THE IMPACT OF INFRASTRUCTURE DEVELOPMENT ON TRADE COSTS IN THE EAST AFRICAN COMMUNITY

BY

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DECLARATION

This paper is my original work and has not been submitted for an award for a degree in any institution of higher learning.

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This research paper has been submitted for examination with my approval as University Supervisor.

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DEDICATION

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List of Abbreviations

AFDB - African Development Bank

AIDI – Africa Infrastructure Development Index

Aft - Aid for Trade

cif - cost-insurance-freight

DRC – Democratic Republic of Congo

EAC - East Africa Community

ITC - International Trade Centre

ICT – Information Communication and Technology

LDC - Least Developed Countries

NTM - Non-Tariff Measures

ODA - Official development assistance

OECD - Organization for Economic Co-operation and Development

OSA - Open Skies Agreements

RIT - Regional Integration theory

RIO - Regional International Organizations

SDG - Sustainable Development Goals

SME - Small and Micro Enterprises

UN - The United Nations

WTO - World Trade Organization

SVE - Small vulnerable economies

Definition of Terms

Infrastructure: refers to the roads, rail, electricity, telecommunication networks, and other public works that are essential for the operation of an industrial economy. Infrastructure also includes airports, energy sources such as electricity and other structural facilities required for a society's operation.

Hard and soft Infrastructure - Hard infrastructure comprises of physical structures and telecommunications and information technology indicators. Soft infrastructure on the other hand are linked to the following indicators; border and transportation efficiency, business and regulatory environment.

Trade costs - Trade costs refer to the costs related to goods exchanged across borders which, obstruct economic integration.

Trade facilitation - Trade facilitation measures refers to simplifying and harmonising procedural and administrative trade regulations that can act as trade barriers.

ICT - This is the technology or know-how of acquiring, storing, processing, and transmission of data and information.

Abstract

This study examined the impact of infrastructure on trade costs in the five East African Community countries. Various studies i.e. (Aldagheiri, 2009), have found that efficient infrastructure is fundamental to a country's development. According to literature infrastructure is instrumental in promoting trade whereas a lack of infrastructure impedes trade. Studies on trends in trade costs have similarly illustrated the contribution of technological advancement in the infrastructure sector which contributed to their decline. The study assessed bilateral trade costs between EAC members by applying the gravity model using ESCAP World Bank Trade Costs Database's trade costs data. Infrastructure data from the African Development Bank's Socioeconomic Database is used in the analysis. This study examined the history and present state of infrastructure in the EAC, as well as the influence of infrastructure constraints on trade facilitation and regional cooperation, so as to realize the goals of the Region's Vision 2050. The study enriches the scanty literature on the impact on the advancement in infrastructure on trade costs in East Africa. The results of this study are essential in informing policies and advising policy makers in the EAC. This study finds that bilateral trade costs have been declining between EAC countries due to advancements in infrastructure during the study period between 1997 and 2015.

CHAPTER ONE
INTRODUCTION

1.1 Background

International trade is typically defined as the sale and distribution of products and services across international borders, with a commercial element (a sale for profit) required for a transaction to be classified as trade (Goode, 2003). It consists of transaction between residents of different countries. According to the Latin dictionary, trade by definition means "path" or "course of conduct" and Commerce stems from the Latin term commercium, from "cum" meaning "together" and merx which means, "merchandise".

Since 1927, the term "infrastructure" has been used to refer to the roads, rail, electricity, telecommunication networks, and other public works that are essential for the operation of an industrial economy. The definition of infrastructure has since evolved to include airports, energy sources such as electricity and other structural facilities required for a society's operation. According to Dupuy, (2000), Infrastructure is responsible for the roll-out of power, water, sewerage, and communication facilities across geographical zones as public goods by means of uniform service systems.

In the ancient days, trade led to the creation of trade routes, which eventually supported the development of road infrastructure and communication networks. This is evident in the Trans-Saharan trade, which occurred, between the 8th century and the early 17th century and involved travelling across the Sahara desert transporting goods from outside and within African regions. Trade routes were formed and they spread all over Africa and traders becoming very important in all African societies over time. (Shillington, 1989)

Africans have always devised new ways to communicate with one another. Ancient Africans devised a variety of communication methods, i.e. drums. Colonialization led to the introduction of modern forms of communications such as telephony and telegraphs. It is important to note that communication infrastructure has also supported transport infrastructure. The recent introduction of mobile networks and Information and Communications Technologies (ICT) represent the present forms of modern communication. ICT is the technology or know-how of acquiring, storing, processing, and transmission of data and information. (Wangwe, 2007).

Because of the advancement of ICT, people and businesses can now transact and connect worldwide at lower costs. Embracing modern technologies and e-commerce have stirred trade at various levels. Technological developments have the ability to improve efficiency while also continuing to expand new markets. Technology has improved access to trade data, allowed traders to communicate more effectively, facilitated fund transfers, and facilitated exports. The efficient use of ICT is a critical step toward realizing the electronic trade capacities for developing countries, Xing, (2018). Across Africa, ICT continues to be acclaimed as economic growth and development drivers. This acclaim is largely owed to mobile communications' success (Stork et al., 2007). Despite numerous achievements in African telecommunications, there is still a huge digital divide between Africa and the rest of the world.

