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WORLD MARITIME UNIVERSITY

An Empirical Assessment of Trade Engagements:

Linking China, Africa and the Belt and Road Initiative

By

STERSHA ALLEYNE

A dissertation submitted to the World Maritime University in partial
Fulfillment of the requirements for the award of the degree of

MASTER OF SCIENCE

In

**INTERNATIONAL
TRANSPORT AND
LOGISTICS**

Class of ITL2020

Declaration

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views and are not necessarily endorsed by the University.

(Signature): *Sterska*

(Date): 29/06/2020

Supervised by:

Supervisor's affiliation:

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Title of Dissertation: **An Empirical Assessment of Trade Engagements:
Linking China Africa and the Belt and Road
Initiative**

Degree: **Master of Science**

Abstract

The Belt and Road Initiative has included many policies in service of integrating China and Africa. These policies and the resulting effects have always varied for the various partners of the Initiative without much study completed with regards to related issues. This research investigates the direct economic impact of the Belt and Road policies with respect to seven participants: Egypt, Ethiopia, Ghana, Kenya, Nigeria, Tanzania, South Africa.

A general introduction to Sino-Africa relationships and the bonds created are presented. The basic idea and ambition of the Belt and Road Initiative is discussed, especially the aspect of international cooperation between various continental groups. Focus is given to the historical bindings of the Initiative with respect to the legendary Silk Road.

Economic indicators are adopted as methods of policy analysis and are introduced along with the data sources and its formats followed by the computational results presented in order of indicator type and country in tabular form. The indicators are the Revealed Comparative Advantage, Trade Integration Index, Trade Complementarity Index and Herfindahl-Hirschman Product Index.

The analysis result is that Africa SITC export values shows trade in raw materials Trade integration index indicates greater need of Chinese imports than African exports. Complementarity index shows that trade cooperation is not ideal Herfindahl Hirschman product index reveals that African exports are sensitive to market changes.

The penultimate sections provide observations, implications and recommendations for each of the economies analyzed and finally conclude with policy implications. The Summary and Conclusions chapter reinforces the current status of the Belt and Road participating economies studied, the recommendations for improvement and summarizes all the implications for future cooperation in the Initiative.

KEYWORDS: Belt & Road, Sino-Africa Relations, Trade, China, Africa

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List of Abbreviations

AfCFTA	African Continental Free Trade Area
AIIB	Asian Infrastructure Investment Bank
ASEAN	Association of Southeast Asian Nations
BRI	Belt and Road Initiative
BRICS	Brazil, Russia, India, China, South Africa
CBD	China Development Bank
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
HHPI	Herfindahl-Hirschman Product Index
HS	Harmonized Commodity Description and Coding System
MSR	Maritime Silk Road
NBD	New Development Bank
OBOR	One Belt One Road
RCA	Revealed Comparative Advantage
SITC	Standard International Trade Classification
SREB	Silk Road Economic Belt
TAZARA	Tanzania-Zambia Railway Authority
TCI	Trade Complementarity Index
UN-COMTRADE	United Nations Commodity Trade Statistics
UNCTAD	United Nations Conference on Trade and Development
US	United States
USSR	Union of Soviet Socialist Republics

1 Introduction

1.1 Research Background

According to United Nations Conference on Trade and Development (UNCTAD), Africa has a large domestic market that holds both important challenges and opportunities. With a total population of about 1.2 billion and a combined national income that surpasses the trillion-dollar mark, it has a significant place and potential in the world economy. But African countries are facing challenges in realizing their full capacity. Economic development gaps both between African and the developed countries and among African countries are immense. While Africa accounts for 16.3 per cent of the world population its share in the world economy amounts to 2.9 per cent. (UNCTAD, 2019). Africa's total trade with to the rest of the world averaged US\$4.193 trillion in current prices in the period 2015–2019. According to the data extracted from Trade map, as of 2019, the value of exports from Africa to China is totaled at US\$751 billion.

It is stated that the African Continental Free Trade Area (AfCFTA), which is the largest free trade area in terms of participating countries, is expected to lead to greater exports, higher value-addition in manufacturing and services, and to bring about a more diversified intra-African trade opportunity for the continent with benefits spilling over to small and medium-sized enterprises in Africa. However, there are existing problems such as basic infrastructure, including access to clean, reliable and affordable energy, human capacities skills and also the lack of access to new technologies, knowledge, information and finance will continue to widen the gap between Africa and rest the of world causing Africa to be left behind (Yong, 2019).

Most of Africa's exports to China are comprised of, lubricants, mineral fuels, and related materials, iron ore, metals, and food and agricultural products amongst other things while China exports a range of machinery, transportation, communications equipment, as well as manufactured goods to African countries. China's outreach

continued when President Xi Jinping announced the project of the Belt and Road Initiative (BRI) also known as One Belt One Road (OBOR) or New Silk Road.

The Initiative aims to promote connectivity, infrastructure development, trade and investments among other activities between China, Eurasia, and Africa. (Chen 2016). By focusing on Africa, the Belt and Road is considered a shift in hopes to strengthen bonds that already existed, hence this research is important because it means more exchange of good and services between countries and more investments mobility which can hint the Belt and Road Initiative could have a positive impact to the trade of good and services because exchange of good and services between countries will be easy. (Lahiani, 2019).

The Belt and Road Initiative brings trade related opportunities between Africa and China. This is seen through planned and existing joint infrastructure projects such as dams, development of ports, roads etc. which allows commodities to be traded between both Africa and China. In addition, the mere existence of these infrastructure projects creates jobs and opportunities for trade. (Han et al, 2019., Nantulya, 2019). Furthermore, Chinese enterprises both private and public are increasingly acquiring stakes in resource projects ignored and/or relegated to lower priority status by other initiatives. (Dong et al, 2018). Natural resources play an integral role in the initiative, China has become Africa's largest customer for raw materials in multiple sectors. (Zhou,2019).

1.2 [Relevance](#)

The Belt and Road Initiative is a major factor in China's ambitions for larger international cooperation and its peaceful rise. BRI policies are presumably mutually beneficial for all participants, however, there is an acute lack of related literature. For example, Igbinoba assessed trade in the BRI but merely discussed the possibility of beneficial outcomes in various scenarios; Ehizuelen and Abdi's goal was to examine China-Africa relations while centering on the implementation and likely inclusion of

more African countries in the One Belt One Road initiative (Igbino 2017, Ehizuelen & Abdi, 2017).

Policies and ambitions are rarely static and instead are quite mutable. It is critical that studies of the policies and effectiveness are regularly conducted. The major relevance (and value added) of this study is to provide updated analysis about the effectiveness of the Belt and Road Initiative and contribute to the list of methods to optimize the existing trade and development policies.

1.3 Objectives

There is certain form of responsibility to provide observation and examination of policies where traceability is available. The conclusion of the analysis will help to provide a meaningful level of correlation and/or causation of the Belt and Road Initiative and the economic progress of different countries. This means that the viability of the Initiative in the selected countries can be discussed. Such discussion is acutely useful for both current and future literature.

The most important objective of this research is to indicate the effectiveness of the Belt and Road Initiative in selected African countries and to reveal where trade and cooperation can be optimized. A secondary purpose is to identify and highlight the effective policies of trade within the Belt and Road Initiative and review the implications both positives and negatives of the initiative in its current state in Africa. By completing this analysis, the hope is to increase the body of accumulated knowledge on the BRI and related topics of Sino-African relations.

