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Assessment of Namibian Agricultural export diversification and trade complementarity

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Declaration

I, Caroline D. Kandjii, hereby declare that the work contained in this thesis entitled is my original work and that I have not previously in part, or in its entirety submitted it to any university or other institution of higher learning for the award of a degree.

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List of Acronyms

AMTA	Agro-Marketing and Trade Agency
MAWLR	Ministry of Agriculture, Water and Land Reform
BON	Bank of Namibia
WITS	World International Trade Statistics
UN COMTRADE	United Nations commodity trade statistics
NSA	Namibia Statistics Agency
MPR	Market Penetration Rate
ITC	International Trade Centre
PGC	Persian Gulf Countries
HS	Harmonized Systems
UAE	United Arab Emirates
GDP	Gross Domestic Product
ATPI	Agricultural Trade and Policy Institute
NHHI	Normalized Hirschman-Herfindahl Index
HHI	Hirschman-Herfindahl Index
TCI	Trade Complementarity Index
TII	Trade Intensity Index
SITC	Standard International trade centre
SADC	Southern Africa democratic countries
SACU	Southern African Customs Union
EU	European Union
ASEAN	Association of Southeast Asian Nations
EU-SA FTA	European Union-South Africa free trade agreement
AfCFTA	Africa continental Free Trade Agreement
COMESA	Common Market of Eastern and Southern Africa
EPA	Economic Partnership Agreement
WTO	World Trade Organization

Acknowledgements

Dedication

To my mother and brother, Hilde and Melchizedek Kandjii, who have been my biggest supporters through the 20 years of continuous educational pursuits. Additionally, it is dedicated to my little sister,Ragel Kandjii, and my beautiful daughters, Lee Ann, Cherish and Eleanor.

Abstract

The reliance of Namibia on primary commodities and their unstable prices has left the country vulnerable to external price shocks, thus the need for appropriate agricultural trade research. This study was carried out to fill this gap by providing quantitative information regarding agricultural export diversification and trade complementarity. Specifically, the study measured the export diversification of the Namibian agricultural sector (export basket and trade destinations), analysed the trade complementarity of Namibia and trade destinations, and estimated the intensity of agricultural trade with trade destinations.

To meet these objectives, the normalised Hirschman- Herfindahl index (NHHI), trade complementarity index (TCI) and trade intensity index (TII) were used to compute diversification, complementarity, and intensity respectively. The study used secondary data on the exports and imports of 19 agricultural commodity groups from 2000 to 2020 obtained from the UN COMTRADE database. Twenty trade destinations comprising ten African countries (Malawi, Mauritius, Botswana, Cameroon, Tanzania, Lesotho, Democratic Republic of Congo, South Africa, Zambia, and Zimbabwe) and ten non-African countries (United States of America, United Kingdom, Spain, Germany, Bulgaria, China, Netherlands, Belgium, United Arab Emirates, and Brazil). The 19 agricultural commodities at SITC digit-3 level have been selected by considering their contribution to Namibia's export and import basket and the sample makes up the whole agricultural sector and the availability of data.

In addition, trade destinations were selected based on the top percentage shares in exports and imports of Namibia's agricultural commodities. The results indicated that the Namibia agricultural sector exhibited a fair diversification in terms of the export basket, but it is highly concentrated in terms of destination/market. For trade complementarity, Namibia is strongly complementary with the selected trade destinations except for the Democratic Republic of Congo. Namibia intensively traded with South Africa (4.90%), Zimbabwe (1.44%), Zambia (3.92%), and Botswana (14.47%) as the rest of the trade destinations registered a TII value of less than 1. The study recommends that Namibia increases trade in the following commodities: live animals, Meat and Meat preparations and Fish and also increase bilateral trade between African trade partners, especially Botswana, Zambia, Zimbabwe, and South Africa. Additionally, there is a need for the Namibian government to substantially intervene in the export promotion activities to oversee the agricultural practices in the exports sectors with stimulation mechanism to increase Namibian export and attention should be focused on identifying realistic export

opportunities for Namibia to boost and diversified agricultural export to trade destinations through research and development.

Chapter 1: Introduction

1.1.   Background of the study

Namibia is rated as an upper middle-income country albeit, unstable in its micro and macroeconomic conditions. For instance, the unemployment rate was 20.59% in 2020 and there is a high-income inequality in the country with a Gini coefficient of 0.55 (African Development Bank Group, 2020). Namibia experienced a slow economic growth rate of, 1.1%, -1.65% and -7.24% during the years 2018, 2019 and 2020 respectively (Namibia Statistics Agency, 2020).

Since 2008, the global economic crisis had a devastating impact on vulnerable economies from which many have not recovered till today. Consequently, a negative economic outlook persists in most countries. For example, Namibia experienced a negative trade balance from 2000-2020. In 2020, Namibia's overall trade amounted to N$197 billion, slightly lower (3.7%) than its 2019 level of N$204.5 billion (Namibia Statistics Agency, 2021). In addition, there was a 3.7% contraction in overall exports in 2020, which led to the shrinkage of the economy thus underlining the importance of trade to the economic growth of the country (Namibia Statistic Agency, 2020).

Agriculture is one of the sectors that is highly affected by Namibia's contraction in a gainful trade. In 2020, agricultural exports experienced a decline of 24.0% in the first quarter. The decline was mainly exacerbated by a 42% drop in cattle exports. Despite this, Livestock farming remains an imperative foreign exchange earner for Namibia (Namibia Statistic Agency, 2020).
The decline in growth is a cause for concern because Agriculture accounts for the livelihood of about 70% of the population and employs about 30% of the labour force (Namibia Statistics Agency, 2020).

Furthermore, Namibia has experienced relatively faster growth in import volumes compared to export of mainly unprocessed goods compared to the imports of consumer and capital goods. This can be attributed to the recurrent drought which meant that most of the food consumed in Namibia is imported. This in turn affects the balance of payments (Simasiku & Sheefeni, 2017). According to the Meat Board of Namibia (2019), out of the total livestock produced locally 84% of beef, 77% of sheep and 97% of goats that are exported every year are destined for the South African market. This over-reliance on one destination

market is risky as it leaves Namibia vulnerable to external shocks. export of crops, vegetables and fruits have also grown in value. In the attempt to encourage local farmers to increase or take up cereal production and support trade diversification, the government established trade control in terms of the agronomic Act (Act no 20 of 1992) under the Agronomic board of Namibia permit control (Agronomic board Namibia, 2020). In addition, the government has many initiatives amongst which are the Green Scheme and the National Horticulture Development Initiative, intended to increase local agricultural production. The National horticulture development initiative facilitates the marketing of fruit, vegetables, livestock fodder, and other horticultural products and also mandates the Namibian Market Share Promotion (NMSP) which is an import subsidisation program requiring local importers of fresh horticulture commodities to source a minimum percentage of their products locally before gaining access to import permit (Agronomic board Namibia, 2020).

The primary objective of the Act is to promote the agronomic industry and to facilitate the production, processing, storage, and marketing of controlled products in Namibia. Despite the government efforts, the overall agricultural export in Namibia occurs at the margins and there is a need for trade diversification, complementarity, and intensification (Agronomic board Namibia, 2020).

Export diversification is defined as the changing of a country's export structure. Trade complementarity is the measure of the level of similarity between the export supply of a country and the import demand of its partners (Zhou, Wu, & Si, 2006). Trade intensity is a measure of the extent to which one country's share in another country's export (import) differs from the former's share in world trade (Kojima, 1964).

There is a huge significance in the improved export diversification, trade intensity and trade complementarity to the Namibian economy. The diversification enables developing countries to turn a negative term of trade into growth, knowledge spillovers and increasing returns to scale (Yokoyama & Alemu, 2009). The trade intensity and complementary significantly contribute to trade promotion by increasing both internationalization of economic activity and international integration of economies that contribute to the process of globalization, thus leading to economic growth (Amurgo-pacheco & Piérola, 2007).

Fundamentally, the aforementioned international trade intricacies contribute significantly to the development of a country. Trade theories suggest that international trade may act as an engine of growth

thus leading to the development and economic growth. Trade contributes to development in many ways, besides the gains from comparative advantages, such as full utilization of idle domestic resources, the economics of scale through production expansion, generation of new ideas, innovations, and skills. There is a potential for development when the country embarks on trade by opening its borders. Furthermore, growth such as technology and capital flows are facilitated, thus enhancing domestic demand through imports (Anukoonwattaka, 2017). The study aims to assess Namibia's export diversification and trade complementarity which translates to the promotion of agricultural trade, thus leading to economic growth.

1.2.   Problem statement

According to National Planning Commission (2018), the reliance of Namibia on primary commodities and their unstable prices has left the country vulnerable to external price shocks. Therefore, it is imperative to hedge against these shocks through diversification of exports to stabilize trade revenue. For the Namibian government to mitigate the external shock resulting from heavy reliance on primary commodities, there is a need for appropriate agricultural trade research. In addition, the agricultural sector needs to provide the policy makers with the necessary information to design the appropriate developmental strategies that will boost economic growth through agricultural trade. This study will fill this gap. Based on the extensive search and to the best of the authors' knowledge there is limited research on export diversification, trade complementarity, and trade intensity in Namibia.

Given the above-mentioned problems, it is imperative to estimate the exact level of export diversification (or concentration), trade complementarity, and trade intensity and to study agricultural trade patterns to provide the policy makers with the necessary information to design the appropriate developmental strategies that will help reduce Namibia's dependence on primary commodities, build resilience to external economic shocks and boost economic growth through agricultural trade.

1.3.   Objectives of the Study

The overall objective is to assess the Namibian agricultural export diversification and trade complementarity and trade intensity.

1.3.1. Specific objectives

- Measure the export diversification of the Namibian agricultural sector.
- Analyse the trade complementarity between Namibia and the trade destination.
- Estimate the intensity of trade between Namibia and trade destinations.

1.4. Research questions

- What is the exact level of Namibia's agricultural product and market export diversification?
- Does trade complementarity exist between Namibia and trade destinations?
- What is the exact level of trade intensity between Namibia and her trade partners?

1.5. Significance of the study

The study is expected to estimate the export diversification, trade intensity, and trade complementarity in Namibia. The information is key in determining which product and trade partner/destination have a greater potential for growth, which supports the policymakers in designing fitting policies that can improve trade and enhance economic growth in Namibia. In addition, it is of great importance for policy makers to be able to measure the trade indicators of a country to identify market and product potential. The study will also benefit other organizations (local and international) such as the Ministry of Industrialization, trade and SMEs development, World trade organization, United Nations, Namibia development bank, etc. looking for areas of investment which would have a higher likelihood of increasing the country's GDP, thus addressing economic problemssuch as unemployment, poverty, and inequality for Namibia as a whole. It serves as a source for futureempirical literature for scholars and students interested in Namibian trade within the field of agribusiness,agricultural economics, and related fields. The research output will serve as one of the deliverables for the Namibian Agricultural Trade Outlook report.

1.6. Thesis outline

The dissertation is structured in 4 chapters broadly consisting of empirical regularities, methodology to identify variables or data requirements for export diversification, trade complementarity and trade intensity and modelling and they are as follows:

Chapter 2 is a review of previous empirical studies conducted to establish the extent of export diversification, trade intensity and trade complementarity. In addition, the chapter presents a review of the agricultural trade profile, Namibia's agricultural trade overview and the theoretical framework with a focus on export diversification, trade intensity, trade complementarity, and general trends. The chapter also presents and discusses trade-related terminologies.

Chapter 3 presents the datasets, data source, research design, sample size and description and the methodology (Analytical framework) used to estimate export diversification, trade intensity and trade complementarity. Chapter 4 presents the results and statistical interpretation of the Hirschman-Herfindahl index,trade intensity index and trade complementarity index of the 20 trade destinations. This is to provide statistical meaning to the empirical findings and hence answer the study's research questions.

Chapter 5 presents the discussion of the results, conclusions and policy recommendations drawn fromthe study. The discussion concludes by providing suggestions on some areas of the topic that the study did not adequately cover due to its scope but can be further analysed by the future researcher.

Chapter 2 Literature review

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2.1. Agricultural sector profile overview

Namibia is a dry to semi-arid country characterized by low rainfall, with two deserts, the Namib Desert which bounces off the Namibian coastline, and the Kalahari Desert which shelters the South-Eastern parts of Namibia. The country is disposed to natural disasters and endures floods and droughts which affect humans, animals, and plant life, causing devastating effects on the productivity of the land, food security, and access to water (Nangolo & Alweendo, 2020).

Namibian agricultural activity consists of subsistence, commercial and mixed farming. Where subsistence farming is a means of survival, commercial farming is a profitable enterprise whereas, mixed farming is a combination of the two. Subsistence farming is the most practised system on communal land in Namibia, which is dominated by crop and animal production for its use. The production is mostly rain-fed and highly labour-intensive (Nangolo & Alweendo, 2020).

Commercial farming is more organized compared to subsistence farming and it involves a high level of productivity, the goal is to make a profit from the production of either crops or livestock raised for sale to asuitable market. It is an enterprise that involves the identification of viable markets and the development of suitable farming techniques. This form of farming is more capital intensive, makinguse of advanced technology in machinery to increase productivity. A notable difference is that commercialfarmers own title deeds to the land and they require capital investment in terms of start-up and operatingthe farm (Nangolo & Alweendo, 2020).

Mixed farming involves the production of both crops and raising livestock, where they utilize every input to maximise output. This is achieved by growing crops for animal feed and using one of the by-products (manure) to fertilize the crops. Mixed farmers capitalize on selling animal products such as eggs, milk, and skins (Nangolo & Alweendo, 2020). The agricultural sector in Namibia constitutes crop and livestock production. Crop production includesmainly pearl millet (Mahangu), maize, sorghum, wheat, grapes, and dates but to mention a few. On the other hand, livestock production includes cattle, goats, sheep etc. The agricultural sector contributes significantly to the economy of the country, in employment creation, trade

revenue and foreign exchange.

2.2.   Namibia agricultural trade overview

The livestock subsector contributes about 80% to the agricultural sector and livestock produce is exported as primary beef cuts, lamb carcasses and live exports (Bank of Namibia, 2017). Similarly, about 55% of crop produce were exported from 2011 to 2017, such as table grapes, onions, potatoes, and tomatoes (Agro marketing and trade agency, 2017).

According to the Ministry of Agriculture, Water and Land Reform (2011) Namibia exports approximately 500 agricultural product lines at the 6-digit Harmonized systems (HS) of product classification code level. In addition, the exported products include beef and mutton (fresh, chilled, and frozen), live animals (cattle, sheep, and goats), fresh grapes, dates etc.

According to the Ministry of Agriculture, Water and Land Reform (2011) the agricultural sector has a lot of potentials that are marginally explored to the potential benefit of the country. The challenge is for Namibia to develop export markets targeted at agricultural products that are not currently exported. The range of imported agricultural and agro-industrial products is approximately 600 lines at the 6-digit HS code level in 2009, of which sugar, frozenchicken, and prepared food feature prominently (Ministry of Agriculture, Water and Land Reform, 2011).

According to the Namibia Statistic agency (2020), over 80% of agricultural products are imported from South Africa. Out of the top 25 export products, only20% have undergone some degree of processing and even fewer could be regarded as having reached the final phase of value addition, these are some of the barriers to trade (Namibia Statistics Agency, 2020). The current limited range of Namibia's agro-industrial products is a testimony to the fact that there is room for increasing this range through value addition (Namibia Statistics Agency, 2020). The heavy reliance on imports of food from South Africa leaves Namibia vulnerable to food shortages, given political unrest (Xenophobia), or temporary closing of borders in South Africa. In 2020, Namibia recorded an overall trade deficit of US$-0.97B, a 29.45% decline from 2019, despite the commodity level the country recorded trade a surplus on various commodities such as fish and live animals (Namibia Statistics Agency, 2020). Additionally, the live animals (exported on hoof) present Namibia with an opportunity to develop its Agro industries (Namibia Statistics Agency, 2020). Live cattle

(excluding pure-bred breeding) accounted for 67.7%, live sheep 16.3%, and live goats 4.4% of total animal exports. In 2020, the value of total exports was estimated at N$88.7 billion whereas the value of total imports was N$108.3 billion, resulting in a deficit of N$19.6 billion (Namibia statistics agency, 2020). Namibia'sagricultural commodity groups accounted for 6.5% of all goods exported, with Live animals emerging at the top with 1.7% followed by Vegetables and fruit at 1.2%, meat and meat preparations at 1.1%, Cork and wood at 1.1%, Beverages at 0.8%, feeding stuff for animals at 0.3%, Miscellaneous edible products and preparations at 0.2% and cereals and cereal preparations at 0.1% respectively (See figure 1).
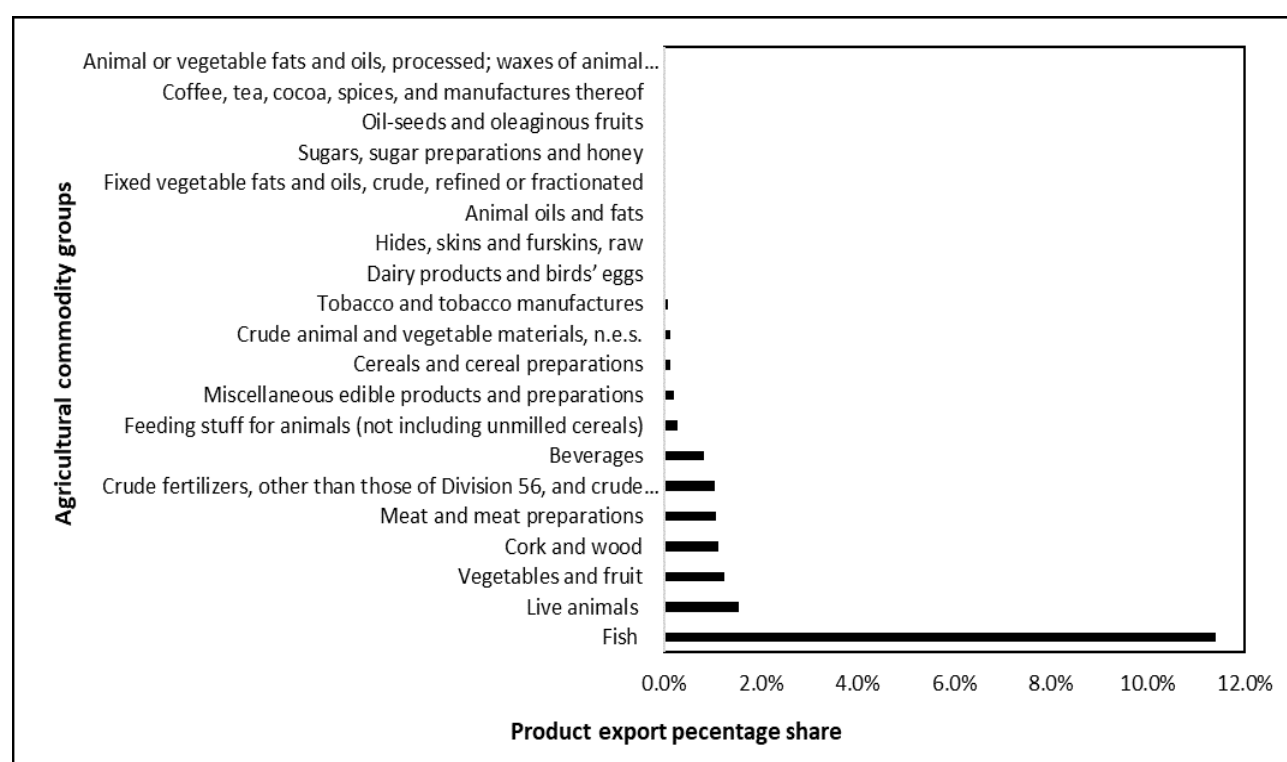
Figure 1: Agricultural product export percentage share 2020
Source: Author's compilation from Namibia Statistics Agency's (2020) dataset.

During the study period, Namibia's agricultural import product share on average was 11.6%, with cereals and cereal preparations emerging at 2.1%, followed by Beverages at 1.6%, Vegetables and fruit at 1.4%, Sugars, sugar preparations and honey at 1.3%, Meat and meat preparations at 1.1%, Miscellaneous edible products and preparationsat 1%, feeding stuff for animals at 0.7%, Dairy products and birds eggs at 0.7%, Tobacco and tobacco manufactures at 0.7%, Coffee, tea, cocoa, spices, and manufactures at 0.5%, fixed vegetable fats and oils,crude, refined at 0.5%, Cork and wood at 0.3% and crude animals and vegetable materials at 0.2% respectively (See figure 2).
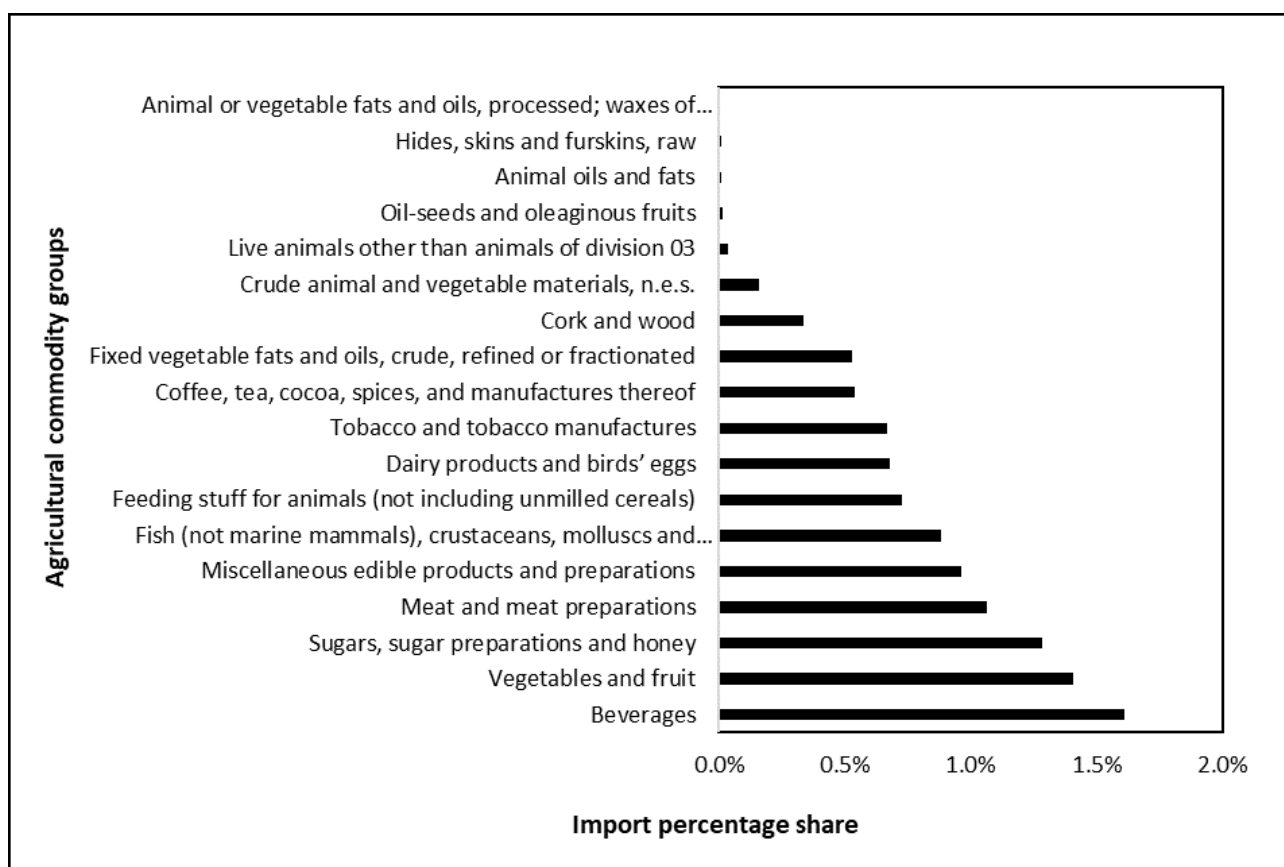
Figure 2: Agricultural product import percentage share 2020

Source: Author's compilation from Namibia Statistics Agency's (2021) dataset.