Trade costs refers to costs related to goods exchanged across borders which, obstruct economic integration, (Obstfeld and Rogoff, 2001). Trade costs influence export performance and competitiveness. Trade costs comprises of policy barriers explicitly tariffs and non-tariff barriers, information and communication costs, transportation costs, legal costs, enforcement costs, exchange rate and regulatory costs as well as distribution costs. As detailed by Anderson and van Wincoop, (2004), international trade costs are estimated to account for 74% of ad valorem equivalents, while local distribution costs account for 55%. Total trade cost reductions accounted for over 30% of the expansion of global trade from 1950 to 2000 during the globalization era (Jacks, Meissner and Novy, 2009).

Despite a decrease in trade costs over recent decades, they remain important, particularly in developing countries. The cost of transportation, travel, and communication is proportional to the distance traveled (Head, 2007). High transportation costs pose a significant barrier to development in Africa. High freight rates, weight and distance, fuel costs, the demand for freight and government regulation are some of the causes of high transport costs. These costs cause friction in the movement of labour and goods and have been found to considerably reduce their markets for labour and goods (Naudé and Matthee, 2007). Countries which incur elevated communication costs, on average, possess lower export power than countries which exhibit relatively low communication costs. As a result, ICT infrastructure investments will lower international communication costs and benefit regional trade in the long run. (Mupela and Szirmai, 2012).

Numerous research studies have proven a link between trade capacity and various infrastructure categories. For instance, (Limao and Venables, 2001) established that communications and transport infrastructure advances led to significant reductions in trade costs. On the other hand, (Balisteri, 2014) found that advances in a variety of business services i.e. communication, insurance, and banking will lower trade costs.

The huge dearth of African infrastructure poses a big challenge to the development of the continent. As populations grow and with investment increments, the pressure exerted on that infrastructure grows. Poor transportation services in many Sub-Saharan Africa countries are known to increase trade costs in the continent (Balisteri, 2014). Inadequate infrastructure is a significant constraint for trade. Many developing and developed countries have a well-documented infrastructure deficit, which is impeding growth prospects. Infrastructure is critical for small, vulnerable economies to boost trade performance and overcome market size limitations (OECD, 2013).

Enhanced development of infrastructure networks will reduce the cost of transportation as well as communication in terms of both money and time. Good infrastructure such as roads promotes regional integration both in various regions within the country, with neighbouring countries as well as on an international level (Aldagheiri, 2009). Costs, such as freight charges and tariffs, have been fairly well tracked in the investigation on the nineteenth-century trade boom. Measurement of the extent and impact of trade costs and other trade impediment is nonetheless difficult.

To expedite economic growth, developing economies require a significant increase in infrastructure. There is substantial evidence that investing in infrastructure may boost economic growth and decrease disparities and poverty levels. According to the findings, infrastructure investment explains a significant portion of the disparity in social and economic indicators (Koner et al, 2012). There is need to invest in soft infrastructure, which include the services necessary for the maintenance of the population's economic, health and social standards, so as to increase productivity, reduce border transactions. Eradicating bureaucratic bottlenecks that provide opportunities for corruption can significantly decrease trade costs (WTO, 2013)

1.1.1 The Evolution of Infrastructure in Africa

Infrastructure refers to the roads, rail lines, airports, telecommunication networks among others. Transport infrastructure (roads, rail, air, sea etc.) allows for the flow of people and goods from one area to another. The development of transport in Africa is studied from a historical viewpoint where three eras can be distinguished namely: the pre-colonial, the colonial and the post-colonial era. In the course of the pre-colonial period, infrastructure development was slow. In the colonial period, cities developed where leaders lived while the majority of the local people lived in the outskirts. Through this time, most transportation infrastructure was built in the style of their colonial masters. Transport infrastructures were needed to transport the natural resources to be exported to the metropolis hence the need for development in transport structures. (Tchanche, 2018).

Roads can be referred to as physical structures and capital goods, which make possible the mobility of persons and goods and make certain locations accessible for economic agents. According to Karl, (1997), the determination of the economic impacts of road infrastructure is the term "accessibility". The main mode of transport in Africa is roads which bears the capacity of carrying up to 80% of goods and 90% of passengers (AfDB, 2014).

To assess the development of African countries' road networks it is necessary to employ indicators like aggregate lengths, classified according to operating conditions, as a substitute of standard indices like as ton per kilometer or passenger per kilometer. Because operating conditions meet performance standards such as capacity, speed etc., roads can be categorized as paved or unpaved. The Trans African Highways system consists of nine major corridors totaling 59,100 kilometers in length. More than half the network is currently paved, though maintenance is still an impediment. Around 53% of African roads are unpaved, which has isolated people from basic services, (AfDB, 2014).

The EAC uses five modes of transportation: rail, maritime, road, air, and oil pipelines. These modes support services sub-sector, in addition to supporting national economic development. The current transportation system in Tanzania and Kenya serves as a key transit network for the Lake Victoria Basin's landlocked countries, such as Burundi, Rwanda, and Uganda. It also benefits South Sudan, Ethiopia, and the Democratic Republic of the Congo, which are landlocked but not members of the EAC.

Infrastructure Development in the EAC

Road, rail, maritime, air, and oil pipelines are among the five forms of transport used by the EAC. These form part of the infrastructure and support services sub-sector. The existing transport network in Kenya and Tanzania, facilitates economic development of the nations and additionally, acts as a critical transit network for the Lake Victoria Basin's landlocked countries (Uganda, Rwanda, and Burundi). The networks also supports non-EAC but landlocked neighbours; Ethiopia, South Sudan and the Democratic Republic of Congo. After road, railway transport, is the second most significant infrastructure and therefore is critical for long-distance freight along the EAC's main transport corridors. (EAC, 2019).