1.4 Limitations

Issues with this research include lack of updated information and biases within the data. There seems to be lack of interest in the study of trade between Africa and Asia. Many articles focus more on implications for the US and Europe and lack perspectives for other regions. Examples include Draper's 2009 article which investigates African trade and integration challenges with focus on Europe's role and Ghiasy's discussion of the maritime component of the BRI and possible security issues but neglects trade impact for Africa (Draper 2009, Ghiasy 2018).

Internally, African government and economies are not very rigorous about providing data publicly while this may not be malicious, the possibility of gaps within the data cannot be ignored. Current instances of this phenomena include Tanzania's sporadic publication of its Statistical Abstract and Gross Domestic Product articles and Ethiopia's complete lack of self-reported since 2017. Even when data is available, it is not uncommon for reporting agencies to provide the data in a more favourable light. This may mean that data may be skewed towards supporting these goals.

2 Introduction to Belt and Road Initiative

2.1 China-Africa Relations

As early as the 7th century, China and Africa had contact, made close friendship, made positive contributions to the advancement and progress of human society and began direct contacts by sea route. Since that engagement, cultural exchanges and trade between China and Africa had expanded (Ministry of Foreign Affairs, the People's Republic of China, 2014). Sino-African relations refer to the historical, political, economic, military, social and cultural connections between China and the African continent (Ooi 2004). According to Moumouni, Sino-African relations underwent roughly four stages. The first stage was in the early 1950s to early 1960s where New China faced pressure and adversary from the US, followed by a split with the USSR, which added to Beijing's isolation. To gain friends, China embarked on a vast support of African Liberation Movements till most of these won independence. The second stage was in the early 60s to mid-1970s where full-scale ideology inspired relations. China maintained good links with revolutionary countries, providing them with military hardware, infrastructure construction, medical assistance and training, etc. The third stage was in the mid-70s to end-80s where the Chinese Reform and Open-Door Policy and the defining of a new vision on foreign relations. Africa embarked on the "lost decade" which was characterized by recession and less density in its relations with China. And the final stage is in the early 1990s onward where regime changed in Africa and implementing of a new policy on Sino-African relations, supposed now to serve economic development (Moumouni,2019).

In the framework of three decades of a robust economy, China had emerged as the single member of the Brazil, Russia, India, China and South Africa (BRICS) with more economic interaction with Africa and over this period, China had emerged as one of the most powerful industrial powers on the surface of the planet. Africa, a continent endowed with an array of scarce natural resources, such as oils and gases, minerals,

and virgin forests, was identified by China as particularly suited for its economic objectives (Bbaala, 2015). The Forum on China-Africa Cooperation (FOCAC) summit held in Beijing from 4 to 5 November 2006, which attracted 48 African countries and 42 African heads of state (Chun 2009) demonstrated the popularity of China's foreign policy, at least among the elites, in Africa. Today, China boasts of several trade-related deals with most African governments that have culminated in Chinese multinational corporations' involvement in the extractive industry, construction, agriculture, manufacturing and commerce on the continent (Bbaala, 2015). Africa-China trade has been growing at approximately 20 percent per year. Foreign direct investment has grown even faster over the past decade, with a breakneck annual growth rate of 40 percent. (Dong et al, 2018).

2.2 The Belt and Road Initiative

2.2.1 Overview

Since the year 2001, China has been emerging in the world economy; and more recently with the implementation of the Belt and Road Initiative (BRI). The BRI, with its "Silk Road Economic Belt" and "the Twenty-First-Century Maritime Silk Road," is now the largest platform for international cooperation, reflecting the new approach of China's development and diplomatic strategy (Zhang et al, 2018). On 7th September of 2013 Chinese president Xi Jinping gave a speech at the Nazarbayev University with the title 'Promote People-to-People Friendship and Create a Better Future'.

"To forge closer economic ties, deepen cooperation and expand development in the Euro-Asia region, we should take an innovative approach and jointly build an 'economic belt' along the Silk Road. This will be a great undertaking benefitting the people of all countries along the route."—Xi Jinping, Sept. 7, 2013 (Otmakhova, 2017)

With that in mind, China put forward a plan to revive the Ancient Silk Routes in a contemporary form of cross continental economic collaboration network, in order to strengthen trade and investment partnerships across Asian, European and African markets. In May 2017, Beijing introduced their initiative and invited the global community to join powers and contribute to the ‘win-win’ project of the century during the Belt and Road Economic Forum (Phillips, 2017).

The BRI aims to

... promote the connectivity of [the] Asian, European and African continents and their adjacent seas, establish and strengthen partnerships among the countries along the Belt and Road, set up all-dimensional, multi-tiered and composite connectivity networks, and realize diversified, independent, balanced and sustainable development in these. (Dong et al, 2018).

2.2.2 The Belt

According to the Silk Road Economic Belt (SREB), The belt refers to an economic cooperation area including European countries, China and West Asia. The inventiveness calls for the incorporation of the region into a unified economic area through expanding trade having more cultural exchanges and constructing infrastructures. The South Belt links China with Southeast Asia, South Asia, and the Indian Ocean. The North Belt goes through Central Asia, and Russia to Europe. The Central belt goes through Central Asia and West Asia to the Persian Gulf and the Mediterranean. On the north side the belt, is the historical Silk Road, and areas such as South Asia and Southeast Asia, are included in the extension The Belt connects countries such as Germany, Kazakhstan, Russia, Ukraine Italy, etc which rich in resources of minerals, energy, land tourism, etc and some are world industrial powers as well. (DU, 2015).

2.2.3 The Road

The 21st Century Maritime Silk Road (MSR), refers to the road. This is a plan of action, aimed at investing and nurturing collaboration in Oceania, North Africa Southeast Asia, and, through several bodies of water that are connected– the South Pacific Ocean, the South China Sea, and the broader Indian Ocean area, connects The Association of Southeast Asian Nations (ASEAN), North Africa South Asia, West Asia, and Europe. However, today the road has become a great waterway for maritime exchanges between China and other countries such as Kenya, Egypt, Vietnam, Singapore etc. (DU, 2015).

Figure 1: Silk Road Economic Belt & 21st Century Maritime Silk Road



Source: China Division

The Belt and Road Initiative (BRI), consists of two parts: a series of sea-routes supported by existing and new Chinese ports, providing better access to Africa, Middle East and Europe from China and a network of logistic and economic corridors over land. (Otmakhova, 2017)

The Silk Road Economic Belt includes 6 corridors for economic cooperation: (1) China-Pakistan Economic, (2) New Eurasia Land Bridge Economic, (3) China-Mongolia-Russia Economic, (4), China-Indochina Peninsula Economic, (5) Bangladesh-China-India-Myanmar Economic, (6). China-Central Asia-West Asia Economic (Standard Chartered, 2019). Networks of rail routes, waterways, roads, pipelines and information highways that link industrial and energy clusters will make up these corridors and will also contain both maritime component and an overland. (Das 2017).

2.2.4 Visions, Goals and Actions Plan

In order to gain better understanding of the Belt and Road Initiative (BRI), it is important to understand the BRI visions and action plan (Du, 2016). These visions and plans were published by the National Development and Reform Commission, the Ministry of Foreign Affairs and the Ministry of Commerce of the People's Republic of China. (National Development and Reform Commission et al). The BRI consists of five major goals:

Policy Coordination - Policy coordination is critical and fundamental in the implementation of the BRI initiative. It will comprise inter-governmental cooperation, macro-policy exchanges and communication mechanism to further mutual political trust among participating countries.