In terms of trade destinations, China emerged as the largest destination for Namibian exports, constituting a market share of 36%, followed by South Africa (15.3%), Botswana (8.5%), Belgium (5.5%), Spain (4.9%), Zambia (4.5%), Democratic Republic of Congo (2.8%), Germany (2.5%), United Arab Emirates (2.1%) and Netherlands (1.9%) respectively (See figure 3).
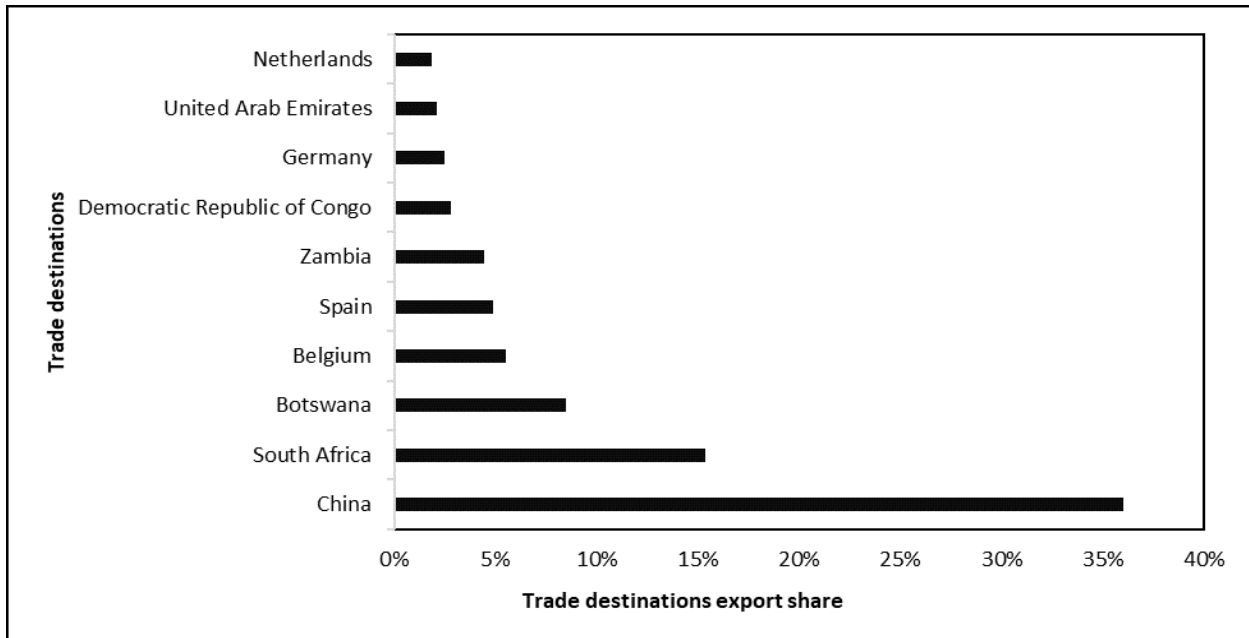
Figure 3: Namibia's key export market destinations 2000-2020

Source: Author's compilation from Namibia Statistics Agency's (2021) dataset

In terms of trade destinations, South Africa accounted for the largest share of 38% of total imports to Namibia, followed by Zambia (20%), the Democratic Republic of Congo (6%), China (5%) and Bulgaria (4%) respectively (Namibia Statistics Agency, 2020) (See figure 4).
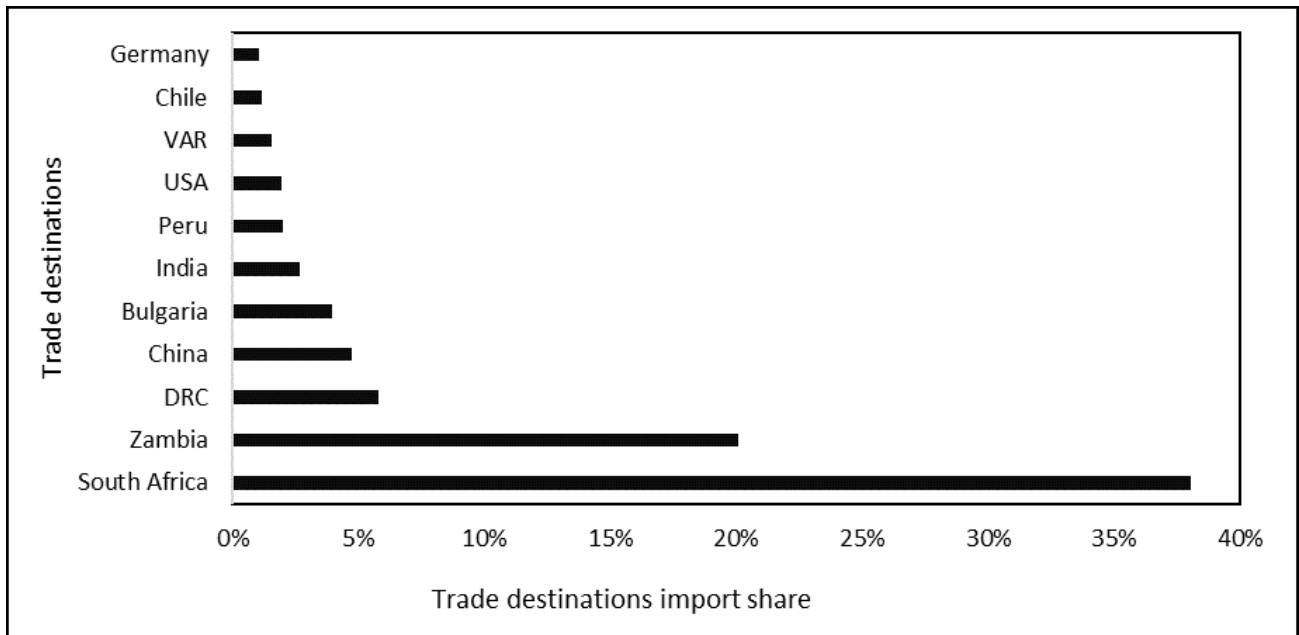
Figure 4: Namibia's key import destinations 2000-2020

Source: Author's compilation from Namibia Statistics Agency's (2021) dataset.

Additionally, Namibia exported most commodities by sea, air, and road, with the sea emerging as the most used means of transport by traders, accounting for (62%) share of the total export, air (21%); while the road wasthe least used mode of transport with a share of (16%) of total exports. On the other hand, most commodities imported into Namibia were transported by road (65%) and sea (29%) respectively (Namibia Statistics Agency, 2020). The reason behind the decrease in the use of roads as a mode of transport for export can be attributed to the covid 19 pandemic and the restrictions of movement to combat the virus.

2.2.1. General trends
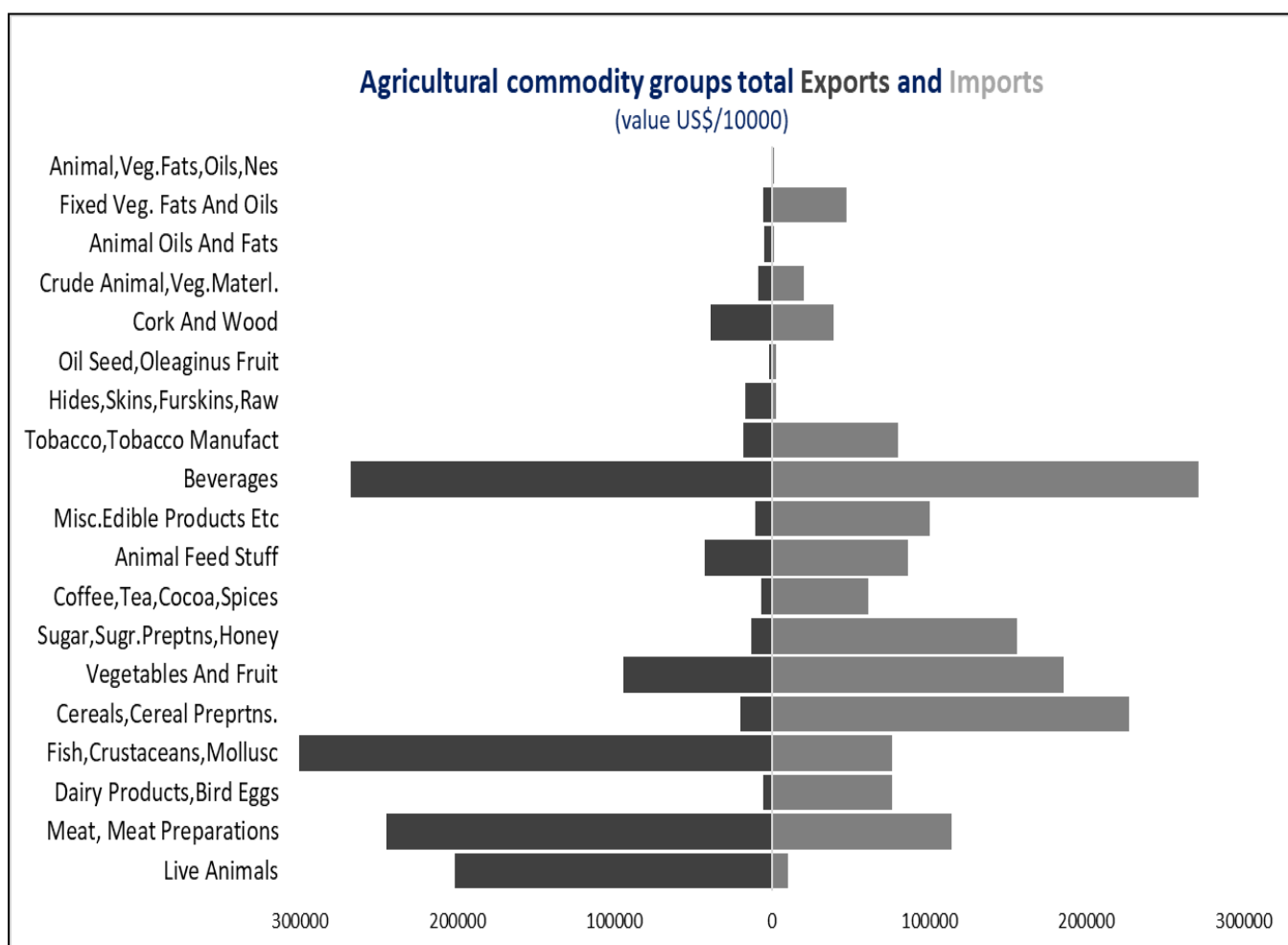
Figure 5:Average exports and imports of Agricultural commodity groups 2000-2020

Source: Author's compilation from UNCOMTRADE's (2021) dataset

The Namibian agricultural trade consists mainly of 19 commodity groups (Live Animals, Meat, Meat Preparations, Dairy products, Birds eggs, Fish, crustaceans, mollusc, Cereals, cereal preparations,

Vegetables and fruits, Sugar, sugar preparations and honey, Coffee, Tea, Cocoa, Spices, Animal feed stuff, Misc. Edible products etc, Beverages, Tobacco, tobacco manufacture, Hides, skins, fur skins, raw, Oil seed, Oleaginous fruits, Cork, and wood, Crude animal, veg. material, Animal oils and fats, and Animal, veg. fats, oils, and nes (not elsewhere specified). The average volume of Namibia's agricultural exports over the study period was relatively small, with exceptions in Live animals, Meat and meat preparations, Fish, Hides and animals, oils, and fats where Namibia exported on average more in terms of those commodities compared to imports of the same commodities over time. Figure 5 indicates that Namibia is a net importer of agricultural commodities, as the country imports 14 out of 19 of the agricultural commodity groups from elsewhere. This could be attributed to the low agricultural productivity in Namibia with reoccurring drought.
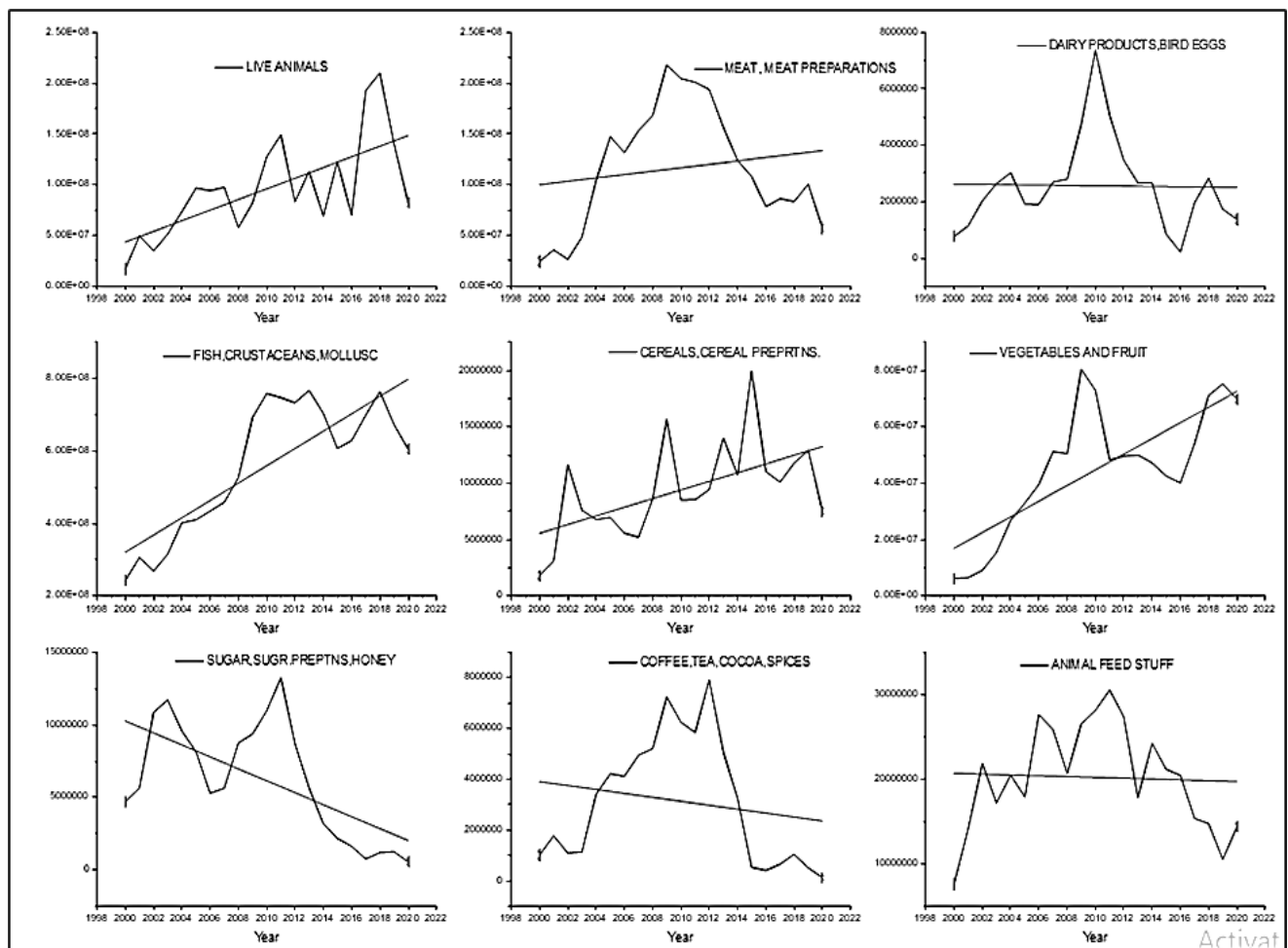
Figure 6: (a) Namibia agricultural commodity exports trend 2000-2020
Source: Author's compilation from UNCOMTRADE'S (2021) dataset

Figure 6 (a) shows that the total exports of Live animals, Meat and meat preparations, Fish, Cereals and

cereal preparations, Vegetables, and fruits, have increased over the study period, meanwhile, the total exports of Sugar and sugar preparations, Honey and Coffee, cocoa, tea and spices, and Dairy products and birds' eggs, and Animal feed stuff has decreased over the years. The unstable production level of Namibia's agricultural products due to changes in weather (drought) and other conditions is a likely cause of the decrease in exports or the downward trends.
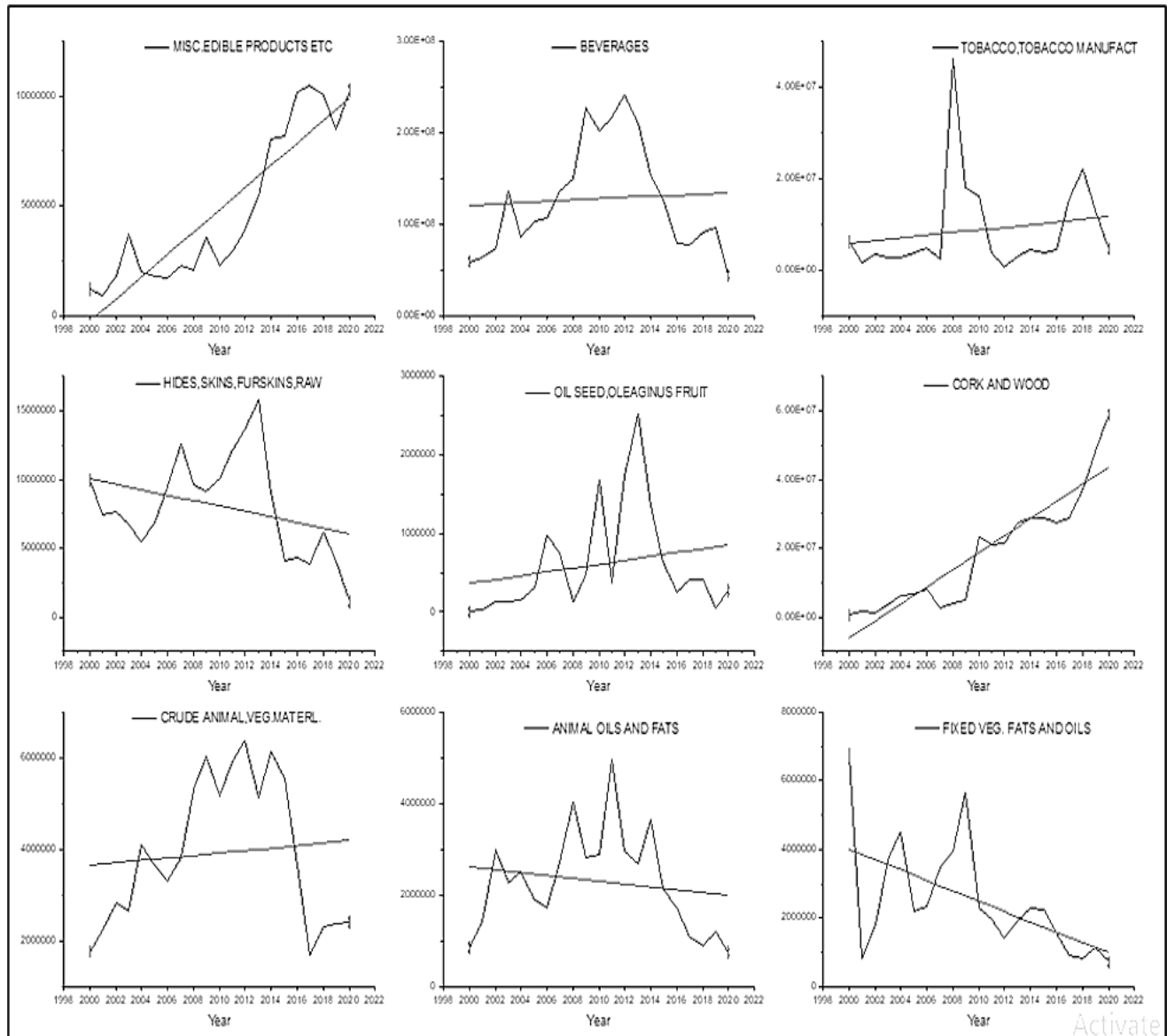
Figure 6 :(b) Namibia agricultural commodity export trend 2000-2020

Source: Author's compilation from UNCOMTRADE'S (2021) dataset

Figure 6 (b) shows that the total agricultural exports increased over the study period in the following commodity groups; Miscellaneous edible products, Beverages, Tobacco and tobacco products, Oil seeds

and oilgious fruits, Hides, skins and fur skin, Cork, and wood, and Crude animal and veg materials, whereas, the exports of Animal oils and fats, and fixed veg, fats and oils decreased over the study period.
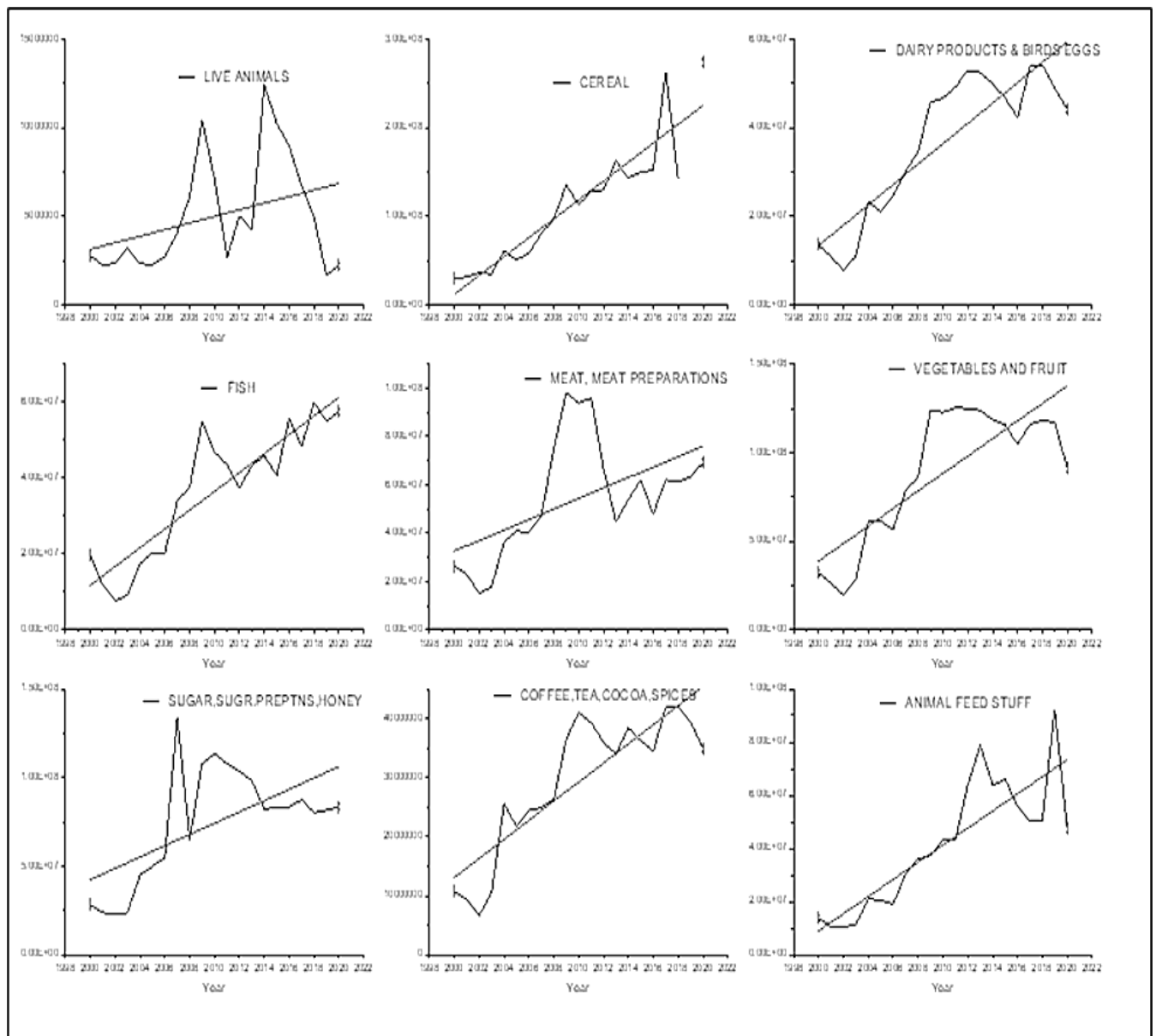
Figure 7: (a) Namibia agricultural commodity imports trends 2000-2020