Kenya opened the 579-kilometer Nairobi-Mombasa Standard Gauge Railway (SGR) in 2017, running parallel to the Kenya-Uganda railway line. The SGR has resulted in an increase in freight and passenger traffic between Mombasa and Nairobi (EAC website). The development of the SGR from Mombasa, Kenya to Uganda, in addition to the railway from Dar es Salaam to Kigali, is expected to lower freight transport costs and time to and from the other neighbouring States aided by Dar es Salaam and Mombasa ports. This intends to increase the opportunities for industrial development and skilled labour (EAC, 2019).

The EAC Treaty recognizes the significance of air transportation in boosting the region's economy. Partner countries agree to work together to build and operate communications infrastructure, develop and deploy ICT software and services, and promote postal services. The primary objective is to coordinate EAC Partner States' Policy frameworks, laws, and regulations, to encourage the development of communications infrastructure and services, to synchronize technology and services, and to enhance communications markets. (EAC, 2019).

1.1.2 The Global Evolution of Trade Costs

Economists define trade costs as the distinction between the theoretical "frictionless" world's quantity of trade flows and what is actually witnessed. All factors that result in a disparity between the producer price and the consumer price are considered to be trade costs. Example of such costs include; policy barriers (tariffs and non-tariff barriers), transportation costs, Communication and other information costs, enforcement costs, exchange rate costs, legal and regulatory costs, and local distribution costs are examples of these factors. (Van Wincoop and Anderson, 2004).

The history of trade costs is divided into three eras: the first globalization wave occurred between 1870 and 1913, followed by the interwar retreat which begun in 1921, and finally the rise of globalization from the 1950's. The first wave of globalization saw a 23 percent drop in global trade costs when compared to domestic trade costs. The majority of the decline occurred during a period of falling tariffs and freight charges, and increased use of the gold currency. The downward trend in the cost of transport was significantly watered-down in subsequent periods (Jacks, Meissner, and Novy, 2009).

During the interwar period from 1921 to 1939, several attempts to reinstate the prewar order, such as the restoration of the gold standard, were made. Prior to 1929, trade costs fell by an average of 4%. However, between 1929 and 1932, the Great Depression's turning point saw the most intense upsurge in trade costs, with costs rising by 18 percent on average. Finally, between 1950 and 1970, the third era of globalization saw a 16 percent decrease in average trade costs. As a result, there appears to be slightly more variation in experience than in the past. Trade cost reductions accounted for about 55% of the trade surge before World War II and 33% of the increase in trade after World War II. A sharp increase in trade costs is responsible for the interwar decline in trade (Jacks, Meissner and Novy, 2009).

Trade Costs in Africa

A majority of African economies with the slowest growth are experiencing or have reemerged from conflict. These countries ability to trade globally has been severely hampered by conflict. Geographical factors are an important determinant in the economic prosperity of African countries. Uganda, Botswana, Burundi, Rwanda, Central African Republic, Lesotho, Chad, Mali, Malawi, , Niger, Zimbabwe, Swaziland, Burkina Faso, Zambia, Ethiopia, and South Sudan are all landlocked countries (LLCs). These countries' geographic location places them physically and economically further away from key global markets, contributing to their massive trade costs. (AfDB, 2010)

These immense trade costs have prevented landlocked countries from benefiting from development, since their exports are less competitive while their imports are more expensive. When essential good imports become expensive, the competitiveness of exports reduces. The World Bank found that importers in Chad and Central African Republic paid cost-insurance-freight (cif) fees which are about 1.3 to 1.8 times higher than the price of goods at country of origin. (AfDB, 2010)

Trade Costs in the East African Community

Bribery as a trade cost factor is evident along the Uganda-Kenya border, where traders engage in illegal practices such as undervaluing the quantity, weight, or value of goods in order to pay lower customs duties, falsifying product descriptions so that they are treated as products with no or low tariffs, and bribing customs officials and police officers (Ogalo, 2010). Trade costs also include costs that occur “at-the-border" as well as "behind-the-border".

By developing a multi-region CGE model focusing on Kenya, Tanzania, and their EAC Customs trading partners, Balistreri, (2014) observed three categories of deep integration for the countries: trade facilitation, services liberalization, and non-tariff barrier reduction, found that the deep aspects of the agreements provide the most benefits.

Trade cost estimates are higher for trade partners situated further away from the EAC and lower for partners located near the coast. Costs are also lower for EAC countries with a common market and shared colonial history. After 1999, the total bilateral trade costs projections in intra-EAC trade dropped from an estimate of three to two, which happens to coincide with the 2000 EAC Treaty's implementation. However, total bilateral trade costs for non-EAC trade have risen from an average of seven to ten. (Kaminchia, 2019)