Facilities Connectivity - The priority area for BRI is to improve the connectivity of the infrastructure in countries along the Belt and Road areas. It is expected to link up unconnected road sections, port infrastructure construction, and cooperation in order to deliver international transport facilitation. Also, the connectivity of energy infrastructure and the construction of cross border optical cables and communication trunk line networks would be a priority for the BRI. Skip a line or two lines?

Investment and Trade - This area is to ensure improvement in investment and trade facilitation, enhancing customs cooperation, expanding trade areas and developing modern service trade and cross-border e-commerce. The objective is to eliminate investment barriers, expand mutual investment areas and strengthen cooperation in emerging industries and to encourage Chinese enterprises/companies to participate in infrastructure construction by making industrial investments in countries along the Belt and Road Corridors.

Financial Integrations - The success of the BRI initiative would be based on sound and effective financial integration of all countries along the Belt and Road. Systems would be put in place to build a currency stability system and the establishment of the Asian Infrastructure Investment Bank and BRICS New Development Bank. a line or two lines here?

People to People Bonds - This is to ensure friendly cooperation among countries along the One Belt One Road corridors to promote cultural and academic exchanges between China and participating countries. It will be in the form of sending students to each other's countries for exchange programmes. The cooperation in science and technology is expected to increase and think tanks in the Belt and Road countries will be supported to jointly undertake research with special forums (Mensah et al, 2016).

The Chinese government founded the International Asian Infrastructure Investment Bank (AIIB), the New Development Bank (NBD) and the Silk Road Fund in order to support to this large project. However, reports stated that up to this point, most the funding came from the state-owned China Development Bank (CBD) and four commercial banks (Wildau & Ma, 2017). As part of the BRI, China lends other countries the money to apprehend infrastructural projects such as oil pipelines, power plants, ports, highways and railways. Another vital motive behind the BRI is that China wished to export its proficiency in construction of infrastructure and produce business for construction companies and Chinese engineering.

2.3 The Belt and Road: Historical Inspiration

The Belt and Road Initiative originates from the Silk Road, which is the name of the route that connected ancient China with Central Asia, Western Asia and the European continent. It was already open in the second century AC and was the fundamental trade route, starting in China and connecting Asia, Africa and Europe. (Christian, 2000) This route provided a thoroughfare for goods and ideas between China and the other cultures of Central Asia; India and Persia. The route began in Chang'an (present-day Xi'an, capital of the Shaanxi province) and crossed Gansu and Xinjiang provinces to Central Asia, West Asia until the shores of the Mediterranean Sea. The direct exchange of goods, such as textiles, metal ware, and ceramics, inspired the Tang Dynasty (618 - 907), which it is known for being one of the most prosperous dynasties in the history of China. On the other hand, a web of maritime routes connected Chinese seaports like Guangzhou with the south of India, the Persian Gulf, and the Eastern coast of Africa. (Colburn, 2009)

3 Methodology

Historically, economic schemas (especially the theoretical ones) included or trended towards the notion that the relationship of trade and growth is advantageous for all parties involved. Frameworks such as the Hecksher-Ohlin model or the Ricardian model posit this general idea. Fascinatingly, there is surprisingly insufficient empirical data to support a conclusion in either direction. In fact, a sector where imports outperform domestic products and exports suffer from quantity volatility would indicate a negative relationship (Igbinoba, 2017). The current consensus is that greater global integration of economies will positively affect growth, however, the short-term domestic effects rely on the agile reaction to competition in those markets.

In order to explore the current economic status of the countries involved in the Belt and Road Initiative, it is necessary to complete certain statistical analysis of trade data. Rather than assuming the advantage or disadvantage of any singular framework, it is useful to synthesize various points or indicators from each, utilizing each one to provide some assessment of the integration and the policies associated.

Synthesis is generally an insightful technique in methodical research. Incremental improvements are often the sum of the same components re-analysed and re-assembled by adopting radical new thought or even standard techniques from other fields. The rule of thumb in any instance of analysis by synthesis is to avoid many conjectures and input only data reliably available and verifiable. This type of analysis provides better measures to draw conclusions from since each indicator describes another dimension of the economic relationship.

The methodology selected for the research is as follows: the analysis will be in the form of both qualitative and quantitative data. While qualitative data will be collected from previous research papers, official reports, books etc. the quantitative data will be collected and analyzed using formulas or in other words trade indicators. These

indicators will be used to find the relation between the growth of a countries' economy and trade and assess trade patterns, potentials and gains. The indicators according to the World Banks are as follows:

3.1.1 Revealed Comparative Advantage Index

Measures of revealed comparative advantage (RCA) have been used to help assess a country's export potential. The RCA indicates whether a country is in the process of extending the products in which it has a trade potential, as opposed to situations in which the number of products that can be competitively exported is static. It can also provide useful information about potential trade prospects with new partners. Countries with similar RCA profiles are unlikely to have high bilateral trade intensities unless interindustry trade is involved. RCA measures, if estimated at high levels of product disaggregation, can focus attention on other non-traditional products that might be successfully exported. The RCA index of country i for product k is often measured by the product's share in the country's exports in relation to its share in world trade: too much space, skip a line or two lines here?

$$(1) \quad RCA_{ijk} = \frac{X_{ijk}/X_{ij}}{X_{wjk}/X_{wj}}$$

Where X is the value of country i 's exports of product k to country j and w world exports of product k to country j . Generally, a pre-selected range of values is adopted to assess the existence of comparative advantage between countries i and j , in this study values greater than 1 indicates an advantage and multiples of 1 (for example 2, 5, 9) indicates an extreme advantage. (Igbino, 2017).

3.1.2 Trade Intensity Index

The trade intensity index (T) is used to determine whether the value of trade between two countries is greater or smaller than would be expected based on their importance in world trade. It is defined as the share of one country's exports going to a partner divided by the share of world exports going to the partner. It is calculated as:

$$(2) \quad T_{aj} = \frac{X_{ie}/L_t}{W_e/W_t}$$

Where X_{ie} and w_e are the values of country i 's exports and of world exports to country j and where L_t and W_t are country i 's total exports and total world exports respectively. An index of more (less) than one indicates a bilateral trade flow that is larger (smaller) than expected, given the partner country's importance in world trade.

3.1.3 Trade Complementarity Index

- (3) The trade complementarity index (TCI) can provide useful information on prospects for intra-regional trade in that it shows how well the structures of a country's imports and exports match. It also has the attraction that its values for countries considering the formation of a regional trade agreement can be compared with others that have formed or tried to form similar arrangements.

The TCI between countries i and j is defined as: $C_{ij}^k = 100 * [RCA_{xi}^k * RCA_{mj}^k]$

$$[RCA_{xi}^k * RCA_{mj}^k]$$

- (4) In this case C_{ij}^k is the trade complementary between country i and j for the k commodity. The comparative advantage of country i in the exportation of the k commodity is RCA_{xi}^k and the comparative disadvantage of country j and the in the k commodity by its imports is $RCA_{mj}^k \cdot RCA_{xi}^k =$

$$\frac{\left(\frac{X_i^k}{X_i}\right)}{\left(\frac{X_w^k}{X_w}\right)}, \quad RCA_{mj}^k = \frac{\left(\frac{M_j^k}{M_j}\right)}{\left(\frac{X_w^k}{X_w}\right)}$$

In country i and the rest of the world X_i^k and X_w^k are commodity k 's export values; In country i and the rest of the world, X_i and X_w are the aggregate export values; In country j , M_j^k is the import value of the k commodity and in the country j , M_j is the aggregate import value. In the international market if a country has advantage in product k , and its trade partner has advantage in a product that's different, it shows

complementarity exist and if both parties engage in bilateral trade cooperation, the potentials for benefits in trade are high. (Igbinoba, 2017).