Source: Author's compilation from UNCOMTRADE'S (2021) dataset

Figure 7 (a) shows the total imports of Live animals, Meat and meat preparations, Fish, Cereals and cereal preparations, Vegetables, and fruits, Sugar and sugar preparations, Honey and Coffee, cocoa, tea and spices, and Dairy products and birds' eggs, and Animal feed stuff have increased over the study period. The increase is attributed to the increase in consumer demand for those commodities.
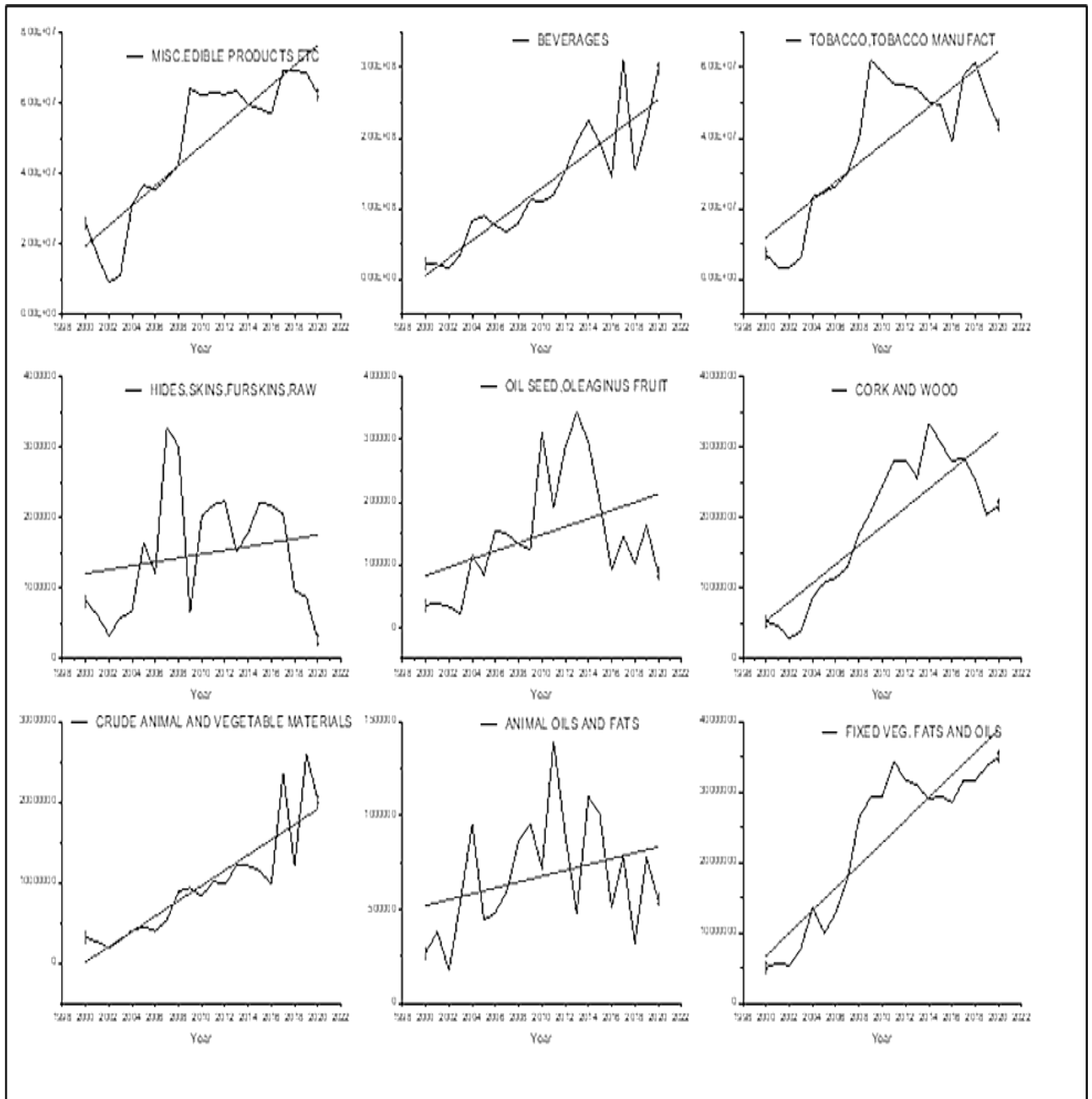
Figure 7: (b) Namibia agricultural commodity imports trends 2000-2020

Source: Author's compilation from UNCOMTRADE'S (2021) dataset

Figure 7 (b) shows that the total agricultural imports increased over the study period in the following commodity groups; Miscellaneous edible products, Beverages, Tobacco and tobacco products, Oil seeds and oilgious fruits, Cork and wood, and Animal oils and fats, Hides, skins and fur skins and Animal feed stuff.

2.3. Theories of international trade

Numerous ideas on international commerce have been developed by economists, and they may be divided into two groups: theories based on countries and theories based on firms. Given that the research's focus is on agricultural commerce between Namibia and a few trade destinations, country-based theories are more suitable for this study. Absolute and comparative advantage theories enabled country-based theories to progress from commercialism to factor endowment theory. The theories of comparative advantage, nation similarity, regional integration, and absolute advantage served as the foundation for this study. These explanations are all consistent with the goals of the investigation.

2.3.1. The theory of comparative advantage

According to Watson (2017), the comparative advantage theory developed in 1817 by David Ricardo states that a country ought to specialize in the production and exportation of commodities in which it has a smaller absolute disadvantage (comparative advantage) and importation of commodities of greater absolute disadvantage (comparative disadvantage). The theory embraces that trade must take place between two nations despite the technological advancement of one country over the other. The theory speaks to this study as trade takes place between Namibia, a relatively less technologically advanced country and the trade partners who are relatively more technologically developed than Namibia, especially the non-African trading partners.

Observing the gains, the theory of comparative advantage is an optimistic sum-game theory that all trade destinations benefit from trade. Krugman et al. (2012) showed that trade in terms of comparative advantage is beneficial in two ways. Firstly, trade is an indirect technique of production as a country cannot trade if there is no production and a country produces commodities (including human resources) that are demanded by the world market. Secondly, the benefits of mutual trade in terms of comparative advantage theory can be evidenced when looking at how trade affects each country's likelihood of consumption. The consumer in Namibia can only have a diversity of choice if Namibia participates in world trade as one country cannot produce all commodities demanded by the consumer.

2.3.2. Country similarity theory

The theory of similarity established by Linder (1961) stresses that a country exports those manufactured

products for which a huge local market exists (Neculita & Sarpe, 2018). In other words, the theory shows that trade takes place between nations with the same level of development, where similarity is visible in aspects of location, culture, political and economic interests, natural resources, etc. The importance of this theory to the study can be explained as selected trade destinations are similar, especially in terms of natural resources, political, and economic interest etc. This is apart from the non-African trade destinations which are ahead in terms of development when compared to the African trade destinations selected for this study. Therefore, the theory of country similarities is suitable for this study.

2.3.3. Theory of regional economic integration

Viner (1950) established the theory of economic integration, which commenced with the classic customs unions, and presented two concepts of trade creation and diversion. The concepts measure the effect of economic integration on the Nation's welfare.

Salvatore (2014) defines trade creation as a condition whereby some local production of a member of the customs union is substituted by lower-cost imports from another member-nation and trade diversion as a situation whereby lower-cost imports from outside the union are substituted by higher-cost imports from another union member. Regional economic integration is a process where a group of countries comes together to form closer economic links (Caporaso, 2018). As defined by Balassa (1994) economic integration is a process which includes measures designed to eliminate discrimination between economic units belonging to different national states and it can be embodied by the absence of various forms of discrimination between economies. The economic integration's goals are to promote efficiency in resource use at the region level, where it is fully achieved when all barriers to the free movement of goods and factors of production are eradicated, and the elimination of discrimination based on nationality amongst the member states (Robson, 2002).

Tinbergen (1965) distinguishes between a negative and positive integration. Where a negative integration is a regional integration that simply involves the removal of discrimination and restrictions on the movement of goods, services and people and a positive integration entitles the amendment of existing instruments, institutions, and the creation of new ones to enable the market to function effectively. Different forms of economic integration exist namely, a free-trade area, a customs union, a common market, an economic union, and a complete economic bloc. Andic et al. (2010) summarized those stages in three

main phases: firstly, the establishment of some form of a customs union or a free trade area; secondly, involves a tax union which is the harmonization of taxation policies; and thirdly, the formation of a common market.

Balassa (2013) examined the benefits of economic integration and indicated four ways: increased productivity in terms of commodities, alteration in the degree of discrimination between local and foreign goods, redistribution of income between the nationals of different countries and income redistribution within individual countries. The theory of economic integration applies to this study as the selected trade destinations are trading under one or more trade blocs, such as the Southern African Development Community (SADC), Southern African Customs Union (SACU), European union (EU) etc. and the study analyses the trends in the flow of trade between Namibia and trade partners over time.

2.4. Other related theories

The theoretical link between export diversification, trade complementarity, and trade intensity to improved trade is provided in the next sections. It is believed that these trade concepts significantly influence how countries trade.

2.4.1. Export diversification

The concept of international trade as an engine of 'economic growth' has been around for years, for instance, trade openness, trade liberalization and out-ward oriented policies are popular policy paradigms among economies and policy makers for achieving economic growth (Alemu, 2009).

In the same light, the theory related to structural changes in exports and increased diversification of exports gained even greater popularity in international trade literature (Ali, Alwang & Siegel, 1991; Gutierrez de Pineres & Ferrantino, 1997). In this section, two arguments for export diversification; traditional and modern trade arguments are discussed.

The traditional argument for export diversification is based on its role in the reduction of export earnings instability because of cyclical fluctuation in international commodity prices. Many nations that are commodity dependent are likely to suffer from export instability arising from inelastic and unstable global

demand and export diversification is one way to alleviate these constraints, by stabilizing export earnings in the long run (Bleaney & Greenaway, 2001). The above-mentioned concept is key to the objectives of this study because the study measures the Namibian agricultural export diversification to determine how reliant or not the Namibian agricultural sector is on primary commodities. In addition to this argument, the relationship between a country's export value and its export diversification status which is defined in terms of the number of products and destinations is of great interest to this study.

The interest in this relationship is driven by the theoretical and empirical evidence that export diversification has a strong, positive influence on economic growth (Imbs & Wacziarg, 2003; Hausmann, Hwang, & Rodrik, 2007; Hausmann & Klinger, 2006). One of the likely channels through which export diversification boosts economic growth is through mitigating the negative fluctuations in export revenue attributable to unforeseen changes in prices of the major export products. This has prompted economists to advocate for a policy of export diversification (both product and destination diversification) to avoid the negative effects associated with export concentration.

Similarly, Love (1983) found that the more highly concentrated a country's exports are, the lower the probability that fluctuations in one direction in some exports will be offset by counter fluctuations or stability in others, thus the need for diversification. To support those findings Labys and Montague (1990) stated that export diversification offers a means by which countries can combat earnings uncertainty, given that the earnings are derived from a diverse primary commodity and can increase revenues from investment in the production of products with market growth potential. Labys and Montague (1990) further revealed that unstable export earnings make it difficult for a country to plan capital imports, undermine consumption and adversely affect export earnings trends.

The relatively new arguments are mainly derived from the endogenous growth theory that is based on export diversification being beneficial not only for offsetting export earnings fluctuations, but also has a very strong and dynamic comparative advantage. The argument has dynamic elements of export diversification which include demand and supply changes, industrial capability, risk aversion, environmental considerations, and changes in commercial policies (Ssemogerere & Kasekende, 1994).

The demand side entails the exporters facing autonomous factors such as an increase in incomes and changes in consumers taste which pushes countries to diversify their exports towards income-elastic ones,

while on the supply side the production structure adjusts to changes in production technology and input mix, better land utilization, the introduction of new skills, changes in the availability of imported inputs, in response to potential competitors (Alemu, 2009).

Based on the traditional argument Fotros et al. (2013) state that policy makers over time have considered export diversification as a means of increasing exports and reducing dependency on import primary goods. Moreover, export diversification can take different scopes which can be analysed at different levels.

Following the literature, export diversification can either be horizontal or vertical in dimension. Vertical diversification involves creating additional use for existing and new products through value-addedactivities such as processing and marketing. On the other hand, vertical diversification can expand market opportunities for raw materials, thus enhancing growth and leading to more stable prices, as processed goods tend to have a more stable price as compared to raw commodities. Furthermore, advanced technology, skills and initial capital may be a requirement for vertical diversification.

On the contrary, horizontal diversification involves alterations in the export mix to avoid international price instability or decline (Ali, Alwang, & Siegel, 1991). Considering that, countries like Kenya, Uganda and Ethiopia used the production of non-traditional dynamic exports such as cut flowers to supplement the traditional export produce such as coffee and tea. Additionally, the export diversification's potential to reduce the dependence on fluctuating commodity prices and export riskiness may result from the diversification into other technology-intensive sectors which trigger knowledge spillovers from the exposure to international markets, management and marketing practices, and production processes.

A study conducted in South Africa by Matthee and Naudé (2008) concluded that export diversity and diversification at the country level could be important for economic growth. A separate study by Naudé and Rossouw, (2008) found that South Africa's export was relatively diversified compared to other developing economies but less diversified when compared to its main trading partners. A more recent study in South Africa by Choga (2014) on the impact of export diversification on economic performance in South Africa, found that export diversification plays a significant role in economic growth in South Africa.

In a separate study conducted by Ofa et al. (2012) on the export diversification and intra-industry trade in

Africa, using the Normalized Hirschman-Herfindahl index to measure export diversification of 49 African economies found that, the preliminary results tend to indicate that while both export diversification and intra-industry trade in Africa are generally low, with a few exceptions. The author used the same method of measuring export diversification as adopted by this study focusing only on 20 African and non-African trade destinations which is an improvement as they only looked at 49 African economies, but they further computed the correlation between export diversification and intra- industry trade which is beyond the scope of this study.

The study conducted by Hussien (2014) identified the pattern of export diversification and discussed export concentrations using the Hirschman-Herfindahl index, but the study further estimated the number of jobs created by the export sector. Even though this is beyond the scope of this study, the empirical findings show vertical diversification has a statistically significant impact on total export growth. Interestingly, the empirical evidence revealed horizontal diversification has no positive relationship with export growth in the long run.

Polytechnic of Namibia and Northwest University (2012) analyzed market diversification opportunities for Namibian red meat and meat products outside the European Union, Norway, and South Africa for the period, using the revealed comparative advantage index (specialization). The study concluded that for the Namibian livestock sector to be more competitive, there is a need to strengthen product differentiation by strengthening exports of bone-in products, and value addition thus stimulating the market for goat meat. However, the results from this study are more general and the study was not rigorously focused on export diversification be it in the export basket or market destination. In addition, the study calculated the relative advantage of Namibia's red meat and meat products outside the European Union, Norway, and South Africa and only considered commodities in a disaggregated way (red meat and meat products). Therefore, the study did not capture the exact level of export diversification between Namibia and trade destinations, even though the comparative advantage is linked to diversification. In addition, the study considered Namibia's trading with countries outside the European Union, Norway, and South Africa which constitute some of Namibia's major trade destinations. Furthermore, the study concluded in a short time (2010); however, to better understand the direction of diversification of a country, one needsto study the trends.

To address the limitations of the study done by Polytechnic of Namibia and North-West University (2012)

this study assessed Namibia's agricultural export diversification with trade destinations, considering larger agricultural commodity groups while covering a longer time and included other variables such as trade complementarity and trade intensity index. Comparatively, this study provides better evidence on Namibian agricultural trade in terms of diversification, complementarity, and intensity than the previous study.

2.4.2. Trade complementarity

Much work has not been done on trade complementarity in Namibia, despite the lack of existing literature, this sub-section deals with the review of some related literature relevant to this study, written by authorson bilateral trade measured with trade complementarity index as a means of laying background upon which this study was based.

For this study, the paper written by Chaudhary and Saleem (2001) on the Comparative Advantage, Complementarity, Market Diversification and Trade Instability: A Case Study of Pakistan was adopted. The study used varies indices to draw empirical evidence, such as the comparative advantage index, commodity concentration index, export instability and Complementarity index etc. Chaudhary and Saleem (2001) found that a mismatch exists between Pakistan's exports and world imports, and the study also indicated that Pakistan's exports experienced a growth increase from 1972 to 1998 despite the wide variation in growth rates of demand for exports across the trading member states. The result of the Complementary Index suggests that Pakistan's exports are not closely linked to the dominant trading partner's imports. The mitigation of the above-mentioned issues can be summed up as follows, aggressive trade policies, diversification of exports and markets among others.

Kabiru and Abdulaziz (2016) conducted a study to establish trade complementarity and similarities between Nigeria and India using the RCA index. The findings suggested a possibility of increasing Nigeria-India trade in commodities such as mineral fuels, organic chemicals, nuclear reactors, fish, coffee residues and waste, Coffee, tea and spices, rubber, foot wears, man-made staple fibres, edible fruits, ores, slag ash, cereals.

In a similar study conducted by Chandran (2010) on trade complementarity and similarity between India and Asian countries in the context of the RTA, the findings revealed that there are complementary sectors

and products available for enhancing trade cooperation between the trading partners.

Zhou et al. (2007) examined the trade complementarity between China and Australia in the agriculture sector and found a high-level complementarity and its growing trend. Lv and Xiang (2010) used the revealed comparative advantage analysis and intra-industry index to identify trade complementarity between China and the USA. According to Munemo (2011), the result of empirical research showed that the trade complementarity of China to Southern African countries was much higher than that of Southern African countries to China.

Vahalik (2014) analysed the trade complementarity among the EU, China, and the Association of Southeast Asian Nations (ASEAN), which implied that the EU was a bigger trading partner to ASEAN than China. Zheng et al. (2018) studied the international trade structure and complementarity between China and the Baltic States and concluded that there is an inconsistency between the current trade structure and the results from the complementarity analysis. To exploit the trade potential several strategies can be used, for example, to strengthen the transport infrastructure construction. Stehel & Šuleř (2016) studied the international trade structure between China and the Czech Republic and discussed trade complementarity between both countries.

Zheng et al. (2019), conducted a study on the international trade structure and complementarity between China and the three main central European countries: Poland, the Czech Republic, and Hungary and adopted the revealed comparative advantage index (RCA) and trade complementarity index (TCI). The findings indicate that the complementarities of China to the three central European countries are mainly in the labour-intensive products, while the complementarities of the three central European countries to China are in the resource-intensive products. However, the current trade structure of China and the three central European countries are different from the findings of the complementarity analyses.

2.4.3. Trade Intensity

The popular formula for calculating trade flows and patterns defined as the Trade Intensity index (TII) was first popularized by Brown in 1949 and Kojima in 1962. The index examines the bilateral trade between two countries to the total volume of world trade and its share in the world.

Drysdale and Garnaut (1982) refined the intensity of trade index by developing a new index that separates the effects of the commodity composition of countries' foreign trade (complementarity) from other factors influencing the intensity of trade, hence the birth of the trade complementarity index. The methodology used is motivated by studies conducted by Goyal et al. (2018) on the analysis of bilateral trade between India and the United Arab Emirates and Mohajeri (2015) on the trends of trade between India and Persian Gulf Countries (PGC), which will serve as an underlining base for this study with regards to trade intensity.

According to Mohajeri (2015) despite the outstanding growth in trade volume, the structure, and pattern of India-PGCs trade show a very contrasting picture. To understand trade intensity between both regions atrade intensity index was applied, and the results indicated that India's export intensity is above one for UAE, Saudi Arabia, Iran, Kuwait, and Oman, while for the other Gulf countries (Bahrain and Qatar) the export intensity was fluctuating. Moreover, India imports smaller volumes from countries such as Bahrain and Qatar which is reflected in the low Import intensity Index.

In addition to the above-mentioned studies, Sundar Raj and Ambrose (2014) made interesting findings in a study on a brief Analysis of India- Japan Bilateral Trade: A Trade Intensity Approach. The authors analysed the trade intensity between India and Japan with the help of Kojima's trade intensity index and found that India has not diversified its export basket over the years to Japan. During the study period from 2001 to 2011, Japan's imports from India declined much more than its exports to India. In a separate study with Kojima's trade intensity approach; Bano and Paswan (2010) found that the bilateral trade between India and New Zealand is low compared to the global trade profiles of both countries. Priority areas for realizing untapped trade and investment potential between both countries were suggested. Javeria et al. (2018) conducted a study on the intensity of trade among BRICS countries and with the EU andemployed a trade intensity index (TII) for the period 2001-2015. A comparative analysis of export similaritywas also done for India and other BRICS countries in the EU and the findings showed large bilateral trade flowsamong BRICS members. Russia has emerged as the main trading partner with the EU in BRICS. For the year 2015, the comparative study of RCA at HS-two digits and HS-four digits classification highlights marginal structural changes in the export composition of these countries.

Paswan (2021) examined and compared the bilateral relationship between India and China. The study analysed the trends in trade and the major composition of commodities traded between India and China

during the period (2008-2017). The study adopted the following approaches: Annual Growth Rate (AGR), Combined Annual Growth Rate (CAGR), Trade Intensity Index (TII), and Trade Reciprocity Index (TRI) to analyse the bilateral trade between India and China. Worth noting the Trade Intensity Index reveals there is a serious imbalance in trade relations between India and China from India's point of view and India needs to take productive steps to minimize the imbalance. Kumar (2018) conducted a study on India's Foreign trade with the United States of America and adopted the trade intensity and reciprocity index. The study concluded that India is moving towards an unbalanced trade with the United States of America. In a separate study conducted by Wani and Dhami (2013) to identify how bilateral trade between India and China helps in growing their partnership for their mutual benefit, the study adopted the trade intensity index and found a huge potential focused on their political achievements.

In a similar study, Kabiru and Dilfraz (2014) analysed India's trade intensity with Nigeria for the periods 2000-2013, using the trade intensity index and found a high intensity of trade between the countries over the study period. Kalaba et al. (2005) analysed trade between South Africa and the EU and a preliminary attempt to examine the impact of the EU-SA FTA on trade, this study adopted the same approach to measure trade intensity, thus it serves as an example in terms of trade intensity index. In a separate study Raghuramapatruni (2014) conducted a study on the pattern of India- the China's trade relationship with specialattention to the service sector of both nations by employing the Trade Intensity Index (TII), Modified Trade intensity index (TII) and Revealed Comparative Advantage Index (RCA) and the findings suggest that India registered greater TII and TII indicating India's higher dependency on China as a major export and import partner meanwhile, China's values are comparatively low which indicates a less dependent country than India.

Chapter 3 Methodology

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This chapter discusses the methods for assessing Namibia's agricultural export diversification and trade complementarity. It consists of the research design; date source; sample size and description; method of data analysis and specification of the models applied.

3.1. Research design

This is an empirical study that requires the calculation of trade indices therefore, a desktop review and quantification of the trade parameters were embarked on. Time series monthly trade data was used to determine the changes in the indices over time. Time series trade data was used because it was readily available and easy to interpret.

3.2. Data source

The data was obtained from the United Nations Commodity Trade Statistics Database (UN COMTRADE). It covers import and export statistics, with up to 250 economies registered in the database. The listing classifies the data in years, commodity groupings, and commodity level disaggregation. The value of exports and imports are in US dollars and the commodity level is at 2-, 4-, and 6-digits harmonized systems (HS) levels and at standard international trade centre revision 3, 4 (SITC REV 3,4). When trade data are obtained from the national agencies on trade statistics of each country, they are standardized by the UN Statistics Division and then added to the database. The limitations of the database are that it does not include estimates for lacking/missing data, and it does not assess data for countries that did not report in the latest classifications. The selection of this database for the study was based on literature, frequent updates of data, and availability of data.

3.3. Sample size and description

This study selects a sample of 19 agricultural commodity groups at 3-digits in SITC Rev. 3 and 2-digits in Harmonized System (HS) and they are as follows; live animals, meat and meat preparations, dairy products and birds' eggs, fish, crustaceans, molluscs and preparations, cereals and cereal preparations, vegetables

and fruits, sugar, sugar preparations and honey, coffee, tea, cocoa, spices and manufactures, feedstuff for animals (excluding unmilled cereals), miscellaneous edible products and preparations, beverages, tobacco and tobacco manufactures, hides, skins and fur skins, raw, oil-seeds and oleaginous fruits, cork and wood, crude animals and vegetable materials n.e.s, animal oils and fats, fixed vegetables fats and oils, crude, refined or fractionated, animal or vegetables fat and oils processed; waxes of animals or vegetable origin; inedible mixtures or preparations of animal or vegetable fats or oils, n.e.s (See Appendices 11).