1.2 Statement of the Problem

Infrastructure is widely acknowledged to have significant role in promoting trade. The EAC has continued to invest in infrastructure to get a competitive edge in trade compared to their counterparts. Investments in EAC infrastructure have greatly supported landlocked territories within the region i.e. Uganda, Rwanda and Burundi. However, the infrastructure sector faces many challenges such as financing, transport congestion, poor maintenance, and communication breakdowns which have in turn hindered smooth operation of trade. The causes of trade costs that greatly hinder trade have not been studied extensively whereas it is known that most of the challenges affecting EAC integration can be attributed to poor governance, poor physical infrastructure, and persistent trade disputes among others. These challenges would be resolved if stronger and firmer governance frameworks were established with the support of reliable data. There also exists inadequate knowledge on the effect the state of infrastructure facilities has on trade costs which has made it difficult to design effective policies that will help reduce these trade costs and to further foster regional integration in the EAC. This study set out to establish the impact of infrastructure on trade costs using the gravity model. The study compared infrastructure conditions within the five countries using the African Infrastructure Development Index (AIDI). The study established whether EAC infrastructure networks are able to meet the outcomes of EAC's vision 2050 and other development projections. It also determined the impact of trade costs on exports. From the findings, policy makers are steered towards the justification of significant investment in infrastructure sectors to support the objectives of regional integration in East Africa.

1.3 Research Question

The study sought to examine the following research questions:

i. What is the impact of infrastructure on trade costs?
ii. What is the impact of trade costs on exports?
iii. What policy implications can be drawn from research findings?

1.4 Main objective

This study aimed at assessing the impact of infrastructure development on trade costs in the East African Community

1.5 Specific objectives

i. To determine the impact of infrastructure on Trade Costs
ii. To determine the impact of trade costs on EAC's exports.
iii. To make policy implications based on the study's findings.

1.6 Justification of the study

This study shows the importance of infrastructure to trade and eventually to the economy. Good and reliable infrastructural networks facilitate trade, create opportunities and reduce trade costs.

This study analyzes infrastructure challenges to establish their causes which will then help us understand them. As a result, solutions to the problems can be applied to infrastructure systems to improve their efficiency.

Analyzing the EAC infrastructural projects is of great value to EAC governments, and policymakers in addressing challenges in infrastructural development as well as offering recommendations through which some of these challenges would be alleviated.

This paper provides a guide to policymakers and key government players in scaling up infrastructure investment, which is a critical pillar in national development strategies, particularly for low-income developing countries.

The study acts as a guide to policymakers and other stakeholders because it enriches existing knowledge on this research area. This will encourage policy makers to design better policies in infrastructural development.

1.7 Organization of the study

Chapter one of this research paper presented the study's scope, the research problem, questions, research objectives and justification. The chapter also gives a background on the history of infrastructure and trade costs globally, in the African continents and in the EAC.

Chapter two examines the existing literature on infrastructure and trade costs from previous studies. The chapter reviews and critiques theoretical and empirical literature and highlights gaps to be addressed. Chapter three presents the theoretical and empirical framework used in the analysis. It presents variable measurements and the estimation techniques the data that was analyzed and its sources.

Chapter Four summarizes the findings from analysis of trade cost and infrastructure data between the years 1997 and 2015. The chapter shows descriptive statistics of the variables, correlation and regression analysis. Chapter five summarizes results, conclusion and policy implications drawn from the results.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter surveys theoretical literature and the empirical studies on the impact of infrastructure on trade costs. The study sums up findings through providing an overview of literature as well as identifying gaps that this study attempts to fill.

2.2 Theoretical Literature Review

This section discusses how different studies have addressed the impact of infrastructure on trade costs. Trade costs can be classified into various categories due to the incidence or nature of their occurrence or by the industries or trade networks they affect. This section reviews existing literature on infrastructure-related categories of trade costs, the incidence and occurrence of trade costs hard and soft infrastructure's role in facilitating trade.

By measuring various indicators of cross-border connectivity, Kurmanalieva, (2020) estimated trade cost as a function of trans-border connectivity, distance, and the quality of infrastructure. They discovered that high trade costs slow and cost the manufacturing process, forcing international trade to focus on regions with lower tariffs and higher quality of infrastructure, thereby pushing the others to the edge. This does not benefit geographically disadvantaged islands or landlocked nations desperate for improved access to a wide range of global distribution networks.

Trade Costs occur at different phases of the trading process, which involves getting the good from the producing country to the consumer. These stages include costs which are incurred behind the border (before getting to the border), costs incurred in every stage of the international trade chain as well as people-related costs that are incurred when crossing the border which include documentation and compliance to customs requirements and finally beyond the border costs which influence getting the goods to the final consumer. Because of the dominance of value chains, which increase costs every time borders are crossed, these interactions along the trade path are significant, they therefore affect the efficiency and competitiveness of local manufacturing and exports as well as the value of imports, (OECD, 2008).

The first category of trade costs are referred to as "behind-the-border" costs. These costs affect transactions even in situations where goods are sold locally. Low trade costs have an important influence on non-agricultural product trade only to a certain extent. Non-tariff barriers have the potential to nearly double a tariff's prohibitive effect on a wide range of products (UNCTAD, 2018). Governance transparency and the business environment are two other issues that exist behind the border.

Informal trade between Sub-Saharan African countries is widespread. A study by (Siu, 2019) examined trade elasticity informality with regard to trade costs. To estimate the effect on trade formalization, the study looked at the time and custom point variation in the institution of border facilities that reduce trade costs by reducing border delays and corruption. The study found that the informal-total trade ratio between Uganda and its neighbors decreased only by a quarter when border facilities were introduced, based on data collected at two border towns between Kenya and Uganda.