3.1.4 Herfindahl-Hirschman Product Index

This indicator is defined as a normalized Herfindahl-Hirschman index of the product concentration of merchandise exports at the country level. It is calculated according to the following formula is defined:

$$(5) \quad \frac{\sum_{k=1}^{n_i} \left(\frac{x_{ik}}{X_i}\right)^2 - \frac{1}{n_i}}{1 - \frac{1}{n_i}}$$

With X as country i 's total export value, x as the export value of product k from country i , and n as the number of products exported by country i (Igbinoba, 2017). Generally, the Herfindahl-Hirschman index is used in the analysis of competing enterprises in a certain sector, the product index adapts this concept to countries.

3.2 Data

The present study relies on databases which are used for the analysis, namely one database containing trade data by product and country to calculate the dependent variable, another for the amount of aid by sub-category and recipient country. Data from the TRADE MAP which sources its information from United Nations Commodity Trade Statistics (UN-COMTRADE) will be extracted and used for the analysis. The databases mentioned above reports thorough data about imports and exports data based on various internationally recognized trade classifications. The most common classifications are the Standard International Trade Classification (SITC) and the Harmonized Commodity Description and Coding System (HS).

Standard International Trade Classification (SITC) is a classification of goods used to classify the exports and imports of a country to enable comparing different countries and years. The classification system is maintained by the United Nations. Using the

SITC statistics, trade commodities will be divided into categories based on the international merchandise trade. The nine SITC categories are divided into three categories. The first category is the primary intensive resource commodities and includes SITC 0 (food and live animals), SITC 1 (beverages and tobacco), SITC 2 (crude materials and ores), SITC 3 (mineral fuels, lubricants and related materials) and SITC 4 (animal and vegetable oils, fats and waxes). The second category is the capital-intensive secondary commodities consisting of SITC 5 (chemicals and related products), SITC 6 (manufactured goods), SITC 7 (machinery and transport equipment) and SITC 8 (miscellaneous manufactured products). The last category is the special transactions commodities and is composed of SITC 9 (commodities not classified elsewhere).

The Harmonized Commodity Description and Coding System (HS) is a secondary (and often competing) classification of trade goods with similar goals to the Standard International Trade Classification (SITC). This system is maintained by the World Customs Organization since 1988 and has released updated versions of the system. It is divided into 21 sections, 99 chapters and thousands of headings and sub-headings. The products are classified in terms of the 2007 Harmonized Commodity Description and Coding System (HS) but then were converted to the SITC codes.

Countries in the Belt and Road Initiative used in the analysis are China, Egypt, Ethiopia, Ghana, Kenya, Nigeria, South Africa and Tanzania using each country latest year of reported data.

4 Results and Analysis

By applying the four indicators described in the methodology, the following results were obtained. All results were calculated by country, SITC and year of most recent reliable data. Note that SITC UNK is meta-category used to describe goods without a direct relationship from HS to SITC systems.

Table 1: SITC

	Egypt	Ethiopia	Ghana	Kenya	Nigeria	South Africa	Tanzania
CHINA	2018	2017	2018	2018	2019	2019	2018
SITC 0	70063	9445	58954	9208	1500	350462	9377
SITC 1	0	0	0	86	198	32225	14441
SITC 2	41139	223162	291128	78136	76024	751776 0	95611
SITC 3	730436	5	168141 0	2758	153995 5	15869	0
SITC 4	325	0	2	0	7476	4190	23
SITC 5	112732	1496	21	1671	9405	184558	286
SITC 6	69014	45170	449	14842	8113	141675 9	22660
SITC 7	1637	268	167	3111	22376	87967	1163
SITC 8	14934	8617	103	64	198	49308	69
SITC 9	0	0	37	0	0	41	20
SITC UNK	0	0	0	0	0	547	8

Unit: \$US 10,000

Table 1 shows the export values in nine SITC categories with its relevant totals for Egypt, Ethiopia, Ghana, Kenya, Nigeria, South Africa and Tanzania for the latest year. For Egypt, SITC 3 (Mineral fuels, lubricants and related materials) is ranked the highest in exports. In Ethiopia, the highest number of exports is from SITC 2 (Crude materials, inedible, except fuels). In Ghana, SITC 2 has the highest exports as well as Kenya. For Nigeria the top number of exports is in SITC 3. In South Africa, SITC 2 is ranked the highest and finally in Tanzania SITC 2 shows to have the highest number of exports. Table 1 also reveals that in the listed countries, SITC 2 (Crude materials, inedible, except fuels) amongst the other countries has the highest number to exports

in relation to China. Generally, the trade relationship between China and BRI participants is based on trade of raw materials.

4.1 Revealed Comparative Advantage

Table 2: Egypt - China

	Egypt
SITC 0	2.216239
SITC 1	0
SITC 2	0.310434
SITC 3	4.310558
SITC 4	0.073965
SITC 5	1.041252
SITC 6	0.93509
SITC 7	0.00397
SITC 8	0.224842
SITC 9	0

Table 2 indicates that Egypt has comparative advantage in SITC 3 which includes natural gas and petrochemical products as well as SITC 2 which includes crude materials and ore. It was recorded that Egypt had a percentage of 18.91 of total exports to China.

Table 3: Ethiopia - China

	Ethiopia
SITC 0	1.10357949
SITC 1	0
SITC 2	5.508729451
SITC 3	0.000129025
SITC 4	0
SITC 5	0.049370663
SITC 6	2.127546198
SITC 7	0.002317451
SITC 8	0.431531496
SITC 9	0

Table 3 shows Ethiopia's comparative advantage exist in SITC 2 especially oily seeds as well as a comparative advantage SITC 6 pertaining to leather. It was recorded that Ethiopia held a percentage of 8.25 of total exports to China.

Table 4: Ghana - China

	Ghana
SITC 0	0.954574516
SITC 1	0
SITC 2	1.124521837
SITC 3	5.079179208
SITC 4	0.000232991
SITC 5	9.9288E-05
SITC 6	0.003114091
SITC 7	0.000207332
SITC 8	0.000793794
SITC 9	0.000848416

Table 4 shows Ghana's comparative advantage exist in SITC 2 particularly in crude materials as well as a comparative advantage in SITC 3 in particularly in petroleum oils. It was revealed that Ghana had a percentage of 11.88 in total exports to China.

Table 5: Kenya - China

	Kenya
SITC 0	2.757659548
SITC 1	0.218031532
SITC 2	5.582308974
SITC 3	0.154096563
SITC 4	0
SITC 5	0.14612773
SITC 6	1.903952957
SITC 7	0.071438043
SITC 8	0.009122829
SITC 9	0

Table 5 shows that Kenya's comparative advantage resides in crude materials SITC 2 such as titanium, feldspar, niobium and tantalum as well as a comparative advantage in SITC 0 particularly in live animals and vegetables, oils and fats. The percentage of total exports to China was 2.1 percent.

