-phrases. Ultimately, all these results were deemed suitable to review and download – see file '*Trade indicator scoping review_Initial ProQuest results_Spreadsheet'* on the OSF repository, described in Appendix D.

3.3.1.4 Final list of articles to be reviewed

Table 3.1 shows that in total across these three databases a total of 137 sources/articles were downloaded and reviewed (104 + 20 +13). In subsequently reviewing the 104 sources from Google Scholar, several relevant articles and authors were identified from amongst the references used in the articles that were not part of the Google Scholar search results themselves, and, although not identified as part of the initial Google Scholar search these additional 7 articles were added to the initial combined list of sources to be reviewed. This resulted in 144 sources/articles being downloaded and reviewed in more detail – see task 2 described earlier. As indicated earlier in stage 3,

5 Recall that although classified as a book, in Google Scholar many of the publications and large reports by multilateral organisations, were also classified as books.

6 Most of these were actual books that contain numerous chapters, and the search terms used in this study, while present in the book, were not necessarily closely associated with each other and may have been discussed in different chapters, making books a poor source for this study.

the final list of sources reviewed can be accessed on the OSF repository (refer to file *'Trade indicator scoping review_Initial articles reviewed'*), described in Appendix D.

Of the 144 articles reviewed, 82 sources were found to be relevant, containing one or more trade indicators (graded 'green' or 'yellow'). Green-graded sources were deemed the most relevant with seven or more indicators listed, while yellow-graded sources were also considered relevant, but perhaps not as pertinent, or with fewer indicators identified in the source. In contrast, 62 sources were found not to be relevant at all (graded 'red') and did not contain any relevant trade indicators. Of the 62 excluded from further review, 38 came from Google Scholar, 11 from ProQuest, and 13 from Ebscohost.

3.3.2 Part 2: Review of articles to identify trade indicators

Reviewing the 82 sources deemed relevant to this study, was a time-consuming process and went through several iterations. The first iteration involved scrutinising the 82 sources, identifying those that contained trade indicators as defined for this study and capturing the indicators in a table with some supporting detail as described earlier. This initially resulted in 419 possible trade indicators being identified. Many of these were obvious duplicates, or were formulaic expresses/functions or models, or did not meet the definition of a trade indicator as outlined earlier. Subsequent iterations involved revisiting all the relevant articles and extracting detailed information as follows – see file '*Trade_indicator_scoping_review-Final list_of_trade_indicators'* on the OSF repository, described in Appendix D:

- Trade indicator name, and any notes about the indicator (for example, alternative names and relationships to other indicators).
- Acronym, if one was used.
- Possible categorisation of the trade integration into one or more logical types.
- Formula where available.
- Definition of trade indicator where available.
- Data source for calculating indicator, where available.
- Article numbers (these article numbers can be correlated with the list of articles – 'Trade_indicator_scoping_*review-List_of_articles*' in OSF repository), where the reference for the article can be found, together with page numbers where trade indicators are located.

This file and these above-mentioned findings are at the core of this study. A total of 101 trade indicators were identified from the literature – see Table 3.2 below. It is important to note that every trade indicator can be accompanied by two further indicators, namely (i) a change indicator, and (ii) a growth indicator. While a trade indicator is useful in providing insight at any point in time, the change in every indicator also offers additional insight between two points in time. Similarly, growth – a different measure to change – provides additional insight as to the pattern of the change over time (either based on an average or a compounded growth rate basis). Thus for 101 indicators, there are a potential further 202 change/growth indicators that could also be captured. These have not been documented as part of this study but would be worthwhile to include in future studies. It was stated earlier that tariff-related indicators were not included in this study. While examining the extent of protection that nations use to protect themselves from foreign competition is a key task in better understanding the opportunities for internationalisation, there are 70 or more different measures that can be used making this additional insight too voluminous for this study (David 2004).

Table 3.2: Unique trade indicators identified from the scoping review (101 indicators)

Additive Revealed Comparative Advantage Index	Net Export Index
Additive Revealed Comparative Export Advantage	Net Exports
Average Export Prices	Net Revealed Comparative Advantage
Barter Terms of Trade	Net Trade Ratio
Bilateral Revealed Comparative Advantage	Normalized Trade Balance
Competitiveness Index	Price Similarity Index
Complementarity Index	Product Similarity Index
Dynamic Comparative Advantage	Ratio of Trade Balance to Total Sales
Export Concentration (either destination or market) (Herfindahl-Hirschman Index)	Real Effective Exchange Rate (Harmonized Competitiveness Indicator)
Export Diversification Index	Real Exports
Export Exposure Index	Real Imports
Export Intensity Index	Regional Hirschmann Index
Export Openness – based gross production	Regional Intensity of Trade
Export Openness – based on value added	Regional Market Share
Export Penetration Index (market penetration)	Regional Orientation Index
Export Propensity Index	Regional Trade Introversion Index
Export Sales Ratio	Relative Export Advantage
Export Similarity Index	Relative Export Density
Export Sophistication Index	Relative Export Prices
Export to Import Ratio	Relative Import Advantage
Export Unit Value Index	Relative Price-Change Trade Performance Index
Export Unit Values	Relative Quality
Export Volume Index	Relative Trade Advantage
Export/Import Coverage	Relative-Rank Trade Performance Index

Exports Per Capita	Revealed Comparative Advantage
Exports Per Worker (In Currency Terms)	Revealed Comparative Advantage of Quality In Trade
Extensive Margin	Revealed Comparative Export Advantage
External-Internal Index	Revealed Comparative Import Advantage
Finger and Kreinin Index of Similarity	Revealed Competitiveness
Greenaway, Hine, Milner and Elliott Index	Revealed Human Capital Index
Growth Rate of Exports*	Revealed Income Content of Product (PRODY)
Growth Rate of Imports*	Revealed Physical Capital Index
Horizontal Intra-Industry Trade (Excluding Horizontal Specialisation)	Revealed Symmetric Comparative Advantage
Import Intensity	Sectoral Contribution to Trade Balance
Import Penetration Index	Sectoral Hirschmann
Import Price Index	Sectoral Intra-Industry Trade
Import Unit Value Index	Size-Adjusted Regional Export Share Index
Import Unit Values	Terms of Trade
Import Volume Index	Theil's Entropy [Concentration] Index
Imports per Worker	Total Trade
Income Terms of Trade	Trade Balance
Intensive Margin	Trade Concentration Ratio
Inter-Industry Trade	Trade Dependence (Trade Openness) Index
Intra-Industry Trade (Various)	Trade Entropy Index
Intra-Regional Trade Intensity Index	Trade Intensity Index
Lafay Index	Trade Overlap Index
Major Export Category	Trade Share
Marginal Intra-Industry Trade	Trade Specialisation Index (Net RCA)
Marginal Propensity to Import	Uniform Growth Trade Performance Index
Merchandise Trade Specialisation Correlation Index	Vertical Intra-Industry Trade (Excluding Vertical Specialisation)
Michelaye Index	

Source: Researcher's compilation

If one examines the key sources consulted as part of this scoping review – defined as those sources that incorporated more than 10 indicators (see Table 3.3) – none of these articles discussed more than 32 unique indicators. In consolidating these indicators from key sources, a total of 69 unique trade indicators were identified. None of the key sources are typical journal articles, but all of them come from the research of supranational organisations such as the World Bank, the World Trade Organisation (WTO), the UN Economic and Social Commission for Asia Pacific (UNESCAP), the UNCTAD, and other similar organisations.

Table 3.3: Key sources identified from the literature each with more than 10 indicators

Source no.	Source details	No. of indicators
3	Karadeloglou, P. & Benkovskis, K. (2015). Compendium on the diagnostic toolkit for competitiveness. *ECB Occasional Paper*, No. 163, **European Central Bank (ECB),** Frankfurt a.M.	23
4	Chemingui, M. & Eris, M. 2019. *Ex post trade impact analysis: A methodological note.* Working paper prepared on behalf of the **Economic and Social Commission for Western Asia (ESCWA).**	17
12	Islam, R. & Zanini, G. 2008. World Trade Indicators 2008: Benchmarking policy and performance. The **World Bank Group.**	15
22	Reis, J.G. & Farole, T. 2012. *Trade competitiveness diagnostic toolkit.* **The World Bank Group** publication no. 67362.	32
33	Zurek, M. et al (25 others). 2020 Sustainability metrics for the EU food system: A review across economic, environmental and social considerations. ***Sustainable Food and Nutrition Security*** **(SUSFANS),** Deliverable No. 1.3.	15
54	Bacchetta, M., Beverelli, C., Cadot, O., Fugazza, M., Grether, J-M, Helble, M., Nicita, A, & Piermartini, R. 2012. *A Practical Guide to Trade Policy Analysis*. **World Trade Organisation (WTO) and UN Conference on Trade and Development (UNCTAD).**	27
61	Haar, L.N. 2014. Do patterns of trade and international competitiveness support the case for industrial policy? *Policy Studies*, V35(3), pp.221-245.	17
104	World Bank. 2005. Ukraine's Trade Policy: A Strategy for Integration into Global Trade. **The World Bank Group**, country study no. 34336.	14
123	Mikic, M. & Gilbert, J. 2009. *Trade statistics in policymaking: A handbook of commonly used trade indices and indicators. Revised edition,* **UN Economic and Social Commission for Asia Pacific (UNESCAP)** publication no. ST/ESCAP/2559.	30
	TOTAL	**193***

*Not unique (there were 69 unique indicators identified from these sources)
Source: Researcher's compilation

3.4 DISCUSSION OF FINDINGS

Reflecting on the fact that a search of the two largest academic bibliographies, namely WoS and Scopus, on the topic of trade indicators and trade performance at industry level, produced no results, this finding suggested a lack of academic research on this topic. However, using Google Scholar as an alternative source, as well as the full-text versions of ProQuest's dissertation and theses database and the Ebscohost bibliography, these three sources together revealed that 218 initial articles matched the search algorithm. The PRISMA process revealed that Google Scholar ultimately produced 73 articles or reports relevant to this study, while ProQuest added only 9 out 20 initial dissertations/theses to the mix, and the Ebscohost bibliography contributed none. Given this small contribution of the ProQuest and Ebscohost bibliographies, and the datedness of the results (none were considered recent), the results for all three sources (Google Scholar, ProQuest and Ebscohost) were combined, and dealt with as a single data source. The results reviewed from these three sources suggest that there was a growing focus on trade indicators for measuring trade performance in industry in the period until

2019. While still an important topic, articles drawing on trade indicators to discuss industry trade performance and the development of new indicators seems to be abating. This study established that not much has been done to propagate the use of trade indicators more widely at industry level for industry policy development and trade performance measurement, even though there is evidence of the availability of many trade indicators beyond a limited range of indicators that are commonly used in the academic literature. This lack of use or awareness of the full spectrum of indicators to measure trade performance at industry level, as unearthed in this review, may limit more extensive and effective research by practitioners, as well as academics.

The researcher used full-text sources, namely Google Scholar, Ebscohost and ProQuest as the sources of all the identified articles. These articles also contain complex trade formulae, functions, expressions, or models, but that did not meet the author's criteria for trade indicators. Given the complex nature of full-text sources, Scopus and WoS are preferable academic bibliographies because they are more focused in their scope. In contrast, one could argue that the fact that only 82 articles were deemed relevant should not be seen as a weakness. Using Google Scholar, it was indeed still possible to find relevant articles for this scoping review when the bibliographies such as Scopus and WoS failed to do so, given the search algorithm that was applied.

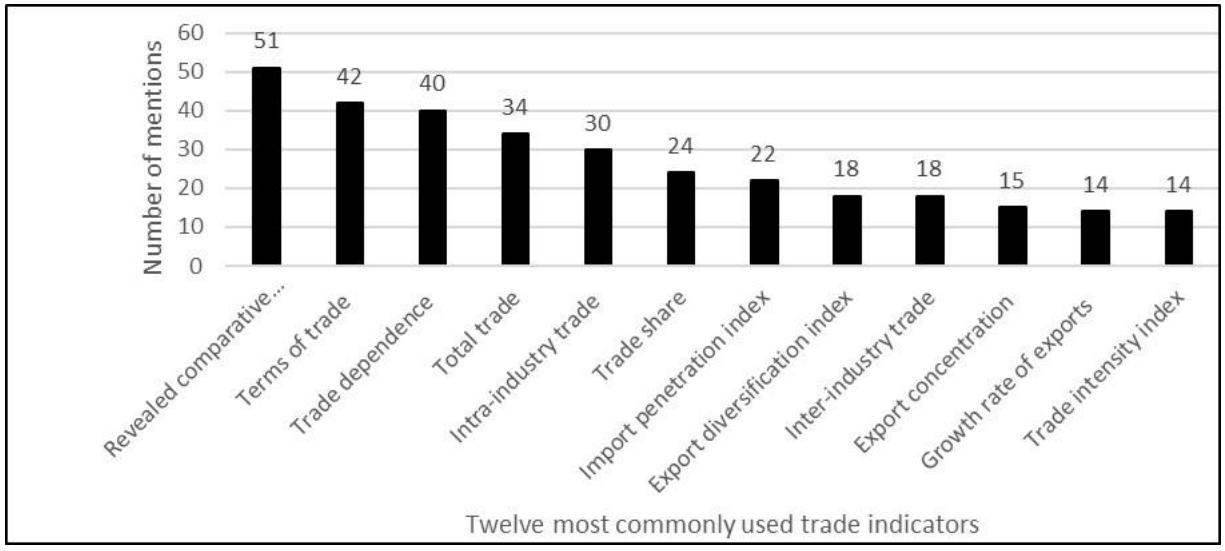
It was established that 9 of these 82 articles were key (as indicated in Table 3.3), because all of them are from supranational organisations, such as the UN, the WTO, the World Bank, the OECD and the IMF. Each of these sources discussed more than 10 indicators (up to 32 indicators in one instance). A total of 69 unique indicators (more than half of the total identified in Table 3.2) emerged from the 9 articles. Wolff (2022:3) highlights the role of these aforementioned institutions in helping to enhance global intelligence, while Sredl (2023), from the Harvard Library, points to these supranational organisations as key trade resources. Egger and Wolfmayr (2018:79-91) emphasise the importance of *supranational* data sources such as the World Bank, the WTO, the OECD and the UN in making available [mostly free-of-charge] consistent and transparent data that can be used for empirical analysis of benefit to countries and industries alike.

3.4.1 The trade indicators

The trade indicators listed in Table 3.2, have additional information (such as acronyms, definitions, possible data sources, references, etc.) associated with them that can be found in file *Trade indicator scoping review_Final list of trade indicators*, discussed earlier, available on the OSF repository, described in Appendix D. This list of trade indicators is one of the main outcomes of this study**.** This file only includes the trade indicators considered relevant to this study, extracted from the 82 articles reviewed for this study.

Figure 3.2 below provides a visual record of the 12 most used indicators in the literature reviewed. The revealed comparative advantage (RCA) indicator is the most popular indicator in the literature, followed by the terms of trade indicator, and then the trade dependence index (also referred to as trade openness or trade as a ratio to GDP), total trade, and intra-industry trade. These five trade indicators are mentioned in more than a third of the total articles (30+ mentions / 82 articles = 36.6%), with the RCA alone mentioned in almost two-thirds of the articles reviewed. While all the indicators have a relevance for industry, the terms of trade, trade openness/trade dependence, and total trade are typically used in a macro context. Most of the indicators fall into the one- or two-mentions categories (there are 30 indicators mentioned only once and 15 indicators mentioned twice). The remainder of the 101 indicators, namely 44, had from 3 to 13 mentions each.

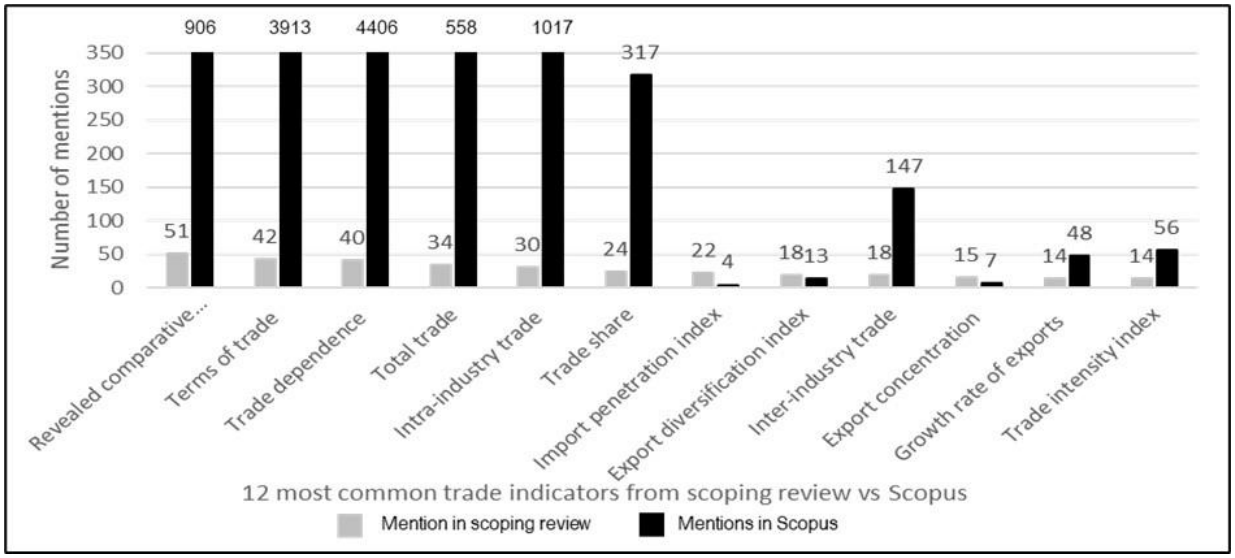
Biemudo, Antonio and Agustin (2022:610), and Binos, Vigonte and Abante (2023:6) point to the importance of trade indicators in improving economic growth. There are other articles that discuss one or more of these trade indicators in a given context and in that context the authors may highlight the value or importance of the indicator(s) concerned. However, no evidence could be found of articles that discuss all or most of these trade indicators with the focus of highlighting their value in industry policy creation or strategic firm decision-making context.