The data set focuses on the exports and imports of 20 trade destinations such as South Africa, Botswana, Malawi, Mauritius, Cameroon, Lesotho, Zambia, Zimbabwe, Democratic republic of Congo, Tanzania, Germany, Belgium, Bulgaria, United States of America, United Arab Emirates, Netherlands, Brazil, China, United Kingdom, and Spain for the period 2000-2020.

The aim is to present a comprehensive picture of Namibian agricultural export diversification, trade intensity, and trade complementarity. The 19 agricultural commodities at SITC digit-3 level have been selected by considering their contribution to Namibia's export and import basket and the sample makes up the whole agricultural sector. In addition, trade destinations were selected based on the top percentage shares in exports and imports of Namibia's agricultural commodities.

3.4.   Analytical framework

An analysis of agricultural export diversification, trade intensity and trade complementarity using traditional economic indicators was fundamental in investigating trade relations. Thus, the study adopted the Hirschman-Herfindahl index, Trade intensity index and Trade complementarity index to measure trade relations. The data extracted from the above-mentioned database were analysed with the use of Microsoft excel spread sheets and the results were presented in a graphical and tabular manner.

3.4.1.   Export diversification analysis

To estimate the extent to which Namibia's agricultural export is diversified among trade destinations, the study calculated the share of good i and then the sum of all the shares squared is computed using the first principle. In practice, the Hirschmann index can be calculated using import or trade shares if one is interested in import or overall trade dependence (Bonaglia & Fukasaku, 2003). It may be seen with the final square root operation or using percentages instead of fractions. It may also be normalized using the number of

destinations. The latter adjustment turns the index into a measure of the 'evenness' in the sectoral export share pattern. The study computes a simple average at the destination level over time. To see the trajectory of the Namibian export diversification in terms of both export basket and trade destinations over time trend analysis was determined.

The Herfindahl-Hirschmann index (HHI) was calculated by taking the square of the export share of all export categories in the market. HHI was calculated for both the export basket and destination (market) of 19 agricultural commodity exports at the country level. This index gives greater weight to the larger export categories and reaches a value of unity when the country export only a single commodity - high concentration (Fotros, Nemati, & Darabi, 2013).

The index is shown in equation 3.1

$$H_j = \sum_{i=1}^{N} \left(X_{i,j} / X_j \right)^2 \tag{3.1}$$

Where, H_j is the agricultural Hirschman-Herfindahl index of exports for country j, $X_{i,j}$ is the agricultural exports of product i by country j, X_j is the total agricultural exports of country j. The normalized Hirschman-Herfindahl index is given as,

$$HHI' = \frac{H_j - \dfrac{1}{N}}{1 - \dfrac{1}{N}} \tag{3.1.1}$$

Where, H_j is the agricultural product/market concentration index of exports for country j, $X_{i,j}$ is the agricultural exports of product i by country j, X_j is the total agricultural exports of country j, and N is the number of products exported by country j or the number of export destinations country j exports to. The exports are highly diversified when the HHI is less than 0.01, fairly diversified when the HHI is greater or equal to 0.01 and less or equal to 0.15, moderately diversified when HHI is greater than 0.15 or less than

0.25, and highly concentrated/ low diversification when HHI is greater than 0.25. Similar reasoning can be applied to the HHI value corresponding to the export destination.

3.4.2. Trade complementarity analysis

To estimate the extent to which Namibia's agricultural trade is complementary among trade destinations, the study calculates the sum of the absolute value of the difference between the import category shares and the export shares of the countries under study, divided by two. The trade complementarity index is converted to the percentage form and then a simple average at the destination level is computed over time. To see the trajectory of trade complementarity between Namibia and the trade destinations over time trend analysis was included.

Trade Complementarity Index (TCI) measures the extent to which two countries are "natural trading partners", in the sense that what a country exports overlap with what the other country imports. For this study, the Anukoonwattaka (2017) approach was used to measure the trade complementarity of Namibia and its trade partners.

The index is shown in equation 3.2

$$TCI_j^i = \left[1 - \left(\frac{\sum \left| N_k^i - X_k^j \right|}{2} \right) \right] * 100 \qquad (3.2)$$

Where, N_k^i is country $i's$ total export shares of good k and X_k^j is to country j's total import shares of good k. TCI equal to 0 indicates countries do not complement each other, which implies that the export basket of one country does not match the import basket of another. TCI equals to or closer to 100 indicates that countries complement each other, which implies that the export basket of one country matches the import basket of another.

3.4.3. Trade intensity analysis

To analyse the extent to which Namibia is trading with the selected trade destinations, the study

calculated the ratio of two export shares. The numerator is the share of the destination of interest in the exports of the country under study. The denominator is the share of the destination of interest in the exports of the world. The trade intensity index (TII) is converted to percentage form and then a simple average at the destination level is computed. To see the trajectory of trade intensity between Namibia and the trade destinations over time trend analysis was included.

Trade Intensity Index (TII) was used to measure the trade intensity between Namibia and trade destinations. The index is defined as the share of one country's trade with another country, divided by the other country's share of global trade (Kojima, 1964).

The index is shown in equation 3.3

$$TII_{ij} = \left(\frac{X_{ij}/X_i}{X_{wj}/X_{wt}} \right) * 100 \qquad (3.3)$$

Where X_{ij} are the total agricultural exports of country i to destination j, X_i is the total agricultural exports of country i, X_{wj} is the total agricultural export from the world to destination j, X_{wt} is the total world agricultural exports. The value of TII from country j to country i with a value more than 1 (TII>1) indicates the intensity of trade conducted by country j to country i is above the world average level and indicates the country's importance in terms of intensity as a trade partner to country i. But if the value of TII from country j to country i has a value less than 1 (TII<1) it indicates that the intensity of trade made by country j to country i is below that of the world average level and indicates the country's lack of importance in terms of intensity as a trade partner to country i.

Chapter 4: Results and Discussion

This chapter provides the results and statistical interpretation of the Hirschman-Herfindahl index,trade intensity index and trade complementarity index of the 20 trade destinations. This is to provide statistical meaning to the empirical findings and hence answer the study's research questions.

4.1. Export diversification (Export basket and Trade destinations)

To answer the research question on the extent of the Namibian export diversification in terms of export basket, the Hirschman- Herfindahl Index (HHI) and Normalized Hirschman- Herfindahl (NHHI) Index were used.

Figure 8: Namibia Hirschman-Herfindhal (Product) index 2000-2020
Source: Author's compilation from UNCOMTRADE'S (2021) dataset

Figure 8 shows the Namibian Hirschman-Herfindahl product index (HHI) and the normalized Hirschman-Herfindahl product index (NHHI) during the period 2000-2020. The results show that Namibia's exports were moderately diversified from 2000 to 2002 (with NHHI ranging between 0.15 and 0.25), despite the economic crisis and its heavy reliance on exports of primary commodities. However, this does not mean that the economic crisis did not affect the Namibian exports during the study.

The moderate diversification could be attributed to the performance of selected commodities, such as live animals, fish, and crops which grew during the period in 2003 Namibia experienced a drought which effected both livestock and crop production, resulting in the contraction in the agricultural sector, thus the high concentration of exports (NHHI of 0.27) in the same year and for the rest of the study period the exports were diversified fairly. In 2018/2019 the wood and cork commodity group, specifically, the charcoal exports increased contributing about 17% to the total and this could be the reason for the exports being more diversified in 2018, with the highest NHHI of 0.107 (Ministry of Agriculture, Water and Land Reform, 2019).

According to Bouët and Odjo (2019), Africa lags behind other regions in terms of export diversification and many African countries were move towards further product concentration. In contrast to that, the results show a decreasing trend in the NHHI which indicates the improvement of export diversification in terms of the export basket over the study period. This suggests that the economy is moving away from a high export product concentration (even though not significant). This could be attributed to the government rolling out schemes and policies in an attempt to boost agricultural productivity, such as the 2011 agriculture marketing and trade policy strategy which gave birth to the Agriculture Marketing and Trade Agency to manage fresh produce business hubs and national strategic food reserve infrastructure towards the attainment of food safety and security (Mubita, 2018).

The government also implemented the national drought policy and strategy to manage drought, a challenge facing the agricultural sector. The policy specifically aims to shift responsibilities for managing risk from the government to the farmers with financial assistance and food security interventions (Mubita, 2018). Namibian Horticulture Market Share Promotion (MSP) scheme to promote the consumption of local produce, import substitution, Agro-processing and export marketing of local fresh produce. Importers are expected to ensure that a minimum percentage of their horticulture produce purchases consist of Namibian products, failure to meet the required percentage they are curtailed in their import's pro rata (Mubita, 2018).

The above-mentioned initiatives together with the increased credit lending opportunities over the last 18 years in Namibia could be the reason for the improved diversification in terms of the export basket. The credit lending opportunities have moved at a low pace from 2001 to 2011 and increased rapidly thereafter till the year 2018. In terms of credit extension to the agricultural sector, total loans from financial

institutions averaged N$ 449 million in 2001, N$ 3675 million in 2011 and N$ 7026 million in 2018 respectively (Mubita, 2018).

Figure 9: Agricultural commodity group concentration share 2000-2020
Source: Author's compilation from UNCOMTRADE'S (2021) dataset

Figure 9 shows the concentration share of Namibian agricultural commodity exports for the period 2000-2020. The results further suggest that Namibian export are highly concentrated on a few products during the study period, despite the improved diversification over time. It is interesting to note that Fish accounted for 2.18% of the commodity group concentration share, followed by Beverages at 0.16%, Meat and meat preparations at 0.09%, Live animals at 0.06%, and Vegetables and fruits at 0.01%. This finding is in agrees with the literature reviewed as over the study period there has been an increase in exports among the above-mentioned commodities. During the study period, there was an expansion of the fishing activities such as the Namibian government giving fishing quotas to local citizens and private enterprises, this could be the result of the fish's high concentration share.

To answer the research question on the extent of the Namibian export diversification in terms of trade destinations the Hirschman- Herfindahl Index (HHI) and Normalized Hirschman- Herfindahl (NHHI) Index

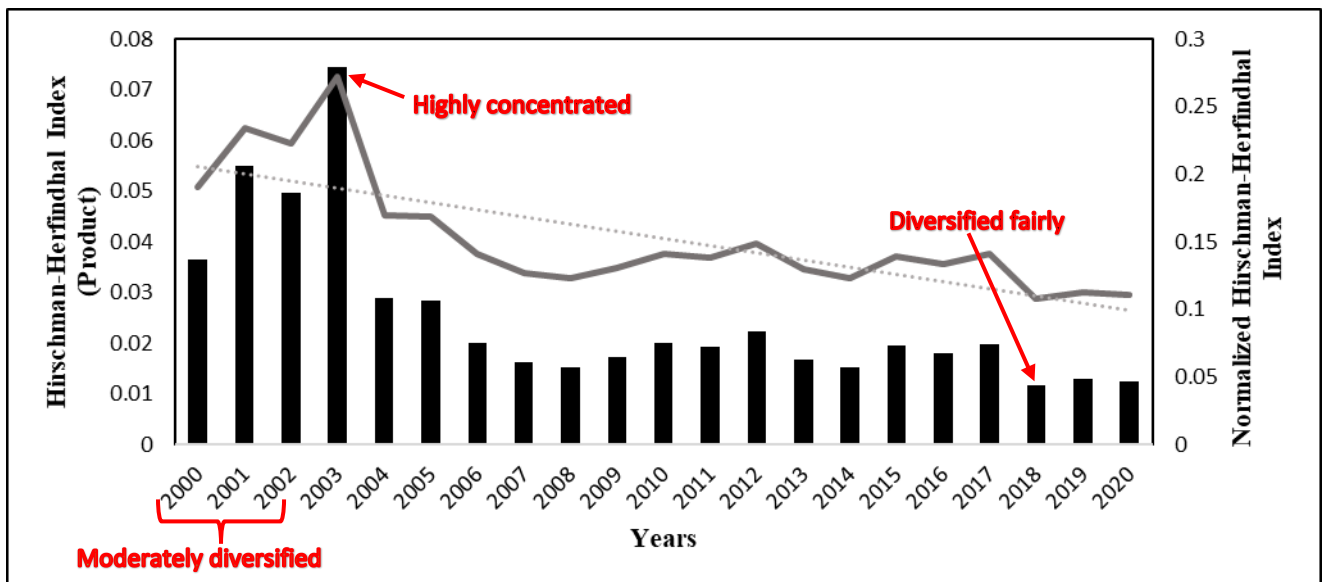were used and the results and interpretations are as follows;
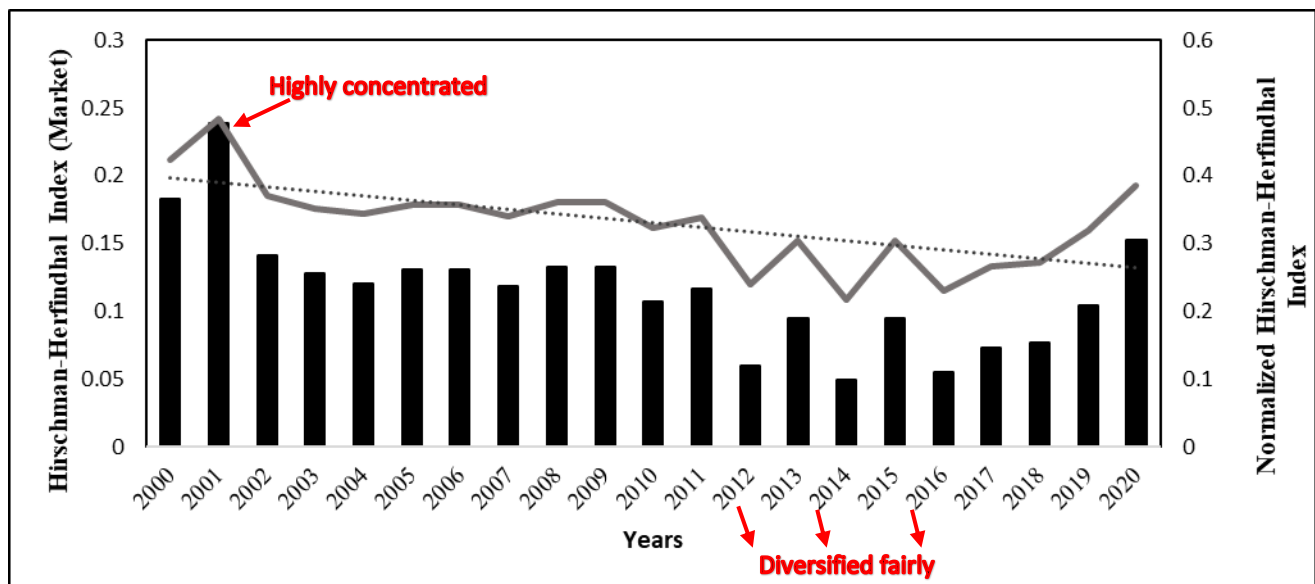
Figure 10:Namibia Hirschman-Herfindhal (Market) index 2000-2020

Source: Author's compilation from UNCOMTRADE'S (2021) dataset

Figure 10 shows the Hirschman-Herfindahl index and the Normalized Hirschman-Herfindahl index for Namibian agricultural market destinations during the years 2000-2020. Generally, the results indicate that the Namibian market diversification is low or highly concentrated for most of the study period with exceptions in 2012, 2014, and 2016 which were moderately diversified. The highly concentrated markets may be attributed to the contractions experienced in the agricultural sector during the following years; 2001, 2003, 2007, 2008, 2013, and 2015 due to drought which resulted in stock losses and a reduction in grain production. Additionally, the sector was also hit by low rainfall which affected both livestock and rain-fed crop production (Simasiku & Sheefeni, 2017). However, in 2016 the sector shows a significant recovery and recorded a growth of 0.8% mainly due to improved performance of both livestock and crop farming as a result of better rainfall received during the year and this is attributable to the moderately diversified market in that year, as increased productivity in the sector could mean the countries capacity to serve more markets (Simasiku & Sheefeni, 2017).

Generally, Namibian's high market concentration in terms of agricultural exports over the study period could be attributed to the government's attempt to diversify to alternative markets leading to the country spreading its exports too thinly, such as in the case of Meatco where it entered new markets (USA and China), while it was unable to serve its EU market quota (Meat Board of Namibia, 2019). The bulk of Namibian exports went to SADC member states representing 32% and 29% of total Namibian exports in 2012 and 2013 respectively. Namibian exports to the Common Market for Eastern and Southern Africa

(COMESA) grew to about 5% of total exports. Meanwhile, Namibian exports to the European Union (EU) dropped from 38% in 2011 to 31% in 2012. According to Bouët and Odjo, (2019) Namibian exports were destined to a few countries in the above-mentioned economic blocs. In contrast to that, it is worth noting that during this time Namibia recorded a moderate market diversification.

The decline in exports to these markets could be attributable to the emergence of low-cost suppliers and Namibia's newly found focus on new markets such as China and the USA. The total Namibian agricultural export that went to SADC during the study period was directed to two member states, with South Africa accounting for the largest share of 6% followed by Botswana at 1% on average. In terms of the EU, the exports were directed to the United Kingdom accounting for a 1% share of total exports. Namibia has not been able to expand its exports to the SADC region and take full advantage of its membership in SADC, thus the lack of Namibia's capacity to maximize its potential participation in both global and regional trade (Bouët & Odjo, 2019).

The reason for this is that the bulk of its export base is still unprocessed minerals and primary agricultural products as the manufacturing sector remained largely undeveloped. As a result, there are supply-side constraints which inhibit the production of high-quality products which would enable Namibia to effectively compete in both the global and regional markets (Bouët & Odjo, 2019). Additionally, those reasons can be the attributing factors to a high market concentration.

The trend analysis results show a decrease in the NHHI over the study period, which indicates that Namibia is becoming more diversified or less concentrated in terms of the market over time. The results show that the market concentration of Namibian exports was high in 2001, at NHHI of 0.48 compared to the other years. It is worthnoting that the computed NHHI values were moderately diversified at 0.24 in 2012, 0.22 in 2014 and 0.23 in 2016, this could be attributed to the changes in the structure of Namibia's export and the attitude toward trade.
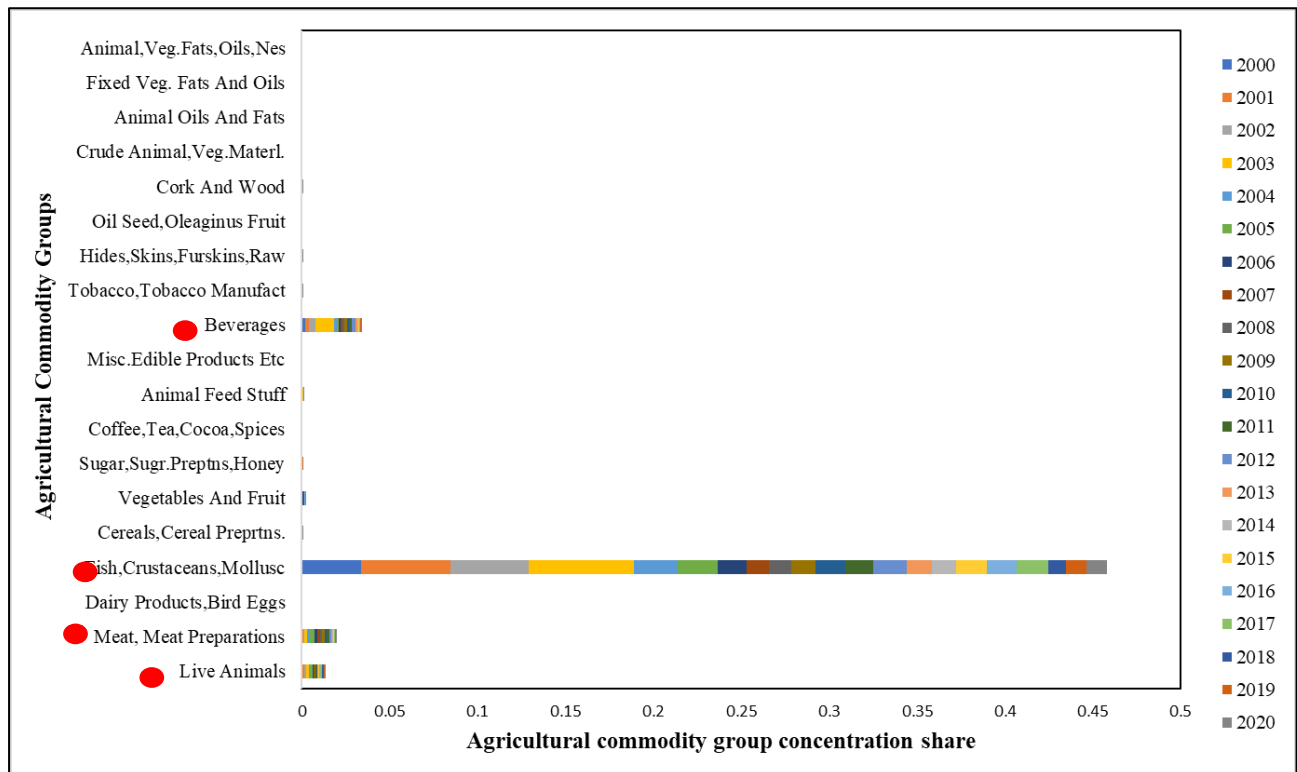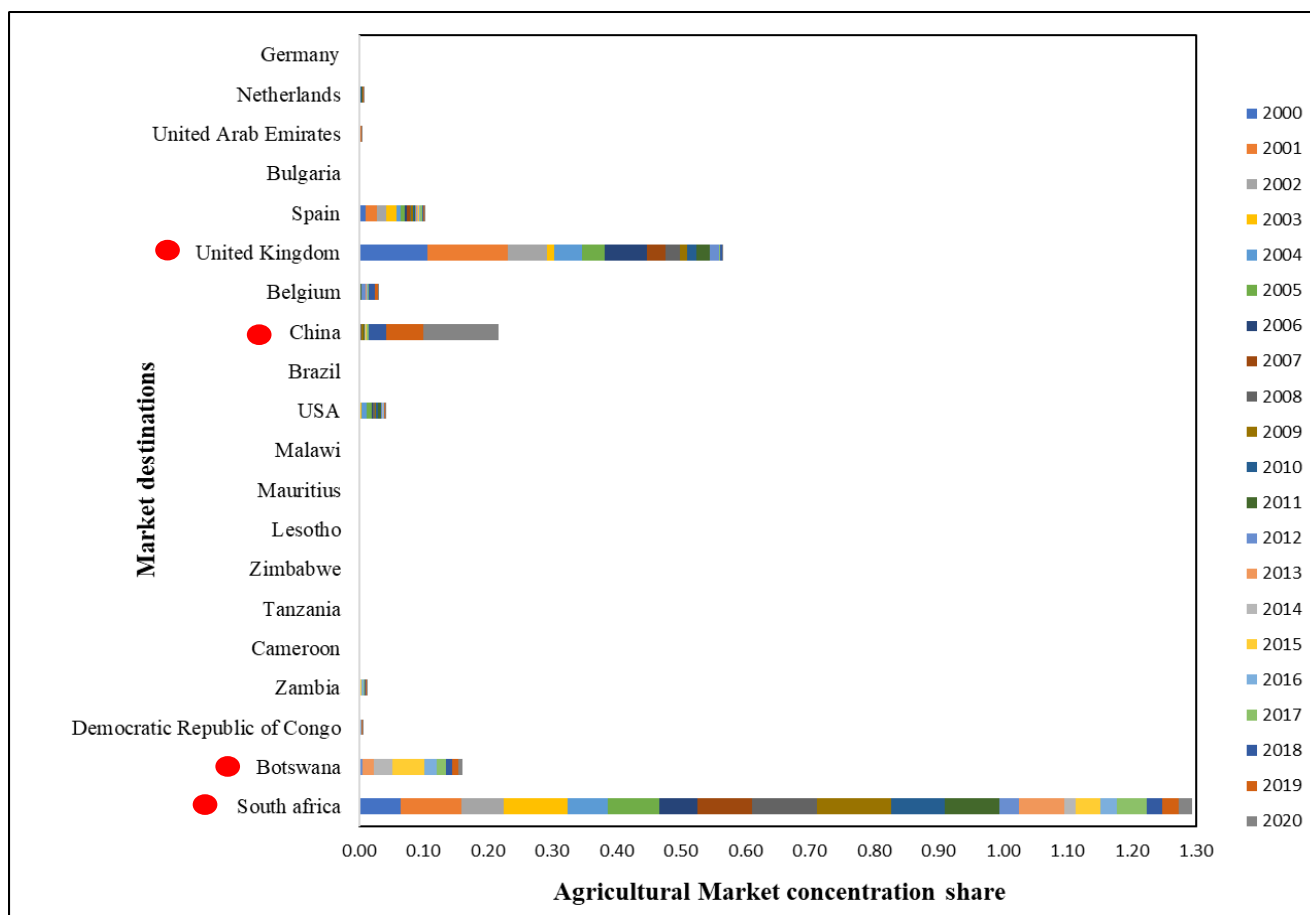
Figure 11: Agricultural market concentration share 2000-2020
Source: Author's compilation from UNCOMTRADE'S (2021) dataset

Figure 11 shows the Namibian market concentration during the period 2000-2020. The result indicates that on average the share of Namibia's exports was concentrated in a few markets during the study period namely South Africa, the United Kingdom, Botswana, and China accounting for 6%, 3%, 1% and 1% respectively. It is important to note that the leading market for exports of Namibia has been changing throughout the study. More importantly a single export market namely South Africa was the destination for 11% of the total Namibian exports in 2009. United Kingdom (UK) was the major export destination for Namibian agricultural commodities in 2000 accountingfor 11% of total exports, following a 1% increase in the export share in 2001 accounting for 12% thereafter, it declined to 6% share of total exports in 2002. South Africa was the leading export destination for Namibian agricultural commodities from the year 2003 to 2005 and then from 2007 to 2013. Botswana accounted for 3% and 5% from 2014 to 2015 respectively. In 2016 and 2017 South Africa accounted for 5% and 2% and China took over in 2018, 2019 and 2020 accounting for 3%, 6%, and 12% respectively.