Table 6: Nigeria - China

	Nigeria
SITC 0	0.023071671
SITC 1	0.032064363
SITC 2	0.333379427
SITC 3	5.568008322
SITC 4	0.889079657
SITC 5	0.053604544
SITC 6	0.072011765
SITC 7	0.035046741
SITC 8	0.001814546
SITC 9	0

Table 6 shows Nigeria's comparative advantage exist in SITC 3 particularly in oil and natural gas as well as a comparative advantage SITC 4 which is animals, oils, fats and

vegetables. It was recorded that Nigeria had a percentage of 3.1 of total exports to China.

Table 7: South Africa - China

	South Africa
SITC 0	0.929274157
SITC 1	0.899633226
SITC 2	5.683183325
SITC 3	0.009891372
SITC 4	0.085901458
SITC 5	0.181338832
SITC 6	2.16786927
SITC 7	0.023751995
SITC 8	0.07789963
SITC 9	0.000199884

Table 7 shows South Africa comparative advantage lie in ores SITC 2 as well as a comparative advantage in SITC 6. South Africa has the highest exports particularly in gold, copper, manganese. The percentage of total exports to China was 10.8 percent.

Table 8: Tanzania - China

	Tanzania
SITC 0	2.1478912
SITC 1	28.0021352
SITC 2	5.224486136
SITC 3	0
SITC 4	0.037904312
SITC 5	0.019129131
SITC 6	2.223293082
SITC 7	0.020425951
SITC 8	0.007522665
SITC 9	0.00648767

Table 8 reveals Tanzania has a comparative advantage in SITC 1 which is beverages and tobacco as well as a comparative advantage in SITC 2 and SITC 6 particularly in wood. It was revealed that Tanzania had a percentage of 6.2 in total exports to China.

4.2 Trade Integration Index

Table 9: Trade Integration Index between Africa and China

2018		2017		2018		2018		2019		2019		2018	
Egypt/ China	China/ Egypt	Ethiopia/ China	China/ Ethiopia	Ghana/ China	China/ Ghana	Kenya/ China	China/ Kenya	Nigeria/ China	China/ Nigeria	S Africa/ China	China/ S Africa	Tanzania /China	China/ Tanzania
0.322628	3.05741	0.967908	13.22421	1.083076	1.036714	0.165526	4.720022	0.281275	1.687432	0.967651	1.351194	0.344752	3.620069

Table 9 is the trade integration index between China and the selected African hubs which are Egypt, Ethiopia, Ghana, Kenya, Nigeria, South Africa and Tanzania which lies on the route of the Maritime Belt and Road. Egypt's exports to China is low, Egypt exports crude petroleum, unworked building stone and oranges. Compared to China's exports to Egypt which are greater than 1, suggesting Egyptian dependence on exports from China, particularly on Non-retail synthetic filament yarn, TV and radio transmitters, Telecom parts and accessories and Optical instruments. (OEC, 2017)

Trade integration between Ethiopia exports and the Chinese market in Table 9 reveals Ethiopia's exports to China is low. However, for China there is a high demand for oil seeds, especially sesame since it is Ethiopia's second largest export commodity, legumes, cut flowers, meat, coffee, sugar and tobacco which supports China's dependence on Ethiopia for its agricultural needs. But China's exports to Ethiopia is greater than 1, suggesting Ethiopian dependence on exports from China particularly in machinery, nuclear reactors, boilers, electrical equipment, Iron and steel (OEC, 2017).

Trade integration between Ghana exports and the Chinese market in Table 9 reveals Ghana and China equal dependence on each other. Ghana's exports in non-fuel crude

materials such wood and metalliferous ores (SITC 2) and mineral fuels, lubricants and related materials including petroleum and natural gas (SITC 3) to China are particularly high, indicating reliance on these imports in China. Ghana quite similarly has a large reliance on Chinese imports in machines and machinery, construction materials and clothing (OEC, 2017).

Trade integration between Kenya exports and the Chinese market in Table 9 reveals Kenya's level of trade integration with China is very low. This is so because of Kenya's lack of mineral fuel resources (Igbinoba, 2017) compared to China's exports to Kenya which are greater than 1, suggesting Kenya dependence on exports from China particularly in electronic equipment, machinery, nuclear reactors and boilers (Trading economics, 2020).

Trade integration between Nigeria exports and the Chinese market in Table 9 reveals Nigeria exports to China is low compared to China's exports to Nigeria which are greater than 1, suggesting Nigeria dependence on exports from China particularly in machinery, boilers, nuclear reactors and electronic equipment. (Trading economics, 2020).

Trade integration between South Africa exports and the Chinese market in Table 9 reveals that South Africa's export integration with China is close to 1. Though reduced demand for minerals due to China's economic change, it has seen a fall in exports, China is South Africans highest import partner compared to China's exports to South Africa which are greater than 1, suggesting South Africa has more dependence on exports from China.

Trade integration between Tanzania exports and the Chinese market in Table 9 reveals Tanzania exports to China is low. compared to China's exports to Tanzania which are greater than 1, suggesting Tanzania dependence on exports from China particularly in machinery, equipment, constructions materials. (Trading economics, 2020)

To summarize China's trade integration with African markets is higher than Africa's integration with China. With its position as Africa's largest trading partner, African

countries are observed to be more dependent on Chinese imports, relative to China's dependence on African exports and this reflects its growing trade deficit.

4.3 Trade Complementarity Index

Table 10: Trade Complementarity Index Between Africa and China

Egypt	Ethiopia	Ghana	Kenya	Nigeria	South Africa	Tanzania
2018	2017	2018	2018	2019	2019	2018
57.11008	2.061569	1.983665	0.377066	1.36554	1.56757356	1.165871

Table 10 shows the degree to which exports complement or match various trading partners. The trade complementarity index ranges from 0 to 100, with a score of 100 indicating trade cooperation between both of the parties is ideal.

For Egypt, there is evidence of growing complementarity in its trade with China. Egypt's exports to China are consist of ores, metals, chemical products, animals and agricultural produce such as fruits, nuts and cotton. Egypt's imports from China are automobiles, electric and electronic goods, semi-finished goods.

For Ethiopia, the degree of complementarity is low, regardless of the high trade intensity. Commodities such oily seeds, vegetables, flowers, nuts, coffee and meat exports are complemented by imports in heavy machinery, electric, electronics, medicines and automobiles.

In the case of Ghana's exports of unprocessed cocoa, raw metals, wood products, and petroleum oils complement the imports of iron, steel, electric and electronic goods.

Kenya's complementarity level is low and the exports of tropical fruits, cut flowers, legumes nuts, tobacco and tea complement the imports of machinery, electric, electronics and textiles from China.

For Nigeria the exports of mineral fuels, oils, oil seed, grains, oleagic fruits, seeds and fruits complement the imports of electric, electronic goods, machines and automobiles.

In the case of South Africa's exports of wines, agricultural products, ores, chemicals, and fruits complements the imports of miscellaneous goods, electrical, machines and mechanical products.

For Tanzania, the exports of salt, Sulphur, earth, stone, plaster, lime, cement, iron, steel and oils complement the imports of machinery and transport equipment from China. Normally, the extent of complementarity grants potentials for trade cooperation due to the arrangement structure and of both parties' exports. One could predict an increase in manufacturing investments and trade between both parties. This is due to the comparative advantages both of the parties have.