Source: Researcher's compilation

Figure 3.2: Summary of the common trade indicators identified in scoping review

The findings of this study correlate with evidence from the literature, specifically the Scopus bibliography. Figure 3.3 provides a comparison of the mentions of the most common trade indicators identified in this article. The terms of trade and trade dependence indicators have the most mentions in Scopus.



Trade dependence = trade dependence OR trade openness

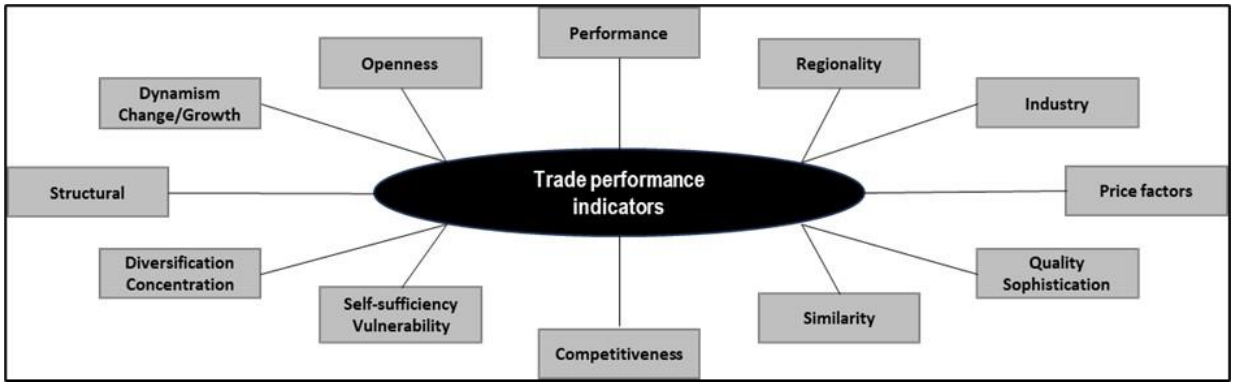
Source: Researcher's compilation

Figure 3.3: Comparison of mentions of trade indicators from study vs Scopus

3.4.2 From the scoping review to a typology of global trade indicators

With the findings of the scoping review in hand, it was decided to attempt to create a typology of these trade indicators. A typology (or taxonomy) can be defined as a way of

classifying, or grouping entities (in this instance, trade indicators) (Stutter, Helliwell, May & Carvalho 2017:3), based on their common purpose, viewed from the standpoint of what they strive to measure. Collier, Laporte and Seawright (2012:217) explain that a typology is a well-established analytical tool that is useful for creating categories, classifying information, sorting cases, and providing structure. Figure 3.4 depicts this typology.



Source: Researchers' compilation

Figure 3.4: Proposed typology of trade indicators

In this discussion, the total mentions of each indicator across all the reviewed articles are captured in the discussion to provide evidence of their use and to highlight the extent of their use in the research reviewed in this study. It should be noted, though, that these mentions may be general in nature in support of the discussion concerned and may not be specifically aligned to where the indicator is formulated or defined in the article.

The first category discussed is **performance**. This study explored trade performance as a measure of the success of the internationalisation efforts of industry. *Trade performance* and *industry* were key-phrases included in the search algorithm. It is therefore not surprising that many of the indicators were allocated to either the competitiveness category and/or the trade performance category, according to the proposed typology. The trade indicators identified from the review may fall into more than one category; the categories are not seen as mutually exclusive. The category of performance refers to those metrics that measure how well an industry or country is doing, not necessarily in terms of the industry's/country's competitors (a comparative measure which would be better allocated to the competitiveness category), but in their own right, or perhaps over time. Most change and growth metrics would arguably fall

into this category. Some competitiveness metrics might also have a performance perspective associated with them.

The **competitiveness** category deals with those indicators that measure how countries or industries compete or compare with other countries, industries, or regions. The OECD define export competitiveness as the extent "to which [a country] can produce goods and services that meet the test of international markets, while simultaneously maintaining and expanding the real incomes of its citizens" (De Vet 1993:15). This view is supported by Siggel (2006:138) who argues that the various revealed comparative advantage terms are "a misnomer in the sense that they are a better measure of competitiveness than comparative advantage". Bedir (2023:117) concurs with this outlook in arguing that "in the determination of the comparative advantages and the analysis of competitiveness, the revealed comparative advantage indexes, which are more than ten in number with their different formulations, are frequently used in the national and international literature." Other examples of competitiveness indicators include the Competitiveness Index (CI) (Mikic & Gilbert 2009:65), the Revealed Comparative Export Advantage (RXA) (Zurek et al. 2017:50), Michelaye Index (MI) (Bedir 2023:121), Revealed Competitiveness Index (RC/RCI) (Danna-Bultrago & Stellian 2022:478), Lafay Index (LI) (Baumann & di Mauro 2007:47) and the Trade Specialisation Index (TSI) (Zaghini 2003:10).

Regionality is a term used to refer to the focus on regions (Kühne & Weber 2022:222-226; Grupp & Gschwender 2023:207), and, in the context of this study, the term is used to refer to those metrics that measure how trade from one country compares with other regions. See Hernandez (2022:44) who uses the term in her study on global food trade. These indicators are not mutually exclusive, and a regional indicator may also be competitive, or performance orientated, but most importantly in the context of this category, they focus on given regions. These measures would exclude bilateral or world trade. Industries and countries are often interested in a particular focus on a particular region and may develop policies and strategies to pursue exports to these regions. This contrasts with general efforts to promote trade globally (with the rest of the world) or bilaterally (with a specific country). Examples of regional indicators include the External-Internal Index (EII) which measures regional trade cohesion (Huang, Gou, Cai, Li &

Chen 2020:10), Intra-Regional Trade Intensity Index (IRTII) (Khalid 2023:489), Regional Hirschman Index (RHI) (Hedoui, Natos & Mattas 2019:22), Regional Intensity of Trade (RIT) (Ibitoye 2022:33), Regional Orientation Index (ROI) (Dinda 2019:53), and the Regional Trade Introversion Index (RTII) (Eriksson 2021:23).

The category of **structural** trade indicators are those metrics that are associated with or organised/structured according to other factors, such as product factor intensities including human capital, human factors, productivity, physical capital, financial capital, technology, research, and development (R&D), income factors, population, and other external factors that could influence the trade indicator in question. So, for example, one might want to categorise exports according to the impact of human capital or physical capital or R&D or other factors that influence trade and then measure the RCA for each category to see how that factor influences the RCA. Two key indices identified in this category, include the intensive and extensive margin metrics. Reis and Farole (2012), discuss these indicators in some detail – see Figure O.3 (p.6) in their article. In addition, to the intensive margin and extensive margin measures, Reis and Farole (2012:49) also present two further trade indicators focusing on the factor intensity of international trade, namely the Revealed Human Capital Index (RCHI) and the Revealed Physical Capital Index (RPCI). These indices help measure the factor intensity or structure of trade (for example, how much capital is involved in trade, how much labour is involved in trade, or how much R&D is involved, and so on).

A further category in the proposed typology is '**industry'** which includes two related perspectives, namely IIT (intra-industry trade), and IeIT (inter-industry trade). IIT includes the "two-way exchange of goods of the same industrial classification" (Clark 1999:80), while IeIT is the two-way exchange of goods of different classifications, namely dissimilar products (Leyaro 2022:5). The most well-known indicator to measure IIT is the Grubel-Lloyd Index (GLI). This GLI metric describes the extent of overlap in trade within the same industry, between two countries. Inter-industry trade is related to IIT, in that inter-industry trade is one minus the intra-industry trade (or what is not inter-industry trade is intra-industry trade or vice versa).

The **dynamism** category includes indicators that are dynamic in nature and that measure change and/or growth, and more. It is difficult to provide an indication of the

extent of use of these indicators amongst the articles reviewed in the context of this study, as the terms *change,* and *growth* are widely used in most of the articles. The discussion where the term is used could be of a narrative nature, rather than quantitative. In the literature, Montañez, Sarmineto and Córdoba (2022:74) refer to 'trade dynamism indicators' in their analysis of the dynamics of international trade in Latin American countries. The extensive work on trade dynamism by Lima, Alvarez and Cracau (2016:11-15) emphasises the roles of rates of change, indexes, and growth rates in trade dynamics. The work of Montañez et al. (2022) refers to trade indicators such as the trade concentration index, trade diversification indices, and trade balance as *trade position* indicators (that is, static indicators), but considers the RCA indicators, the Trade Overlap Index (TOI), the Theil Index (TI), the GLI, and others, as indicators of trade dynamism, a view supported by Lima et al. (2016). The category of trade dynamics is also not a mutually exclusive category when compared with other categories of indicators. The indicators could be both a competitive measure on the one hand, in that one country could be growing faster than another, or, on the other hand, it could be a performance metric in terms of a country's progress over time or based on markets, industry growth, technology adoption, productivity, or upskilling.

Another category for which there are numerous measures is the **diversification/concentration** category**.** This category has to do with the extent to which a country's or industry's exports are diversified across many different product-lines or concentrated in only a few product lines. Reis and Farole (2012:41) posit that a country with a diversified composition of exports is normally preferable to a concentrated composition of exports. They find more evidence of export concentration usually in less developed countries, and vice versa for diversification, which is more common amongst developed nations. The literature review identified numerous measures of concentration (or diversification). The most well-known is the Herfindahl-Hirschman Index (HHI), or the Export Concentration Index (ECI), discussed 64 times in 10 of the articles reviewed. The research of Dergachova, Dunska, Holiuk, Lutsenko and Pichugina (2021:26) found a positive link between the impact of export diversification and concentration on trade performance and economic growth.

The **quality** category focuses on those trade indicators that strive to measure the quality of the products being exported. Quality is a variable that may be associated with sophistication and/or specialisation, and often leads to export diversification, with a positive impact on performance. The focus on export specialisation leads industries and firms in these industries to leverage comparative advantages that such firms and industries may have either in geographic location, labour skills or productivity, resources, historic ties, or similar advantages. To achieve this goal, industries will strive to determine the comparative advantages they have and to exploit such advantages. This is where the RCA may come into play. Typical quality indicators include the Revealed Income Content of a Product (PRODY) and Export Sophistication (EXPY), two indicators that are closely aligned. Cabral and Veiga (2010:45) provide an argument for the adoption of export sophistication strategies and link both quality and specialisation in their discussion, while Carbone and Henke (2016:15) find evidence to support the move of industries to more specialised exports and more sophisticated markets.

The category of **similarity** indicators reflects those metrics that show whether a country or industry has a similar trading profile compared with its trading partner. The term *similarity* is mentioned 354 times in 26 articles reviewed (considering that all the articles reviewed were trade articles). Mikic and Gilbert (2009:82-83) explain that similarity "is designed to measure the degree of similarity between the export profiles of two economies." According to the researchers, the value of this indicator is that countries with similar export profiles are likely to be competitors and that significant levels of similarity may also indicate limited potential for inter-industry trade. Wenqi and Zhang (2023) discuss study on trade development stemming from the Chinese *Belt and Road* initiative and examine the trade competitiveness of this region using the RCA and drawing on the Export Similarity Index (ESI). The work of Li, Ma, Wang, Chen and Niu (2022:4) explores competition among cities for export trade development opportunities and they use the ESI for this purpose. To this end, they state that:

> "As a reflection of the similarity in exports between regions, the export similarity index (ESI) has been widely adopted by scholars since its inception, especially those focusing on economic geography. The ESI has expounded many academic achievements involving international trade,

> industrial economies, and other multidisciplinary fields [pp. 51–53]. It can indicate the degree of convergence of commodities in two regions in a certain market. The higher the ESI, the more intense the competitive relationship is."

The research of Li et al. (2022:3), although it draws on export similarity, is primarily about export diversification. Their study not only touches on diversification, but also competitiveness, highlighting that the trade indicators identified in the review could fall into more than one category. The indicators identified from the review deemed to fall into this category include the ESI that was discussed above. Liu, Xu and Zhang (2020) use both the ESI and the TCI in their study on agri-trade along the Belt and Road. Lloyd (2004:21-34) reports on measures of similarity, highlighting the Finger Kreinin indicator's use in matching trade between countries. The Merchandise Trade Specialisation Correlation Index (MTSCI) was mentioned only twice in one article reviewed, but a definition and formula were provided. Chemingui and Eris (2019:13) explain that this indicator "assess(es) the degree of trade specialization between two countries". Gampfer and Geishecker (2019:327), for example, explore the link between product similarity and product quality and their impact on Chinese competition.

The **openness** category refers to a country's, or industry's, *openness to trade* or *trade openness* or the extent to which the country/industry is dependent on trade. It is measured using the Trade Openness Index (TOI). The term trade dependence index (TDI) is another term used to describe the same metric (Mikic & Gilbert 2009:26). Trade openness is one of the most widely discussed measures in this scoping review with 405 mentions in 36 articles reviewed as part of this study. It is computed using the value of trade (imports plus exports in value terms, divided by GDP and converted to a percentage). These indicators provide evidence of the degree of involvement of a country or industry in global trade. Some industries have a home focus, or at most, a limited global focus. These indicators are often used at industry level. For example, Kacani (2020:267-268) examines the impact of innovation on trade openness and argues that "more significant results can be obtained in the future by collecting industry level data". The research of Marjit, Basu and Veeramani (2019:3), in turn, focuses on the growth gains from trade using this indicator as a measure, with a specific industry

focus in their research, while Esaku (2021:1-2) in his research, examines the short- and long-run relationship between trade openness and economic growth in Uganda.

The **self-sufficiency/vulnerability** category includes indicators that focus on a country's or industry's self-sufficiency or vulnerability to the dynamics of international trade. For example, when it comes to petroleum, South Africa is vulnerable to the import of oil. However, when it comes to other raw materials South Africa, in many cases, is self-sufficient. Kaufmann et al. (2022:12) examine self-sufficiency in the agricultural sector using net trade as an indicator. Curtis and McLellan (2023:6&15) discuss self-sufficiency in energy exports with reference to export exposure. Pokrivčák, Nambuge and Gálik (2022:466) explore self-sufficiency in the beef sector on the Sloval Republic using net exports as an indicator. Stagni, Fosfuri and Santaló (2021:1516) investigate technology solutions in the manufacturing sector to address vulnerabilities caused by import penetration in the US. Export vulnerability in the manufacturing industry in Ghana is examined by Anning and Darko (2019:19&21) using amongst other metrics, Export Propensity. Finally, Kaur (2020:85) specifically discusses the role of the “export to imports ratio and self-sufficiency of the automobiles sector in India”.

3.5 CONCLUSION

This study highlighted the importance of the scoping review, as well as the importance of the set criteria, but above all, highlighted that the said trade indicators have not been well documented in a language that is understood universally. South African academics and practitioners may find it difficult to understand which trade indicators resonate with their sectors. More importantly, academics may be required to expand their set criteria to accommodate various terminologies used in trade indicators. This may hinder further research on the subject of trade indicators.

The researcher of this article recommend that practitioners focus on trade indicators that closely describe activities in their sectors. Academics in contrast, are encouraged to collaborate across universities, countries, regions, and with industries to develop a clearer perspective of the most suitable trade indicators to use, given the context. In addition, researchers need to better understand the power that these indicators have to promote the industries they are measuring.

It was posited in the introduction that to help promote and grow trade at industry level, a comprehensive list of trade indicators needed to be compiled to assist researchers to measure trade performance at industry level. This was the justification for this scoping review. Using an adapted version of the PRISMA method and drawing on the work of Arksey and O'Malley (2005), a comprehensive scoping review identified 82 articles to be review. From the intensive review of these 82 articles, 101 trade indicators were identified (not including any change, growth, or tariff-related indicators). This list was far more comprehensive than any single source that was examined as part of the scoping review. The most identified were 32 trade indicators. This list of trade indicators serves as a unique outcome resulting from this study. In addition, the most commonly used indicators were identified from the review. To add a novel perspective to these findings, a trade performance indicator typology was proposed and defended with supporting evidence from the literature. The researcher see this as one of the most comprehensive reviews and list of trade indicators currently available. The focus on industry is seen as a valuable perspective to help promote, grow, and track trade at industry level, taking a bottom-up approach by informing industry policy from within, rather than a top-down approach that allows government and trade policy to dictate the future direction of industries. Finally, the unique and novel typology of trade indicators should help other researchers with a quick reference guide of trade indicators, encouraging more diversified use of trade indicators.

PRELUDE TO ARTICLE 3

This next article builds on the scoping review which identified more than 100 trade performance indicators from the academic literature. In this next chapter, the 13 most popular of these indicators are computed drawing on trade and output data from the leather and footwear industries. The trade data (based on the HS2017) originated from C&E, while the latest industry information came from StatsSA (based on the SICv5). The concordance exercise undertaken in Article 1 enabled trade data to be used in combination with industry data in the South Africa context, which was a requirement for several of trade indicators.

The scoping review in Article 2, helped identify the most comprehensive list of over 100 trade performance indicators used at industry level and referred to in the academic literature. For the sake of feasibility, the 13 most widely used trade performance indicators from Article 2 were selected for this analysis, based on the total references to these indicators across the articles reviewed. These indicators were then computed using the trade and industry output data from Article 1 and the findings discussed from the perspective of the marketing value of these indicators for industry managers. The article has been submitted to Management Dynamics.

It should be noted that the content of this article (including the abstract and keywords) is exactly as submitted to the journal in question, except that the heading numbers (including figure and table numbers [as well as the references to these tables and figures in the text]) have been changed to accommodate the chapter and heading numbering of this study, and the font style and spacing is in keeping with the style/spacing used for the dissertation as a whole, rather than for the journal. The reason for this is to keep an element of consistency across the dissertation. However, recommended examiner changes have also been addressed, as is required by the University. The footnotes are numbered per chapter, not across the entire dissertation. The references and appendices for Article 3 are presented at the end of the dissertation together with the other references for the other chapters/articles, as a single combined reference list, so not to disrupt the readability of the dissertation.