During the first 6 years, Namibia's agricultural exportable commodities have been limited both in terms of volumes and value which is evident for many small economies. This limits Namibia's capacity to export a large variety of goods as the productivity is low and is attributable to Namibia's climatic conditions and natural disasters such as drought, floods, and insect infestation. Despite the improved diversification over time, it can be argued that Namibia's agricultural export diversification in terms of both export basket and trade destination is low. Additionally, Namibia's agricultural sector has limited access to skilled labour which leads to low productivity and a lack of value addition (Mubita, 2018).

A study conducted by Shabana and Zafar (2014) shows that an increase in Foreign direct investment results in high export diversification, this could be a reason for Namibia's low export diversification in terms of both export basket and trade destinations over the study period, as the foreign direct investment in Namibia decreased over time and recorded an average of N$907 million from 1999 to 2021, reaching an all-time high of N$6789 million in 2015 and a low of -N$1757 million in 2018 and the area of interest are mainly mining and fisheries (small per cent of this investment goes to the agricultural sector) (Kaune and Mbazuvara, 2020). Studies conducted by Gourdon (2010) and Moran (2010) support these findings. In addition, these findings hold as Fish was the commodity with the highest concentration share accounting for 2.18% of the total agricultural export in Namibia.

According to Bonaglia and Fukasaku (2003), low-income and developing trade destinations are characterized by low agricultural export diversification, as their agricultural exports are dominated by primary commodities, which are highly vulnerable to external shocks, despite what literature suggests, the study found that Namibia was diversified (Fairly) in terms of export basket although this does not mean an increase in the agricultural export share within Namibian total exports. In the same light, Bonaglia and Fukasaku (2003) also suggest that low-income and developing trade destinations have a feasible option in commodity-dependent destinations to increase the efficiency of firms operating in the agricultural sector and to develop non-traditional primary exports, moving towards a more agro-industrial country.

4.2. Trade complementarity

To answer the research question of the trade complementarity between Namibia and trade destinations,

the trade complementarity index (TCI) was used and the results and interpretations are as follows;
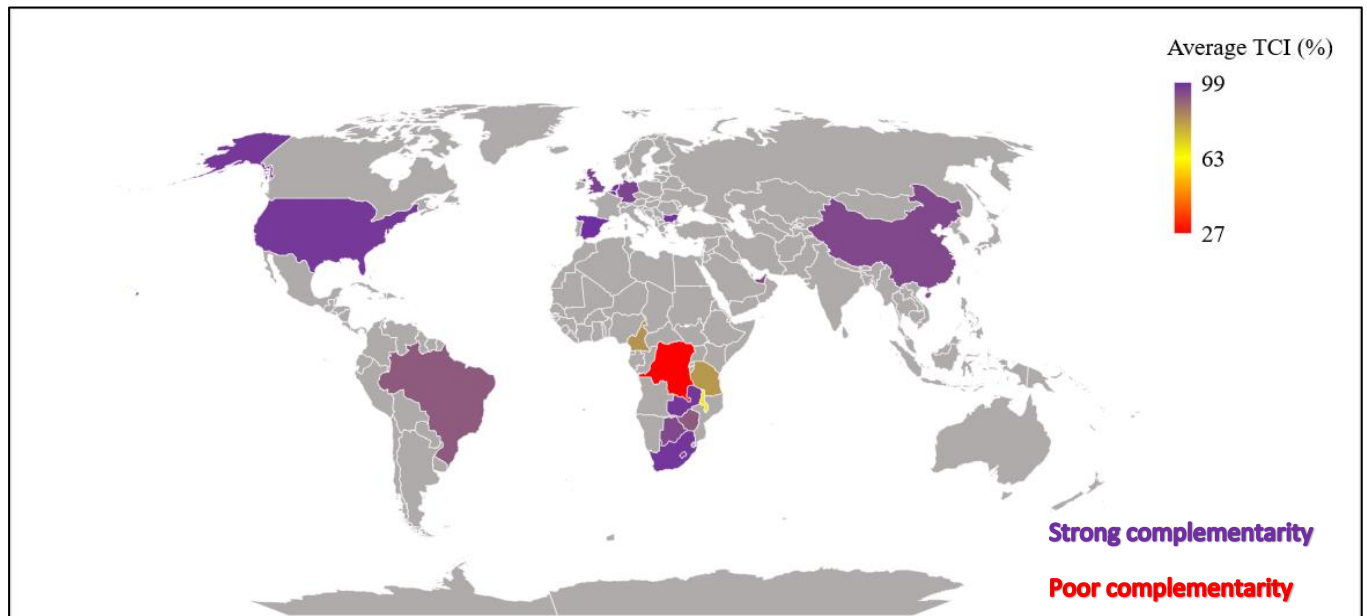
Figure 12: Trade complementarity index of trade destinations (average) 2000-2020
Source: Author's compilation from UNCOMTRADE'S (2021) dataset

Figure 12 shows the trade complementarity index (TCI) values of all trade destinations on average. Where the trade destination in purple has a strong complementarity, followed by the trade destinations in gold to yellow and the countries in red have a poor trade complementarity or are highly competing in terms of agricultural commodities. Most of the selected trade destinations are in purple indicating a strong complementarity suggesting that the agricultural import patterns of Namibia strongly match the agricultural export patterns of all trade partners in comparison with the agricultural commodity composition of the word trade, with the Democratic Republic of Congo (in red) being the exception. On average the index lies between 27% and 99%. The country that exhibits the greatest potential to increase bilateral trade with Namibia or with the highest adequacy of export supply in meeting Namibia's import demands (on average) in Spain with a TCI score of 99% followed by the Netherlands at 98%, Bulgaria 98%, South Africa 98%, Belgium 98%, the United Kingdom 96%, Zambia 97%, United States of America 97%, Lesotho 96%, Germany 95%, Botswana 94%, China 94%, the United Arab Emirates 94%, Zimbabwe 91%, Mauritius 91%, Brazil 91%, Cameroon at 81%, Tanzania 81% respectively. The results do not depict perfect matching between the import pattern of Namibia and the export pattern of Malawi, but the TCI score of 66% is above 50% which represents the existence of trade complementarity between the two countries.

Meanwhile, the Democratic Republic of Congo (DRC) exhibits the lowest potential to increase bilateral trade, with a TCI score of 21 %. Notably, DRC reported no data to UN COMTRADE from 2000 to 2014 and this is attributable to the political instability which ended in 2003. Great caution must be taken when conclusively stating the poor complementarity on average between Namibia and the Democratic Republic of Congo, as the poor index could be attributed to the lack of data and not the true reflection of the bilateral relations between the two countries. The poor coverage of the formal and informal trade in our database leads to a degree of uncertainty in these conclusions.

The evolution of the TCI over time allows for assessing whether the compatibility of trade profiles has increased or decreased over time. A trend analysis of the trade complementarity between Namibia and African trade destinations was included in Figure 13 and the results and interpretation are as follows.

Figure 13: Evolution of trade complementarity index of African trade destinations 2000-2020
Source: Authors' calculation from UN COMTRADE data 2000-2020.

Figure 13 shows the evolution of trade complementarity between Namibia and African trade destinations in terms of agricultural trade during the period 2000-2020. The figure further shows that all TCI values are greater than one and relatively close to 100. Generally, the results imply that the African trade

destinations and Namibia are strongly complementary or weakly competing in the agricultural trade. In other words, the agricultural export patterns of the African trade destinations strongly match the agricultural import patterns of Namibia in comparison with the agricultural commodity composition of the word trade.

The TCI shows a 97% match between Namibia imports and Zambia exports in 2000 and increased to 99% match 2001, 2002, 2004, 2012, 2013 and 2015. It further shows a decline to 95% match in 2006, 2017 and 2020. In the case of Malawi TCI values fluctuated during the entire study period with a 65% match between Namibia imports and Malawi exports in 2000, in 2001 and 2002 it declined to 64% following a slight increase in 2003 of 65%. It further increased reaching its peak of 70% in 2004, thereafter the indicator declined to 64% by the year 2009. In 2014 it was a 70% match and gradually declined to 60% in 2019 and by the year 2020, the TCI value was 63% match.

Mauritius registered a TCI value of 99% in 2000, but in 2001 the TCI declined by 4% achieving a 95% match. It further declined to 93%% in 2002 and by the year 2004/5, the TCI increased by 3%. Since then, there was a gradual decline to the lowest TCI reported of 87% match by 2013 and 2018/19 respectively, which was caused by a change in the structure of Mauritius's export. In 2014 the TCI was a 90% match, following an increase to 91% and then declined by 3% to 88% match,by the year 2020 the TCI value was 88%.

The results show 99% match between Namibia imports and Cameroon exports in 2000, but in 2001 TCI declined by 8% achieving a 91% match, it then increased to 94% in 2002 and continue increasing, by the year 2004 the TCI was a 98% match, following a decline of 3% in 2005. In 2016 the relation between the offer of Cameroon and the demand of Namibia was 74% which was the lowest TCI value during the study period and since this time the TCI grow by 17% in 2017, which was caused by a change in the structure ofCameroon's export; thereafter a slight decline of 1% followed in 2018. Notably, Cameroon reported no data to UN COMTRADE from 2019 to 2020, this could be attributed to the COVID-19 pandemic, the lack of data does not mean trade did not take place. Despite the strong complementarity Zambia, Malawi, Mauritius, and Cameroon experienced a downward trend suggesting the countries have become more competing in agricultural trade over the study period, this is attributable to the countries' similar agricultural export baskets.

The results show a 96% match between Namibia imports and South Africa exports in 2000, but in 2001 TCIachieved a 98% match, further increasing to 100% in 2002. In 2004 the relation between the offer of South Africa and the demand of Namibia was only 95% which was the lowest TCI value during the study period andsince this time it increased until 2010 with a TCI of 98%. Then the TCI shows a decline in 2011 to 97% match, which was caused by a change in the structure of South Africa's export. Since 2011 the trade complementarity index started to grow rapidly, and it was a 99% match in 2016. After a slight decline followed in 2017 at 97% match the TCI value increased to 100% in both 2018 and 2019 and by the year 2020, the TCI declined by 2% and stood at 98% match. Namibian agricultural imports perfectly overlap South African exports, this may be attributed to the factor that South Africa (15.3%) is one of the major importers of Namibia's agricultural commodities. Additionally, Namibia depends heavily on South Africa as 48% of Namibian imports are from South Africa. The strong complementarity between the two countries can be attributed to their economic and political ties. Moreover, both countries belong to the Southern African Customs Union and are thus bound by similar reciprocal trade agreements and they are also part of the common monetary area, with the Namibian dollar pegged to the rand at 1:1. Given the interdependence, both countries are protected by policies within their economies, especially the infant industries.

In the case of Botswana, the TCI value was 93% match in 2000 and in 2001/2 TCI increased by 3% achieving a 96% match, by the year 2005 the TCI has declined by 4% and stood at 92% match. Since 2005 the trade complementarity index started to grow rapidly, and it peaked at 97% match in 2009. In 2010/11 the relation between Botswana's supply to Namibia's demand declined by 1% in both years; thereafter the TCI was constant at 95% match from 2012 to 2015, following a decline of 2% by the year 2017 with a TCI value of 92%. In 2017 the pair reported the lowest TCI value during the study period of 92% match and since this time it increased to 96% match in 2018 and 2019, by the year 2020 the TCI value declined by 3% and stood at 93% match.

Meanwhile, Zimbabwe recorded an 83% match in 2000, following a decline in the TCI value of 04% achieving a 79% match which was the lowest TCI value during the study period. In 2002 there was a 14% growth in the TCI value achieving 93% and the relation between Zimbabwe's supply to the demand of Namibia further increased to 95% match by the year 2007. In 2010 the TCI was 96% match which declined to 89% match by the year 2015 and the TCI value exhibits a 7% growth by 2017 which had a 95% match; thereafter TCI value declined by 2% in 2018 and by the year 2020 the value grows to 5% achieving a 97%

match.

The results show a 92% match between Namibia imports and Lesotho exports in 2000 and 2001 TCI value grow by 8% achieving a 100% match, followed by a decline to 91% by the year 2005, which was the lowest TCI value during the study. In 2006 and 2007 the relation between Lesotho's supply to the demand of Namibia was 92% and increased to 99% in 2008 with a decline of 2% in 2009. The highest TCI value of 100% was recorded in 2014 and 2015 following a 4% decline in 2016 which further declined by 3% in 2017 achieving a 96% and 93% match respectively. The trade complementarity index started to grow and was a 96% match in 2019. Thereafter a slight decline followed in 2020 at a 93% match.

Tanzania recorded a 79% match in 2000 and 2001 which was the lowest TCI value during the study period, following a 7% increase in the TCI achieving an 86% match in 2002, and further increasing to 88% in 2003. The relation between the offer of Tanzania and the demand of Namibia was 89% in 2007 and increased to 96% match in 2011. Then the TCI shows a 3% decline in 2012 reporting a 93% match. Since 2012 the trade complementarity index started to decline rapidly, and it stood at 83% match in 2014. The TCI value increased to 85%, 88%, and 89% in 2015, 2016and 2017 respectively. The TCI value further increased and by the year 2018, it was a 94% match.

Given the strong complementarity between Namibia and South Africa, Botswana, Zimbabwe, Lesotho, and Tanzania exhibited an upward trend, suggesting the countries become strongly complementary or less competitive in terms of agricultural trade over the study period. This is attributable to their close economic and political ties, the export market structure of the trade destinations and their attitude towards trade.

The results for the Democratic Republic of Congo show a 94% match between Namibia imports and DRC exports in 2015 and 2016, but in 2017 the TCI declined by 3% and stood at a 91% match. In 2018/19 the relation between the offer of DRC and the demand of Namibia was 95% which was the highest TCI value during the study period and then the TCIshows a 3% decline in 2020 and stood at 92% match.

The evolution of the TCI over time allows for assessing whether the compatibility of trade profiles has increased or decreased over time. A trend analysis of the trade complementarity between Namibia and non-African trade destinations was included and the results and interpretation are as follows;
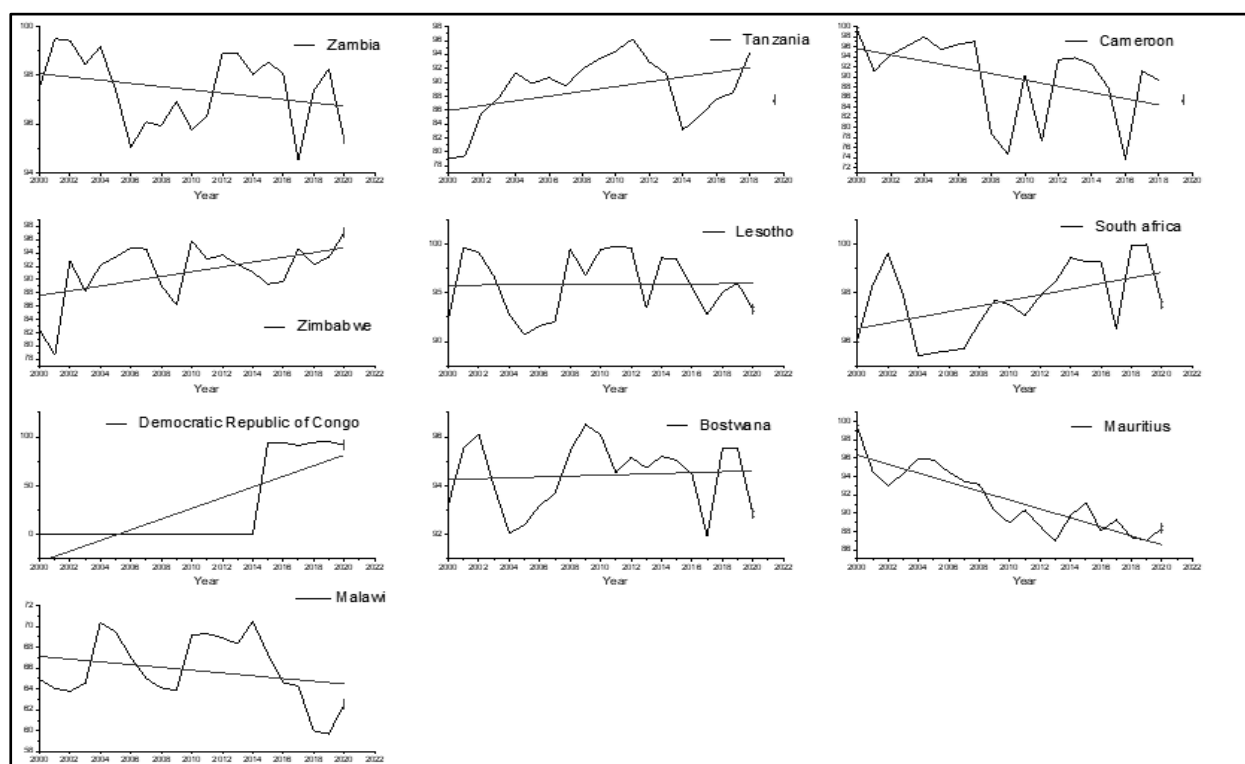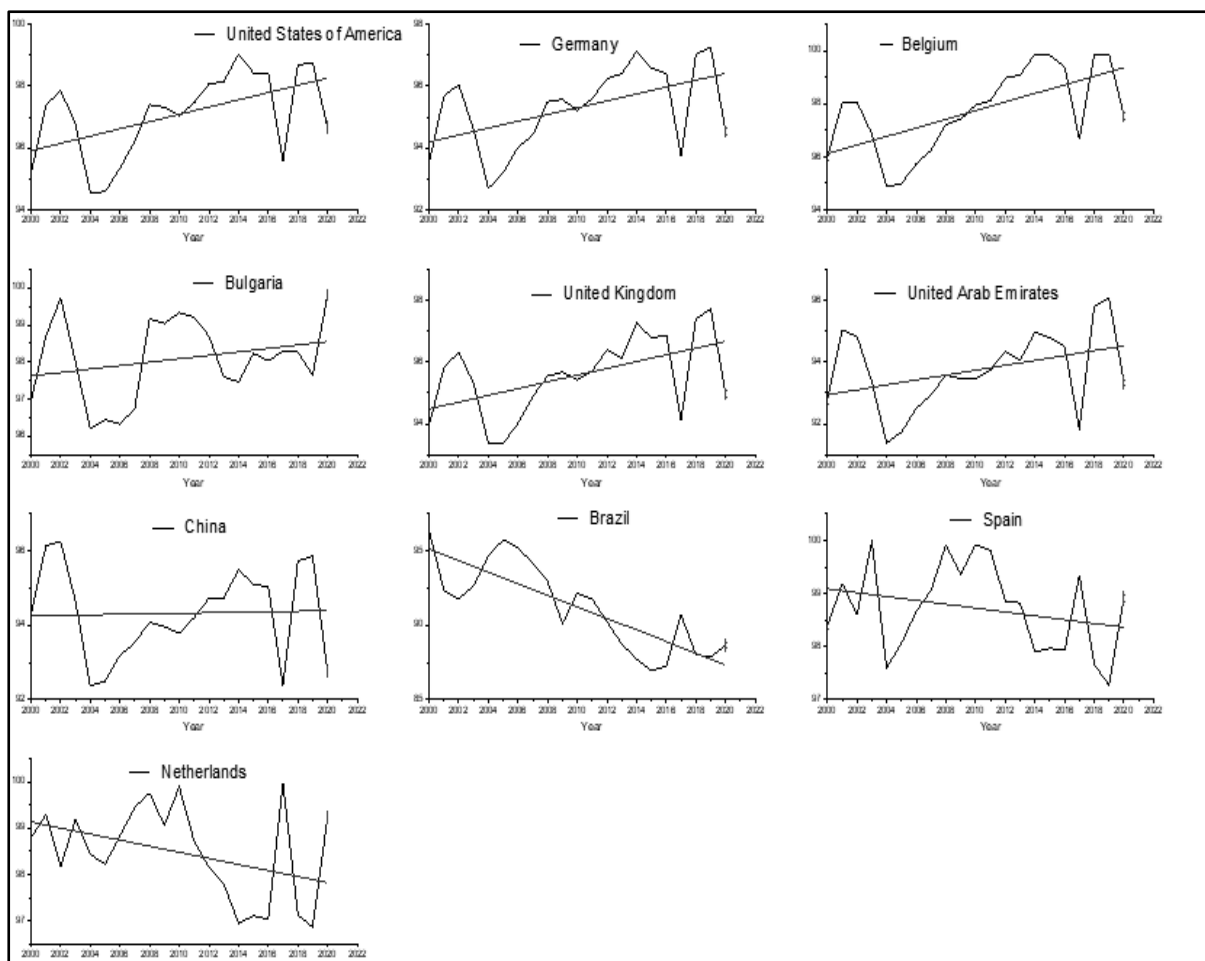
Figure 14: Evolution of trade complementarity index of non-African trade destinations 2000-2020
Source: Authors' calculation from UN COMTRADE data 2000-2020.

Figure 14 shows the evolution of trade complementarity between Namibia and non-African trade destinations in terms of agricultural trade during the period 2000-2020. These results show a strong complementarity exists between Namibia and non-African trade destinations. In other words, the agricultural export patterns of the non-African trade destinations strongly match the agricultural import patterns of Namibia in comparison with the agricultural commodity composition of the word trade. The figure further shows that all TCI values are greater than one and relatively close to 100.

The results show a 95% match between Namibia imports and United States of America exports in 2000, in 2001 TCI grow by 2%achieving a 97% match, it further increased to 98% in 2002. In 2003 the relation between the offer of the USA and the demand of Namibia was 97%, following a constant TCI value of 95% in 2004, 2005, and 2006, which was the lowest TCI value during the study period. The TCI shows a 1%

growth in 2007 with a 96% match, and from 2008 to 2011 the TCI remain at a 97% match which was caused by a change in the USA's export. Since 2012 the trade complementarity index increased to 99% match by the year 2014. After a slight decline followed in 2015 and 2016 at 98% match, it further declined to 96% in 2017 and the TCI value increased to 99% in both 2018 and 2019 by the year 2020 the TCI declined by 2% and stood at 97%match.