4.4 Herfindahl-Hirschman Product Index

Table 11: AFRICA HHPI TO CHINA

Egypt		Ethiopia		Ghana		Kenya		Nigeria		South Africa		Tanzania	
2018		2017		2018		2018		2019		2019		2018	
HHPI	Prod	HHPI	Prod	HHPI	Prod	HHPI	Prod	HHPI	Prod	HHPI	Prod	HHPI	Prod
0.15073	906	0.399997	346	0.267714	691	0.22662398	1003	0.729652	304	0.153057	1199	0.153057	791

Table 12: CHINA HHPI TO AFRICA

Egypt		Ethiopia		Ghana		Kenya		Nigeria		South Africa		Tanzania	
2018		2017		2018		2018		2019		2019		2018	
Prod	HHPI	Prod	HHPI	Prod	HHPI	Prod	HHPI	Prod	HHPI	Prod	HHPI	Prod	HHPI
1194	0.153621279	1149	0.421425628	1163	0.274022909	1171	0.228166296	1178	0.754738613	1178	0.152895487	1165	0.221343987

HHPI measures exporting countries weakness to net gains or losses from trade caused by changes in international prices and in the volume of goods and services that are traded internationally. From the analysis, it was revealed that exports are focused in fewer segments as the indexes are not close to 0. This implies that exports are not well varied to reduce being exposed to risk. A possible reason why diversification is low may come from the arrangement of African industry and the exports that mostly focused on commodities that are primary. As showed in the index, China's exporting products varies due to how engaged China is in tertiary and secondary economic areas. This will allow the capacity of exports to be more expanded on broader range of products as well as a produce a higher profitability margin.

4.5 Observations, Implications and Recommendations

While the BRI may appear to have lofty, seemingly impossible goals, the general concept of Sino-African economic integration is obviously achievable. Naturally, the possibility of integration imbalances and the associated political or socioeconomic by-product are an important state to avoid. Successful economic integrations most likely require equilibrium among stakeholders. This section discusses those observations, implications and makes recommendations to optimize the integration.

4.5.1 Ethiopia

Observations

Ethiopia's economy has largely been agriculture-based with more than 40 percent of its GDP being directly attributed to agriculture or related activities. Even more ominous is the dependence of agriculture for both foreign capital and domestic survival; more than 85 percent of the populace dependent and 90 percent of exports (hence foreign capital) coming directly from it (Chakrabarty 2016). The country's singular dependence is especially obvious in the Comparative Advantage indicators, with the

preceding sections displaying extreme advantage in SITC 2 and 6. This fixation on agricultural exports is appears to be planned economic specialization (albeit rather extreme) since the economy has grown with this focus.

The Ethiopian economy's growth, while appearing to vindicate its planners of the last two decades, may be propped and supported by an ugly truth: the increasing intensity of bilateral trade with China. Exports to China grew by 8 percent in less than a decade in the early 2000s which coincided with double digit economic growth (Chakrabarty 2016). China's major interest in Ethiopia's exports is rather concentrated in sesame seeds with 66 percent of all exports in 2017 (OEC 2017). The uninformed reader may be unaware of China's love of sesame since Ethiopian coffee is the country's most famous export; indeed, China's import of sesame fulfills a cultural need instead of any concrete one.

Ethiopia's imports, especially those from China outweigh the foreign capital from coffee and sesame. Machinery, construction materials, telecom and other infrastructure related goods are necessary to build a modern country yet these imports are likely to produce extreme strain on the populace via foreign debt. Chinese FDI, while slowly growing, has already displaced the competition in infrastructure, with China being involved in virtually all airport, power generation and telecommunication projects.

Implications and Recommendations

Building an economy on enabling the cultural habits of trade partners may be engender short-term successes for a populace in need of financial stability. The major indictment of Ethiopia's economy is its susceptibility to collapse in the aftermath of future upheaval where austerity in larger economies can create enormous ripple effects. China's love of sesame and the World's love of coffee may shift with warning. The HHPI results clearly recommend diversification of exports, regardless of the export destination, failure to diversify will likely lead to an integration imbalance. A

candidate for diversification is the minor industrialization movement associated with production of leather. Some technology transfer with China would be necessary but is certainly achievable.

From China's perspective, being involved in 'nation building' of this type is a major indication of the success of its policies to integrate. However, it is prudent to support Ethiopia without becoming its crutch, the Chinese economy, while officially world-class should not be burdened with supporting a failed economy. Minor transfers of general technologies are an option to consider, stable technologies can become more robust with usage outside China, new use cases can drive innovation faster.

4.5.2 Egypt

Observations

Egypt occupies a rather unique role in the Belt and Road Initiative, being the only country with ties to both Africa and the Arabian Peninsula. In fact, Egypt's inclusion in the initiative may appear awkward given the initiative has strong African leanings. While Egypt boast one of the better economies in Africa, China's main imports are petroleum related, 60 percent (or greater) of exports to China are petroleum related (OECD 2017). This sector is rather volatile and extremely susceptible to economic and political interference, events which Egypt has had primary experiences with in the last decade. China, with its preference for peaceful rise has avoided such events and in the immediate aftermath of Egypt's last upheaval, temporarily reduced its engagement (TIMEP 2019).

Egypt's foreign income appears to be a combination of tourism (Great Pyramids for example) and export of natural resources (Chen 2018). The Suez Canal and economic zone also appears to be a potential source of income since it controls a major shipping and logistics transit point. China has, in recent years, actively entered into cooperation

exchanges and infrastructure projects related to or near Suez Canal zone (TIMEP 2019).

Since 2012, China has surpassed the US to become Egypt's largest trading partner, however, US and EU foreign direct investments (FDI) has not decreased in this time-frame (Scott 2015). The total FDI has increased since China's FDI has only added to the previous and continued investments from the West.

Implications and Recommendations

While Egypt's economy exhibits some measure of diversity, the GDP-debt ratio has only marginally improved from its extreme point of 102 percent. The complementarity index, which seemingly indicates mutual need between China and Egypt, does not consider the dynamics of the exported goods. Natural resources such as petroleum while potentially important for economic growth, has volatility in the potential foreign capital gain. The Covid-19 pandemic is warning marker for the economy as petroleum and its related products have decreased in value, arriving at historic lows. Simultaneously, key actors in the fossil fuel industry are reducing investments in light of greater profitability in the alternative energy arena. The HHPI results reinforce this theory with its low outlook on the resistance to external factors.

It is extremely important to reduce the risk of further instability and sustain integration with key trading partners. While the West has maintained its involvement, possibly from an idealistic perspective, it is imperative for Egypt to further diversify its foreign capital streams. The Suez Canal Economic Zone has major potential to boost income and growth, economists and planners should investigate further. China has entrenched itself in the economic zone and has promised investment in future infrastructure. These investments should be carefully coordinated and preserved since the economic zone has major potential in establishing a larger export market inclusive of Sub-Saharan Africa. Too much space here

4.5.3 Ghana

Observations

Ghana occupies a distinctive role in the Belt and Road Initiative by virtue of its West African geopolitical status. Of the countries considered core or early BRI participants, Ghana, one of West Africa's leading economies, is key to the China ambitions. Ghana is considered West Africa's greatest potential market by FDI measures (AFDB 2020). Ghana's major source of foreign capital is exports of crude/raw materials, petroleum and related products with these products essentially driving economic growth in the last decade (Danquah 2017). Unsurprisingly, exports to China are comprised of these categories, a staggering 91.5 percent of all exports in 2018 were petroleum products and metalliferous ores (Manganese ores etc.), the remainder being other crude materials such as wood (OEC 2018).