The second incidence of trade costs covers trade costs in every stage of the international trade chain. Due to how costs influence time delays, transport networks and logistics are considered more strenuous on trade than tariffs. In every stage of trade, infrastructure is the most expensive yet important component of transportation costs. This has an influence on export performance. Maritime transport costs account for approximately 6% of import value, whereas trade across continents and landlocked countries requires road transport (OECD, 2009). However, providing excellent physical infrastructure will not lead to a reduction in transport costs unless logistics services are efficient and productive.

Borders impose high barriers to trade. To highlight random processing times owing to administrative and physical handling of shipments, Carballo et al, (2017) examined detailed Peruvian import-processing data to show that firms absorb longer processing times with shorter storage times. They looked at the impact of border processing time on the value of imports. They calculated that eliminating physical document inspection would save between 6 and 12 percent on border processing costs. Their findings also revealed that the costs of border processing were disproportionately high for new trade relationships.

The third category of trade costs covers crossing the border and can be referred to as thickening borders. These costs regardless of whether it is upstream or downstream create obstacles and inefficiencies for goods crossing the border. Before goods can be cleared at a customs station checkpoint, they are frequently subjected to extensive documentation, lengthy administrative processes, and compliance fees. The cumbersome border regulations are referred to as "thickening" borders by trade facilitation scholars and they are especially predominantly high in developing countries (OECD, 2009). Border-related costs are comprised of; tariffs and non-tariff measures.

Customs administrations, as national gatekeepers, play an important role at border checks, and borders have a huge impact on cross-border operations by women in the informal economy. In his discussion, Chiukira, (2021), discovered that African borders are well-known for being thick and insensitive to women's needs in cross-border trade. Border processes and regulations, the number of agencies at the border, the professionalism level, and the flow of trade policy information, and other reforms are all topics of discussion.

Thick borders as well as significant hidden costs particularly in developing countries has been noted to provide incentives for informal trade. This is especially the case for informal cross-border trade observed in Sub-Saharan Africa. This trade is predominantly made up of essential food commodities and goods of low quality, which often outnumbers formal trade of the same products. Small and medium sized businesses are the most common participants, as formal trade procedures are prohibitively expensive for them. In 2006, it was noted that 86% of Uganda's official exports comprised of informal trade. (OECD, 2009).

The fourth classification of the incidence of trade costs are the beyond the border costs which occur when the goods are en route to reaching the final consumer. The destination country's transportation infrastructure is as important. On the importer side, goods must first go through the supply and retail sector before reaching the consumer. ICT advancements as well as the growing integration of logistics and marketing, have increased the potential for economies of scale in the retail sector. Secondly, goods move through a greater availability of high-quality yet less costly intermediate goods. Foreign imports can significantly boost the overall productivity of a nation (Hallaert et al., 2011).

Next we evaluate literature that examines infrastructure-related categories of trade costs. Trade Costs which are specific to infrastructure include transport costs, communication and information costs, among others. Scholars have studied infrastructure-related trade costs and found that declines in international transport costs have been prominently listed as evidence for the advancement in international trade. Transport cost reductions are at the top of the list of possible reasons for trade growth after World War II (Hummels, 2007). It is noted that between 1850 and 1913, technological advancements resulted in significant reductions in shipping costs. Thereafter following the wars, trade globally rose at an average rate of 5.9 % annually between 1950 and 2004 (WTO, 2005).

Focussed on transport in France, Lafourcade et al, (2005) developed a road cost transportation indicator for France over time that considers the charges imposed on transporters. They found that between 1978 and 1998, the cost of road transportation dropped dramatically. Infrastructure investments were a driving factor, determining which regions benefited the most from the cost reductions. Ocean transport costs includes freight and shipping charges. The ocean is the primary mode of trade between nations that don't share a common border. Ocean shipping, is a preferred mode for the transport for bulk commodities i.e. oil. In terms of weight, they account for a large portion of trade, but ocean cargo account for a minor and diminishing portion of trade in value. However, reduced shipping times due to improvements in technology have improved the speed of ships as well as port efficiency. (Hummels, 2007)

There is proof that investing in air transportation reduces trade costs. Air transport is more likely to be chosen over ocean transport, particularly for goods whose weight is low but are of higher value. The determinants of air transport costs include geography, distance, the existing airport infrastructure, regulatory quality, competition regimes, and trade composition. (Micco and Serebrisky 2006). Between 1955 and 2004, air transportation costs decreased by 92% in terms of revenue per ton-kilometre. Consequently, the number of ton-miles transported rose by 11.7 % annually between 1975 and 2004 (Hummels, 2007).

There also exists a time cost of transport which implies that the time it takes to ship products is a significant barrier to trade. The variability of delivery time is another aspect of time that creates a barrier to trade (WTO, 2008). According to (Hummels, 2007), each day spent in shipment corresponds to a 0.8% tariff which equates to a 16% tariff based on a 20-day trip by sea which is higher than a tariff rate on average. Studies have shown that subject to the sector and destination of goods, an increase by 10% in the time taken to export reduces trade by approximately 5-25% (Hausman et al., 2005). The development of an efficient system of intermodal transport enabled by advancements in communication technologies has helped reduce both delivery time and delivery uncertainty. Factory and warehouses can track where a product is at any point (WTO, 2008).