While Germany recorded 94% in 2000, following an increase in 2001 and 2002 of TCI value of 96% match. The TCI value declined by 1% in 2003, further declining to 93% in 2004 and 2005, which was the lowest TCI value during the study period. In 2006 the relation between the offer of Germany and the demand of Namibia was 94% and since this time it increased by the year 2009 with a TCI of 96% match. Thereafter the TCI value during 2011, 2012, and 2013 remain unchanged at 96% and in 2014 and 2015 the TCI also remain unchanged at 97%. Then the TCI shows a 1% decline in 2016 to 96% match, it further declined by 2% in 2017 which was caused by a change in thestructure of Germany's export. In 2018 and 2019 the trade complementarity index remains constant at 97% match after which a slight decline followed in 2020 at 95% match.

In the case of Bulgaria, the TCI value was 97% match in 2000, by the year 2002, the TCI value have increased to 100% match, followed by a 2% decline in 2003 it further declined to 96% and remain unchanged at 96% match until 2006, which was the lowest TCI value during the study period. In 2007 the relation between the offer of Bulgaria and the demand of Namibia was 97% and it further increased to 99% in 2008 and remain unchanged until 2012. Since this time TCI value declined by 1% in 2013 recording a value of 83%, which further declined to 97% in 2014, which was caused by a change in the structure of Bulgaria's export. The trade complementarity index increased to 98% in 2015 and remain the same until 2019, it further increased to 100% match by the year 2020.

The results show a 96% match between Namibia imports and Belgium exports in 2000, following a 2% increase in both 2001 and 2002 achieving a TCI value of 98% match. The TCI value declined to 97% in 2003 and continue to decline to 95% in both 2004 and 2005, which was the lowest TCI value during the study period. Since 2006 the trade complementarity index started to grow rapidly, and it reached a peak of 100% match in 2015. After a slight decline followed in 2016 at 99% match the TCI value further declined

to 97% in 2017. In 2004 the relation between the offer of Belgium and the demand of Namibia was 100% match in both 2018 and 2019 and this could be attributed to the change in the structure of Belgium's exports. The TCI shows a 2% decline to 98% match by the year 2020. The results further show a 94% match between Namibia imports and United Kingdom exports in 2000, following a 2% increase in TCI value achieving a 96% match in both 2001 and 2002. In 2003 the relation between the offer of the UK and the demand of Namibia was 95% which continued to decline to the lowest TCI value during the study period of 93% by the year 2005. The TCI value increased from 94% in 2006 to 96% in 2009 and further increased to 97% match by the year 2016. Since this time the TCI declined by 3% in 2017 and increased by 3% in 2018 and stood at 97% match, it further increased in 2019 to 98% match, and by the year 2020, the TCI value stood at 95% match.

Meanwhile, the United Arab Emirates exhibited a 93% match in 2000, following a 2% increase in 2001 recording a TCI value of 95% and the value remained unchanged in 2002. The TCI value declined to 93% match in 2003 and further declined to 91% match in 2004 recording the lowest TCI value during the study period. In 2005 the relation between the offer of UAE and the demand of Namibia was 92% and since this time it increased until 2008 with TCI of 94%. Then the TCI shows a decline in 2009 and 2010 to 93% match, which could be caused by a change in the structure of UAE's export. Since 2011 the trade complementarity index started to grow, and it stood at 95% match in 2015. Thereafter a slight decline followed in 2016 at 94% match, with a further decline in 2017 at 92%. The TCI value in 2018 and 2019 recorded a 96% match and by the year 2020, the TCI declined by 3% and stood at a 93% match.

The results show a 94% match between Namibia imports and China exports in 2000, following an increase in 2001 at a 96% match and the TCI value remains unchanged in 2002 recording a 96% match. In 2003 the relation between the offer of China and the demand of Namibia was 95% and declined to 92% match which was the lowest TCI value during the study period and since this time it increased until 2014 with a TCI of 96%. Then the TCI shows a decline in 2015 to 95% match and remain unchanged in 2016 at 95% match, which could be attributed to the change in the structure of China's export. In 2018 and 2019 the trade complementarity index remains unchanged at a 96% match, and by the year 2020, the TCI declined by 3% and recorded a 93% match.

Given the strong complementarity between Namibia and the United States of America, Germany, Bulgaria, Belgium, United Kingdom, United Arab Emirates, and China all exhibited an upward trend,

suggesting the countries became strongly complementary or less competing in terms of agricultural trade over the study period. This is attributable to signed preferential trade agreements between Namibia and those destinations.

In the case of Brazil, the TCI value was 96% in 2000, following a 4% decrease recording a TCI value of 92% match and in 2002 the TCI remain unchanged at 92% match, it increased from 2003 at 93% to 2005 at 96% match. In 2006 the relation between the offer of South Brazil and demand of Namibia declined to 95% match and continued to decline until 2009 at 90% match. Thereafter the TCI increased to 92% in 2010 and remain unchanged in 2011. Since 2012 the trade complementarity index started to decline rapidly, and it stood at 87% match in 2016, which was the lowest TCI value during the study period. After a slight increase followed in 2017 at 91% match, the TCI value declined to 88% match in 2018/19 and by the year 2020, the TCI value stood at 89% match.

Meanwhile, Spain recorded a 98% match in 2000, and in 2001 the TCI achieved a 99% match, further increasing to 100% in 2003. The TCI value was 98% in both 2004 and 2005, since then it increased to 100% match by 2008. In 2009 the relationship between the offer of Spain and the demand of Namibia decreased to 99% and increased to 100% in 2010 and 2011. Thereafter the TCI value declined from 99% in 2012 to 98% in 2016, following a 1% increase in 2017, then further declined back to 98% match. The lowest TCI value recorded during the study period was in 2019 at 97% match.

For the Netherlands, the results fluctuated between 97%, 98%, 99% and 100% throughout the study period. The results further showed a 99% match between Namibia imports and Netherlands exports in 2000 and 2001, following a 1% decline in 2002 recording a 98% match, increasing by 1% in 2003 recording a TCI value of 99% match. In 2004 and 2005 the relationship between the offer of the Netherlands and the demand of Namibia stood at 98%, following an increase to 99% in both 2006 and 2007, and a further increase to 100% match in 2008. Then the TCI shows a 1% decline in 2009 to a 99% match. The trade complementarity index declines from 99% in 2011 to 97% in 2016, which was the lowest TCI value recorded during the study period. Thereafter a 3% increase to 100% in 2017 was recorded, which was followed by a 3% decline and the TCI value stood at a 97% match in 2018 and 2019, by the year 2020 the TCI increased by 2% and stood at 99% match. Despite the strong complementarity Brazil, Spain, and the Netherlands experienced a downward trend suggesting the countries became more competing in

agricultural trade over the study period, this is an attributable change in the structure of those destinations' exports.

Based on the above-mentioned results, Namibia demonstrated a strong trade complementarity with selected trade destinations during the study period. In addition, the evolution of trade complementarity increased over the study period with an exception of a few cases. This is in contrast with literature, which suggests most pairs of African countries demonstrate poor and partial trade complementarity, signifying a limited potential to expand trade, even though most country pairs had dissimilar agricultural exports.

In contrast to these results, Kabiru and Abdulaziz (2016) stated that the composition of Africa's world imports and exports does not match sufficiently to trigger a process of import substitution away from the rest of the world.

The strong trade complementarity is attributable to the increased role of agricultural exports to the above-mentioned trade destinations and a slight change in Namibia's trade profile from one sector export-dependent economy to a more diversified export economy. This and many other factors like attitude toward bilateral trade with trade destination has also placed some of the above-mentioned destinations to be amongst the top largest trading partner of Namibia in terms of agricultural trade in the world.

Additionally, a strong complementarity should facilitate regional trade arrangements (Bouët & Odjo, 2019). For that reason, Namibia is well-positioned to harness the benefits of the AfCFTA.

4.3. Trade Intensity

To answer the research question of the trade intensity between Namibia and trade destinations, the trade intensity index (TII) was used and the results and interpretations are as follows;
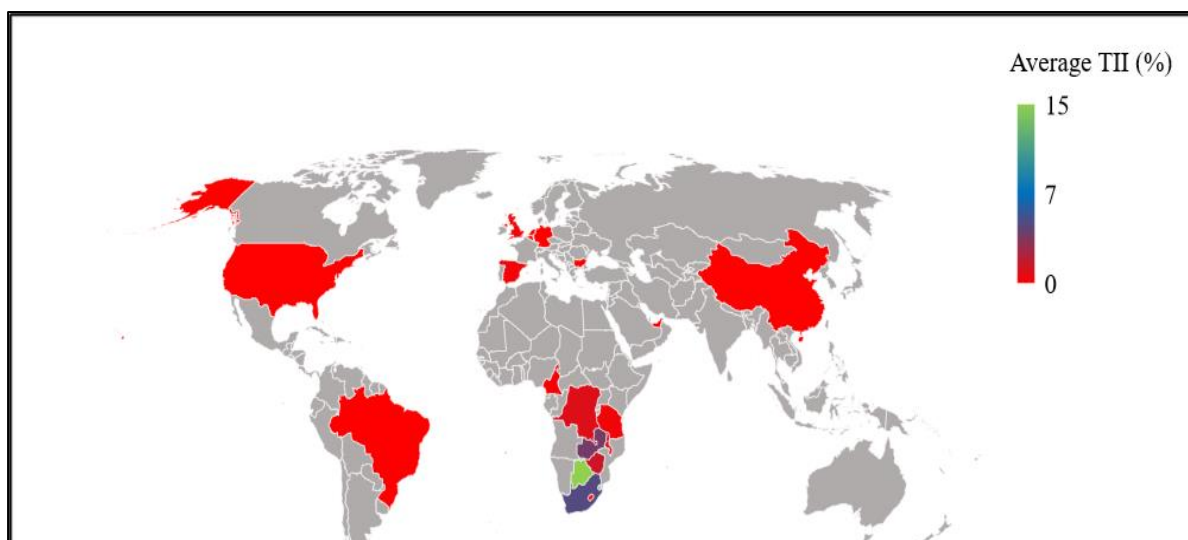
Figure 15: Trade intensity index of trade destinations 2000-2020
Source: Authors' calculation from UN COMTRADE data 2000-2020.

Figure 15 shows on average the value of the Trade Intensity Index (TII) between Namibia and trade destinations, where the trade destinations in red exhibit an intensity of trade below the world average level and the destinations in blue, purple and green exhibit an intensity of trade above world average level.

Generally, South Africa, Botswana, Zambia and Zimbabwe have a value of more than one (TII>1)which shows the intensity of trade conducted by those destinations to Namibia is above the world average level, but Cameroon, Tanzania, Lesotho, Mauritius, Malawi, United States of America, Brazil, Belgium, Bulgaria, United Kingdom, United Arab Emirates, Spain, China, Netherlands and Germany have a TII score of less than one (TII<1), indicating that the trade conducted by the above-mentioned destinations is below the world average level.

Botswana on average exhibits the highest trade intensity index (TII) score among the trade destinations during the period 2000-2020, with a TII score of 14.67%, followed by South Africa (4.90%), Zambia (3.92%) and Zimbabwe (1.44%) respectively. On the other end of the spectrum, Bulgaria exhibits the lowest TII score of 0.0025% followed by Brazil (0.0037%), Germany (0.0054%), United States of America (0.040%), China (0.043%), Netherlands (0.046%), United Arab Emirates (0.047%), Mauritius (0.082%), Belgium (0.143%) Cameroon (0.201%), Lesotho (0.279%), Spain (0.327%), United Kingdom (0.330%), Tanzania (0.358%), Malawi (0.652%) and Democratic Republic of Congo (0.956%) respectively.

As previously mentioned, Namibia only intensively traded with South Africa, Botswana, Zambia, and

Zimbabwe on average among the selected trade destinations. The intensity of trade relations between Namibia and the above-mentioned economies has been accelerating gradually as they emerged as some of the largest agricultural trading partners with Namibia both as the potential export market and as an important source of imports. This is attributable to countries having joint borders, as the presence of joint border turn to increase bilateral trade among countries (Hussain, 2017). Furthermore, Namibia's proximity to South Africa, Botswana, Zambia, and Zimbabwe is an attributing factor to the increased intensity of trade between the trade destinations (Javed, Ashfaq, Adil, & Bakhsh, 2016). Additionally, the low cost of transportation as a result of proximity (shorter distances between trade destinations) encourages trade.

On the other end of the spectrum, Namibia's low intensity of trade with the rest of the selected trade destinations may be attributed to economic factors like better technology, relatively cheap labour, specialisation and economies of scale of the trade destinations, especially the non-African trade destinations. Those factors renters Namibia incapable of expanding bilateral trade with these destinations (Ishfaq & Ajaz, 2015).

The evolution of the TII over time allows for assessing whether the bilateral trade and the importance of countries as trade partners have increased or decreased over time. A trend analysis of the trade intensity between Namibia and African trade destinations was included and the results and interpretation are as follows;
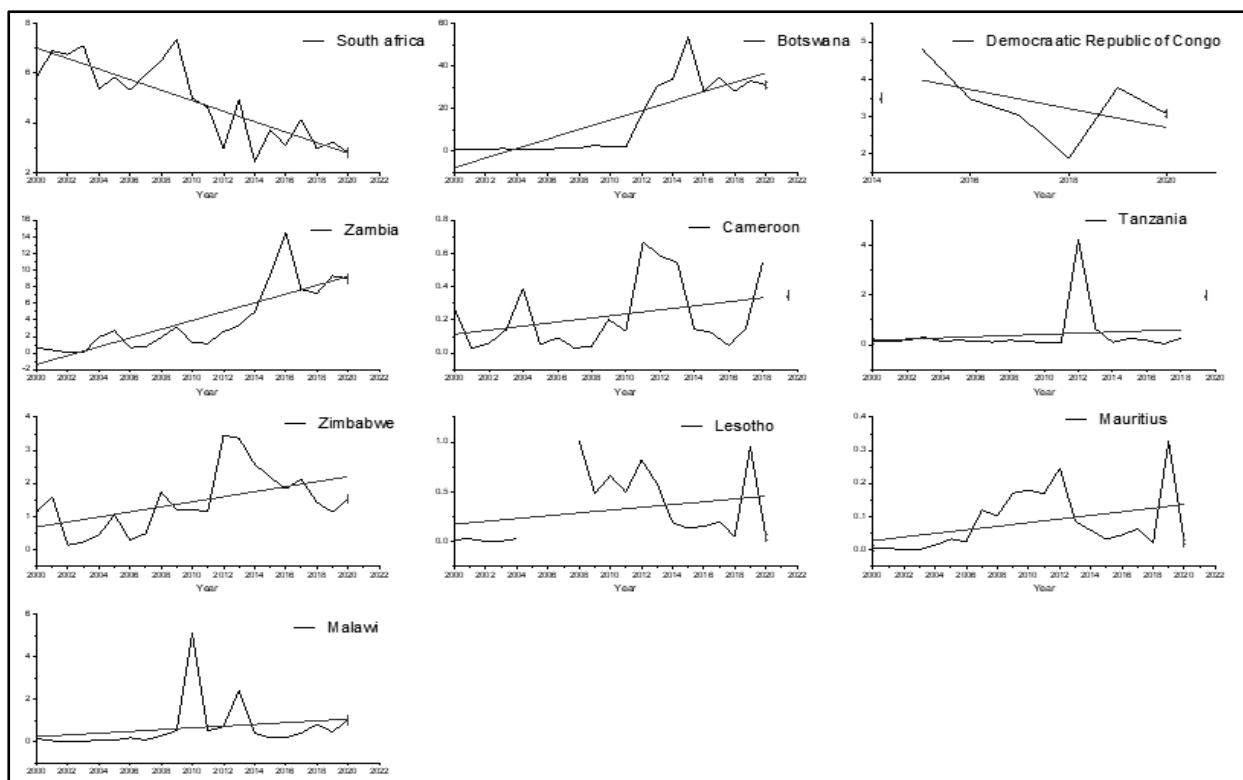
Figure 16: Evolution of Trade intensity index of African trade destinations 2000-2020
Source: Authors' calculation from UN COMTRADE data 2000-2020

Figure 16 shows the evolution of the intensity of trade between Namibia and Africa trade destinations during the period 2000-2020. The TII Index of Namibia with Botswana in the year 2000 is 1.28 which gradually rose to 1.95 in the year 2011 and further rose to 30.43 in the year 2013 this increase is to be attributed to the economic ties and the memorandum of understanding signed between the two countries to promote trade and investment to boost economic relations, with one of the Memorandum of the agreement being the Trans Kalahari corridor management committee. They continued exhibiting a growth of 33.98 in 2014 and reached their peak at 53.55 in 2015; thereafter there was a gradual decline by the year 2016 to 28.25 and by the year 2020 the TII value was 31.16. The values of the Trade Intensity Index between Namibia and Botswana were significant for the whole period under study presenting an increasing trend, implying an improved intensity of trade between the two nations.

South Africa in the year 2000 recorded a TII value of 5.83 which gradually rose to 7.11 in 2003 and declined to 5.37 in 2004, the index keeps fluctuating throughout the study period, and it peaked at 7.36 in 2009; thereafter there was a gradual decline to 2.82 in 2020. The figure further shows a decreasing trend, implying a decrease in the intensity of trade between the two countries.

Namibia depends heavily on South Africa. The intensity of trade which is above the world average level between the two countries can be attributed to their strong economic and political ties. Moreover, both countries belong to the Southern African Customs Union and are thus bound by similar reciprocal trade agreements and they are also part of the common monetary area, with the Namibian dollar pegged to the rand at 1:1. Despite the strong relationship between Namibia and South Africa, the decreasing trend shows Namibia's reliance on South Africa has decreased over time this could be due to diversification of trade destinations and Namibia "Growth at Home" strategy which emphasizes the importance of commodity-based industrialization by strengthening local and national value chains (Ministry of Industrialisation, Trade and SME Development, 2017). In addition, the government's attempts to mitigate Namibia's heavy reliance on the South African economy are not in vain, as during the same period there is an increase in Namibian exports to Zambia, Zimbabwe and Botswana indicating a slight shift in Namibia's export to South Africa.

The TII of Namibia with Zambia fluctuated throughout the study period in 2000 it was 0.63 and gradually declined to 0.03 in the year 2003; thereafter it rose to 2.97 in 2005. The TII reached its peak at 14.54 in 2016, the following year it gradually declined to 7.67 in 2017 and by the year 2020, the TII was at 8.98. The overall increase in the intensity of trade between the two countries can be attributed to the increase in trade from 2000-2006 supported by USAID, and their political ties which have culminated in the signing of several agreements and memorandums of understanding (MoUs) aimed at strengthening economic cooperation. Worth noting Zambia and Namibia have a joint permanent commission on cooperation which focuses on bilateral cooperation in several fields, such as trade, investment, livestock, and agriculture. This is the reason Zambia is one of Namibia's major trade partners. The results further show an increasing trend which implies an improved intensity of bilateral trade relations between the countries over the study period.

In the case of Zimbabwe, the TII value was greater than 1 during the study period, except in 2002, 2003, 2004, 2006, and 2007 which presents an insignificant amount of trade for those years between the two countries, this can be attributed to the serious food crisis due to severe prolonged drought in 2002 in Zimbabwe. For the rest of the study period, Zimbabwe presented a significant trade with Namibia because of the signing of the Namibia/Zimbabwe preferential trade agreement in 1992 between both countries to avoid customs duty fees. In 2000 Zimbabwe registered a value of 1.14 which gradually rose to 1.61 in 2001 with a decline to 0.14 in 2002 and gradually rose to 1.05 in 2005, reaching its peak at 3.44 in the year

2012; thereafter there was a gradual decline by the year 2016 which was 1.85 and by the year 2020 the TII value was 1.54. The results further show an increasing trend, which implies growth in the intensity of trade between Namibia and Zimbabwe, this may be because of their economic and political ties. Besides the preferential trade agreement signed between them, they also signed a joint permanent commission to facilitate bilateral cooperation. Additionally, Zimbabwe is not a SACU member it does not enjoy preferential treatment, but it is an important trade destination for Namibia.

The result further suggests that trade intensity between Namibia and Mauritius, the Democratic Republic of Congo, Tanzania, Cameroon, Lesotho, and Malawi is below the world average level or is less than expected given their importance in world trade. The TII of Namibia with those destinations was less than 1 during the study period, which presents an insignificant amount of trade between those countries, thus a decreased intensity of trade between them.

The TII values for Mauritius were not significant for the whole period under study, despite this, the figure shows an increasing trend, implying an improved intensity of trade between the two nations. The intensity of trade between the two countries registered values less than 1 for the entire study period, the result shows a lower degree of integration of the two countries as compared with the rest of the world, but with increasing intensity of bilateral trade relations between the countries. The TII Index of Namibia with Mauritius in the year 2000 is 0.004 which gradually rose to 0.03 in the year 2005 and further rose to 0.24 in the year 2012; thereafter there was a gradual decline by the year 2018 to 0.019 and by the year 2019 reached its peak of 0.33 and experienced a decline in 2020 and the TII value was 0.024.

In the case of the Democratic Republic of Congo, the TII value in 2015 was 4.82 which gradually declined to 1.88 in the year 2018 and rose to 3.78 in the year 2019; thereafter there was a gradual decline by the year 2020 the TII value was 3.08. Noting the Democratic Republic of Congo has missing data on the UN COMTRADE database from the period 2000-2014, this could be attributed to the country not being able to report trade due to the political unrest in the country during the time. The results further show a decreasing trend which implies a decline in the intensity of bilateral trade relations between the countries over the study period. Meanwhile, Lesotho recorded a TII value of 0.02 in 2000 which gradually rose to 0.03 in 2003. The data for the years 2005 to 2007 is missing from the UN COMTRADE database, this may be attributed to Lesotho not reporting trade due to the 2005 to 2007 Lesotho food shortage crisis. TII reached its peak at 1.01 in 2008; thereafter there was a gradual decline to 0.05 in 2018 and by the year

2020 it was at 0.04. The figure further shows an increasing trend, implying an improved intensity of trade between the two countries, despite this Lesotho's importance to Namibia trade is low.

The TII of Namibia with Tanzania in the year 2000 was 0.15 which gradually rose to 0.30 in 2003 and by 2011 it dropped to 0.07, the TII reached its peak at 4.22 in the year 2012; thereafter there was a gradual decline by the year 2018 the TII value was 0.26. Despite this, the pair exhibits an increasing trend implying an increase in the trade between the two countries and Tanzania's increased importance as a trade destination for Namibia. Worth noting there is missing data for the years 2019 and 2020 for Tanzanian trade on the UN COMTRADE database, this may be attributed to the country not reporting trade data due to the COVID-19 pandemic. Namibia and Tanzania signed Joint Permanent Commission for Cooperation agreements in 1999, which provides a platform for the two countries to cooperate in agriculture, trade and industry, tourism, health, education, human resource development, sports, and culture just to mention a few. Despite the two governments' attempts to promote trade between them for the past five years since 2014 business between the two countries has not progressed so well. This is evident in the results as there was a sharp drop in terms of trade intensity from 2014 to 2018.

The TII of Namibia with Malawi in the year 2000 was 0.14 which gradually rose to 0.53 in the year 2009 and further rose to 5.06 reaching its peak in the year 2010. The TII fluctuated from the year 2010 to 2020, where it dropped from 5.06 in 2010 to 0.50 in 2011 and then gradually rose to 2.41 in 2013; thereafter it dropped to below 1 from 2014 to 2019 then increased to 1.01 in 2020. The results further show an increasing trend which implies the increasing importance of Malawi as a trade destination to Namibia. The two countries established diplomatic relations in 1990 and are also part of SADC, despite this the trade relations between them are low, this can be attributed to Malawi's close relations with South Africa throughout the apartheid era which strained its relations with other African nations.