While foreign capital enters the economy via exportation of natural resources and FDI, the domestic economy is supported by agriculture accounting for greater than 50 percent of the workforce and 23 percent of the GDP since 2013 (FAPDA 2013). Minor industrial activity occurs as a side-effect of the sourcing of natural resources for export.

China product exports into Ghana are essentially finished goods with heavy machinery, clothing, construction related goods headlining the import sheets. Comparative Advantage and Integration Index results imply a certain trade balance in the bilateral trade but this skew is rather obvious. Bilateral trade is essentially one-dimensional with both parties importing a single category of goods in large volumes.

Implications and Recommendations

Unlike Ethiopia and Egypt, China is not Ghana's largest trading partner with the Eurozone holding that position. Similarly, Chinese investments in the economy has never surpassed 10 percent (Danquah 2017). The Complementarity Index appears to support the lack of complementarity between Ghana and China. Ghana's wealth in

natural resources indicates that its industrial sector should perform more robustly. The industrial technology necessary to support this sector needs to be extended into other general industries. This is an opportunity for China to trade its technical knowledge for greater integration. Ghana also needs to add more diversity to its export portfolio, especially since its natural resources are not unique, geographically or otherwise.

4.5.4 Kenya

Observations

Kenya is one of the China's most well-known allies in Africa with ties as early as the 15th century. Kenya's involvement in the Belt and Road Initiative is due to its key port at Mombasa which can be a secondary point for imports and exports where Egypt's Suez Canal zone lacks resources or is overloaded. Kenya itself does not maintain significant bilateral trade with China due to lack of resources in demand by China but provides alternative routes for imports from nearby land locked countries such as the Sudans (Sudan and South Sudan) and Uganda (Githaiga 2019, Farooq 2019). To achieve this, China has invested heavily in transport infrastructure, building railways to connect Mombasa to Kenya's interior, building a second a port at Lamu and planning an oil pipeline (Farooq 2019). Mombasa's importance as a port of entry is due to its status as East Africa's largest and most modern port.

Kenya major import source switched from India to China in 2014 and the volume of imports has consistently increased. The construction of the Mombasa-Nairobi railway spiked imports for a few years as specialized products were necessary for the construction (Githaiga 2019). In 2018, electronics headlined Kenya's imports but in third position was Railway, tramway locomotives, rolling stock, equipment (Trading Economics 2018). In contrast, Kenya's exports to China consists of crude materials such as ores and food products, which can even be considered token imports.

Implications and Recommendations

Kenya's trade complementarity and integration indices are indicative of its weak bilateral trade with China. Indeed, China's involvement with Kenya appears to be a pragmatic relationship where the macro-benefits are not derived from Kenya directly. The implication is that Kenya's importance and inclusion in the Belt and Road Initiative is merely a geopolitical accident in collusion with China's peaceful rise mantra. This clearly explains China's economic disinterest with Kenya; all of the infrastructure projects in Kenya have provided little benefit to its economy. Researchers have cited jobs per kilometer of railway and greater employment numbers at Chinese involved enterprises and endeavors as positive impacts of China's presence but note that the impact is neutral at best (Farooq 2019).

Kenya needs to solve its trade imbalance with China and spur growth. Solving the imbalance implies that Kenya must provide new products in demand (or potentially in demand) to China. Growth can be achieved by utilizing the modern infrastructure being created by China for additional purposes other than facilitating China's trade with neighboring states. Kenya could establish bilateral logistics agreements with Egypt to complement the Suez Canal with its modern port facilities. China can negotiate a pact where Kenya's ports are open to Europe and India for transits where China has preferential status. Additional secondary routes will become available, allowing the export apparatus to become more robust and impervious to interference.

4.5.5 Nigeria

Observations

Nigeria is West Africa's only other BRI participating country after Ghana and similarly covers an area known to be rich in natural resources especially petroleum products and metalliferous ores. Petroleum accounts for approximately 10 percent of GDP and 83 percent of all foreign income. Agriculture employs 36 percent of the

population and contributes approximately 21 percent to GDP (Nordea 2020). The domestic services sector is unusually robust with employment rates of 50 percent (Nordea 2020). Nigeria has, in recent years, experienced turmoil and instability on scale only slightly lower than Egypt. While regime change did not occur, the government lost control of areas (especially rural areas) to insurgent groups led by Boko Haram. Like Ghana, there is a small industrial sector that employs 12 percent of all Nigerians but is beset by internal issues (Nordea 2020).

Nigeria's export profile is only marginally distinguishable from Ghana, more than 85 percent of all exports to China were of petroleum related products, metalliferous ores and wood related raw products, an actual difference of approximately 5 percent with Ghana in 2018 (OEC 2018). The economy is extremely susceptible to fluctuations in oil prices and the government continuously adjust policies as reactions to oil price changes. Nigeria imports finished products from China in the form of machinery, electronics, vehicles etc. (Trading Economics 2018). These imports have consistently increased since the late 1990s and has contributed to the trade imbalance with China (Adewuyi 2010).

Implications and Recommendations

Given Nigeria's Comparative advantage is solely petroleum related products, a category of products that China imports from numerous trade partners and its weak integration index, it is unsurprising that the economy struggles even with current BRI projects. It is, however, extremely alarming that such a resource-rich state struggles with the volatility of oil exports (The Commonwealth 2020). Contrast with neighboring Ghana, which has generally avoided this volatility, the requisite actions to reduce this dependency should be sufficiently urgent.

It is beyond prudent that Nigeria diversify its portfolio of foreign income sources. The government should implement methods to export its services industry to foreign partners. The potential growth for that half of the populace and the immediate

diversification is great. It is also necessary for the industrial sector to solve its issues with machinery and power supply to expand its reach. China has the technical knowledge and skills to assist the industry, it is necessary for bilateral agreements for knowledge transfer to be codified.

4.5.6 South Africa

Observations

South Africa, home to Africa's most famous economy and only African member of the G20 and BRICS is the most diversified economy of the continent. The country's major foreign income source is the export of natural resources particularly precious stones, ores and metals with accounting for approximately 60 percent of global exports (OEC 2018). The mining sector responsible for these exports is the fifth largest globally by GDP and contributes between 6 and 8 percent of the GDP. The industrial or manufacturing sector provides a greater percentage of the GDP at 13 percent. The finance sector and government via state owned enterprises (SOEs) contribute a further 38 percent (Brand South Africa 2018).

While the domestic economy is appropriately diversified (as is evident in the comparative advantage), South Africa's export profile closely resembles its West African neighbors Ghana and Nigeria. The country's major export destinations include the US, UK, Germany, Japan, China and the Netherlands, with China surpassing the others become the top export and import destination since 2009 (Mutambara 2017). Greater than 85 percent of China's imports were from the mining sector in 2018 (OEC 2018). South Africa imports of electrical and heavy machinery, electronics, mechanical appliances account for more than 40 percent of Chinese imports with other finished and semi-finished goods providing the difference.

South Africa's key economic challenge comes in the form social instability due to unprecedented high levels of unemployment for a growing economy. Almost 30

percent of the population is unemployed with greater than 50 percent of young adults reporting unemployment. This has resulted in a rather large inequality with the top 10 percent controlling more than 70 percent of the wealth (World Bank 2019).

Implications and Recommendations

South Africa's trade with China has a Comparative Advantage in categories where it is a major world producer. These categories, however, are not crucial demands for China, this explain the substantially low integration index between the parties. While the export potential volatility is lower compared to petroleum related products, the income is of low value. The economy is unable to achieve better growth rates simply because the workforce is unskilled. The country needs to use the BRI to improve the skill-set of current and future laborers. People-to-People skills and technology transfer are an underutilized aspect of the initiative.