CHAPTER 4
(ARTICLE 3)

PROMOTING THE INTERNATIONALISATION OF THE FOOTWEAR AND LEATHER INDUSTRIES IN SOUTH AFRICA THROUGH THE LENS OF TRADE PERFORMANCE INDICATORS

ABSTRACT

This study explores the role of trade performance indicators in measuring the internationalisation efforts of the footwear and leather industries in South Africa. The study argues that while internationalisation is typically the purview of firms, firms operating in similar industries have similar opportunities and challenges, and that working together as an industry, the potential benefit is greater for all industry members. Extracting and interpreting the potential marketing value from the key trade performance indicators identified to contribute to quantifying and driving the internationalisation efforts of an industry, is the aim of the study. To this end, this article focuses on using trade indicators to measure the trade performance of the footwear and leather industries in South Africa in their internationalisation endeavours. Selected trade indicators are used, and the study draws on national output data from the statistics authority and trade data captured by the local customs and excise services to compute each indicator. The analysis finds that there is value in all the indicators at industry level for international marketing decision making, although some have more value than others.

Keywords: Industry internationalisation, trade performance, trade indicators, footwear industry, leather industry, marketing value, South Africa

4.1 INTRODUCTION

This study explores the role of trade performance indicators in measuring the internationalisation efforts of the footwear and leather industries in South Africa. The benefits of internationalisation have been widely recognised in the academic literature over the years, and range from increasing revenues, expanding and diversifying markets and customers, lowering transaction costs, improving economies of scale, growing institutional learning, reducing risk, improving competitiveness, overcoming

seasonal market fluctuations, and increasing innovation (Gould 2002; Ruffini 2013; Pekarskiene & Susniene 2014; Sun, Price & Ding 2019:326; Buckley, Enderwick & Voss 2022:71-72). While the benefits of internationalisation are well documented, and generally agreed to in the academic literature, defining internationalisation is a topic that finds less agreement in the literature. This challenge of defining internationalisation is argued by several authors (Baran 2019; Mugobo & Manzi 2021:11; Glinkowska-Krauze, Chebotarov & Chebotarov 2019:83-84). Baran (2019) posits that "internationalisation is a complex phenomenon [and] there is no approach which would comprehensively explain this phenomenon". Glinkwoska-Krause et al. (2023:83-84), in turn, argue that internationalisation is defined in multiple ways and that "there is a multitude of views in the literature, lending to the complexity of the issue". Mugobo and Manzi (2021:11) also point to several views in defining internationalisation. One of these views is adapted and adopted for this study. Internationalisation of industries is broadly defined as *the expansion of an industry's business endeavours beyond domestic borders into international markets, driven by the members of the industry or by those who strive or are appointed to lead the industry* (such as government, organised commerce, or industry associations).

While internationalisation is typically a task of firms, the concept is arguably equally relevant to industries and countries. Countries around the world actively promote exports as a national policy – there are more than 100 articles on Scopus that deal with the export promotion programmes in countries around the world. However, as this study is about internationalisation of industries, the recent literature (since 2018) on the "internationalisation of industries" (or "industry internationalisation") was the key focus of the researcher. But the literature is sparse. A search of the Scopus and Web of Science (WoS) bibliographies reveals five articles on this topic[1]. Browsing these articles (discussed in more depth in the literature review), reveals that the focus of the articles is often on firms rather than industries (the latter may only receive peripheral or contextual mention in the article). The lack of focus on industry internationalisation is echoed by Burge (2023), writing for the World Chamber Congress, who argues that although multilateralism is about country-to-country collaboration, it is the firm that plays

1. Seventeen articles since 2000. The search algorithm was worded to exclude articles on the internationalisation of the education sector, which is an industry receiving special attention in the literature currently.

a key role in the internationalisation of countries; industries receive no mention in his discussion. Baran (2019:70) is more emphatic and states that "there are only a few studies regarding the analysis of the internationalisation of sectors[2]". The apparent lack of focus on the internationalisation of industries is seen as a justification for this study.

But this study takes the discussion further still. The focus is about investigating the role of trade indicators as metrics that industries can use to plan, implement and control (PIC) industry internationalisation. In the process of 'going global', firms, industries and countries may make use of quantitative metrics to plan, manage, and track such internationalisation efforts. Trade performance indicators, collectively, represent the tools industry members and leaders can use to track performance. Trade performance indicators are defined by Mikic and Gilbert (2009:4) as "an index or a ratio that can be used to describe and assess the state of trade flows and trade patterns of a particular economy or economies and can be used to monitor these flows and patterns over time or across economies/regions". When the literature is examined using the key-phrases "internationalisation of industries" OR "industry internationalisation" AND "trade indicators",[3], neither Scopus nor WoS produced any results.

This paucity of research into the use of trade indicators to measure industry internationalisation is part of the justification for this study. As further justification for the study, the researcher argues that quantifying the trade activities of an industry should help provide useful insights into the PIC of the internationalisation endeavours of the industry in question. Such effort should prove of benefit to the industry as a whole, to its members (that is, individual firms), and for government trade policy. This leads to the objectives of the study, namely, to explore the use of trade performance indicators in promoting the internationalisation of industries in South Africa. Two industries are selected to present the case, namely the footwear and leather industries. These are two active and related industries, evidenced by their website, while not big, are labour intensive and important in the regions in which they operate. They are led by a single active joint industry association (the South African Footwear and Leather Industries

2 Replacing 'industries' with 'sectors' in the literature search made little difference.

3 There were numerous instances in which 'industry' and 'internationalisation' were brought together not as a single phrase, but as a comma-separated phrase, negating the relevance of the result. The search also included 'trade performance indicators' or just 'trade indicators' (or metrics), but to no avail.

[SAFLIA]) and have a government-approved export council (the South Africa Footwear and Leather Export Council [SAFLEC]) that has the task of promoting the internationalisation of the two industries concerned. The association also has a statistical manager to assist with the quantitative measurement of the industries' activities and there is evidence of various trade promotion efforts and the use of trade statistics on the website of the export council (SAFLIA 2023; SAFLEC 2023).

4.1.1 Literature review

Although the literature has no evidence of the use of trade indicators to measure industry internationalisation, there is evidence of research that explores various aspects of industry internationalisation, even though the focus on the use of trade indicators to measure internationalisation is not overtly discussed (although trade indicators may be used as tools as part of the analysis). For example, the research by Sambharya, Rasheed and Farok (2022) into the antecedents of industry globalisation reveals that such internationalisation efforts are positively influenced by barriers to entry, industry competition, industry assistance, capital intensity, industry concentration and industry regulation, but negatively influenced by technological change. This suggests that indicators which can provide metrics on one or more of these issues could be useful to manage the internationalisation efforts of the industry in question.

The work of Piekkola (2018:5-8), is an example of a paper that uses trade indicators but does not specifically refer to the term 'trade indicator'. This study uses the Revealed Comparative Advantage (RCA) indicator, and also refers to trade openness and export specialisation, two traditional trade metrics. The study finds that specialisation (the author refers to 'smart specialisation' which incorporates R&D, organisational capital and information and communication technologies) appears to have a positive impact on exports.

Pekarskiene, Susniene, Saboniene, and Cibiniskiene (2019:109) argue that multinational corporations (MNCs) are often key participants in the internationalisation of industries in that they move to selected countries to be closer to raw materials, labour, or consumers. As such, they 'push' the process of internationalisation to the foreign

country industries they operate in. Given these findings, indicators that measure the extent of MNC involvement in an industry might be good indicators to use.

Ly (2021) examines the concept of a 'circular economy' and posits that a new approach is required within industry and firm-level stakeholders in industry, especially when it comes to the internationalisation of industries. The aim of the circular economy is to revisit business and industry to overcome the 'wicked problems' argued by Kamm, Faber and Jonker (2016:36-42). The work of Beck (1999) in the World Risk Society, is also relevant here. In so doing, the circular economy strives to design out waste and pollution; keep materials in use; and generate natural systems (Ellen Macarthur Foundation 2023). While this article is about exploring the "resources, competencies, and capacities to acquire to mature toward the aim of sustainable development" (Ly 2021:18), it implies the need to find new metrics and measures to track sustainable internationalisation of firms of industries; measures that may not yet exist.

4.2 MATERIALS AND METHODS

This study is the culmination of two earlier studies.[4] The first study undertook a concordance exercise in South Africa to bring the manufacturing production and sales data published monthly by Statistics South Africa (StatsSA) together with the latest trade data published by Customs and Excise (C&E) in South Africa. The need for such a concordance is that the manufacturing data in South Africa is published according to an outdated classification system, namely the South African Standard Industrial Classification (SIC version 5 or SICv5), dating back to 1993. The trade data, in turn, is published according to a much newer (2017) classification system known as the Harmonized System (HS). No such concordance existed before, which meant that the two sets of data could not easily be matched to bring manufacturing production and sales data together with trade data. With the concordance in hand, this is now possible. For this study, data was obtained from StatsSA's monthly P3041.2 Manufacturing and Sales report, made available on the StatsSA website, combined with data on South Africa's exports and imports at 6-digit level of detail captured by C&E and accessed via

4 The references have been left out to ensure anonymity.

the Comtrade[5] database. The file containing the production and trade data for the footwear and leather industries for the period 2017 to 2021 is available in the Open Science Framework (OSF) repository (see https://osf.io/fztjp) The files on this repository are described in Appendix E. This data is used (a) to prepare a broad overview of the two sectors in question, as well as (b) to serve as input to some of the trade indicators used in this study – see the next paragraph.

The second study undertook an extensive scoping review of the use of trade indicators to measure trade performance at industry level. This study uncovered 101 trade performance indicators from the literature. From these indicators, the intention was to identify the 12 most popular indices, but one index – the export concentration index – has both a market and product perspective, so there are 13 most often-used indicators outlined in Table 4.1 below. The table includes the indicator name, the formula, and a brief definition. The indicators are presented in order of popularity.

Table 4.1: The trade performance indicators used to measure the internationalisation of footwear and leather industries in South Africa

Indicator name	Acronym	Formula	Definition and reference
Revealed comparative advantage index	RCA	$\frac{\sum_d x_{isd} / \sum_d X_{sd}}{\sum_{wd} x_{iwd} / \sum_{wd} X_{wd}}$ Where: x = industry i's exports (either for the source country [numerator] or the world [denominator]) X = total exports (either for the source country [numerator] or the world [denominator]) s = the source country d = the destination country or countries w = world exports i = the industry of interest	Originally proposed by Balassa (1965), this index is a ratio of two ratios or shares. The numerator is the share of exports of industry i from a source country to a destination country or countries (it could be a region), divided by all exports of the source country to the destination country (or countries). This result is then, in turn, divided by the denominator which is the share of world exports of industry i to total world exports (Saki, Moore, Kandilov, Rothenberg & Godfrey 2019:464). The value can vary between 0 and +∞. An industry is said to have a comparative advantage if the value exceeds 1 (Adigwe 2021:12-13).

5 The UN Comtrade database is made available via the International Trade Centre (ITC) website at http://www.trademap.org. As a UN member, South Africa's C&E are required to report all exports and imports to Comtrade monthly.

Indicator name	Acronym	Formula	Definition and reference
Terms of trade index*	ToT	$\frac{P_{X_1}/P_{X_0}}{P_{M_1}/P_{M_0}}$ x 100 Where: P_{X_1} = the price index of exports at the end of the period P_{X_0} = the price index of exports at the start of the period P_{M_1} = the price index of imports at the end of the period P_{M_0} = the price index of imports at the start of the period	This index measures the cost of imports if they were paid for by exports, or the "prices at which countries exchange their products in international trade" (Deardorff 2016:1). The 'net barter terms of trade' index is calculated as the percentage ratio of the export unit value indexes to the import unit value indexes, measured in a given year 1, relative to a base year 0, multiplied by 100 (World Bank 2023a). At an industry level, the ToT index provides an indication as to the competitiveness of an industry (Smith, Gorgoni & Cronin 2016:49). If the index is below 100, it suggests that the industry is not very competitive in global terms. The formula provided here is the relative price of exports to imports, but this could be phrased as the relative price of imports to exports, if the numerator and denominator were switched around (Matthew 2020:15). In this article, the formula is used as presented here.
Trade dependence index (also known or referred to as the trade openness index)	TDI	$\frac{\sum X_{isd} + \sum M_{ids}}{GDP_{is}} \times 100$ Where: X = total exports of a source country s M = total imports of a country s from various countries d s = home country d = foreign partners (destinations or suppliers) i = industry of interest GDP = output of industry i in country s	Typically, this indicator is used at a macro level (Mikic and Gilbert 2009:26-27), but it can also have meaning at industry level. At industry level it can be interpreted as the total exports (X) and imports (M) for an industry (i), divided by the gross domestic product (GDP) – the production output of industry i. The resulting value can vary between 0 and +∞. Using this simple formula, the dependence of a home country (s) for industry i on either another country, a group of countries or region, or all countries (d), can be determined as a share of the total output of the industry i. Depending on the proportions between exports, imports and output, insight into the competitiveness and self-sufficiency or dependence on trade (be it exports or imports) for industry in question, can be obtained. There are other variations of the trade dependence index (Jian, Ding & Ma 2022:5; Xu-guang, Xue-hong & Jun-yu 2022:3; Yawen, Yu, Yun, & Yi 2023:1145).
Total trade	TT	$\sum_i (X_{sd} + M_{ds})$ Where: X = exports M = imports s = home country d = foreign country i = industry of interest	This metric TT_i is a simple but widely used metric and measures the total exports (X) and total imports (M) for industry i (Fredman 2020:62). It measures the importance of trade to the industry in question. The larger the value, the more important trade is to the industry. It is more commonly used at macro level.
Intra-industry trade index (also known as the Grubel-Lloyd Index)	IIT(a)* GLI	$1 - \frac{\sum_i \lvert X_{sd} - M_{ds} \rvert}{\sum_i (X_{sd} + M_{ds})}$ Where: X = exports M = imports s = home country d = foreign country i = industry	This metric was developed by Grubel and Lloyd (1975) in their study on IIT. They proposed a measure which has been widely used in the literature (PaluŠ, & Parobek 2015:198). The index is calculated by taking the absolute value of an industry's exports less its imports, divided by the total of the industry's exports and imports for the same period – the measure for intra-industry trade, and subtracting the value from 1 (Dutta 2022:5-7). The logic is that total trade (=1) is a mixture of either inter-industry or intra-industry. If it is not inter-industry trade it must be intra-industry trade, hence subtracting the value from one. Thus the possible range of outcomes is from 0 to 1. If expressed as a percentage, then it would be between 0 and 100.

Indicator name	Acronym	Formula	Definition and reference
Trade share index	TSI	$\frac{\sum_i X_{sd} + \sum_i M_{ds}}{\sum_i X_{sw} + \sum_i M_{ws}} \times 100$ Where: X = exports M = imports s = home country d = foreign country i = industry w = world	This index highlights the importance to a specific industry, s, of a particular target market, d, represented by the share of sum of the total exports (X) plus sum of the total imports (M) from the industry in question (s) to the target market being studied (d), versus the total trade (X + M) of the industry concerned (s) to the world as a whole (w) (Mikic and Gilbert 2009:48-49). The result will vary from 0 to 100, with the greater value represented the importance of the target market to the industry in question. Authors such as Chui, Hall and Taylor (2002) have used this metric to explore market behaviour.
Import penetration index	IPI (or MPI)	$\frac{\sum_{id} M_{ds}}{GDP_s - \sum_{id} X_{sd} + \sum_{id} M_{ds}} \times 100$ Where: M = imports X = exports i = industry in question s = home country d = foreign country GDP = industry output	The MPI is an index of a home country's imports for a selected industry i, as a ratio to local production in industry i, less exports (X) for industry i to foreign countries d, plus imports (M) for industry i from foreign countries d (Grzegorzewska, Sedliačiková, Drábek & Behún 2020:151; Chakravorty, Liu, Tang, & Zhao 2022:5). The research by Fronczek (2017:289) recognises that the MPI can be measured either by gross output or by value added (leading to a modified MPI). In this study, the traditional gross value-added approach is used. The result can vary from 0 to 100, where 0 represents no imports to 100, where all domestic demand is satisfied by imports only. In this last-mentioned instance there are no domestic production and no exports.
Export diversification index	EDI	$\left(\sum_i \left\lvert \frac{\sum_d x_{isd}}{\sum_d X_{sd}} - \frac{\sum_{wd} x_{iwd}}{\sum_{wd} X_{wd}} \right\rvert\right) \div 2$ Where: x = exports of sector concerned X = total exports i = industry in question s = home country d = foreign country(ies) w = world exports	Mikic and Gilbert (2009:70-71) argue that the EDI is different from the Herfindahl-Hirschmann index (HHI), but other researchers see the HHI and the EDI as the same index (Tanasritunyakul 2022:20). In this article we use the EDI as provided by Mikic and Gilbert. Mikic and Gilbert (2009:70) explain that the index is the "sum of the absolute value of the difference between export category shares of the country under study, and the world as a whole, divided by two". The result will vary from 0 to 1, with 0 indicating that the export pattern of the industry in question exactly matches the world average. In other words, the industry is diversified in respect of its exports. The higher the value, the more dependent the industry is on a small number of products.
Inter-industry trade index	IeIT	$\frac{\sum_i \lvert X_{sd} - M_{ds} \rvert}{\sum_i (X_{sd} + M_{ds})}$ Where: X = exports M = imports s = home country d = foreign country i = industry	Inter-industry trade is essentially all trade that is not intra-industry trade. As IIT increases, so the IeIT will decrease. The value will range between 0 and 1 (Chakravarty, Pfingsten & Silber 2003). This metric is closely linked to IIT -see above.
Export concentration index (market) This indicator was divided into a 'market' and 'product' perspectives – see next indicator.	ECIm	$H_i = \left[\sqrt{\sum_s \left(\frac{x_{is}}{X_i} \right)^2} \right] * 100$ Where: x = exports of industry concerned X = total exports i = industry in question s = country under investigation	This index quantifies, for each product category, the extent of export market concentration by country of origin. The index indicates whether a small number of countries account for a significant portion of exports or, conversely, whether exports are evenly divided across the importers of the product in question. The index ranges from 0 to 1 with higher values indicating more market concentration (UNCTAD, 2018).