Meanwhile, Cameroon exhibited a TII value of 0.26 in 2000 which gradually decline to 0.03 in 2001 and further rose to 0.38 in 2004 it declined to 0.03 in 2007; thereafter it increased peaking at 0.67 in 2011 and further dropped to 0.05 in 2016 and by the year 2020 the TII value was 0.55. Despite the TII values being less the 1, the results further show an increasing trend, implying the improved importance of Cameroon to Namibia as a trade destination.

The evolution of the TII over time allows for assessing whether the bilateral trade and the importance of

countries as trade partners have increased or decreased over time. A trend analysis of the trade intensity between Namibia and non-African trade destinations was included and the results and interpretation are as follows;
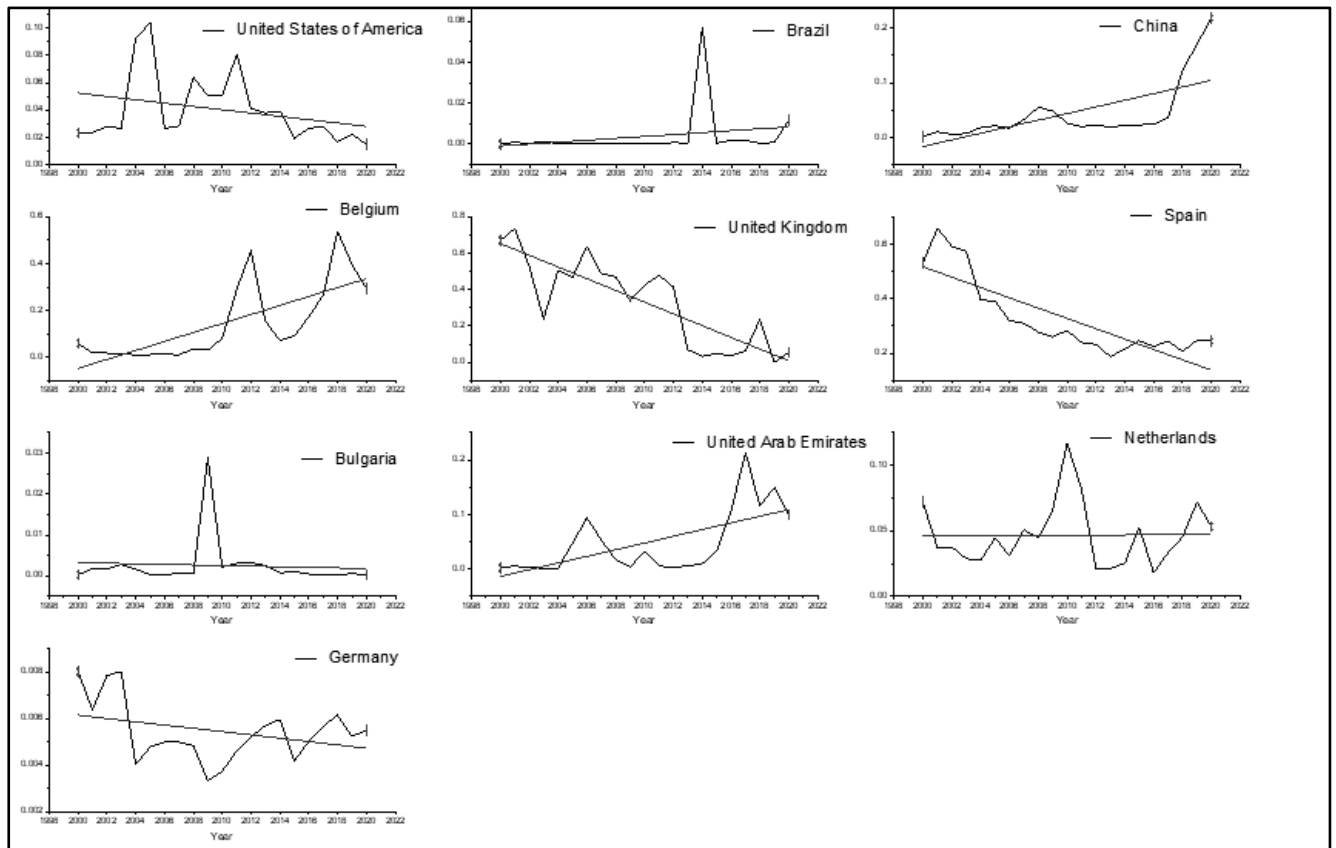
Figure 17: Evolution of Trade intensity of non-African trade destinations 2000-2020

Source: Authors' calculation from UN COMTRADE data 2000-2020.

Figure 17 shows the evolution of trade intensity between Namibia and non-Africa trade destinations that are below the world average level or are less than expected given their importance in world trade. The TII of Namibia with those destinations was less than 1 during the study period, which presents an insignificant amount of trade between those countries, thus the lack of importance of those destinations to Namibia as trade partners.

The TII Index of Namibia with United States of America (USA) in the year 2000 was 0.02 which gradually increased reaching its peak of 0.10 in 2005, it declined to 0.03 in 2006; thereafter it gradually increased to 0.08 in 2011 and further dropped to 0.02 in 2015 and by the year 2020 the TII value declined to 0.01. The results further show a decreasing trend, implying the decrease in the potential importance of the USA

to Namibia as an agricultural trade destination over time.

The TII of Namibia with the United Kingdom (UK) fluctuated during the study period, in 2000 it peaked at 0.67 which gradually rose to 0.73 in 2001, following a gradual decline to 0.23 in 2003, it increased to 0.63 in 2006 and declined to 0.33 by the year 2009, following an increase to 0.48 in 2011; thereafter there was a gradual decline to 0.07 by the year 2013 and by the year 2020 the TII value was 0.06. Despite the UK being the second largest importer of Namibian goods, the results show a decreasing trend, which implies a decrease in the importance of the UK as a trade destination, this could be attributable to the increased regional integration and trade between African countries thus moving away from trade with non-African countries. Additionally, the trade between Namibia and UK is flourishing in terms of the exports of table grapes, beef, fish, and beer.

In the case of Spain, the TII value was 0.53 in 2000 and reached its peak at 0.66 in 2001, following a gradual decline to 0.19 in 2013, it increased to 0.25 in 2015; thereafter there was a gradual decline to 0.21 by the year 2018 and by the year 2020 the TII value was 0.24. The results further show a decreasing trend implying the decrease in the importance of Spain as a trade destination during the study period.

Meanwhile, Bulgaria recorded a TII value of 0.0003 in 2000, which gradually rose to 0.002 in 2001, following a gradual decline to 0.0006 in 2008, it reached its peak at 0.03 in 2009 and declined to 0.002 by the year 2010, it further declined to 0.0008 in 2014, by the year 2020 the TII value was 0.0003. The results further show a decreasing trend over the study period implying a decrease in Bulgaria's importance as a trade destination for Namibia in terms of agricultural commodities.

The TII Index of Namibia with the United Arab Emirates (UAE) in the year 2000 is 0.0013 which gradually decline to 0.006 in 2001, rose to 0.09 in 2006 and declined to 0.0033 in 2009; thereafter it reached its peak at 0.21 in 2017 and further dropped to 0.12 in 2018 and by the year 2020 the TII value was 0.09. Despite the TII values being less the 1, the results further show an increasing trend, implying the increased importance of UAE to Namibia as a trade destination.

In 2000 Netherlands recorded a TII value of 0.07 which gradually decline to 0.03 in 2004 and reached its peak of 0.11 in 2010, thereafter it declines to 0.02 in 2012 following a gradual rise to 0.07 in 2019, by the year 2020 the TII value stood at 0.05. The results further show a constant trend, implying an unchanged intensity of trade or no change in the potential importance of the Netherlands to Namibia as a trade destination in terms of agriculture.

Meanwhile Brazil's TII value in the year 2000 was 0.00008 which gradually rose to 0.0005 in 2013 and further rose to reach its peak at 0.06 in 2014, following a decline of 0.0004 in 2015; thereafter it declined further to 0.0008 in 2019, by the year 2020 the TII value was 0.01. Despite the TII values being less the 1, the results further show an increasing trend, implying the improved importance of Brazil to Namibia as an agricultural trade destination.

In the case of China, the TII value in 2000 was 0.0009 which gradually rose to 0.02 in 2006 and further rose to 0.05 in 2009, following a decline in 2016 to 0.02; thereafter it gradually increased peaking at 0.2 in 2020. Despite the TII values being less the 1, the results further show an increasing trend, implying the improved importance of China to Namibia as an agricultural trade destination over time.

Where Belgium recorded a TII value of 0.06 in 2000, which gradually decline to 0.009 in 2007 and further rose to 0.45 in 2012 it declined to 0.07 in 2014; thereafter it increased peaking at 0.54 in 2018 and further dropped to 0.29 in 2020. Despite the TII values being less the 1, the results further show an increasing trend, implying the improved importance of Belgium to Namibia as an agricultural trade destination.

Germany reached its peak in 2000 at 0.008, which gradually declined to 0.006 in 2001 and further rose to 0.008 in 2003, it declined to 0.004 in 2004; thereafter it dropped to 0.003 in 2009 and rose to 0.005 by the year 2014 and further rose to 0.006 in 2018, by the year 2020 the TII value was 0.005. Despite the TII values being less the 1, the results further show a decreasing trend, implying the decrease in the potential importance of Germany to Namibia as an agricultural trade destination. It is interesting to note that the trade intensity index for all the non-African trade destinations remains below one during the study period.

Chapter 5 Conclusion and recommendations
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This chapter summarises the results of this study and it is organized as follows: the first section is about the key conclusions drawn from this study; the second section deals with the recommendations and the third section is about the suggestions for future studies.

5.1. Conclusion

This study assessed Namibia's export diversification and trade complementarity. The result shows that Namibian export diversification in terms of both the export basket and market destination improved over time and this is in contrast with reviewed literature, which states that developing countries are characterized by low agricultural export diversification.

However, it is a matter of concern that Namibia was diversified (moderately to fairly) in terms of the export basket and highly concentrated in terms of trade destinations during the study period. The Namibian exports were concentrated in four products namely, Fish, Beverage, Meat and meat preparations, Live animals and four markets namely, South Africa, Botswana, the United Kingdom, and China and these findings support the issue of Namibia's reliance on primary commodities.

The study concludes that Namibia is well-positioned to increase bilateral trade with the selected trade destinations, given the suitable policies which will help capitalize on the compatibility of agricultural supply potential and consumer demand across the world. The agricultural trade between Namibia and the trade destinations is not directly competitive because of the high complementarity demonstrated thus the need for Namibia to not only consider promoting trade but also promoting more general agricultural cooperation between countries. Cooperation in areas of agricultural technology and management is likely to benefit Namibia. However, increased agricultural production in Namibia may aid in increased exports. The strong trade complementarity contrasts with the literature reviewed, which indicates a poor complementarity between most developing country pairs.

The study further concludes that Malawi, Zambia, Zimbabwe, Mauritius, Cameroon, Brazil, Spain, and the Netherlands are becoming less compatible with Namibia in terms of agricultural trade over time, as they

demonstrated a decreasing trend in trade complementarity over the study period.

In terms of intensity of trade, the study concludes that Namibia's trade with Botswana, South Africa, Zambia, and Zimbabwe is in good flow. In the study period from 2000 to 2020, Namibia's trade intensity with the above-mentioned destinations never went below unity which implies the pairs have a good trade relationship in comparison with global trade. However, it should be noted that over the study period the intensity of trade between Namibia and South Africa has declined (while remaining above the world average). The study further concludes that despite the low intensity of trade Cameroon, Lesotho, Mauritius, Tanzania, and Malawi exhibited an upward trend, implying an improved intensity of trade with Namibia. It should be noted that the intensity of trade remained below the world average, despite improvement over time. Poor coverage of the formal and informal trade in our database leads to a degree of uncertainty in these conclusions, this is evident in the cases of the Democratic Republic of Congo, Tanzania, Cameroon, and Lesotho that have missing data.

5.2. Recommendations

On the strength of the main findings and conclusion presented above, several recommendations are made aimed at improving the Namibian agricultural trade: Firstly, Namibia increases trade in live animals, Meat and Meat preparations and Fish. Secondly, enhance bilateral trade between Namibia and African trade destinations especially Botswana, Zambia, Zimbabwe, and South Africa, and also there is a need for the Namibian government to substantial intervention in the export promotion activities to oversee the agricultural practices in the exports sectors with stimulation mechanism to increase Namibian export. The government, export promotion agencies, ministries, exporters, and other stakeholders should focus on identifying realistic export opportunities (through research and development initiatives) for Namibia to boost and diversify agricultural export in terms of trade destinations using other approaches. Thirdly, Namibia takes advantage of the AfCFTA to boost economic growth through agricultural trade as there is a strong trade complementarity with selected trade destinations and their trade relationship has strengthened in the past few decades, with exceptions in a few cases. Therefore, achieving a free trade agreement (FTA) with trade destinations would undoubtedly allow Namibia to diversify exports both in terms of export basket and destination. Lastly, the variables (export diversification, trade complementarity, and trade intensity) studied are of paramount importance and should be taken into consideration when designing appropriate strategies to promote agricultural trade.

5.3   Area of future study

The study suggests that future research work on Namibian trade should extend to study the identification of realistic export opportunities for Namibia to boost exports and reduce over-dependence on primary commodities. Furthermore, there is a need to identify the possible constraints Namibia face in diversifying its exports. It would be advisable to extend the analysis of trade complementarity to identify the most beneficial commodities under the AfCFTA. In the same manner, also discuss the regional dimension of the effects that said the agreement could have; this would be relevant considering that a greater commercial relationship of trade destinations could drive a relocation of economic activity in Namibia. Therefore, it would also be desirable to broaden the analysis at a regional level.

References

African Development Bank Group. (2020). *Namibia Economic Outlook Report*. Retrieved April 12, 2020, from https://www.afdb.org/en/countries/southern-africa/namibia/namibia-economic-outlook#:~:text=Real%20GDP%20growth%20is%20projected,attract%20investment%2C%20and%20spur%20industrialization.

Agro marketing and trade agency. (2016). Agro marketing and trade agency annual Report. Windhoek, Namibia.

Agronomic board Namibia. (2020). *Agronomic board Namibia resolution no 3.* Windhoek, Namibia: Republic of Namibia Press release.

Alemu, A. M. (2009). *Determinants of vertical and horizontal export diversification: Evidence from Sub-Saharan Africa and East Asia.* Graduate School of Asia Pacific Studies, Ritsumeikan Asia Pacific University, Beppu-shi, UNPUBLISHED.

Ali, R., Alwang, J., & Siegel, P. B. (1991). Is Export Diversification the Best Way to Achieve ExportGrowth and Stability? A Look at Three African Countries. *The World Bank Policy ResearchWorking Paper Series*, 729.

Amurgo-pacheco, A., & Piérola, M. D. (2007). Patterns of export diversification in developing countries: Intensive and extensive margins. *Policy Research Working Paper, 1(4473)*, 1–34.

Andic, F., Andic, S., & Dosser, D. (2010). *Andic, F., Andic, SA theory of economic integration for developing countries: illustrated by Caribbean countries.* Routledge: 1(26), 1-40.

Anukoonwattaka, D. W. (2017). Trade indicators for evaluating the potential impacts of an FTA. *ARTNeT-GIZ Capacity Building Workshop* (pp. 8-20). Bangkok: Trade, Investment and Innovation Division (TIID), ESCAP.

Balassa, B. (1994). *The theory of economic integration: An introduction.* Palgrave, London.: In The European Union (pp. 125-137).

Balassa, B. (2013). *The theory of economic integration (Routledge revivals).* London: Routledge.

Bank of Namibia. (2017). Bank of Namibia Annual Symposium. Windhoek, Namibia.

Bano, S., & Paswan, N. (2010). India-New Zealand trade and trade potential: Recent experience and future opportunities. *51St New Zealand association of economists (NZAE): Annual Conference* (pp. 1-35). New Zealand: University of Auckland Business School.

Bleaney, M., & Greenaway, D. (2001). The Impact of Terms of Trade and Real Exchange Volatility on Investment and Growth in Sub-Saharan Africa. *Journal of Development Economics 65(1)*, 491–500.

Bonaglia, F., & Fukasaku, K. (2003). *export diversification in low-income countries and small states: do country size and income level matter?* University Library of Munich, Germany: Development and Comp Systems 0307001.

Bouët, A., & Odjo, S. P. (2019). *Africa agriculture trade monitor 2019.* Washington, DC: International Food Policy Research Institute (IFPRI).

Brown, A. (1949). *Applied economics: Aspects of World Economy in War and Peace.* London: George Allen and Unwin.

Caporaso, J. (2018). *The European Union: dilemmas of regional integration.* New York: Routledge.

Chandran, S. (2010). *Trade Complementarity and Similarity Between India and Asian Countries in the context of the RTA.* Goa: VVM's Shree Damodar College of Commerce and Economics.

Chaudhary, M., & Saleem, M. (2001). Comparative Advantage, Complementarity, Market Diversification and Trade Instability: A Case Study of Pakistan. *Journal of Economic Integration*, 568-589.

Choga, I. (2014). *The impact of export diversification on economic performance in South Africa.* The University of Fort Hare.

Drysdale, P., & Garnaut, R. (1982). Trade intensities ana analysis of Bilateral Trade flows in a many-country world: Survey. *Hitotsubashi Journal of Economics*, 62-84.

Fotros, H., Nemati, M., & Darabi, H. (2013). Relationship between Export Diversification and Economic Growth. *International Journal of Basic Sciences & Applied Research*, 991-999.

Gourdon, J. (2010). *FDI Flows and Export Diversification: Looking at Extensive and Intensive Margins in Trade Competitiveness of the Middle East and North Africa: Policies for Export Diversification.* Washington, DC: The World Bank Press.

Goyal, & Vajid. (2018). An Analysis of India's Trade Intensity with UAE. *Journal of Commerce & Trade*.

Gutierrez de Pineres, S., & Ferrantino, M. (1997). Export Diversification and Structural Dynamics in the Growth Process: The Case of Chile. *Journal of Development Economics, 52 (1)*, 35-91.

Hausmann, R., & Klinger, B. (2006). *Structural Transformation and Patterns of Comparative Advantage in the Product Space.* Harvard University, Cambridge, MA.

Hausmann, R., Hwang, J., & Rodrik, D. (2007). What You Export Matters. *Journal of Economic Growth, 12(1)*, 1-25.

Hussain, M. (2017). Globalization and gravity model of trade of Pakistan-A PPML estimator analysis. *Management and Administrative Sciences Review, 6(1)*, 15-27.

Hussien, A. M. (2014). *Export diversification and growth: A case of Ethiopia.* Sejong City, South Korea: Unpublished.

Hwang, J. (2006). *Introduction of New Goods, Convergence and Growth, Job Market Paper.* Cambridge, Harvard University, MA.

Imbs, J., & Wacziarg, R. (2003). Stages of Diversification. *American Economic Review, 93(1)*, 63-86.

Ishfaq, M., & Ajaz, R. (2015). China's trade intensity with South Asian countries. *Journal of Economics and International Finance, 10(4)*, 30-42.

Javed, I., Ashfaq, M., Adil, S., & Bakhsh, K. (2016). Analysis of Agricultural trade between Pakistan and the United Arab Emirates: An application of gravity model. *Journal of Agricultural Research, 54(4)*, 787- 799.

Javeria, M., Umer, J. B., & Ashok, M. (2018). Trade Intensity and Revealed Comparative Advantage: An Analysis of Intra-BRICS Trade. *International Journal of Emerging Markets*, 1-18.

Kabiru, H. I., & Abdulaziz, S. (2016). Nigeria-India bilateral trade relations: An analysis of trade complementarity index (TCI). *Asian Journal of Economic Modelling*, 190-198.

Kabiru, H., & Dilfraz, S. (2014). Changing the perspective of Indo-Nigerian trade relations. *Indian Journal of Applied Research 4(7)*, 497-503.

Kalaba, M., Sandrey, R., & Seventer, D. E. (2005). *Analysis of trade between South Africa and the EU and a preliminary attempt to examine the impact of the EU-SA FTA on trade.* Trade & Industrial Policy Strategies.

Kaune, J., & Mbazuvara, B. (2020). *Note on understanding foreign direct investment profitability in Namibia: Reinvestment or repatriation?* Windhoek, Namibia: Bank of Namibia, Research and Financial stability department.

Kojima, K. (1964). The Pattern of International Trade Among Advanced Countries. *Hitotsubashi Journal of Economics*, *5(1),* 16-36.

Krugman, P. R., Maurice, O., & Marc, J. M. (2012). *International economics: Theory and Policy (Fifth edition).* Addison-Wesley, New York.

Kumar, R. (2018). India's foreign trade with USA-A study based on trade intensity and reciprocity index. *International Journal of Research in Economics and Social Sciences(IJRESS) 8 (4)*, 1-14.

Labys, W., & Montague, L. (1990). Portfolio Optimization and the Design of Latin American Export Diversification Policies. *Journal of Development Studies. 26 (2)*, 260-277.

Linder, S. (1961). *An Essay in Trade and Transformation.* New York: Wiley.

Love, J. (1983). Concentration, Diversification and Earnings Instability: Some Evidence on Developing Countries' Exports of Manufactures and primary products. *World Development, 11(9)*, 787-793.

Lv, J., & Xiang, L. (2010.). Empirical Analysis of Bilateral Trade Complementarity between China and USA. *Proceedings of International Conference on Management and Service Science*, (pp. 1-27). Wuhan, China.

Matthee, M., & Naudé, W. (2008). *Export diversity and regional growth in a developing country context: Empirical evidence.* South Africa: UNU-WIDER. North-West University.

Meat Board of Namibia. (2019). *Integrated Annual report 2018/2019.* Windhoek, Namibia.

Ministry of Agriculture, Water and Land Reform. (2011). *Agriculture Marketing and Trade Policy and Strategy.* Windhoek, Namibia.

Ministry of Agriculture, Water and Land Reform. (2019). *Namibia Census of Agriculture.* Windhoek, Namibia.

Ministry of Industrialisation, Trade and SME Development. (2017). *Ministry of Trade Annual Report 2016/2017.* Windhoek, Namibia: Ministry of Industrialisation, Trade and SME Development.

Mohajeri, P. (2015). *Trends of India Trade with Persian Gulf Countries.* Chandigarh: PhD Research Scholar, Department of Economics Panjab University.

Moran, R. (2010). The State and Effective Control of Foreign Capital: The Case of South Korea. *World Politics, 43(1)*, 111-138.

Mubita, L. (2018). *Is Agricultural Productivity an engine for growth?* Windhoek, Namibia: National Planning Commission, Office of the President.

Munemo, J. (2011). Trade between China and South Africa: Prospects of a Successful SACU-China Free Trade Agreement. *African Development Review 25(3)*, 303-329.

Namibia Statistic Agency. (2020). *Namibia trade statistics Bulletin 2020.* Windhoek, Namibia.

Nangolo, M., & Alweendo, N. (2020). *Agriculture in Namibia: An overview democracy report 2020.* Windhoek, Namibia.: Institute for Public Policy Research.

National Planning Commission. (2018). *The state of the Namibian economy.* Windhoek: Office of the President.

Naudé, W., & Rossouw, R. (2008). Export diversification and specialization in South Africa: Extent and Impact. *World Institute for Development Economics Research*, 1-210.

Neculita, M., & Sarpe, D. A. (2018). International commerce-development factor in China and India. Annals of the University Dunarea de Jos of Galati: Fascicle: I. *Economics and Applied Informatics, 24(3)*, 65-72.

Ofa, S. V., Spence, M., Mevel, S., & Karingi, S. (2012). *Export diversification and Intra-industry trade in Africa.* Lusaka, Zambia: United Nations Economic Commission for Africa.

Papageorgiou, C., & Spatafora, N. (2012). *Economic Diversification in LICs: Stylized Facts and Macroeconomic Implications.* Washington, DC: International Monetary Fund.

Paswan, A. S. (2021). Inda's bilateral trade with China-empirical study based on trade intensity index & trade reciprocity index. *Studies in Economics and Business Relations 2(1)*, 1-16.

Polytechnic of Namibia and North West University. (2012). *Market diversification opportunities for Namibian Red meat and meat products outside the European Union, Norway and South Africa.* Windhoek, Namibia: Matboard of Namibia Report.