Communication costs can be referred to as the costs of connecting people. People need to communicate in order to trade. Traders should gather information on profitable international trading opportunities as well as consumer preferences. Finally, good producers must seek out the right supplier. Telecommunications provide an affordable means of probing, collecting, and exchanging data. Unreliable communication could be a major obstruction especially in just-in-time processes (WTO, 2008). Communication costs have long been recognized as important in international trade by economists (Harris, 1995). Growth in trade globally in the twentieth century has frequently been attributed to advancements in telecommunications technology and lower communication costs. Effective communication is especially important in the trade of various types of goods. Connections among vendors and purchasers are expected to enable information exchange (WTO, 2008). A study on the impact of language on trade by Melitz, (2002) discovered that language is key in reducing information costs. A common language benefits business by allowing for direct communication and thus promoting trade.

Most gravity model estimations include a variable that measures the ease of communication between countries. Employing a gravity model, Fink et al., (2002) found that communication costs, impact trade negatively, as measured by average bilateral calling price per minute. They also learnt that the differences in international communication costs, in particular influences trade significantly. The cost of connecting people has decreased gradually, especially for the expenses incurred when making international calls. From 1949 to 2007, the number of international calls made to other countries from Germany using fixed lines decreased significantly. Telecommunications costs have been significantly reduced as a result of technological advancements and regulatory reforms. Second, the telecommunications network's worth has increased (WTO, 2008).

The internet is a wealth of information and is also a business and research platform. When analysing the influence of internet on trade by quantifying the total number of web servers in a nation, Freund and Weinhold, (2000) discovered a significant increase between the year 1997 and 1999. The quality of telecom infrastructure is key, according to evidence reported by Spinanger, (2001) from a study on textile manufactures in Hong Kong.

Finally, we evaluate how hard and soft infrastructure promotes trade facilitation. Trade facilitation is broadly defined as any policy that aims at reducing trade costs, bureaucratic delays, and "red tape" which makes cross-border trade difficult. Trade facilitation measures refers to simplifying and harmonising procedural and administrative trade regulations that can act as trade barriers. Trade facilitation programs significantly influence the profit margins of small exporters. (Olarreaga, 2016). Trade facilitation measures are classified into two categories which are 'hard' infrastructure and 'soft' infrastructure (Portugal-Perez and Wilson, 2010).

Perez analysed the relationship between a set of observed variables via an unobserved mutual element to create four indicators linked to trade facilitation. Hard infrastructure comprises of physical infrastructure and ICT indicators. Soft infrastructure on the other hand are linked to the following indicators; border and transportation efficiency, trade and regulatory and legal environment (Portugal-Perez and Wilson, 2010).

Improving infrastructure quality especially physical infrastructure would have a significant and visible effect on export growth. For hard infrastructure, physical infrastructure i.e. roads and rail is used to assess the development and quality of these facilities. Hard infrastructure also includes ICT, which is the level in which a country's economy utilizes technology to enhance efficiency and productivity while lowering costs. Border and transportation efficiency is a type of soft infrastructure that measures the efficiency of border control and transportation. This can be measured by the amount of time, financial resources, in addition to paperwork needed for import and export processes (Portugal-Perez and Wilson, 2010).

In analyzing South Asian hard and soft infrastructure barriers to trade, Tasneem and Bacani, (2013) discovered a potential to enhance trade in the region through institutional changes and reorganization of border customs processes. They discovered that strategically targeted investments and policy implementation by regional partners could help break down barriers and allow for more efficient trade, cargo movements, and gains. Soft and hard infrastructure had beneficial effects on trade amongst African countries and the EU over the period 2005-2012.

2.3 Empirical Literature

Numerous empirical studies have investigated the link between trade costs and infrastructure as discussed below;

Poor infrastructure explains 60% of the anticipated transport costs for landlocked regions and 40% for coastal nations (Limao and Venables, 2001). Using various datasets to observe the impact of geography and infrastructure on transportation costs (Limao and Venables, 2001), learnt that landlocked nations can decrease their high transport costs significantly by improving their infrastructure as well as that of the transit countries. An examination of African trade reveals that their low volume is mostly as a result of weak infrastructure. They discovered that advances in transportation and communication infrastructure decrease trade costs significantly.

To demonstrate the significance of transaction costs and trade infrastructure (Prabir De, 2006) explored 15 Asian Countries from the year 2000-2004 and found that transaction costs create a bigger barrier to trade compared to tariff barriers. The study discovered that transaction costs are statistically significant and contribute significantly to the explanation of variation in Asian trade.

However, Prabir De, (2006)'s study has its limitations. First, there is the possibility of endogeneity, which cannot be ignored, that a growth in trade will result in grander values for transport infrastructure facilities. These facilities are likely to improve as a country's trade costs and imports decrease. However, if endogeneity exists, there is a risk of an upward bias in the variables' coefficients. Endogeneity occurs where an explanatory variable is correlated with the error term. Second, the study focused on the significance of transaction costs in the Asian background, where infrastructure and transaction costs are highly agglomerated. Prabir De was unable to separate both variables and determine the contributing relationships between the variables and the trade.

Using a service delivery approach in observing shipping logistics in their model (Arvis et al, 2010), discovered an indirect correlation between infrastructure and costs. They discovered that provision of infrastructure was impactful to service providers. Furthermore, (Arvis et al, 2010) examined the costs of being landlocked and discussed how non-coastal economies that rely on their neighbours transport corridors to move goods for trade are distinctively interested in trade facilitation and efforts to reduce the transport costs. Based on wide-ranging data collection in the world, the study proposed a new analytical framework based on shipper observations of logistics. The framework assesses the trade and macroeconomic impacts of logistics issues using a microeconomic approach. The study goes on to argue that landlocked developing countries' exporters and importers face high logistics costs, which are highly detrimental to their competitiveness.