Indicator name	Acronym	Formula	Definition and reference
Export concentration index (product) This indicator was divided into a 'market' and 'product' perspectives – see previous indicator.	ECIp	$H_s = \left[\frac{\sqrt{\sum_i \left(\frac{x_{is}}{X_s}\right)^2} - \sqrt{\frac{1}{n}}}{1 - \sqrt{\frac{1}{n}}} \right] * 100$ Where: x = exports of products/industry concerned X = total exports i = product/industry in question s = country under investigation n = the total number of 4-digit products	Similar to the index above, this metric instead measures product (rather than market) concentration, where x_s is the industry s's exports of product i (at HS 4 -digit level), Xs is country s's total exports, and n is the total number (not the value or quality) of 4-digit products in question (Islam & Zanini 2008:81-82).
Growth rate of exports	GRX	$\left[\left(\frac{\sum_i X^1_{sw}}{\sum_i X^0_{sw}} \right)^{\frac{1}{n}} - 1 \right] x\ 100$ Where: X = exports of product/industry n= number of countries exported to s= country under investigation w=world 1= end period 0=start period	The growth rate of exports is calculated for an industry, i, by summing all exports from the source industry in country (s) to the world (w) at the end of a period (1) and dividing the result by the sum of all exports from the source industry in country (s) to the world (w) at the start of the period (0) (Mikic & Gilbert 2009:36-37). The result is the raised to the power of 1 divided by the number of countries exported to, and the value '1' is subtracted from the result. This result in turn is multiplied by 100. The GRX can vary from - 100% to +∞. A GRX=0 means that there is no growth recorded and that the value of trade has remained constant (World Bank 2023b).
Trade intensity index	TII	$\frac{\sum_{sd} X_{sd} / \sum_{sw} X_{sw}}{\sum_{wd} X_{dw} / \sum_{wy} X_{wt}}$ Where: X = exports s = the home country d = destination country w = world t = total (total world exports)	This is another ratio of ratio's index. The numerator comprises the share of exports of country s to country d, divided by the country s's exports to the world w. The denominator, in turn, represents the share of country d's exports to the world, divided by total world exports (Hossain et al 2021:40-41). A value greater than one (TII>1) indicates that the relationship between the home country s and the trading partner d is greater than is expected given the trading partner's share of world trade, while a value of less than one (TII<1) indicates that the strength of the trading relationship is less than is expected (Bano & Tabbada 2012).

*Net barter terms of trade is the metric used here – there are other perspectives such as gross barter ToT, income ToT, single factorial ToT, double factorial ToT, real cost ToT, and utility ToT (Aigbavoa 2022:28-29).

**The challenge is differentiating intra-industry trade from inter-industry trade, a related concept. The acronym for both would be IIT. To differentiate them, inter-industry trade is indicated as IeIT and intra-industry trade is indicated simply as IIT.

4.3 FINDINGS

The findings are presented in two parts. The first provides an overview of the production and trade activities for the footwear and leather industries in South Africa for the period 2017 to 2021. The second part presents a discussion containing the results obtained from calculating the various formulae for the leather and footwear industries in South Africa, respectively. The supporting data files for this article can be found in the OSF located at https://osf.io/fztjp, and described in Appendix E.

Document 1 in the OSF repository (see Appendix E) provides a description of the files stored in this repository. Most of the files in the repository contain multiple tables that were used as source of data for computing the trade indicators. Document 2 In the repository, provides three tables with the product codes and descriptions for the two-digit HS41, HS42 and HS64, HS2017 categories. These tables in document 2 are simply for easy reference for a reader.

It should be noted that the earlier concordance exercise (see Article 1) resulted in two HS categories (namely, HS911390 [leather travel kits and bags]) and HS960500 [leather watch straps]) fitting better within the leather industry – see documents 6 and 7. These two minor HS categories relate best to the HS42 category, dealing with leather products (excluding footwear). Albeit small trade categories, the concordance exercise undertaken by the researchers contributed to more accurate data and findings overall.

4.3.1 Trade in the leather and footwear industries in South Africa

Document 3 in the OSF includes tables reflecting the top 20 export and import countries (for all products), including South Africa, while document 4 in the OSF includes tables on leather and footwear products. These figures reveal that world exports reached R326,8 trillion in 2021 with R1,6 trillion of leather exports (including both leather raw materials and leather products) for the same year. As far as world export growth is concerned, from 2017 to 2021 total world exports grew by 39,9% over the five years, and 14,1% for one year from 2020 to 2021. Comparable figures for world exports of leather are 15,9% growth over five years and 14,1% over the previous year. The value for total world imports in 2021 was R331,3 trillion, representing 39,9% growth from 2017 to 2021, and 14,4% for one year. World imports of leather amounted to R2,6 trillion reflect 22,9% growth over five years for world leather imports and 16,3% for one year.

World exports of footwear, in turn, reached R2,3 trillion in 2021, representing 22,6% growth over the five years from 2017 to 2021 and 8,5% over the previous year (2020 to 2021). World imports of footwear, in contrast, reached R2,1 trillion in 2021. This is 5,5% more over the five years since 2017, and 16,3% over the previous year (2020 to 2021). In the case of South Africa, total exports of all merchandise products amounted to R1,8 trillion, representing 53,3% growth from 2017 to 2021, and 30,3% growth over one year

from 2020 to 2021. As far as imports are concerned, total South African imports amounted to R1,4 trillion, representing 24,7% growth from 2017 to 2021, and 23,0% growth over one year.

4.3.2 A trade indicator analysis of the trade performance of the leather and footwear industries in South Africa

Each of the trade indicators identified from the earlier scoping review of the literature on the role of trade indicators in measuring trade performance at industry level, is presented below, with a discussion of the findings and the marketing implications of these respective indicators based on the findings presented in the discussion (section 4.4) that follows.

4.3.2.1 Revealed Comparative Advantage indicator

The formula for the RCA indicator is provided in Table 4.1 together with a definition. The RCA is a comparative trade indicator that enables international marketers to compare the comparative advantage a home country has in supplying a given destination, compared with the world average. For the sake of illustration, Italy, Mexico, and Namibia were selected – see document 10 which highlights South Africa's major export markets. Italy is a major trader in the leather and footwear sectors in the world, and Mexico was chosen as it has risen to the fourth biggest importer of leather raw materials in the HS41 category. Given its distance from South Africa and overall low ranking as a trading partner of South Africa (51st with imports from South Africa of R3 503 703 in 2021), this growth seems worthy of further investigation. Finally, Namibia was also selected as a major importer from South Africa in the HS42 (and HS911390 and HS960500) HS64 categories. The results from calculating the RCA for these industries are presented in Table 4.2 below. These results are discussed later in this article.

Table 4.2: RCA calculations for Italy, Mexico and Namibia for each industry over five years for the period 2017-2021

Indicator/HS code	2017	2018	2019	2020	2021	Trend
HS41						
$RCA_{SA/Italy}$	170,5	141,4	181,1	164,4	161,6	↓
$RCA_{SA/Mexico}$	16,2	32,3	51,8	57,5	123,5	↑↑
$RCA_{SA/Namibia}$	10,3	7,1	6,9	6,6	15,4	↑
HS42						
$RCA_{SA/Italy}$	0,7	2,6	2,4	1,5	5,8	↑
$RCA_{SA/Mexico}$	0,0	0,0	0,0	0,0	0,0	NA
$RCA_{SA/Namibia}$	45,5	50,5	57,3	61,1	55,6	↔
HS911390						
$RCA_{SA/Italy}$	0,0	0,0	0,0	0,0	0,0	NA
$RCA_{SA/Mexico}$	0,0	0,0	0,0	0,0	0,0	NA
$RCA_{SA/Namibia}$	1710,6	3451,4	1931,6	705,9	3256,4	↑↑↑
HS960500						
$RCA_{SA/Italy}$	0,0	0,0	0,0	0,0	0,0	NA
$RCA_{SA/Mexico}$	0,0	0,0	0,0	0,0	0,0	NA
$RCA_{SA/Namibia}$	13203,6	14335,8	9814,4	20111,2	17372,4	↑↑↑
HS64						
$RCA_{SA/Italy}$	0,0	0,3	0,4	0,4	0,9	↑
$RCA_{SA/Mexico}$	0,0	0,0	0,0	0,0	0,0	NA
$RCA_{SA/Namibia}$	38,7	36,0	32,6	33,8	36,9	↔

↑=increasing, ↓=decreasing, ↔=remaining level / one arrow=small change, two arrows=medium change and three arrows=large change (approximate changes)

4.3.2.2 Terms of Trade indicator

In Table 4.1 it is mentioned that the ToT indicator comprises a ratio of indices of unit values of export to imports. Unit values are calculated by dividing the value of a product category (for example HS401) with the quantity of the product category exported or imported. in the OSF. TradeMap, the source of the data for this study, provides not only the values of the product categories exported or imported but also the quantities – see document 9. To make matters easier TradeMap also calculates an index of exported and imported unit values (where one can select an index year in this instance 2017). This feature of TradeMap makes the subsequent calculation of the terms of trade index a simple one. The export unit price index obtained from TradeMap is divided by the import unit price also obtained from TradeMap. The data was calculated for the six-digit HS41 HS42 and HS64 product categories – see tables 4.3 to 4.5 below. Those product categories that have improved their terms of trade (>100%), are indicated above the grey line.

Table 4.3: Terms of trade index for South Africa for each 6-digit HS code within the HS41 (Leather raw materials) category for the period 2017-2021

Product code	Export unit value index					Import unit value index					ToT index
	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021	
410221	100	89	105	111	112	100	1494	84		26	430,8%
410190	100	94	40	38	119	100	57	30	124	36	330,6%
410229	100		149	188	257	100	1935		14	81	317,3%
410120	100	63	50	57	96	100	78	113	55	33	290,9%
411420	100	108	130		139	100	75	91	121	66	210,6%
410390	100	112	293	297	103	100	65	170	54	59	174,6%
410411	100	87	70	86	79	100	164	144	107	50	158,0%
411510	100	93	122	115	129	100	115	99	93	85	151,8%
410712	100	140	116	99	116	100	101	78	75	79	146,8%
410320	100	70	73	77	81	100	34	33	97	71	114,1%
410799	100	79	163	113	109	100	88	56	91	110	99,1%
410792	100	104	98	104	99	100	88	101	131	117	84,6%
410150	100	69	36	39	80	100	152	252	115	102	78,4%
411410	100	85	58	49	116	100	131	154	171	154	75,3%
411200	100	574	304		133	100	94	164	219	207	64,3%
410441	100	63	68	29	41	100	73	56	61	72	56,9%
410449	100	498	623	945	41	100	107	109	82	75	54,7%
410210	100	89	49	44	54	100	134	179		109	49,5%
410711	100	71	68	60	29	100	90	93	88	81	35,8%
411390	100	63	92	135	89	100	101	90	166	340	26,2%
410719	100	91	46	117	24	100	122	109	77	104	23,1%

Table 4.4: Terms of trade index for South Africa for each 6-digit HS code within the HS42 (Products of leather, exc. footwear) category for the period 2017-2021

Product code	Export unit value index					Import unit value index					ToT index
	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021	
420330	100	127	167	141	189	100	89	86	73	42	450,0%
420211	100	111	99	70	34	100	51	44	28	19	178,9%
420212	100	207	330	249	158	100	101	111	99	96	164,6%
420219	100	161	107	94	170	100	134	144	132	136	125,0%
420291	100	130	86	70	137	100	144	181	89	112	122,3%
420329	100	101	99	106	116	100	101	98	118	98	118,4%
420229	100	166	199	212	196	100	137	127	114	170	115,3%
420100	100	147	100	157	137	100	111	100	121	119	115,1%
420221	100	82	111	69	54	100	101	43	18	48	112,5%
420321	100	57	40	101	120	100	87	115	111	128	93,8%
420239	100	127	244	144	139	100	113	111	168	157	88,5%
420292	100	87	78	122	130	100	101	144	167	155	83,9%
420222	100	65	66	36	58	100	82	60	77	70	82,9%
420232	100	92	123	95	99	100	72	92	133	126	78,6%
420231	100	83	105	76	51	100	96	71	32	66	77,3%
420310	100	180	163	129	96	100	51	95	109	187	51,3%
420500	100	91	66	37	63	100	225	306	200	169	37,3%
420299	100	91	80	45	37	100	99	132	142	144	25,7%
420340	100	66	88	75	92	100	133	223	128	597	15,4%

Table 4.5: Terms of trade index for South Africa for each 6-digit HS code within the HS64 (Footwear) category for the period 2017-2021

Product code	Export unit value index					Import unit value index					ToT index
	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021	
640312	100	361	547	2101	2588	100	675	736	575	143	1809,8%
640359	100	213	207	249	258	100	87	92	103	72	358,3%
640219	100	215	391	408	436	100	112	133	108	132	330,3%
640391	100	342	322	446	438	100	89	95	119	140	312,9%
640212	100	99	317	374	221	100	80	130	48	84	263,1%
640319	100	72	86	314	247	100	104	110	114	112	220,5%
640351	100	93	76	147	171	100	84	163	128	128	133,6%
640320	100	119	150	203	222	100	141	181	226	172	129,1%
640399	100	116	118	133	155	100	106	91	128	123	126,0%
640620	100	120	105	137	148	100	108	93	104	126	117,5%
640610	100	67	101	80	97	100	81	282	88	87	111,5%
640299	100	108	121	136	143	100	114	120	120	129	110,9%
640419	100	105	118	119	132	100	106	122	120	122	108,2%
640420	100	7	89	150	131	100	91	111	112	126	104,0%
640690	100	95	96	124	93	100	46	82	109	91	102,2%
640291	100	103	118	129	127	100	102	120	124	125	101,6%
640192	100	108	122	129	128	100	115	133	125	134	95,5%
640510	100	201	270	306	219	100	215	245	313	234	93,6%
640220	100	95	109	101	111	100	104	122	141	129	86,0%
640199	100	106	153	119	148	100	85	118	156	178	83,1%
640411	100	122	119	113	105	100	88	91	102	132	79,5%
640340	100	95	88	99	103	100	116	136	148	131	78,6%
640590	100	129	111	89	91	100	51	60	127	155	58,7%
640110	100	87	93	79	114	100	74	96	152	199	57,3%
640110	100	87	93	79	114	100	74	96	152	199	57,3%
640520	100	131	156	119	143	100	169	114	289	296	48,3%

4.3.2.3 Trade dependence index

The formula for the TDI is presented in Table 1 in this article. The data is drawn from document 4 in the OSF, and is described in Appendix E. The results for the leather and footwear industries are presented in Table 4.6 below and are discussed later in the article.

Table 4.6: TDIs for five years and growth for the footwear and leather industries in South Africa for the period 2017-2021

Industries	HS description	2017	2018	2019	2020	2021	Change over five years	Change over previous year
Leather*	Leather raw materials & leather products	85,2%	90,2%	83,0%	63,4%	70,4%	-17,3%	11,2%
Footwear	Footwear	131,3%	171,4%	156,7%	149,2%	179,9%	37,0%	20,6%

*Includes HS41 HS42 HS911390 and HS960500

4.3.2.4 Total trade indicator

The formula for TT can be found in Table 4.1 and the data comes from document 4 in the OSF repository. The results are presented in Table 4.7 below and are discussed later in the article.

Table 4.7: Total trade indicator for South Africa's trade for the leather and footwear industries for the period 2017-2021

HS category	HS description	X/I	2017	2018	2019	2020	2021	Growth for period	Growth over previous year
HS41	Leather raw materials	Exports	3611484	3251150	2696393	2384204	2820130	-21,9%	18,3%
		Imports	999135	765866	601330	411132	565782	-43,4%	37,6%
		Total trade	**4610619**	**4017016**	**3297723**	**2795336**	**3385912**	-26,6%	21,1%
HS42*	Products of leather	Exports	1029880	894513	732585	599248	762149	-26,0%	27,2%
		Imports	3091010	3366947	3418124	2553628	2955542	-4,4%	15,7%
		Total trade	**4120890**	**4261460**	**4150709**	**3152876**	**3717691**	-9,8%	17,9%
HS64	Footwear	Exports	2418153	2262050	2331710	2011454	2433107	0,6%	21,0%
		Imports	11430851	12301485	12772834	10871162	12701711	11,1%	16,8%
		Total trade	**13849004**	**14563535**	**15104544**	**12882616**	**15134818**	9,3%	17,5%

*Includes HS911390 and HS960500

4.3.2.5 Intra-industry trade index

The formula for the IIT can be found in Table 4.1 and the data comes from document 4 in the OSF repository, which is described in Appendix E. The results are presented in Table 4.8 below and are discussed later in the article.

Table 4.8: IIT index for South Africa's trade for the leather and footwear industries for the period 2017-2021

HS category	HS description	2017	2018	2019	2020	2021	Growth for period	Growth over previous year
HS41	Leather raw materials	0,43	0,38	0,36	0,29	0,33	-23,3%	13,8%
HS42*	Products of leather	0,50	0,42	0,35	0,38	0,41	-18,0%	7,9%
HS64	Footwear	0,35	0,31	0,31	0,31	0,32	-8,6%	3,2%

*Includes HS911390 and HS960500

4.3.2.6 Trade share index

The formula for the TSI is calculated using documents 4 and 10 in the OSF repository, and which is described in Appendix E. The results for South Africa's trade with the Brazil, Russia, India, China, South Africa (BRICS) countries for 2021 are presented in tables 4.9 and 4.10 below. Table 4.9 presents the TSIs for South Africa's trade with its BRICS partners and strives to identify which of the BRICS partners South Africa has a good

relationship with. The values will vary between 0 and 100, with numbers from 51 to 100 representing countries with significant trade share (exports and imports) with South Africa.