Raghuramapatruni, R. (2014). *A study on the trade patterns between India & China: with special focus on services trade.* Visakhapatnam, Inda: GITAM School of International Business & Economics.

Ricardo, D. (1817). From the principles of political economy and taxation. *In Readings in the economics of the division of labour: The classical tradition*, 127-130.

Robson, P. (2002). *The economics of international integration.* London: Routledge.

Salvatore, D. (2014). *International Economics.* Fordham University, New York: John Wiley & Sons.

Shabana, N., & Zafar, M. (2014). *Explaining trends and factors affecting export diversification in ASEAN and SAARC regions: An empirical analysis.* Islamabad, Pakistan: National University of Sciences and Technology, School of Social Sciences and Humanities.

Simasiku, C., & Sheefeni, J. (2017). Agricultural exports and economic growth in Namibia. *European Journal of basic and applied sciences*, 1-10.

Ssemogerere, G., & Kasekende, L. (1994). *1994. Constraints to the Development and Diversification of Non-traditional Exports in Uganda (1981-90).* Nairobi: African Economic Research Consortium Research Paper 28.

Stehel, V., & Šuleř, P. (2016). Foreign trade between China and The Czech Republic. *Littera Scripta 9 (3)*, 84-95.

Sundar Raj, P., & Ambrose, B. (2014). A Brief Analysis of India-Japan Bilateral Trade: A Trade Intensity Approach. *International Journal of Economics, Commerce and Management*, 2(2), PP 1-7.

Tinbergen, J. (1965). *International economic integration.* Amsterdam, Netherlands: Amsterdam; Brussels: Elsevier.

Vahalik, B. (2014). Regional Bilateral Trade Analysis of the European Union, China and ASEAN. *Proceedings of International Conference on Enterprise and the Competitive Environment.* Brno, Czech Republic.

Viner, J. (1950). *The Customs Union Issue.* New York: Carnegie Endowment for International Peace.

Wani, N. H., & Dhami, J. K. (2013). Indo-China trade: intensity and potential for future trade. *International Journal of enhanced research in management and computer applications*, 2319-7471.

Watson, M. (2017). Historicizing Ricardo's comparative advantage theory, challenging the normative foundations of liberal international political economy. *New Political Economy, 22(3)*, 257-272.

Yokoyama, K., & Alemu, A. (2009). The Impacts of Vertical and Horizontal Export Diversification on Growth between Sub-Saharan Africa and East Asia's Performances. *Ritsumeikan International Affairs*, 49-90.

Zheng, X., Jia, L., Bao, J., & Chen, J. (2018). A Study of Trade Complementarity between China and the Baltic States and its Development Strategies. *Anfiteatro Economic 20(49)*, 788-803.

Zheng, X., Linfeng, Z., Chen, R., & Jia, L. (2019). International trade structure and analysis of complementarity between China and Poland, the Czech Republic and Hungary. *Argumenta Oeconomica 2 (43)*, 1-27.

Zhou, Z., Wu, Y., & Si, W. (2007). Evolving Patterns of Agricultural Trade between Australia and China. *Australasian Agribusiness Review 15*, 27-45.

Zhou, Z.-Y., Wu, Y.-R., & Si, W. (2006). Australia-China Agricultural Trade: Dynamics and Prospects. *18th ACESA International Conference: "Emerging China: Internal Challenges and Global Implications 13-14 July 2006.* Melbourne, Australia.

Appendices

Appendix 1: Normalized Hirschman-Herfindahl Index for Namibian export basket

Year	HHI	NHHI
2000	0.037	0.191
2001	0.055	0.234
2002	0.050	0.223
2003	0.074	0.272
2004	0.029	0.170
2005	0.029	0.169
2006	0.020	0.142
2007	0.016	0.127
2008	0.015	0.123
2009	0.017	0.131
2010	0.020	0.141
2011	0.019	0.139
2012	0.022	0.149
2013	0.017	0.129
2014	0.015	0.123
2015	0.019	0.139
2016	0.018	0.134
2017	0.020	0.141
2018	0.012	0.107
2019	0.013	0.113
2020	0.012	0.111
Average	**0.025**	**0.153**

Appendix 2: Normalized Hirschman-Herfindahl Index for Namibian export market destinations

Year	HHI	NHHI
2000	0.183274	0.423869
2001	0.238232	0.484152
2002	0.141043	0.3706
2003	0.127509	0.351899
2004	0.120815	0.343321
2005	0.131083	0.357884
2006	0.130958	0.35779
2007	0.118503	0.339781
2008	0.132786	0.360375
2009	0.133084	0.360655
2010	0.107227	0.32306
2011	0.116676	0.337331
2012	0.059813	0.239285
2013	0.095059	0.304021
2014	0.049721	0.217969
2015	0.094606	0.303359
2016	0.055044	0.230003
2017	0.073523	0.266653
2018	0.076556	0.272222
2019	0.10456	0.319231
2020	0.152368	0.386109
Average	**0.116307**	**0.330932**

Appendix 3: Namibia Hirschman-Herfindahl Product Index 2000-2020

Year	Live Animals	Meat	Dairy Products	Fish	Cereals	Vegetable Fruit	Sugar, Honey	Coffee, Tea, Cocoa	Animal Feed Stuff	Misc. Edible Products
2000	0.0002	0.0003	0.0000	0.0339	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2001	0.0013	0.0007	0.0000	0.0506	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000
2002	0.0008	0.0004	0.0000	0.0445	0.0001	0.0001	0.0001	0.0000	0.0003	0.0000
2003	0.0016	0.0014	0.0000	0.0598	0.0000	0.0001	0.0001	0.0000	0.0002	0.0000
2004	0.0008	0.0017	0.0000	0.0250	0.0000	0.0001	0.0000	0.0000	0.0001	0.0000
2005	0.0013	0.0029	0.0000	0.0227	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
2006	0.0008	0.0015	0.0000	0.0166	0.0000	0.0001	0.0000	0.0000	0.0001	0.0000
2007	0.0006	0.0014	0.0000	0.0129	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000
2008	0.0001	0.0013	0.0000	0.0125	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
2009	0.0002	0.0014	0.0000	0.0139	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000
2010	0.0005	0.0012	0.0000	0.0169	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000
2011	0.0006	0.0012	0.0000	0.0161	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
2012	0.0002	0.0013	0.0000	0.0186	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
2013	0.0003	0.0006	0.0000	0.0147	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
2014	0.0001	0.0004	0.0000	0.0138	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
2015	0.0007	0.0005	0.0000	0.0172	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
2016	0.0002	0.0003	0.0000	0.0171	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
2017	0.0014	0.0003	0.0000	0.0179	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
2018	0.0008	0.0001	0.0000	0.0104	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
2019	0.0005	0.0003	0.0000	0.0116	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
2020	0.0002	0.0001	0.0000	0.0117	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000

Appendix 4: Namibia Hirschman-Herfindahl Product Index 2000-2020

Year	Beverages	Tobacco	Hides, Skins etc	Oil Seed, Oleaginous Fruit	Cork, Wood	Crude Animal, Veg	Animal Oils, Fats	Fixed Veg. Fats, Oils	Animal, Veg. Fats
2000	0.0020	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2001	0.0022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2002	0.0034	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2003	0.0110	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2004	0.0012	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2005	0.0014	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2006	0.0010	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2007	0.0011	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2008	0.0010	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2009	0.0015	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2010	0.0012	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2011	0.0013	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2012	0.0020	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2013	0.0011	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2014	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2015	0.0008	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2016	0.0003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2017	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2018	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2019	0.0002	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
2020	0.0001	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000

Appendix 5: Hirschman-Herfindahl Market Index for African trade destinations 2000-2020

Year	South Africa	Botswana	Congo	Zambia	Cameroon	Tanzania	Zimbabwe	Lesotho	Mauritius	Malawi
2000	0.06441	0.00003	0.00000	0.00000	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000
2001	0.09529	0.00002	0.00001	0.00000	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000
2002	0.06465	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2003	0.09925	0.00005	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2004	0.06277	0.00002	0.00002	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2005	0.07953	0.00002	0.00002	0.00004	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2006	0.06040	0.00002	0.00018	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2007	0.08418	0.00003	0.00011	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2008	0.10127	0.00003	0.00012	0.00004	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2009	0.11440	0.00007	0.00012	0.00011	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2010	0.08389	0.00004	0.00014	0.00003	0.00000	0.00000	0.00001	0.00000	0.00000	0.00001
2011	0.08474	0.00005	0.00025	0.00004	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2012	0.03013	0.00460	0.00034	0.00021	0.00000	0.00019	0.00007	0.00000	0.00000	0.00000
2013	0.07120	0.01879	0.00054	0.00040	0.00000	0.00000	0.00006	0.00000	0.00000	0.00000
2014	0.01688	0.02758	0.00030	0.00075	0.00000	0.00000	0.00003	0.00000	0.00000	0.00000
2015	0.03807	0.04979	0.00076	0.00167	0.00000	0.00000	0.00002	0.00000	0.00000	0.00000
2016	0.02572	0.01975	0.00029	0.00396	0.00000	0.00000	0.00002	0.00000	0.00000	0.00000
2017	0.04748	0.01493	0.00049	0.00134	0.00000	0.00000	0.00002	0.00000	0.00000	0.00000
2018	0.02285	0.00881	0.00042	0.00125	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000
2019	0.02639	0.00952	0.00081	0.00135	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000
2020	0.02110	0.00641	0.00069	0.00179	0.00000	0.00000	0.00002	0.00000	0.00000	0.00000

Appendix 6: Hirschman-Herfindahl Market for non-African trade destinations Index 2000-2020

Year	USA	Brazil	China	Belgium	UK	Spain	Bulgaria	UAE	Netherlands	Germany
2000	0.00090	0.00000	0.00000	0.00034	0.10684	0.01004	0.00000	0.00000	0.00065	0.00005
2001	0.00088	0.00000	0.00002	0.00003	0.12449	0.01725	0.00000	0.00000	0.00019	0.00004
2002	0.00099	0.00000	0.00001	0.00003	0.06034	0.01475	0.00000	0.00000	0.00018	0.00006
2003	0.00073	0.00000	0.00002	0.00003	0.01083	0.01641	0.00000	0.00000	0.00011	0.00007
2004	0.00765	0.00000	0.00016	0.00001	0.04327	0.00678	0.00000	0.00000	0.00010	0.00002
2005	0.00928	0.00000	0.00028	0.00001	0.03559	0.00599	0.00000	0.00003	0.00026	0.00002
2006	0.00059	0.00000	0.00021	0.00001	0.06568	0.00358	0.00000	0.00014	0.00012	0.00002
2007	0.00064	0.00000	0.00093	0.00001	0.02857	0.00361	0.00000	0.00004	0.00034	0.00003
2008	0.00304	0.00000	0.00274	0.00012	0.02252	0.00263	0.00000	0.00001	0.00026	0.00002
2009	0.00204	0.00000	0.00243	0.00009	0.01075	0.00245	0.00000	0.00000	0.00059	0.00001
2010	0.00209	0.00000	0.00085	0.00024	0.01583	0.00243	0.00000	0.00002	0.00164	0.00001
2011	0.00488	0.00000	0.00046	0.00309	0.02069	0.00174	0.00000	0.00000	0.00073	0.00002
2012	0.00140	0.00000	0.00075	0.00667	0.01380	0.00157	0.00000	0.00000	0.00005	0.00002
2013	0.00116	0.00000	0.00051	0.00076	0.00045	0.00112	0.00000	0.00000	0.00005	0.00002
2014	0.00132	0.00005	0.00089	0.00017	0.00009	0.00154	0.00000	0.00000	0.00007	0.00003
2015	0.00036	0.00000	0.00116	0.00022	0.00023	0.00201	0.00000	0.00004	0.00026	0.00001
2016	0.00068	0.00000	0.00116	0.00099	0.00010	0.00186	0.00000	0.00046	0.00003	0.00002
2017	0.00068	0.00000	0.00233	0.00219	0.00028	0.00205	0.00000	0.00159	0.00011	0.00002
2018	0.00023	0.00000	0.02777	0.00892	0.00393	0.00152	0.00000	0.00060	0.00021	0.00003
2019	0.00042	0.00000	0.05743	0.00481	0.00000	0.00218	0.00000	0.00107	0.00054	0.00002
2020	0.00016	0.00000	0.11641	0.00273	0.00018	0.00213	0.00000	0.00041	0.00031	0.00002

Appendix 7: Trade complementarity index for African trade destinations 2000-2020

Year	Zambia	Tanzania	Cameroon	Zimbabwe	Lesotho	South Africa	Congo	Botswana	Mauritius	Malawi
2000	97	79	99	83	92	96	0	93	99	65
2001	99	79	91	79	100	98	0	96	95	64
2002	99	86	94	93	99	100	0	96	93	64
2003	98	88	96	88	97	98	0	94	94	65
2004	99	91	98	92	93	95	0	92	96	70
2005	97	90	95	93	91	96	0	92	96	69
2006	95	91	96	95	92	96	0	93	94	67
2007	96	89	97	95	92	96	0	94	94	65
2008	96	92	79	89	99	97	0	95	93	64
2009	97	93	75	86	97	98	0	97	90	64
2010	96	94	90	96	99	98	0	96	89	69
2011	96	96	77	93	100	97	0	95	90	69
2012	99	93	93	94	100	98	0	95	89	69
2013	99	91	94	92	93	98	0	95	87	68
2014	98	83	93	91	99	99	0	95	90	70
2015	99	85	88	89	98	99	94	95	91	67
2016	98	88	74	90	96	99	94	94	88	65
2017	95	89	91	95	93	97	91	92	89	64
2018	97	94	89	92	95	100	95	96	87	60
2019	98			93	96	100	95	96	87	60
2020	95			97	93	98	92	93	88	63
Average TCI	**97.41**	**80.57**	**81.47**	**91.16**	**95.86**	**97.69**	**26.72**	**94.43**	**91.43**	**65.79**

Appendix 8: Trade complementarity index for non-African trade destinations 2000-2020

Year	USA	Germany	Belgium	Bulgaria	UK	UAE	China	Brazil	Spain	Netherlands
2000	95	94	96	97	94	93	94	96	98	99
2001	97	96	98	99	96	95	96	92	99	99
2002	98	96	98	100	96	95	96	92	99	98
2003	97	95	97	98	95	93	95	93	100	99
2004	95	93	95	96	93	91	92	95	98	98
2005	95	93	95	96	93	92	93	96	98	98
2006	95	94	96	96	94	92	93	95	99	99
2007	96	94	96	97	95	93	94	94	99	99
2008	97	95	97	99	96	94	94	93	100	100
2009	97	96	97	99	96	93	94	90	99	99
2010	97	95	98	99	95	93	94	92	100	100
2011	97	96	98	99	96	94	94	92	100	99
2012	98	96	99	99	96	94	95	90	99	98
2013	98	96	99	98	96	94	95	89	99	98
2014	99	97	100	97	97	95	96	88	98	97
2015	98	97	100	98	97	95	95	87	98	97
2016	98	96	99	98	97	94	95	87	98	97
2017	96	94	97	98	94	92	92	91	99	100
2018	99	97	100	98	97	96	96	88	98	97
2019	99	97	100	98	98	96	96	88	97	97
2020	97	95	98	100	95	93	93	89	99	99
Average TCI	**97.09**	**95.31**	**97.75**	**98.09**	**95.57**	**93.73**	**94.32**	**91.24**	**98.72**	**98.48**

Appendix 9: Trade intensity index of African trade destinations 2000-2020

Year	South Africa	Botswana	Congo	Zambia	Cameroon	Tanzania	Zimbabwe	Lesotho	Mauritius	Malawi
2000	5.838	1.284		0.631	0.265	0.148	1.138	0.021	0.005	0.142
2001	6.904	1.044		0.375	0.028	0.128	1.612	0.027	0.005	0.053
2002	6.761	1.064		0.078	0.058	0.186	0.138	0.002	0.000	0.019
2003	7.113	1.317		0.029	0.140	0.304	0.241	0.005	0.001	0.024
2004	5.377	1.184		1.932	0.390	0.148	0.443	0.028	0.014	0.080
2005	5.835	0.954		2.674	0.051	0.183	1.053		0.032	0.074
2006	5.327	1.138		0.661	0.092	0.149	0.292		0.025	0.191
2007	5.926	1.412		0.776	0.030	0.104	0.492		0.120	0.091
2008	6.497	1.586		1.872	0.040	0.183	1.746	1.012	0.103	0.279
2009	7.362	2.920		3.170	0.202	0.135	1.219	0.483	0.172	0.529
2010	4.990	2.038		1.225	0.133	0.091	1.207	0.661	0.180	5.064
2011	4.623	1.953		1.155	0.668	0.077	1.159	0.496	0.169	0.509
2012	2.984	17.162		2.571	0.588	4.221	3.443	0.821	0.246	0.716
2013	4.943	30.425		3.306	0.545	0.645	3.373	0.582	0.087	2.414
2014	2.452	33.989		4.952	0.145	0.097	2.584	0.191	0.059	0.397
2015	3.693	53.559	4.822	9.401	0.122	0.258	2.195	0.134	0.033	0.196
2016	3.110	28.259	3.471	14.540	0.046	0.174	1.835	0.155	0.045	0.196
2017	4.147	34.460	3.038	7.676	0.146	0.037	2.135	0.196	0.063	0.415
2018	2.964	28.164	1.881	7.175	0.551	0.264	1.431	0.054	0.019	0.824
2019	3.234	33.154	3.785	9.317			1.144	0.952	0.328	0.469
2020	2.823	31.164	3.084	8.985			1.540	0.045	0.024	1.010
Average TII	**4.900**	**14.678**	**0.956**	**3.929**	**0.202**	**0.359**	**1.449**	**0.279**	**0.082**	**0.652**

Appendix 10: Trade intensity index of non-African trade destinations 2000-2020

Year	USA	Brazil	China	Belgium	UK	Spain	Bulgaria	UAE	Netherlands	Germany
2000	0.0233	0.0001	0.0010	0.0590	0.6704	0.5302	0.0003	0.0014	0.0721	0.0080
2001	0.0237	0.0010	0.0102	0.0167	0.7342	0.6575	0.0017	0.0056	0.0372	0.0064
2002	0.0279	0.0003	0.0055	0.0167	0.5268	0.5919	0.0016	0.0023	0.0375	0.0078
2003	0.0266	0.0014	0.0072	0.0152	0.2382	0.5734	0.0028	0.0017	0.0288	0.0080
2004	0.0927	0.0003	0.0182	0.0088	0.5063	0.3945	0.0016	0.0019	0.0274	0.0040
2005	0.1040	0.0002	0.0213	0.0106	0.4671	0.3905	0.0003	0.0475	0.0447	0.0048
2006	0.0266	0.0000	0.0171	0.0113	0.6372	0.3188	0.0003	0.0937	0.0310	0.0050
2007	0.0284	0.0001	0.0327	0.0097	0.4868	0.3096	0.0006	0.0533	0.0507	0.0050
2008	0.0641	0.0002	0.0553	0.0344	0.4701	0.2772	0.0006	0.0171	0.0445	0.0048
2009	0.0501	0.0001	0.0481	0.0301	0.3381	0.2603	0.0288	0.0033	0.0659	0.0033
2010	0.0509	0.0001	0.0263	0.0798	0.4244	0.2833	0.0022	0.0326	0.1169	0.0037
2011	0.0808	0.0002	0.0195	0.2907	0.4767	0.2388	0.0030	0.0052	0.0815	0.0046
2012	0.0411	0.0009	0.0228	0.4548	0.4147	0.2315	0.0032	0.0032	0.0212	0.0052
2013	0.0380	0.0005	0.0180	0.1524	0.0685	0.1880	0.0025	0.0056	0.0210	0.0057
2014	0.0392	0.0569	0.0223	0.0706	0.0324	0.2146	0.0008	0.0097	0.0254	0.0060
2015	0.0192	0.0004	0.0227	0.0899	0.0496	0.2459	0.0010	0.0326	0.0526	0.0042
2016	0.0265	0.0017	0.0239	0.1711	0.0354	0.2240	0.0004	0.1068	0.0180	0.0050
2017	0.0283	0.0018	0.0358	0.2650	0.0639	0.2442	0.0003	0.2134	0.0333	0.0057
2018	0.0166	0.0004	0.1227	0.5365	0.2346	0.2070	0.0003	0.1157	0.0452	0.0061
2019	0.0223	0.0008	0.1707	0.3959	0.0000	0.2462	0.0005	0.1493	0.0718	0.0052
2020	0.0147	0.0117	0.2182	0.2923	0.0556	0.2449	0.0003	0.0999	0.0531	0.0055
Average TII	**0.040**	**0.004**	**0.044**	**0.143**	**0.330**	**0.327**	**0.003**	**0.048**	**0.047**	**0.005**

Appendix 11: Agricultural Commodity Groups

Code	Description	Code	Description
00	**Live animals other than animals of division**	04	**Cereals and cereal preparations**
001	Live animals other than animals of division 0	041	Wheat (including spelt) and meslin, un-milled
01	**Meat and meat preparations**	042	Rice
011	Meat of bovine animals, fresh, chilled, or frozen	043	Barley, un-milled
012	Other meat and edible meat offal	044	Maize (not including sweet corn), un-milled
016	016 Meat, edible meat offal, salted, dried: fl	045	Cereals, un-milled (excluding wheat, rice, barely
017	Meat, edible meat offal, prepared, preserve	046	Meal and flour of wheat and flour of meslin
02	**Dairy products and birds' eggs**	047	Other cereal meals and flour
022	Milk, cream, and milk products (excluding b	048	Cereal preparations, flour of fruits or vegetable
023	Butter and other fats and oils derived from	05	**Vegetables and fruits**
024	Cheese and curd	054	Vegetables
025	Birds' eggs, and eggs' yolks; egg albumin	056	Vegetables, roots, tubers, prepared, preservations
03	**Fish, crustaceans, molluscs, and preparation**	057	Fruits and nuts (excluding oil nuts), fresh or
034	Fish, fresh (live or dead), chilled or frozen	058	Fruit, preserved, and fruit preparations (no
035	035 Fish, dried, salted or in brine: smoked fi	059	Fruit and vegetable juices, unfermented, no
036	Crustaceans, molluscs, and aquatic invertebrates	06	**Sugar, sugar preparations and honey**
037	Fish, aqua. invertebrates, prepared, preservations	061	Sugar, molasses, and honey
062	Sugar confectionery	211	Hides and skins (except fur-skins), raw
07	**Coffee, tea, cocoa, spices, and manufacture**	212	Fur-skins, raw, other than hides & skins of g
071	Coffee and coffee substitutes	22	**Oil seeds and oleaginous fruits**
072	Cocoa	222	Oil seeds and oleaginous fruits (excluding flour
073	Chocolate, food preparations with cocoa, n.	223	Oil seeds & oleaginous fruits (incl. flour, n.e.s
074	Tea and mate	24	**Cork and wood**
075	Spices	244	Cork, natural, raw & waste (incl. blocks, she
08	**Feedstuff for animals (excluding un-milled**	245	Fuel wood (excluding wood waste) and woo
081	Feeding stuff for animals (no un-milled cere	246	Wood in chips or particles and wood waste
09	**Miscellaneous edible products and preparations**	291	Crude animal materials, n.e.s.
091	Margarine and shortening	292	Crude vegetable materials, n.e.s.
098	Edible products and preparations, n.e.s.	4	**Animal and vegetable oils, fats, and waxes**
1	**Beverages and tobacco**	41	**Animal oils and fats**

11	**Beverages**	411	Animals' oils and fats
112	Alcoholic beverages	42	**Fixed vegetable oils and fats, crude, refine**
12	**Tobacco and tobacco manufacture**	421	Fixed vegetable fats & oils, crude, refined
121	Tobacco, unmanufactured; tobacco refuse	422	422 Fixed vegetable fats & oils, crude, refined
122	Tobacco, manufactured	43	**Processed Animal and vegetable oils and fa**
2	**Crude materials, inedible, except fuels**	431	Animal or veg. oils & fats, processed, n.e.s.;
21	**Hides, skins, and fur-skins, raw**		
247	Wood in the rough or roughly squared		
248	248 Wood simply worked, and railway sleep		
29	**Crude animal and vegetable materials, n.e.s**		