Technological advances have been found to propel a sharp decline in trade costs. To identify the precise causes of postwar trade growth and declines in transport costs (Hummels, 2007) studied the patterns of transport costs over time. Hummels used a diverse set of data to provide a thorough analysis of the shipping costs time series pattern. This study relied on data from the United States' merchandise imports from 1974 to 2004. The average revenue per ton-kilometer that was transported fell by 92% from the year 1955 to 2004.

While analyzing the key drivers of air transport costs; Micco and Serebrisky, (2006) discovered that improving airport infrastructure facilities by 50% decreased air transportation costs by 15%. The availability of runways per million city residents was used to gauge improvements in airport infrastructure quality. From the study, the error term could be correlated among countries, as well as their impact on air transportation costs, without taking into account cross-sectional variation. Furthermore, including country dummies addresses possible endogeneity problems to some extent. The use of country dummies in this study has limitations in that it does not completely eliminate endogeneity bias. An additional endogeneity problem arises from the relationship between transportation costs and imported volume. To resolve the endogeneity issue, the study used the imported country's GDP as a proxy for import volume (Micco and Serebrisky, 2006).

To determine the effect of infrastructure on trade deficits and exports from 1990 and 2017, Rehman et al, (2020) relied on an improved Global Infrastructure Index. The index used a yearly dataset of thirty infrastructure quantity and quality indicators and transportation, communication, finance, etc. sub-indices from countries in South Asian. The Pooled Mean Group (PMG) estimator as well as Pedroni and Kao test co-integration technique were used in this study. The Pooled Mean Group cointegration estimator permits short-term variables to vary among groups whereas requiring long-term coefficients to be equal. The Pedroni test consists of seven test statistics, and the regression equation has more than one independent variable. On the other hand, Kao (1999) developed a constrained version of Pedroni's approach, in which the equation's slope parameters are assumed to be constant across groups but the intercepts are allowed to vary. The Pedroni and Kao test was used to study the co-integration between variables. According to the findings, infrastructure boosts exports while increasing the trade surplus. In selected variables, the Pedroni and Kao test showed a robust indication of co-integration. The advantage of the PMG method over other techniques is that the method yields both short and long-run outcomes (Rehman et al, 2020). The study also employs a Quality of Institution Index, adapted from Rehman and Ding (2019), which considers six institutional quality variables such as control of corruption, rule of law, government effectiveness, government stability, regulatory quality and democratic accountability.

A study on the role of correlation in trade infrastructure was conducted by (Olarreaga, 2016). The study aimed at attempting to explain the heterogeneous results in countries that engage in infrastructure investments. Heterogeneity in this case refers to non - observable variations between research sample which are related to the variables in the study, and it can indicate that the findings are unfitting. In a panel data model, heterogeneity occurs when populations, samples, or findings differ. In the panel dataset, the model coefficients vary from each cross section. Amongst the initial conditions, mentioned by (Olarreaga, 2016) the quality of infrastructure matters a great deal.

Inadequate infrastructure quality and quantity can create trade barriers by increasing transportation costs. Poorly developed areas, could benefit significantly from trade-enhancing infrastructure policies. Drawing estimates from 36 studies which yielded 542 infrastructure elasticities, Celbis et al., (2015) used meta-analysis where they combined the results of multiple studies and meta-regression techniques to measure the prominence of infrastructure for trade. Meta-regression is a type of meta-analysis that employs regression analysis to integrate, compare, and synthesize findings from various studies while taking into account the effect of available explanatory variables on dependent variables. The paper developed numerous simulations to explain for observed heterogeneity. Random effects also accounted for unspecified heterogeneity between studies, whereas the Hedges model addresses publication bias. The study by also focussed mainly on public infrastructure in transportation and communication. According to the study, a 1% increase in internal infrastructure boosts exports by 0.6% and imports by 0.3%. The findings suggests that a general upgrade in trade-related infrastructure would benefit exports more than imports. (Celbis et al., 2015).

In investigating shipping costs determinants, (Micco et al., 2004), used a database of over 300,000 annual observations on product cargos at the six-digit HS level from various seaports globally. They discovered that port efficiency is a significant factor in shipping costs. The costs fall by 12% when the effectiveness of the port increases from the 25th to the 75th percentile. Handling costs, which are one component of shipping costs, are also increased by inefficient ports. They discovered that differences in port efficiency are linked to the state of the nation's infrastructure.

As tariffs fall, it becomes clear that trade costs create a major barrier to international trade, but also that they differ by country. Using Australian data on imports decomposed at the HS 6-digit level, Pomfret and Sourdin, (2010) discovered huge country-by-country variations in trade costs. They also discovered that distance, weight, and size all contribute to the variation in trade costs.

The study by Asma (2015) explores the impact of infrastructure on Malaysian trade between 1990 to 2013 using a panel data analysis. The study's main goals included testing the addition of infrastructure into the augmented gravity equation and investigating trade cost reduction through infrastructure improvement. After using a fixed effect model to test for results robustness, the findings showed that the infrastructure variables are positively significant to the value of trade between Malaysia and its partners in trade.