Table 4.9: TSI for South Africa's trade with BRICS partners for the leather and footwear industries for the period 2017-2021

HS category	HS description	Brazil	China	India	Russia
HS41	Leather raw materials	3,2	15,7	3,2	0,02
HS42	Products of leather	0,02	52,8	4,0	0,1
HS64	Footwear	0,7	51,4	2,1	0,01

Table 4.10 below uses the trade share index in a different way, namely, to establish the intra-regional relationship between BRICS partners and the rest of the world in terms of trade within the indicated industries over the period from 2017 to 2021.

Table 4.10: TSI for South Africa's intra-regional trade with BRICS partners for the leather and footwear industries compared with the rest of the world for the period 2017-2021

HS category	HS description	2017	2018	2019	2020	2021	Growth for period	Growth over previous year
HS41	Leather raw materials	19,5%	17,9%	17,7%	18,3%	19,7%	1,03%	7,65%
HS42	Products of leather	23,8%	23,0%	22,5%	22,4%	24,8%	4,20%	10,71%
HS64	Footwear	22,5%	21,3%	21,3%	20,4%	22,5%	0,00%	10,29%

4.3.2.7 Import penetration index

The formula for IPI – see Table 4.1 above – is calculated using the data in document 4 in the OSF repository, which is described in Appendix E. The results for the leather and footwear industries are presented in Table 4.11 below. The focus here is on the industry not the trade category, and for this reason the HS41 and HS42 leather categories are combined as a single leather industry.

Table 4.11: IPI for South Africa's trade for the leather and footwear industries for the period 2017-2021

Industries	HS description	2017	2018	2019	2020	2021	Growth for period	Growth over previous year
Leather*	Leather raw materials & leather products	84,3	82,9	84,9	83,3	63,2	-25,0%	-24,1%
Footwear	Footwear	53,5	48,7	44,7	41,2	69,0	29,0%	67,5%

*Includes HS41, HS42, HS911390 and HS960500

4.3.2.8 Export diversification index

The formula for the EDI can be found in Table 4.1 and the data comes from document 4 in OSF, which is described in Appendix E. The results are presented in Table 4.12 below and are discussed later in the article.

Table 4.12: EDI for South Africa's trade for the leather and footwear industries for the period 2017-2021

HS category	HS description	2017	2018	2019	2020	2021	Growth for period	Growth over previous year
HS41	Leather raw materials	0,00077	0,00068	0,00051	0,00044	0,00035	-54,5%	-20,5%
HS42*	Products of leather	0,00137	0,00146	0,00180	0,00163	0,00162	18,2%	-0,6%
HS64	Footwear	0,00294	0,00286	0,00307	0,00293	0,00280	-4,8%	-4,4%

*Includes HS911390 and HS960500

4.3.2.9 Inter-industry trade index

The formula for the IeIT can be found in Table 4.1 and the data comes from document 4 in the OSF repository, which is described in Appendix E. The results are presented in Table 4.13 below and are discussed later in the article. Note that the values in Table 4.8 (see earlier) and Table 4.13 (see below), add up to 1.

Table 4.13: IeIT index for South Africa's trade for the leather and footwear industries for the period 2017-2021

HS category	HS description	2017	2018	2019	2020	2021	Growth for period	Growth over previous year
HS41	Leather raw materials	0,57	0,62	0,64	0,71	0,67	17,54%	-5,63%
HS42*	Products of leather	0,5	0,58	0,65	0,62	0,59	18,00%	-4,84%
HS64	Footwear	0,65	0,69	0,69	0,69	0,68	4,62%	-1,45%

*Includes HS911390 and HS960500

4.3.2.10 Export (market) concentration index

The formula for the ECIm can be found in Table 4.1 and the data comes from Table 4 in the OSF repository, which is described in Appendix E. The results are presented in Table 4.14 below and are discussed later in the article.

Table 4.14: ECIm index for South Africa's trade for the leather and footwear industries for the period 2017

HS category	HS description	2017	2018	2019	2020	2021	Growth for period	Growth over previous year
HS41	Leather raw materials	0,1214	0,0947	0,1041	0,1206	0,0967	-20,3%	-19,8%
HS42*	Products of leather	0,1018	0,0999	0,1136	0,1077	0,0953	-6,4%	-11,5%
HS64	Footwear	0,1778	0,1698	0,1683	0,1597	0,1685	-5,2%	5,5%

*Includes HS911390 and HS960500

4.3.2.11 Export (product) concentration index

The formula for the ECIp can be found in Table 4.1 and the data comes from Table 4 in the OSF repository, which is described in Appendix E. The results are presented in Table 4.15 below and are discussed later in the article.

Table 4.15: ECIp index for South Africa's trade for the leather and footwear industries

HS category	HS description	2017	2018	2019	2020	2021	Growth for period	Growth over previous year
HS41	Leather raw materials	0,2210	0,1728	0,1711	0,1800	0,1738	-21,4%	-3,4%
HS42*	Products of leather	0,2567	0,1553	0,1110	0,1138	0,1111	-56,7%	-2,4%
HS64	Footwear	0,1724	0,1791	0,1751	0,1754	0,1715	-0,5%	-2,2%

*Includes HS911390 and HS960500

4.3.2.12 Growth rate of exports

The formula for the GRX can be found in Table 4.1 and the data comes from Table 4 in the OSF repository, which is described in Appendix E. The results are presented in Table 4.16 below and are discussed later in the article.

Table 4.16: The growth rate indicator for South Africa's trade for the leather and footwear industries for the period 2017 to 2021

HS category	HS description	For the period 2017-2021
HS41	Leather raw materials	-4,83
HS42*	Products of leather	-5,84
HS64	Footwear	0,12

*Includes HS911390 and HS960500

4.3.2.13 Trade intensity index (TII)

The formula for the TII can be found in Table 4.1 and the data comes from document 4 in OSF, which is described in Appendix E. As this index is a comparative index comparing one country's exports (in this instance South Africa) with another country.

For the sake of illustration, Italy has been selected. Italy is perhaps the most important source and supplier of leather products in the world. Rather than combine HS911390 and HS960500 with HS42 these have been examined separately. The results are presented in Table 4.17 below and are discussed later in the article.

Table 4.17: TII for trade between South Africa and Italy for the three industries indicated for the period 2017-2021

HS category	HS description	2017	2018	2019	2020	2021	Growth for period	Growth over previous year
HS41	Leather raw materials	1,49	0,96	0,96	0,67	0,72	-51,7%	7,5%
HS42	Products of leather	0,02	0,09	0,08	0,04	0,17	750,0%	325,0%
HS911390	Travel sets of leather	0,00	0,00	0,00	0,00	0,00	NA	NA
HS960500	Watch straps of leather	0,00	0,00	0,00	0,00	0,00	NA	NA
HS64	Footwear	0,00	0,02	0,04	0,03	0,08	NA	166,7%

4.4 DISCUSSION OF FINDINGS

The findings for each of the performance indicators are discussed below in the same order, specifically from a marketing and industry perspective.

4.4.1 Revealed Comparative Advantage index

The most popular indicator in the trade performance literature, the RCA for the industries concerned, reveals that for Italy, South Africa has a significant comparative advantage in the exports of leather raw materials to Italy. But this advantage appears to have been declining over the last three years. Given the importance of Italy in global trade in this sector, and Italy's position as a leading trading partner of South Africa, as well as the size of South Africa's exports to Italy, this is matter of concern and requires further investigation.

While South Africa's exports to Mexico seem to be growing comparatively well, from a strategic marketing perspective this positive development should not be accepted in lieu of the decline in exports to Italy. From an industry perspective, each market should be examined separately from others with the aim of trying to stem declining growth in the case of Italy, while, at the same time, continuing to develop the growth in Mexico. As far as Namibia is concerned, while South Africa is more competitive than the world average, this comparative advantage is not to the same extent as for Italy and Mexico. From an industry perspective, the industry in question should prioritise all markets in which a

comparative advantage exists and then make a considered decision as to which of these markets it will pursue more aggressively and with what marketing strategy.

While the RCA index clearly has benefits as a guide for the internationalisation of industries, there is evidence in the literature of research that examines comparative advantage from different perspectives by drawing on relative productivity, trade barriers, factor endowments, and transportation costs, as well as market structures and demand (French 2017). In other words, simple RCA measures may be broadly useful, but more detailed and diverse analysis may be necessary to extract the essence of the comparative advantages that an industry has. This may point to further research in the case of South Africa.

4.4.2 Terms of Trade

The ToT indicator provides a useful 'price-per-unit' (be it tons, kg, single unit, or other measure) view of trade for export firms and industry leaders. The indicator compares exports with imports such that if imports are getting cheaper, but exports are generating more income, then the industry's ToT are improving. While Petersen (2021) explains terms of trade as a macro indicator of how many units of an import product a country receives in exchange for its exports, at industry level this 'macro' analogy does not make sense. The products imported and exported are seldom done by the same firm. For example, while the footwear manufacturer produces shoes and may export some of these shoes, many shoe imports into the country are by non-manufacturers (outside of the industry concerned) such as importers, retailers, and wholesalers (although some manufacturers may indeed import selected types of shoes or components of shoes to complement their own manufacturing activities).

Instead, what the ToT does is serve as a benchmark against which export prices can be compared with import prices broadly speaking. To be accurate, one should compare like with like, as even at six-digits of detail, any given HS product category may include many different types of shoes, qualities of shoes, styles, designs of shoes, and so on. So, any comparison should be done with care and with further liaison with the industry in question. Still, a growing price-per-unit for exports is good, especially if a similar product is being imported at a declining price. It also provides individual exporters with

a chance to see how their prices to a given destination compare with (a) other competitors in the country, and (b) other competitors from around the world. However, for this insight, the actual unit price may be more revealing than the indicator itself, as the indicator is made of indexes rather than actual unit values.

From tables 4.3, 4.4 and 4.5 above, if one examines the top performing sub-category in the context of ToT for each of the three broad categories (leather raw materials, leather products and footwear), one can see in the case of code 410221 (*Raw skins of sheep or lambs, without wool on, pickled, whether or not split*) the ToT increased by 430,8%, while for code 420330 (*Belts and bandoliers, of leather or composition leather)*, the ToT increased by 450,0%, and for code 640312 *(Ski-boots, cross-country ski footwear and snowboard boots, with outer soles of rubber, plastics, leather or composition leather and uppers of leather)* the increase was1809,8%. This indicator alone is not very insightful and requires further clarity. If one examines the value and quantity of trade, then South Africa exported R178,2 million (or 2 222 tons) of sub-category 410221, R32,1 million (or 142 tons) of sub-category 420330, and R12,3 million (or 22 543 pairs) of sub-category 640312, the top performing sub-categories in respect of the ToT indicator.

From a marketing perspective, even more insight can be extracted from the data, as the target markets can be identified from this data. Further analysis of the 410221 sub-category reveals that all these exports only went to two markets, namely R170,7 million to Italy and R7,5 million to Pakistan. This may seem a risky situation being dependent on only two markets.

The data enables even further analysis to be made. Although South Africa exports mainly to Italy, South African is also Italy's main supplier in this sub-category. Turkiye is a close competitor, with only New Zealand and Namibia representing significant competitors from the southern hemisphere (together they export about a quarter as much as South Africa). Turkiye's unit value import into Italy is R77 646/ton, New Zealand's is R29 170/ton, while Namibia's is R77 307/ton. This compares with South Africa's R108 274/ton and Italy's average imported unit value/ton of 85 661/ton and the world average of R85 663/ton. Spain (R226 266/ton), China (R189 736/ton) and Ethiopia (R162 348/ton) and six other countries are enjoying a higher imported value

per ton than South Africa. One needs to be cautious about interpreting these figures as they stand, as the sub-categories may have further different sub-types and qualities of products brought together under one heading.

4.4.3 Trade Dependence Index

Mikic and Gilbert (2009:26) explain that the TDI "is a measure of the importance of international trade" to an economy or industry. It is more often used at macro level than at industry level, as it incorporates both exports and imports as part of the index. The TDI involved in this study declined from just over 85% to just over 70%, falling by about 17% over the five years for the leather industry (including both raw materials and leather products). This decline suggests that this industry is becoming less dependent on trade and more focused on the local market than before. The recent increase from 63,4% to 70,4% from 2020 to 2021 (post COVID) points to a possible resurgence of trade within this industry. The footwear industry, in contrast to the leather industry, seems to be very dependent on trade, exporting and importing more than it produces. As South Africa is a major supplier to the SADC and African markets, it could be that much of this trade is re-exports.

For industries and firms, especially from a marketing perspective, while exports are a desired objective as exports earn money for the firm and typically bring profitability to the firm and industry, imports are instead seen as a necessity to obtain raw materials, technologies, and components that firms may need in their operations. However, they also bring in competing products often at lower prices or better quality, that represent a challenge for firms in the industry. This 'balance' may have meaning for industries who want to ensure that exports for the industry match or preferably exceed imports. They may contribute to discussions on policy matters to promote an industry or to protect the industry from foreign exporters through tariffs, quotes, or other regulatory means. The openness of trade to an industry and the balance of trade is arguably a desirable objective within certain limits.

For firms within the industry, the indicator is arguably less meaningful. While openness to trade may be of interest to exporters, their focus is likely to be on exporting and export promotion matters. They may have concerns about foreign competition, but these

concerns are likely to be channelled through the industry body, rather than being dealt with by individual firms themselves.

While the literature often mentions trade openness or trade dependence, it typically does so in describing a country's trade generally as part of the introduction of the research in question (Davaakhuu, Sharma & Bandara 2018:1441), but little evidence could be found where the TDI is used as a trade performance indicator of an industry's export endeavours specifically. Jian, Ding and Ma (2022:1&5-6) in their article in which they examine the dependency relations between China and the European Union in manufacturing, draw on an export trade dependency index and an import trade dependency index respectively. These indexes (a) split dependency into an export and import component, and (b) incorporate elements of the Herfindahl-Hirschman Index (or IIT) which brings substitution into the equation. They argue that this is a more robust measure of trade dependency at firm level. It is proposed that their approach is a better option at industry level.

4.4.4 Total Trade indicator

Widely used in the literature, this indicator is also useful for industries, but less meaningful for firms within the industry. For industries, both the industry's exports and imports are relevant issues to take into consideration. An industry that is subject to small amounts of exports and large imports suggests an industry that is a weak competitor in global terms. Not all industries in a country are likely to be strong international competitors, but if this were the case, the causes of this imbalance would need to be investigated, and action taken to try to offset any such imbalances. Even in the case where an industry is a much stronger exporter than importer, the relevant industry association should be aware of this 'positive' imbalance but should strive to determine the reasons behind the imbalance. Is it because South Africa has natural resources and therefore natural benefits, as in the case of certain types of leather raw materials (ostrich skins and exotic wild animal hides comes to mind)? In this instance, the question could be asked as to whether South Africa is competing on price alone, because of its natural advantage? Is this a good situation and could South Africa not be earning more for its raw materials, or better still, turning these raw materials to higher value finished products? Perhaps training, retooling and creative marketing could secure less risk and

longer-term markets – consider the power that De Beers achieved by taking control of the global marketing of diamonds.

4.4.5 Intra-Industry Trade index

The findings presented in Table 4.8, suggest that in all three industries in question, the focus is marginally more on inter-industry trade (trade across industry sub-sectors – see Table 4.13), rather than intra-industry trade (trade within industry sub-sectors). The values in Table 4.8 vary from 0,3 to 0,5 with these smaller values (below 0,5) pointing towards inter-industry trade. Considering that the study is not comparing trade across all industries in the economy, but within reasonable clearly defined industries (that is, leather raw materials, products of leather and footwear), it is to some extent not surprising that the exports are largely of a similar nature. The findings indicate that South Africa is both an established exporter and importer within these industries and their sub-sectors.

Given that IIT is an indicator of higher value and often more sophisticated exports (Havrylyshyn & Kunzel 1997:4), it was decided to split the data into the top five and bottom five exports for each of the three HS categories in unit value terms, and then to recalculate the IIT values for the two groups (that is, top five and bottom five). This exercise was done on the premise that higher value items should have higher IIT scores. Table 4.18 below provides the results which indicate that the higher unit-value group of exports indeed has higher IIT-valued exports than the lower-value group of exports, supporting the IIT premise.

Table 4.18: Comparison of IIT scores of top versus bottom five HS categories ordered by unit value

HS category order by unit value	IIT score
HS42 Leather raw materials	
HS 41 top five export sub-categories	0,20
HS 41 bottom five export sub-categories	0,08
HS42 Leather products	
HS 42 top five export sub-categories	0,66
HS 42 bottom five export sub-categories	0,33
HS Footwear	
HS 64 top five export sub-categories	0,70
HS 64 bottom five export sub-categories	0,27

4.4.6 Trade share index

Essentially this is just an index of total trade for country or countries or a region, as a share of total trade. Thus, in the case of the examples provided, in the one instance it is an indicator of a BRICS partners' shares of total exports within an industry (in this instance, the leather raw materials (HS41), products of leather (HS42) and footwear industries (HS64)). The findings (see Table 4.9) suggest that other than China, South Africa's BRICS partners are not major trading partners of South African within the industries concerned. If one uses this indicator to explore the intra-regional trade share within a group of partner countries (see Table 4.10) such as BRICS, the TSI points to a reasonably well-formed trade relationship amongst BRIC partners. The findings from the table point to noticeable intra-regional trade between the BRICS partners, perhaps less so for HS41, but HS42 and HS64 are similar in their TSI values, varying from 21% to 24%.

For the sake of illustration, similar values were calculated for trade within the Southern African Development Community (SADC). Table 4.19 below provides these figures. Intra-regional trade in all instances is below one per cent. These figures underscore a weak relationship amongst SADC partners. Used in this way, the TSI is about interrelationships not about South Africa's position within the two trade blocs identified. A quick look at South Africa's exports to SADC, suggests that South Africa is an important exporter to its local neighbours, and many of them to South Africa. The reality is that the SADC countries are small exporters and importers as a whole, and for this reason, compared to the global industry, the influence of SADC is limited.