4.5.7 Tanzania

Observations

Tanzania is East Africa's third participant in the BRI and operator of one of East Africa's important ports. Bordered by Kenya in the north, Tanzania shares similar geographic strengths and weaknesses. Agriculture is Tanzania's largest dependent sector, employing more than 60 percent of the populace and contributing between 24 and 30 percent of the GDP (CIA 2020, MoF 2017). Mining of gold and other precious articles or minerals (stones and metals) has recently increased, adding potential new source of income from exports. This industry sector (including mining) contributes approximately 26 percent of the GDP with services (domestic) adding 37.5 percent of the GDP in 2017 (MoF 2017).

Tanzania's major export partners have consistently included India, South Africa, Kenya, Switzerland, Belgium, Democratic Republic of the Congo and China. India is

the largest export destination with China a close second, the countries swap positions with China being the largest import source and India second. (CIA 2020, MOFCOM 2015).

Tanzania's export profile as of 2018 includes precious and semi-precious stones and metals, vegetable products such as tea, coffee etc., metals iron and copper and tobacco related products, the preceding which accounts for 50 percent of all global exports (OEC 2018). Copper, ores and metals along with seeds, grains and electrical parts/accessories comprise approximately 77 percent of all imports from Tanzania. China's exports to Tanzania, like Kenya and other BRI participating countries consists of finished products, especially heavy machinery, vehicles and electronics.

Implications and Recommendations

Tanzania's exports to China are disturbingly minor and inconsequential. The integration and complementarity indices strongly suggest that only Kenya is less important and exiguous. China's stance in Kenya as previously discussed is ambivalent at best and it appears that, regardless of official statements, the same stance exists relative to Tanzania. Indeed, the largest projects between the parties are transport based, railways and ports and roads. This indicates that the country is mainly a transit and/or storage point for more important resources originating from other sources. Tanzania needs to explore its potential export income streams, especially in mining and petroleum (offshore is possibly better) to diversify its export portfolio. The country risks being unable to truly benefit from involvement in the BRI. The original TAZARA railway, a turnkey project, could have been re-purposed for better usage but simple died after the Chinese abandoned it. It is prudent that the government take the current opportunity and reuse the new infrastructure being built.

4.6 Policy Implications

Given the implications and recommendations per bilateral relationship, there exists separate issues with the policy adjustments. These policy adjustments cannot be proposed or implemented in vacuum; bilateral relationships can become volatile. Policy changes always include some measure of uncertainty, some seen and unforeseen implications. This section discusses those implications as they relate to the BRI recommendations listed in the previous section.

4.6.1 China

Key officials and decision-makers of the BRI in China can be modestly elated with the current success of the Initiative. Africa is increasingly friendly to Asia in general and particularly China. These newfound allies are willing to support Chinese initiatives on a global scale. While developing and negotiating policy adjustments in the BRI, policymakers in Beijing should consider the following implications:

Technology Transfer. China's commitment to infrastructure projects for the BRI includes a hidden potential for influence. The US and Europe has traditionally been considered leaders in STEM. China's meteoric rise has produced many modern technologies beyond the capabilities of other regions but has not been able to leverage this into greater global prominence. By teaching, adopting and maintaining technology in Africa, China's tech can meaningfully influence Africa's economic rise and provide non-Asia usage of competing products. Policy makers must decide what tech can be transferred to Africa, how transfers are coordinated, and which party administers transfer. The US and Europe manages these concerns via export controls that include clauses for technology. Tightly controlling the tech and transfers may compel partners to adopt unsavory practices and cause economic tensions.

4.6.2 Africa

The early returns for BRI participating countries have been relatively fruitful. Economic growth rates have increased, jobs and new markets are being created via China's involvement. BRI countries need to be aware of how policies can positively and negatively influence internal issues, policymakers should be aware of the following implications in BRI policies and agreements:

Technology Transfers. Africa's major obstacle in transforming its economies is the lack of certain skill and technologies. Obtaining these technologies has been extremely difficult as Africa's partners in the West are reluctant to share. China has historically exported semi-finished or finished products to Africa and has not shared raw technical skill but has changed policies since the BRI includes knowledge transfers. African leaders have managed to leverage educational transfers as part of the current BRI policies but have suffered, unsurprisingly, from brain drain, as the newly skilled students prefer to remain abroad.

It is still prudent for African leaders to be aware of knowledge China is more willing to share, this avoiding the same issues with the West. Technology and skill transfers need to be targeted for sectors with promising growth. China typically will prefer to allow highly skilled individuals to remain in the country, hence the repatriation or economic contribution requirement needs to be strict.

Infrastructure Sharing. Many of the infrastructure projects underway in BRI countries are based on loan or grant based financing with exclusivity for China's uses. These exclusivity clauses are often the target of criticism, with many labelling it neo-colonialism. These agreements when revisited will certainly include tensions. African leaders need to be aware of the dependency on Chinese capital for future projects. While China is indeed willing to continue such participation, the relationship still requires mutual trust and benefit. Negotiating new sharing agreements will require some version of relatively greater benefits for China's interests. These new agreements may also stoke geo-political interests and tensions inside and out of Africa.

5 Summary and Conclusions

The Belt and Road Initiative is a major factor in China's ambitions for larger international cooperation and its peaceful rise. The participating countries and China have embarked on the creation of cooperation framework with rivalling or even surpassing the Eurozone. With China as the initiator, the Belt and Road Initiative priorities include economic cooperation. It is sufficiently obvious that China needs the raw material exports from Africa, similarly, Africa needs access to the Chinese market. The bilateral trade values in SITC categories and the computed Revealed Comparative Advantage supports the mutual need. While the BRI parties may have mutual need, the Trade Intensity Index indicates that African dependence on China is greater than China's integration with Africa. The BRI African economies are still developing and require a trading partner willing to sustain large import volumes long-term even during economic volatility; especially since HHPI has a low outlook on raw material exports. China is one of few trading partners able to fulfill this role and requiring the products exported out of Africa. Ironically, the Complementarity Index implies that China's need does not directly complement BRI exports even though the import volumes have consistently increased.

Most of the African BRI economies suffer from lack of skills and advanced knowledge. Ethiopia and Tanzania on the east coast, Ghana and Nigeria on the west coast have economies with varying degrees of industrialization which can be boosted by technology transfer from China. South Africa similarly needs skilled laborers in many sectors where unemployment surpasses the African and World average. Thus, the recommendation for those economies is to negotiate knowledge transfers with China. Egypt and Kenya hold strategic importance for logistics via the Suez Canal and Mombasa ports but provide no raw material resources to China. In these economies, the recommendation is re-use important shipping corridors via sharing agreements.

The policy implications for China and Africa in future policy adjustments are mainly technology transfer, infrastructure sharing and policy on internal politics. China will need to consider its non-interventionist policy in situations where bilateral relationship

can become strained; Beijing will also need to decide an amicable strategy for technology and knowledge sharing that protects its interests while preserving its competitiveness in foreign markets. Africa needs to present its adjustments precisely to prevent policy failures with technology transfer or risk alienation or tension with China when including non-BRI partners.

In conclusion, the Belt and Road Initiative, while extremely successful with its current policies, can be improved by achieving greater integration among participants. African economies have many more unclaimed benefits available via lesser adopted or mis-adopted policies that may be able to boost economic growth.

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