Table 4.19: TSI for South Africa's intra-regional trade with SADC partners for the leather and footwear industries compared with the rest of the world

HS category	HS description	2017	2018	2019	2020	2021
HS41	Leather raw materials	0,8%	0,8%	0,8%	0,8%	0,8%
HS42	Products of leather	0,3%	0,3%	0,2%	0,2%	0,2%
HS64	Footwear	0,5%	0,5%	0,5%	0,4%	0,5%

From a marketing perspective, there may be an opportunity for the local industry association to extend their influence to southern Africa and to help the region compete more aggressively in the broader world context. The data seems to point to the fact that South Africa is well-established as a major supplier of raw materials in the leather

industry across the globe and can be said to be a significant supplier of certain leather raw materials.

From a leather products and footwear perspective, South Africa's market appears to be much closer to home. Analysis of document 4 and 10 in the OSF suggest that South Africa is importing from further afield probably for the home market, perhaps with some local finishing and manufacture, but also sells much of this imported product together with locally produced goods, into regional markets. For example, document 8 shows that South Africa imported R100 million or more in 13 out of 20 six-digit HS42 sub-categories in 2021 and exported more than R20 million in 11 out of 19 six-digit HS42 sub-categories in the same year, mostly to SADC and African markets. The exact composition of local manufacture that is exported versus imported products that are re-exported is difficult to determine.

4.4.7 Import penetration index

From the findings, the IPI for the leather industry declined from 84,3% to just over 63% over a five-year period. This decline of approximately 25% for the five-year period was almost exclusively as a result of the decline over the period (2020 to 2021), which was also in the same region (-24,1%). The decline could be as result of the effects of COVID from 2020 to 2021. In the footwear sector, the IPI increased from 53,5% to 69%, an increase of 29,0% over a five-year period and 67,5% increase over the previous year (2017).

As the IPI measures imports expressed as a share of local production minus net trade (Fronczek 2017), it is a useful measure at industry level to see to what extent imports influence or compete in the local industry. This insight would be of value to local firms in the industry as well, as it provides a sense of international competition in the local market. The degree of success of this competition, it is argued, is likely to occur in foreign markets as well, especially if the imports are coming from markets where local firms are exporting to (or trying to export to). Thus, tracking this indicator serves as a forewarning of the competition likely to be experienced abroad, except that it is easier to investigate the nature of this competition in the local market rather than in distant

markets aboard. This tracking of international competition in local markets, it is posited, should be a task of all industry associations.

Fronczek (2017:288-291) proposes a more complex IPI that incorporates foreign and local value added in local production, as well as in exports and imports. The researcher acknowledges the challenge in accessing data for this purpose. If the industry association were to facilitate the cooperation of industry members in sharing anonymised data that were aggregated for the industry, but available to all members, this would go a long way in developing and improving metrics that could be used by the industry leadership and members to benchmark their activities, to guide future industry export endeavours and to track industry and firm performance.

The research by Li and Miao (2018:2-3) highlights the fact that "the existing literature in trade has so far mainly focused on exporting instead of importing and has paid relatively little attention to … imported penetration and market concentration." The researchers argue that while import penetration increases competition from foreign producers leading to decreased markups, on the plus side trade liberalisation reduces costs of foreign inputs (such as machines, tools, raw materials, and intermediate inputs). They further posit that only the most productive firms are likely to succeed in the local market, leading to market concentration with high profits and low labour shares in production. The same firms are likely to be the best exporters.

4.4.8 Export diversification index

The findings show very small scores across the five-year period for the EDI of all three industry sub-sectors. While some are larger than others, they are all small, tending to zero, which implies that all three industries are well diversified and in line with the world average. This could be argued to be a good sign as it implies a lower risk for the industry or firm, but one might want to see a few sub-categories where South Africa's exports are more concentrated, especially in terms of the products the country specialises in (sheep and exotic hides, for example). Also, it would be arguably beneficial to have a degree of concentration in leading markets. This would suggest a level of prominence in these markets.

From a marketing perspective, the EDI is useful in that it provides a degree of forewarning of undesirable dependence on certain markets or product groups within the industry. Too much dependence on a limited number of markets or product categories should be a matter of concern for an industry. At the same time, with no clear prominence in one or two key markets, it should also be a reason for concern.

4.4.9 Inter-industry trade

The findings in Table 4.13 indicate that there is more IeIT that occurs than IIT. This implies that for each industry, South Africa tends to export significantly more in certain HS sub-categories, and imports significantly more in the remaining sub-categories making up the industry. This is a relative rather than absolute perspective, as South Africa tends to export and import to a greater or lesser extent across all sub-categories. This measure should also ideally be used to compare across different HS categories representing different industries, rather than to compare across sub-categories within a single industry. However, it is posited that even in this last-mentioned instance, the indicator can assist in improving the internationalisation efforts of the industry concerned.

From a marketing perspective, this suggests that the leather and footwear industry leadership should give attention to improving exports and competitiveness across all the sub-industries. This may mean focusing on reducing operational costs, product design, materials innovations, feature development, value creation, market innovations, skills development, and other means of improvement. This should not be done randomly and should instead be guided by the metrics. One should compare all sub-categories using measures of IIT/IeIT, as well as unit prices, RCAs, total values of export, and market potential, to select those sub-categories that the industry feels has potential to grow. Then examine these to see where competitiveness can be gained in the most affordable and effective way. Solutions can be implemented on a project basis with clear return on investment targets. This could be done on a firm basis as well.

4.4.10 Export (market) concentration index

The findings show that in all three industries, there is little concentration in a few markets and exports appear to be well distributed across numerous markets (that is, the values

tend to 0 rather than to 1). In no single year do any of the values exceed 0,18. Over time, the values seem to be decreasing, suggesting even more diversification. These findings appear to gel with those from the EDI – see earlier discussion in the chapter.
This indicator, together with the EDI, serve as useful measures of market concentration or, alternatively, marketing diversification (within limits – some specialisation and market prominence might be desirable). For firms, the ECIm may also be relevant. No firm should wish to be dependent on a single market or only handful of markets. The more diversified a firm is in respect of exports, the lower the risk for the firm. When it comes to products, most firms will specialise in a handful of related products. They may focus on a product found in a single product category, or perhaps two or three categories, but are unlikely to be active across the entire range of product sub-categories that make up the broad category such as HS41.

4.4.11 Export (product) concentration index

As with the ECIm, all three sectors also have relatively low ECIps that appear to be decreasing, suggesting increased product diversification. Except for 2017, none of the values have exceeded 0,18.

From a marketing perspective, these figures reflect an industry that is not concentrated on any single product-sub-category. All three industries are quite diversified. This is a useful indicator if it is used in conjunction with other indicators such as price indexes and RCAs. Industry leaders and firms will want to identify those product sectors and markets that offer higher unit value opportunities and, assuming that the markets are quite substantial (worthy of pursuing), consider how to expand sales within these product categories and markets. The ECIm and the ECIp are two indicators that can also be used to support each other.

4.4.12 Growth rate of exports

The GRX is clearly an important measure irrespective of whether it is calculated at macro, industry, or firm level. In this study, two types of growth are calculated. In many of the tables used to reflect the findings for the various indicators, a 5-year and 1-year growth rate is calculated and shown as well. This growth rate is called a simple linear

growth rate, also referred to as an average annual growth rate (AAGR), In contrast, the GRX indicator adopts a compounded annual growth rate (CAGR).

The findings show that leather raw materials (HS41) and leather products (HS42) have declined over the period 2017 to 2021 by about 5 per cent, whereas footwear (HS64) has grown marginally. This could be seen as a concern, but one needs to bear in mind that the period includes the two COVID years which would have had an impact on growth.

From a marketing perspective, growth is an important target. Industry leaders should ideally track all target markets and product categories to see which markets and product categories are growing and which are declining. Those markets and products deemed important, that are also showing promising growth or declines, can be supported with promotional and other support to extend the growth or to combat any declines.

Other indicators, such as the RCA and price indices could be used together with the growth rate to focus attention on markets where South Africa has a competitive advantage or to establish to what extent price or other factors are driving the growth. For example, using unit price, values and quantities, the industry or a firm can see whether growth is purely because of price increases or volume increases, or ideally both. These insights might encourage an industry or firm to promote exports that are growing, both because of price and quantity increases. Management may also want to explore the source of the increases. For example, if there are price increases driving the growth, are these increases because of global price trends or are they because of innovations or efficiencies on the part of the local industry or South African exporter? If growth is exogenously driven then the export/industry is arguably in a weaker strategic position, had the growth been endogenously achieved through product innovation, quality improvements, operational efficiencies, or other factors.

4.4.13 Trade intensity index

The TII findings presented in Table 4.17 earlier, indicate the strength of relationship between South Africa and individual trading partners. Given the importance of Italy in the trade of leather and footwear, Italy was selected to demonstrate this index. From

Table 4.17, it can be seen that except for HS41 *(Leather raw materials)*, South Africa does not have a special relationship with Italy in terms of leather products or footwear (TII < 1) across all years. In fact, the indices are quite weak for HS42 and HS64 in respect of Italy. For HS41, the index also points to a less than expected relationship, except that from 2017-2019, the relationship was on a par with what might have been expected or even a bit better (2017). What is interesting from these findings is that South Africa's relationship with Italy appears to have been weakening rather than strengthening.

From a marketing perspective the change over time is an interesting insight that can be extracted from the findings. In HS41, the change over the five-year period points to a weakening of the relationship (or trade intensity) between Italy and South Africa, while in the case of HS42 and HS64, although the relationship is weaker than might be desired, given the importance of Italy, it appears to be strengthening over time. The scores for HS911390 and HS960500 are so small, that they can be ignored.

Strategically, it is recommended that industry leaders track the TII for all products within their industry and for all countries over a 10- or 20-year period and to update this at least quarterly. The aim would be to identify those markets where 'intense' relationships exist and to decide which of these markets to actively promote (where positive relationships exist) or to defend (should the relationship be declining). This effort would provide a solid base on which to build the industry's internationalisation efforts.

It is further argued that the advantage of this indicator is that it focuses only on exports. For industries and especially for firms, indicators that include imports in their calculation may obfuscate the main aim of their existence, to promote sales, profits, and growth.

4.5 CONCLUSION

The findings and discussion of the findings suggest that the trade performance indicators have strategic and practical relevance in the internationalisation efforts of industries, and, indeed, also for firms active in an industry. However, it seems that some indicators are more useful, informative, and relevant for international marketing purposes than others. While countries may be concerned with both exports and imports,

as one moves from the macro to the micro, so the focus moves more from trade to exports, and those indicators that are export focused rather than trade focused may be more relevant at industry level (and especially at firm level). While the focus of this study was primarily to explore the usefulness of trade indicators at industry level, it is difficult to ignore the potential value of these same indicators at micro or firm level, especially if these indicators could be adapted to include firm-level data and perspectives.

These indicators have been calculated on an annual basis, but they are available monthly. Monthly data, or at least quarterly data, may also prove useful to track changing trends or sudden interruptions in trade. For example, one wonders what will happen to South Africa's trade relations with Israel given that relations with Israel have soured with South Africa considering suspending diplomatic ties with Israel, as well as the fact that South Africa has taken Israel to the International Court of Justice over Israel's actions in Gaza.

This task of calculating trade performance indicators is not a small task. On the one hand, it is time consuming while on the other hand there are numerous potential relationships that could be explored statistically. With respect to the latter point, in this study several examples were provided to illustrate the calculation of one or more of the indicators (Italy, Mexico and Namibia, for example). These are only three countries; there may be many more countries where opportunities exist that require investigation. It is also possible to dig deeper in many cases and explore the trade relationships at six-digit detail. With the width and depth of possible relationships, this type of research could be very time consuming and may need to be done on more regularly as suggested above. It may be feasible to do this research as service to numerous industries, taking advantage of economies of scale and skills efficiencies.

Reference was made to earlier research which identified over 100 indicators sourced from a scoping review of the literature. This article has only examined 13 of these. It may be worth investigating the usefulness and potential strategic value of all 101 indicators. Finally, this research requires further investigation to explore the perceived value of the indicators within the industry itself; that is, by industry leaders and export firms within the industry.

CHAPTER 5
CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

In this final chapter of this study, conclusions about the objectives are presented and recommendations offered for practice and for further academic research. The contribution to knowledge of the study is considered, as are the limitations. The chapter ends with a personal reflection on what the author has learnt from this study. To begin with, the objectives of the study are revisited as a framework against which the conclusions of the study can be drawn.

5.2 REVISITING THE STUDY OBJECTIVES

As outlined in Chapter 1 (section 1.7.1), the primary objective of this study was stated as follows:

> *To explore the potential marketing value of using trade performance indicators in the internationalisation efforts of the footwear and leather industries in South Africa.*

This primary objective was unpacked as several secondary objectives. These are discussed below.

5.2.1 Secondary objectives

Based on the primary objective identified above, the following secondary objectives were outlined in section 1.7.2 in Chapter 1:

1. To concord the Standard Industrial Classification system with the Harmonized System trade classification both of which are used in South Africa, to enable the production and sales statistics captured by StatsSA to be brought together with the trade statistics captured by the C&E in South Africa, allowing industry-level trade performance indicators to be calculated for the footwear and leather industries by drawing on these two data sets.
2. To undertake a scoping review of the academic literature with the aim of compiling a comprehensive list of trade performance indicators, together with their formulae and definitions, that can be used at industry level.

3. To calculate a quantitative outcome for each of the most common trade performance indicators identified under secondary objective 2 for the footwear and leather industries respectively, and to extract and interpret the potential marketing value of these outcomes for the internationalisation efforts of the industries in question.
4. To recommend how these trade performance indicators could be used by the relevant industry body going forward to drive the internationalisation efforts the footwear and leather industries in South Africa.
5. To identify further research opportunities in this field.

In the next section, conclusions are presented related to each of these five secondary objectives.

5.3 CONCLUSIONS PER OBJECTIVE

Conclusions for each of the five objectives stated above, are provided below.

5.3.1 Conclusion to objective 1

In Chapter 2 (Article 1), a concordance exercise was undertaken that enabled the dated (1993) industrial classification (SICv5), still in use in South Africa, to be matched with the more recent trade classification (HS2017). There were several documented outcomes. The first is a concordance between the HS2017 and the ISICv3 – this did not exist before. This concordance is captured in document 9 in the OSF (https://osf.io/8e74c), and described in Appendix B. The second is a manual concordance of the SICv2 with the ISICv3, which is captured in documents 7 and 8 in the OSF (https://osf.io/8e74c), and also described in Appendix B. This also did not exist before. These are new contributions to the literature. Together, this concordance exercise made it possible to more accurately link trade data to industry data. Article 1 used this linked data to analyse a variety of South African industry sectors (including the footwear and leather industries) in terms of their industry output obtained from Stats SA, and also their aggregated trade data obtained from TradeMap. This initial and brief analysis clearly revealed that South Africa is a key global competitor in the leather raw materials subsector, but less so in the leather products and footwear sub-sectors. In these two sectors, South Africa appears to be a supplier to regional and African markets,

serving not only as a primary destination for the country's own products, but also as a re-export hub for imported products. By combining industry output and trade data, a picture is provided of an industry's overall performance and success as an industry within the broader economy of the country and as a global competitor.

The conclusion that can be drawn is that the concordance exercise discussed in Article 1, achieved the objective of bringing together industry data and trade data in a meaningful way. When combining industry and trade data deeper insights into these two industries comes to light. This article outcome was then used as input for Article 3, and also serves as a public resource for other researchers to use in an open repository.

5.3.2 Conclusion to objective 2

The scoping review undertaken in Article 2 had the outcome of identifying 101 trade indicators that could be used to plan, manage, and measure the trade performance and internationalisation efforts of industry sectors (including the footwear and leather industries, the focus of this study). The outcome is an extensive document in tabular form. In this table, available as document 6 in the OSF (https://osf.io/9tx8f), and described in Appendix D, the trade indicators are identified, defined, and discussed with specific page numbers in the source references to enable other researchers to access the sources from which the indicators were obtained. This list does not include any change or growth measures of these indicators, which could more than double the possible indicators to be used as trade performance measures.

The conclusion that can be drawn is that the scoping review discussed in Article 2 achieved the objective of identifying a comprehensive list of trade performance indicators that could be used to plan, implement, and control the internationalisation endeavours of industry sectors in South Africa and elsewhere in the world. This list of trade indicators is arguably one of the more comprehensive lists of trade indicators available in the global trade literature space. The list of trade indicators serves as a public resource for other researchers to use and is available in an open repository (see OSF - https://osf.io/9tx8f).

The research captured in Article 2 also led to a proposed typology of trade indicators. While various authors may well provide some order to the trade indicators they discuss in their research, the proposed typology is an attempt to provide a more structured and comprehensive grouping of the many trade indicators that were identified. The typology should contribute to a better understanding of the various trade indicators that exist and the commonalities between them, as well as enabling other researchers to put these indicators to better use in addressing different categories of problems or issues. Thus, a second conclusion that can be drawn from the article is that a level of value-add in knowledge and structure enhances the literature on trade indicators. This article outcome was then used as input for Article 3.

5.3.3 Conclusion to objective 3

The findings from Article 3 revealed that the leather industry is divided into two important sub-sectors, namely the raw materials subsector and the leather products subsector. The trade data revealed that the leather raw materials subsector is an important competitor on the global market. However, as far as the leather products and footwear industries are concerned, these sub-sectors are more active in Africa, and are typically more import orientated when it comes to trade beyond Africa. The computation of the various trade performance indicators, in turn, revealed that some indicators are very useful in the insights they deliver, while others are less so, although all the indicators did contribute some degree of marketing insights. The RCA, ToT, IIT, and market/product concentration indices are very useful, while others, such as total trade, while relevant, have less impact from a marketing perspective. This article concluded that trade performance indicators examined in Article 3 (see Appendix E), do indeed have marketing value in driving the internationalisation efforts of the industries in question, but that the indicators needed to be prioritised for the industry and that the insights may need to be tested and confirmed with industry leaders and other stakeholders, such as member firms.

5.3.4 Conclusion to objective 4

Objective 4 was to recommend a way forward for the adoption of trade performance indicators by the industries concerned. There are indeed numerous practical and

academic recommendations that can be put forward. These recommendations have been outlined and discussed in detail in section 5.4 that follows.

5.3.5 Conclusion to objective 5

Objective 5 was to recommend further research in this field. The limitations of the study discussed in section 5.6 below, giving rise to numerous areas for further research. These are discussed in section 5.7. There is indeed more research that needs to be done.

5.4 RECOMMENDATIONS

The recommendations provided below are articulated in the context of what the industry leadership should ideally do with the results of this study in terms of the internationalisation efforts of the industries in question.

5.4.1 Recommendation 1

The ability to combine industry output data with trade data - see conclusion 1 - should be put to strategic use by the industry. In this regard there are questions that could be answered. For example, do industry sales' trends correlate with export trends, and which variable (industry sales or exports) is the cause, and which is the effect? Do local markets or export markets dictate growth? While both local and export markets are likely to result in growth, it is the relative strength of one in relation to another that dictates where the focus should be. At the same time, export sensitivity to unit prices could be a factor. Some of the sub-sectors experience wide variance in export unit price changes and this variability may make industries reluctant to invest too much in exports. Similarly, do industry sales depend on imports and import unit prices, and to what extent?

Quantitative economic tools such as Granger Causality or other similar methods could be used to explore cause-and-effect relationships in this sector. Other relationships could be explored as well, such as the sensitivity of manufacturing output and exports to exchange rate changes. Here the research by Lengnoo and Masih (2018:1) has relevance. Using Granger Causality, they found that real exchange rates are unlikely to have influenced economic growth in Thailand. The question arises as to what the situation is at industry level. Typically, when the rand weakens, South Africa is likely to

export more, but at the same time, imports become more expensive. The ‘push-pull’ effect of exports and imports on industry investment needs to be understood and monitored carefully. Bear in mind that the data, while only analysed using annual data for this study, is available on a quarterly and monthly basis as well, enabling more detailed and time-sensitive results to be obtained. These sensitivities of manufacturing to changing rates may require strategic decisions, such as how to improve unit prices (through better quality, materials, tools, automation, design, operations, productivity, training, etc.).

Varshini and Manonmani (2018), in turn, explore the causal relationship between trade and economic growth. The focus could instead be on a causal link between trade and industry sales growth, seeing that the findings in Article 1 enable industry output data to be linked to trade data. Tsen (2007) uses Granger Causality to explore the link between trade openness (one of the key indicators explored in Article 3) and economic growth. At an industry level, economic growth could be replaced by industry growth.

This evidence from the literature supports the recommendation to ‘dig deeper’. There are various relationships that need to be explored, and each industry could be different. This insight could help industry leaders to think differently about their industry. If industry output is found to be the causal variable, then the focus should be on promoting increased output within the industry rather than promoting trade, although one should be careful not to simply replace one with the other. Instead, the emphasis should be placed on increasing output and altering the approach to trade.

The amalgamation of industry data with trade data has thus provided opportunities for further analysis which could influence industry development and internationalisation in many ways. The recommendation is for more analysis to be undertaken from both an industry output and trade perspective.

The integration of two different perspectives – activities versus products – by way of the concordance exercise undertaken in Article 1, is posited not to be sufficient and requires further investigation. In this study, only total output data was used. This is not ideal, as it is the value-add of an industry, not just total sales that is far more meaningful. For this

reason, these figures cannot be directly compared with gross domestic product (GDP) data, as GDP data is of a value-add nature and is not total output data. It is recommended that an input-output and supply-use analysis be undertaken for these sectors to better understand how inputs are used and from where they come, and what the value-add is of the sector concerned. Such an approach would represent a leaner analysis with more meaningful data that could better shape the international marketing efforts of the industry.

5.4.2 Recommendation 2

With the insight gained from bringing manufacturing outputs together with trade, it is recommended that industries take cognisance of both the industry's exports and imports. The focus on exports alone is not enough. Imports have a significant impact on the local market, as well as on exports. Imports represent competition for local producers in the local market and may cause some manufacturers to fail, not a healthy situation for the industry. In addition, import prices could provide a guide as to the comparative competitiveness of foreign competitors and serve as a benchmark for the industry and for member firms both locally and internationally.

Several of the key indicators examined in Article 3, such as the IIT, for example, draw on both exports and imports to calculate the indicator in question (Sari, Yuliati & Komariyah 2019:49&51). Other indicators, such as the IPI (the import penetration index, also known as the self-sufficiency index – [Mikic & Gilbert 2009:28-29]) – are entirely import-specific indicators. The authors explain that the IPI reveals the extent to which domestic demand is satisfied by imports, and that the index may influence policies targeting self-sufficiency. Consider the case of a country that is subject to food shortages. For example, a high IPI could indicate a country that is easily and dramatically subject to external shocks.

5.4.3 Recommendation 3

Besides taking cognisance of the role of imports in many of the trade indicators identified in Article 3, as suggested in recommendation 2 above, it is further recommended that a continually-updated value chain analysis of the industry concerned be implemented by relevant industry bodies to track the functioning of the broader industry. This would

include trade's impact on the industry's inputs and outputs. A search of the literature reveals that a value chain analysis was undertaken in 2014 as announced by the then Minister of Trade and Industries, Rob Davies (SA Government 2014). This announcement has led to the *Retail-Clothing Textile Footwear Leather Master Plan 2030* (DTIC 2022). The R-CTFL Master Plan includes some global trade figures, and it is not clear to what extent trade indicators influenced this report, but it is posited that the trade indicators from this study could contribute to even better execution of the proposed Master Plan. In addition, examples of local leather and footwear value chains do exist in the literature (Department of Agriculture, Forestry & Fisheries 2012; Muthu 2020).

It is important to note that importers at industry level can be divided into four groups. The first group comprises local manufacturers who are also importers of competitive products in the same industry in which they operate locally. They compete in the local market with locally produced goods, as well as with the products they import, although the imported products typically supplement the products they produce, rather than compete with them directly. These manufacturers represent direct competition to other local manufacturers.

The second group are also importers of directly competitive products to those produced locally. The difference of the second group to the first group is that they are not local manufacturers. Instead, they are import agents, local branches of international manufacturers, wholesalers, and retailer buyers. They represent direct competition for local manufacturers. This is a big group in most industries.

The third group of importers, again a large group, are those manufacturers that import raw materials, components, and sub-assemblies that may or may not be classified as falling within the industry in question. Thus, any plastic, rubber, or chemicals that a shoe manufacturer imports to convert into the sole of a shoe or to treat the shoe surface, are likely to be classified as imports within the plastics, rubber, or chemical industries, not the footwear industry. However, the final product with a rubber sole and with treated leather uppers, is likely to be classified as a shoe.

The final group of importers are manufacturers who typically import the tools and machines that they use to manufacture the shoe. These imports would normally fall into machinery imports. Of course, these items described above, could be supplied by local firms, and may be produced locally.

For industry leaders to better measure the trade within their industry, they should strive to obtain support from their members to try to quantify these different types of imports. The reason for doing this is to get a more accurate picture of the imports directly or indirectly influencing the industry. Obviously, only some of the imports described above will appear within the import figures of the industry in question, namely finished or partially finished footwear. The other imports – all crucial to the industry – will be classified as imports in other sectors, yet these imports could have a major impact on outputs and the success of the industry in question.

While one might be inclined to think that this is an industry issue and not a firm-level issue, if a country is very dependent on imports and these imports are lost suddenly because of an exogenous shock, this could affect local producers as well, who now may have to forego overseas markets to satisfy local demand. When the situation improves again, the foreign markets lost may not be so easy to regain and cheaper imports may displace local producers, leaving local firms stranded without any markets or at least significantly reduced markets. The balance between export and imports is therefore argued not to be only an industry matter, but a firm-level consideration as well.

5.4.4 Recommendation 4

Conclusion 2 highlights the fact that there are many more trade performance indicators that need to be investigated and evaluated, so as to determine their usefulness in planning the internationalisation efforts of industries. It is recommended that SAFLIA/SAFLEC investigate all 101 indicators and consider their usefulness in the PIC of the global drive of the industry. These indicators can be prioritised and could be categorised into product-related indicators, market-related indicators, price-related indicators, competitive and comparative indicators, regional indicators, and more, contributing to a more detailed version of the typology presented in Article 2.

5.4.5 Recommendation 5

The typology identified as part of conclusion 2 highlights the importance of regions. For example, the DTIC specifically requires export councils to report on BELN (Botswana, Eswatini, Lesotho and Namibia) trade. This is understandable, given that these countries, together with South Africa form the South African Customs Union (SACU). It is worth noting that in visiting the merchandise trade statistics reports available on the SACU website (www.sacu.int), it was found that the last available report is for 2014. This outdated situation is seen as a matter of concern and one that needs addressing.

The statistics from Article 3 reveal that South Africa's trade with SADC and Africa are equally important, especially as far as leather products and footwear are concerned. Article 3 highlighted the importance of regional markets and markets further afield in Africa, for exports from these two sectors. In addition, South Africa also imports raw materials from regional and African sources, so there is a clear and established trading relationship between these industries and their African partners. This relationship needs to be nurtured. Hewings and Oosterhaven (2019:1) argue that interregional trade is "relatively neglected by most trade analysts" and posit "that greater attention should be directed to this form of connectivity [that is, interregional trade]". Use of interregional indices such as the regional Hirschmann index (Hedoui, Natos & Mattas 2019:20), and other regional indices identified in Article 2, is encouraged.

5.4.6 Recommendation 6

The evidence from Article 3 supports the use of the 13 trade performance indicators investigated, in providing marketing- and market-related insights that can be used to drive the global efforts of the two industries. The aim would be to prepare a quantitative dashboard based on these indicators, using quarterly data. This information can then be used by management to seek out opportunities, understand relationships, exploit comparative advantages that exist, compare price advantages and disadvantages, and to assist in the PIC of the industry's (or firm's) trade endeavours.

It might be found that other trade indicators, see recommendations 3 and 4, are more relevant for these two industries. It is suggested that all 101 indicators identified be investigated (including change indicators) and then, based on the views of the industry

leadership and member firms, the indicators seen as the most useful can be prioritised for the dashboard. The impact of this dashboard can be tracked over time.

5.4.7 Recommendation 7

The development of an industry dashboard, as proposed in recommendation 6, should have two distinct perspectives, namely market perspectives and marketing perspectives. In terms of *market* perspectives, the indicator-powered dashboard should strive to identify new markets with potential, lost markets with reasons why, fast-growing markets, confirm existing relationships with markets, and highlight relationships that appear to be weakening or changing. These should all be flagged for further investigation. Indicators such as market competitiveness indicators, comparative advantage indicators, export market concentration indices, export intensity indices, and other similar metrics – see articles 2 and 3 – could be used for this purpose. There may be other indicators from the remaining indicators identified in Article 2 but not explored in more detail in this study, that could be used to this end.

At the same time, the dashboard should strive to track *marketing-related* indicators. These are indicators that can assist marketing decisions such as product decisions, pricing decisions, promotion decisions and distribution decisions. Related issues, such as productivity and output per worker, product quality and sophistication, production automation, R&D, and capital investment in plant and machinery should also be tracked, although this data may need come from members themselves. For example, the terms of trade indicators and unit price indicators can assist with pricing decisions. These should not just be measured when questions are asked but should instead be tracked on an on-going monthly basis. In so doing, changing trends can be highlighted and early-warning provided to industry stakeholders. Product opportunities or challenges can also be identified by tracking trade in products at the most detailed level of data (eight-digits of detail in the case of South Africa). To achieve this would require an exploration of data and indices beyond the trade indicators discussed in this study. Again, there may be other indicators identified in Article 2 that can be used for this purpose.

5.4.8 Recommendation 8

The data used in this study is all time-series data. It is recommended that industry bodies explore trends, including seasonal trends, and look for change points. Takeeuchi and Yamanishi (2006:483) explain that change points represent points-in-time in time-series data when the data properties change suddenly and significantly from the previous norm; this is not about time-series data that changes slowly or in a predictable way (for example, in the case of seasonal changes). Where there are change points, reasons for these changes should be sought. Change point analysis, however, is not a trade indicator as envisaged in this study and therefore represents an extension of focus beyond the main aim of this study.

5.5 CONTRIBUTION OF STUDY

The study achieved four main goals; the creation of a concordance table that brings the South African SIC classification together with the HS classification to allow manufacturing data to be matched with trade data at industry level in the country. This outcome addresses a gap in the arsenal of economic, export and trade researchers in the country. Secondly, the study identified a comprehensive a list of trade indicators from the literature, by way of a scoping review. The outcome of this review is available for trade analysts across the world to use and improve on as they see fit. The review also resulted in a typology of trade indicators that can facilitate their application in international marketing. Thirdly, the study computed key trade indicators identified from the scoping review for the footwear and leather industries in South Africa. This insight provides an overview of the trade performance of the industries in question with suggestions for improvement. This outcome will hopefully help shape the internationalisation efforts of these two industries, used as proof of concept for this study, going forward. It is hoped that this research can help many other industries in their internationalisation efforts.

5.6 LIMITATIONS OF STUDY

The are several limitations to this study:

- The first limitation is that the focus of the study is only on the footwear and leather industries in South Africa. It would be useful to expand this study to other industries, including in other broader sectors such as agriculture, mining, and services.

- The second related limitation is that the study is only a South African study. While useful in a South African context, it would be appropriate to explore the relevance of the main outcome of this study, namely the usefulness of trade performance indicators in the internationalisation activities of industries in other countries. That said, while Article 1 is only relevant to South Africa and has no application beyond the country, Article 2 is relevant to all trade analysts, while Article 3 is primarily relevant to South Africa, but the findings and recommendations could influence research elsewhere in the world.
- A third limitation is that there is no differentiation made in the study about the use of trade performance indicators in the distinct international management functions in the internationalisation endeavours of an industry (Kyaw, Harland & Mujtaba 2017:2). Instead, a single, overarching approach is followed in this study. It is likely that different indicators might be more or less useful in supporting each of the different international management functions referred to above. Kareska (2023), for example, refers to the issue of productivity in operations management, providing examples of how various aspects of the operations of a firm can be improved to make a firm more globally competitive.
- A further limitation is that only 13 key indicators were explored in Article 3 in terms of their use as measures of trade performance in the internationalisation activities of the two industries in question. However, 101 indicators were identified in Article 2. Ideally, these should all be tested to explore their value.
- The focus of this study was primarily on the industry and industry leadership. However, the findings also have relevance for industry firms who may want to use this information for their own exporting endeavours. The lack of focus on firms in this study is seen as a limitation. There is the potential to research how these trade performance indicators could be used at firm level. There may be an opportunity to encourage firms to work together to share more micro-level data to enhance the analysis and create an industry benchmarking exercise against which member firms could measure themselves.
- Another limitation is that the input and views of the industry leadership as to the perceived value of these indicators for the PIC of the industry's internationalisation efforts are not included in this study.

- A similar limitation to that described above is that the views of firm managers within industry are also not included in this study. This differs from exploring how trade indicators could be used by firms, mentioned earlier. A focus on the perceived usefulness of the indicators in the minds of firm managers is required.
- Finally, this study is unequivocally a study focusing on manufacturing; the target industries selected, and the trade performance indicators used are manufacturing orientated, not service orientated. The agriculture, mining, and services sectors are not included.

5.7 OPPORTUNITIES FOR FURTHER RESEARCH

The limitations identified above lead to opportunities for further research. These research opportunities include:

- Expanding the focus of this study to include all other manufacturing industries in South Africa, as well as the agricultural, mining and services sectors.
- Investigating the remaining trade indicators from the 101 indicators identified in Article 2 (adding the change indicators to this list) to better understand their relevance and potential in driving the internationalisation efforts of the two industries in question.
- Identifying the most relevant indicators from the 101 indicators identified in Article 2 (including the change indicators), and present these to the leadership of SAFLIA/SAFLECA to obtain their views and perceptions as to the value and use of these indicators. This research many need to be divided into two stages. The first stage is to identify the most relevant indicators, as perceived by industry leaders (and firms). The second stage is to explore how best these indicators might be used in the internationalisation efforts of the industry in question, based on first-hand input from the industry body and industry stakeholders. Industry leaders and industry firms may need to be researched separately.
- Investigating how the final set of indicators might be ‘packaged’ and presented as a dashboard and made available to industry stakeholders on a real-time basis.
- Exploring the use of trade indicators by industry management in the planning, implementing and controlling of the internationalisation endeavours of their respective industries.
- The practical application of the outcomes from this study, is a further research opportunity to be explored.

5.8 PERSONAL REFLECTION

This study took a lot more effort than was expected, but an effort that hopefully will contribute to improved trade at industry and firm level in South Africa. With the country experiencing deindustrialisation, this study may play a part, even if it is a small part, in helping to reindustrialise the country. The fact that the study was based on articles instead of the traditional research dissertation structure, was a serious learning curve for the researcher, but a learning experience that hopefully can be shared within the University, as the College of Economic and Management Sciences adopts a PhD by Publication model from 2024 onwards. The research by publication model adopted in this study also resulted in potential research outputs – three articles submitted to accredited journals – as part of the study. This output and engagement proved motivating for the researcher. Considering the further research opportunities outlined above, a single study could have far wider implications that just the completed dissertation. The outcomes from this study, the researcher believes, can help shape research by other international marketing researchers and practitioners, as well as trade analysts, locally and internationally, and may hopefully contribute to a reindustrialisation effort across multiple industries in the country.

The study also has helped to significantly increase the researcher's knowledge about trade performance indicators – in width and depth – and how to calculate and use these in shaping industry globalisation. Mastering this expertise will almost certainly shape further research efforts by the researcher in this field. As an interdisciplinary and multi-method study, the insight gained has expanded the researcher's knowledge both in the field of marketing and trade analysis (an economics sub-field).

5.9 STUDY CONCLUSION

This final chapter brings the study to a close. The chapter presented the conclusions of the study based on the objectives set in Chapter 1. From these conclusions, several recommendations were made. The contribution of this study and the limitations of the study were discussed. The limitations point to further research opportunities.

As a study in its entirety, it has highlighted the opportunities that exist in bringing industry and trade data together to feed into the computation of a comprehensive list of trade performance indicators that were identified in the study, and that can be used to drive the international marketing and internationalisation efforts of an industry. The study has generated three articles that have been submitted for publication, and, as suggested above, the study has highlighted a number of further research opportunities that could contribute to the reindustrialisation of the manufacturing sector in South Africa. It is hoped that this study will have an enduring and positive impact on South Africa.

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UNISA university of south africa

APPENDIX A

UNISA DEPARTMENT OF MARKETING AND RETAIL MANAGEMENT ETHICS REVIEW COMMITTEE

16 November 2022 Dear Dr

CH Bothma

NHREC Registration #: (if applicable)

ERC Reference #: 2022_MRM_016

Name: Dr CH Bothma

Student #: 1124625 Staff #:

N/A

Decision: Ethics Approval from 2022 to 2025

Researcher(s): Dr CH Bothma
bothmch@unisa.ac.za
0828808549

Working title of research:

Exploring the Perceived Usefulness of Trade Indicators as Input to Measuring the Trade Performance of Selected Industries in South Africa

Qualification: Master of Commerce (BMA) Business management (Marketing)

Thank you for the application for research ethics clearance by the Unisa Department of Marketing and Retail Management Ethics Review Committee for the above-mentioned research. Ethics approval is granted for 3 years.

*The **low risk application** was **reviewed** by the Department of Marketing and Retail Management Ethics Review Committee on 16 November 2022 in compliance with the Unisa Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment.*

The proposed research may now commence with the provisions that:

1. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.

2. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study should be communicated in writing to the Department of Marketing and Retail Management Ethics Committee.
3. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.
4. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the confidentiality of the data, should be reported to the Committee in writing, accompanied by a progress report.
5. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study. Adherence to the following South African legislation is important, if applicable: Protection of Personal Information Act, no 4 of 2013; Children's act no 38 of 2005 and the National Health Act, no 61 of 2003.
6. Only de-identified research data may be used for secondary research purposes in future on condition that the research objectives are similar to those of the original research. Secondary use of identifiable human research data require additional ethics clearance.
7. No field work activities may continue after the expiry date 30 November 2025. Submission of a completed research ethics progress report will constitute an application for renewal of Ethics Research Committee approval.

Note:

*The reference number **2022_MRM_016** should be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.*

Yours sincerely,

Signature

Signature

Chair of Marketing and Retail Management ERC and

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APPENDIX B

SUPPORTING DATA FOR CHAPTER 2 (ARTICLE 1)

In this Appendix, the various data sources that support this article are listed and briefly described. These data sources can be obtained from the Open Science Framework (OSF) repository at https://osf.io/8e74c

The files in question are:

1. Meta description of data source in this repository

This is an MS Word file of the concordance exercise undertaken and comprises descriptions of the various data sources used in the study. It is essentially a duplicate of this document.

2. Data for P3041.2 report from 1998

This is the data extracted from the P3041.2 report produced by Statistics South Africa – see https://www.statssa.gov.za/?page_id=1854&PPN=P3041.2

3. Total SA imports from World_2017-2021_no empty rows

The data for South Africa's imports from the World was downloaded from TradeMap from this website – www.TradeMap.org.

4. Total SA exports to World_2017_01-2021_12_no empty rows

The data for South Africa's exports to the World was downloaded from TradeMap from this website – www.TradeMap.org.

5. HS2017toHS2007Conversion table

The UN conversion table of HS2017 codes to HS2007 codes together with the accompanying correlations was obtained from the UN website on Classifications on economic statistics – see https://unstats.un.org/unsd/classifications/Econ

6. HS2007toISICv3Concordance

The spreadsheet containing the HS2007-to-ISICv3 concordance is available from the WITS website at:http://wits.worldbank.org/data/public/concordance/Concordance_H3_to_I3.zip

7. SICv5 to ISICv3 Manual concordance exercise_Jan 2023

This was one of the main outputs of this study, namely a concordance of the SICv5 with the ISICv3.

8. Side by side comparison of SICv5 vs ISICv3 manuals with differences highlighted

This document captures the SICv5 and ISICv3 manuals in Word format with each 4-digit level matched to each other and with differences highlighted. This comparative table was crucial in conducting the concordance.

9. Master analysis of HS2017-HS2007-ISICv3 concordance_with analysis

The data from 5 and 6 were used to create a concordance to bring the HS2017 together with the ISICv3 codes.

10. List of HS2017 codes that must be allocated to separate ISIC codes

This table provides the HS2017 codes that are duplicated across different ISIC codes and that therefore need to be apportioned across these codes.

11. Master-SA exports linked to SIC_4837 rows

This spreadsheet summarises the SA export data and aggregates the data to match the SIC codes at 3-digit level.

12. Master-SA imports linked to SIC_4695 rows

This spreadsheet summarises the SA import data and aggregates the data to match the SIC codes at 3-digit level.

13. Stats SA manufacturing data matched to theSICv5 and ISICv3 codes with analysis

The data from point 2 above, was matched up with the SICv5 and ISICv3 codes and manufacturing sectors that have been combined by StatsSA, were highlighted

14. Final master sheet_manufacturing_imports_exports

The final master spreadsheet incorporates the manufacturing, export and import data from:

1. Data from P3041.2 report from 1998
2. Master-SA exports linked to SIC_4837 rows
3. Master-SA imports linked to SIC_4695 rows

The data is ordered according to the SIC codes used by StatsSA in their P3041.2 report and represents the 60-month period from 2017/01 to 2021/12.

APPENDIX C

SEARCH PHRASES CONSIDERED FOR CHAPTER 3 (ARTICLE2)

Search phrases	Scopus Abstract / Title / Keyword	Web of Science Abstract / Title / Keyword	Proquest dissertations and theses Abstract / Title / Keyword	Proquest dissertations and theses All text	Google Scholar All text All yrs/2019
"trade indicators"	82	40	1	279	6380
"trade indicator"	82				2220
"trade indicators" **[title only]**	6	8	5	NA	0
"trade indicators" AND "industry-level"					443
"trade measure"	241				5320
"trade measures"	241				33500
"trade indices"	114	42	10	227	3180
"trade indice"	114				22
"trade metrics"	2	2	0	22	210
"trade analytics"	1	0	0	1	239
"measuring trade"	46	46	10	370	6230
"trade performance"	2141	297	131	1854	38400
"trade performance metrics"	0	0	0	0	12
"trade performance analytics"	0	0	0	0	0
"trade performance" [title only]	110	78	14	NA	759
"trade performance" plus "exports" AND "imports"	325	65	28	1231	20800
"trade performance index"	8	3	1	12	398
"global trade performance"	0	0	0	2	106
"global trade performance index"	0	0	0	0	1
"international trade performance"	13	12	9	82	1370
"international trade performance index"	0	0	0	0	0
"export trade performance"	2	1	1	7	149
"import trade performance"	0	0	1	1	20
"trade performance measurement"	0	0	0	0	25
"trade performance measures"	1	0	0	5	89
"measuring trade performance"	0	0	0	2	49
"measurement of trade performance"	0	0	0	2	7
"trade performance indicators"	2	1	0	6	275
"trade performance indices"	10	0	0	4	68
"trade performance indexes"	10	1	0	1	27
"trade performance" and "trade indicators"	5				
"trade performance" AND "firm level"	80				
"trade performance" AND "firm level" AND "trade indicators"	0				
"trade competitiveness"	219	172	109	567	15100
"trade competitiveness" **[title only]**	58	51	14	NA	584
"trade competitiveness" plus "exports AND "imports"	0	5	0	4	273
"trade competitiveness index"	16	11	0	4 (27 CN)	426
"global trade competitiveness"	6	4	1	27	338
"global trade competitiveness index"	0	0	0	0	0
"international trade competitiveness"	28	15	12	65	1210
"international trade competitiveness index"	0	1	0	1 (3 CN)	9
"export trade competitiveness"	2	0	0	NA (4 CN)	48
"import trade competitiveness"	0	0	0	0	0
"trade competitiveness measurement"	0	1	0	1	10

Search phrases	Scopus Abstract / Title / Keyword	Web of Science Abstract / Title / Keyword	Proquest dissertations and theses Abstract / Title / Keyword	Proquest dissertations and theses All text	Google Scholar All text All yrs/2019
"trade competitiveness measures"	1	1	0	1	93
"measuring trade competitiveness"	1	1	0	0	35
"measurement of trade competitiveness"	0	0	0	1	35
"trade competitiveness indicators"	3	1	0	0	59
"trade competitiveness indices"	16	1	0	1	47
"trade competitiveness indexes"	16	2	1	2	42
"trade success"	16	5	4	176	1610
"trade success" **[title only]**	3	3	0	NA	11
"trade success" plus "exports" AND "imports"	2	0	0	101	646
"trade success index"	0	0	0	0	0
"global trade success"	0	0	0	0	36800
"global trade success index"	0	0	0	0	0
"international trade success"	1	1	0	10	81
"international trade success index"	0	0	0	0	0
"export trade success"	0	0	0	0	9
"import trade success"	0	0	0	0	0
"trade success measurement"	0	0	0	0	0
"trade success measures"	0	0	0	0	0
"measuring trade success"	0	0	0	0	0
"measurement of trade success"	0	0	0	0	0
"trade success indicators"	0	0	0	0	0
"trade success indices"	0	0	0	0	0
"trade success indexes"	0	0	0	0	0
"export marketing research"	18	7/1	4	43	746/70
"export market research"	8	5/0	2	62	778/83
"export market selection"	15	9/2	2	89	1030/213
"international marketing research"	125	99/18	11	594	7170/1510
"international market research"	52	25/4	4	220	2910"/627
"international market selection"	98	63/17	17	149	2840/821
"export market selection" AND "trade indicators"	0	0	0	0	4/1
"export market research" AND "trade indicators"	0	0	0	0	8/2
"export marketing research" AND "trade indicators"	0	0	0	1	2/0
"international marketing research" AND "trade indicators"	0	0	0	0	9/3
"international market research" AND "trade indicators"	0	0	0	1	4/2
"international market selection" AND "trade indicators"	0	0	0	1	8/2
"export research"	42	11/3	5	126	1800/305*
"exporting research"	11	8/2	1	34	616/148
"export research" AND "trade indicators"	0	0	0	1	4/2
"exporting research" AND "trade indicators"	0	0	0	0	0/0
"export performance"	2071		424	4859	138000
"export performance" AND "trade indicators"	5	0		0	979
"firm's export performance" AND "trade indicators"	0	0	0	3	

Search phrases	Scopus Abstract / Title / Keyword	Web of Science Abstract / Title / Keyword	Proquest dissertations and theses Abstract / Title / Keyword	Proquest dissertations and theses All text	Google Scholar All text All yrs/2019
"export performance of firms" AND "trade indicators"	0	0	0	2	
"firm-level export performance" AND "trade indicators"	0	0	0	0	

APPENDIX D

SUPPORTING DATA FOR CHAPTER 3 (ARTICLE 2)

In this Appendix, the various data sources that support the article to which this Appendix is related, are listed and described. These data sources can be obtained from the Open Science Framework (OSF) repository at https://osf.io/9tx8f.

The files in question are:

1. 1_ Meta description of the data sources available on this repository

This document is the same as the first document in the OSF repository. It is included in the repository to make it easier for researchers to find and to understand the nature of the files included in the repository.

2. 2_Trade indicator scoping review_Initial Google Scholar results_XLS spreadsheet.xlsx

This spreadsheet contains a list of sources downloaded from Google Scholar, given the search algorithm used (see article). Use was made of the *Publish or Perish* tool developed by Harzing (2023) to download these initial **185 sources** from Google Scholar. See row 1 in Table 3.1 in Article 2.

3. 3_Trade indicator scoping review_Initial Ebscohost results.pdf

This a PDF document highlights the **13 sources** identified from the Ebscohot bibliography, given the search algorithm used (see article). See row 1 in Table 3.1 in Article 2.

4. 4_Trade indicator scoping review_Initial ProQuest results_XLS spreadsheet.xls

This an Excel spreadsheet highlighting the **20 sources** identified from the ProQuest bibliography, given the search algorithm used (see article). See row 1 in Table 3.1 in Article 2.

5. 5_Trade indicator scoping review_Initial list of articles reviewed

This document presents a table of the 144 articles initially reviewed for this study. It should be noted that of these, 104 come from Google Scholar, 20 from Proquest, 13

from Ebscohost, and 7 from other articles identified (see the end of the table for these additional articles). These numbers can be compared with Table 3.1 in Article 2 (see rows 8-12). Of these 144 initial articles, 82, were found usefully and contributed to the list of trade indicators in document 5, while 62 were found not to be relevant and were not further used.

6. 6_Trade indicator scoping review_Final list of trade indicators

This document is a tabular list of all the trade performance indicators identified from the literature – a total of 101 indicators excluding any change/growth indicators and tariff indicators. There is legend at the top of the table explaining what has been included in the columns. This document is 180 pages long. The most widely used (popular) trade indicators are captured in Table 3.2 in Article 2.

APPENDIX E
SUPPORTING DATA FOR CHAPTER 4 (ARTICLE 3)

In this Appendix, the various data sources that support the article to which this Appendix is related, are listed and described. These data sources can be obtained from the Open Science Framework (OSF) repository at https://osf.io/fztjp.

The files in question are:

1. **1_ Meta description of the data sources available on this repository**
   This document is the same as the first document in the OSF repository. It is included in the repository to make it easier for researchers to find and to understand the nature of the files included in the repository.

2. **2_Product codes and descriptions for the HS41, HS42 (including HS911390 and HS960500), and HS64**
   This document provides three tables which include codes and descriptions of the four-digit SICv5 codes for these three industry sub-sectors, together with the HS911390 and HS960500 categories that were found to fit best with HS42, rather than HS91 or HS96.

3. **3_Top 20 exporting and importing countries, and trade balance for all products for the period 2017-2021**
   This is a summary table of the top 20 exporters and importers for all products for the period 2017-2021.

4. **4_World top 20 exporting and importing countries for HS41, HS42 and HS64 (including HS911350 and HS960500) for the period 2017-HS2021**
   This document contains export and import tables for each two-digit code. For total exports and imports one would need to add HS41, HS42 and HS911360 and HS960500 together to get total exports and imports for leather products. This is not the case for footwear.

5. **5_ Manufacturing production and sales data (SICv5), and accompanying trade data (HS2017) for the footwear and leather industries in SA**

This data was obtained from the earlier concordance exercise where the SICv5 data compiled by StatsSA according to the SICv5, was mapped to the HS2017 data compiled by C&E, for the footwear and leather industries in South Africa for the period 2017 to 2021.

6. **6_Concordance spreadsheet_ WITS HS2007-to-ISICv3 table.xlsx**

This was one of the outputs from the first article, drawing on the WITS HS2007-to-ISICv3 concordance table. This table highlights the fact that 911360 and 960500 fit best with the leather product sector within the ISICv3. This table was then adapted – see Article 1 – to map the ISICv3 to the SICv5, thus making it possible to match the two codes referred to above to the leather products sector in the SICv5 – see next table.

7. **7_The new HS2017-to-SICv5 concordance table from Article 1**

The newly adapted HS2017-to-ISICv3-to-SICv5 concordance table from Article 1, making it possible to match the two codes referred to above to the leather products sector in the SICv5.

8. **8_Final master sheet_including manufacturing output data & concorded exports and import data**

The master spreadsheet that includes StatsSA manufacturing output data based on the SICv5, concorded to C&E trade date based on the HS2017.

9. **9_Unit value indices for South African leather and footwear exports and imports for the period 2017-2021**

This document incudes several tables that present the values, quantities, and unit values for each of the two-digit HS codes for the leather and footwear industries.

10.10_BRICS and other regional exports and imports of HS41, HS42 and HS64 for the period 2017-2021

The tables included in this document provide data on trade by BRICS member countries for the industries in question and was used for TSI and interregional trade analysis.

APPENDIX F

Natalie Stear (BA Hons, M.Ed)
Cell: 083 258 3776
e-mail: njstear@iafrica.com
30 January 2024

TO WHOM IT MAY CONCERN

I hereby confirm that I have professionally proofread and edited the Master's degree dissertation of Cornelius Henry Bothma, entitled "Exploring the potential marketing application of trade performance indicators in driving the internationalisation efforts of selected industries in South Africa".

(Master of Commerce, Business Management (Marketing Specialisation), University of South Africa)

Sincerely

N.J.STEAR

Gceberha (Port Elizabeth)
January 2024

APPENDIX G

Natalie Stear (BA Hons, M.Ed)
Cell: 083 258 3776
e-mail: njstear@iafrica.com
23 February 2024

TO WHOM IT MAY CONCERN

I hereby confirm that I have professionally proofread and edited Chapter 2 (Article 1) of the Master's degree dissertation of Cornelius Henry Bothma, entitled "Concording trade data with industry date for richer industry-level trade insights in South Africa".

(Master of Commerce, Business Management (Marketing Specialisation), University of South Africa)

Sincerely

N.J.STEAR

Gceberha (Port Elizabeth)
February 2024

APPENDIX H

Draft 1

by Corneluis Bothma

Submission date: 29-Jan-2024 10:22AM (UTC+0200)
Submission ID: 2281058679
File name: MASTER_TII_1.docx (1.71M)
Word count: 55177
Character count: 305812

Draft 1

ORIGINALITY REPORT

10%	9%	6%	3%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	hdl.handle.net Internet Source	1%
2	microdata-catalog.afdb.org Internet Source	1%
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