African countries have higher average trade costs than other developing economies. Using gravity-model estimates, ad-valorem substitutes of advancements in trade metrics were computed for sampled African countries. To African exporters, the benefits of improving trade logistical support halfway to South Africa's level are greater than a reduction in tariff barriers. Enhancing logistical support in Ethiopia halfway to South Africa's level, for example, is approximately equal to a 7.5% reduction in tariffs suffered by exporters in Ethiopia. (Portugal-Perez and Wilson, 2010).

2.4 Overview of Literature

From the reviewed literature it is apparent that infrastructure has an important role in in facilitating trade. It is clear that infrastructure components i.e. transport and communications infrastructure form a large composition of trade costs determination. An increase in own infrastructure increases exports assuming that demand for the good exists. The quality of infrastructure matters a great deal since it accounts for almost half the predicted transport costs. However technological advances could propel declines in trade costs.

The study by Rehman et al, (2020) uses the Quality of Institution Index, developed by Rehman and Ding (2019), which includes institutional quality variables of like; corruption and country stability. Governance and institutional quality are key determinants of economic development and trade.

Based on evidence the literature review has indicated that landlocked countries experience larger barriers to trade compared to their partners hence the need for high quality infrastructure as shown by (Limao and Venables, 2001). However studies such as (Prabir De, 2006) in analyzing trade costs in Northeast Asian countries only focused on China, Japan and Korea(South) and failed to exhaustively explore landlocked-ness as a trade cost determinant especially for countries such as Mongolia in that region.

Many of the previous studies in investigating how infrastructure as a contributor to trade costs failed to include Communication infrastructure. Most studies have failed to include the internet's role in easing trade.The study by (Fink et al., 2002) investigated country-to-country calling prices and found that trade suffers greatly due to high communication costs. Nevertheless much has changed in the world of telecommunication especially the reduction in country-country calling prices over the past nineteen years. Similarly, the advent of the use of internet for online calls has allowed traders and stakeholders to communicate seamlessly.

Logistics' role in facilitating international trade is understated in literature. The efficiency of these logistical support structure has been critical in trade and in supporting commercial activities.

Both Moïse and Le Bris, (2013) and Portugal-Perez and Wilson, (2008) revealed the occurrence of trade costs and their accumulation at every stage of the international trade chain. The two focussed on: border related costs, behind-the border issues as well as documentation and the costs of compliance. However, Portugal-Perez and Wilson, (2008) failed to address accessibility of trade finance as a trade cost factor.

In spite of this, there is limited literature available on trade costs in the EAC, and the study enriches the scanty literature on the impact on the advancement in infrastructure on trade costs in East Africa. Therefore this paper attempts to fill these gaps by capturing the impact of Infrastructure Common border, common language, and landlockedness among other factors on trade costs in the EAC.

In the next Chapter we discuss the research methodology, the study's econometric approach as well as the source of data used in the paper.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter discusses the study's research methodology. It comprises of theoretical framework, empirical model, variable definition and measurement, data sources, and the study's econometric approach.

3.2 Theoretical framework

The study adopts the Gravity model. The model is based on Isaac Newton's gravitational law, which asserts that the force of attraction which is between two elements is proportionate to the product of their masses and inversely proportionate to the square of their distance as shown below;

$$F_{ij} = \frac{GM_iM_j}{D_{ij}{}^2}$$

.... (1)

In Newton's equation F represents attractive force; D denotes distance; M denotes mass and G represents a gravitational constant.

The quantity of trade between two nations is proportional to their mass and a size of their comparative trade resistances. The gravity model has been used to evaluate the trends of bilateral trade between two countries as a function of their GDPs and indirectly comparative to their distance. The earlier trade gravity models proposed a similarity among bilateral trade, economic sizes, and a measure of trade tensions between two countries.

The gravity equation can be presented as shown in equation 2, below;

$$Xij = G \cdot \frac{Y_iY_j}{Dij}$$

.... (2)

X_{ij} represents the volume of trade moved from country $_i$ to country $_j$, Y_i and Y_j represents the GDPs of the two countries, G is a constant, D_{ij} stands for the distance between both countries capital cities, measured by the distance between two capital cities (these being the main hub or the location of each countries markets). Countries that are closer to each other are attracted to trading with each other due to reduced costs in getting their goods to the neighbours' markets. The longer the distance meaning the further apart the countries are from each other, the higher the trade costs incurred.

The Gravity model has been effective in predicting trade flows between countries. The model is appropriate for our study as it analyses the effect of distance on trade and other elements of trade such as geographical position and population. This model links trade to size of the economy and trade costs, which are typically represented by geographical distance, as a measure of transportation costs. The model also captures symmetries in international trade patterns. Infrastructure that is well-developed shortens the distance between regions and allows for market integration (Ismail and Mahyideen, 2015).

Studies that have used the gravity model include McCallum, (1995) who when introducing the McCallum Gravity Equation, estimated an equation where exports from one region to other regions are the regions' GDP, and the distance between them are represented by dummy variables equivalent to one interprovincial trade and zero for state-province trade. To further explore the gravity equation by solving the McCallum border puzzle, Anderson and Van Wincoop, (2003) developed a technique to estimate a theoretical gravity equation efficiently. Van Wincoop used the appraised gravity equation to calculate the variation in bilateral trade flows upon eliminating barriers at the border to find out the effect of borders on trade flows.

Authors like Limao and Venables (2001) and Hummels, (2007) found a positive correlation between distance and trade costs where an increase in the distance has a corresponding increase in trade costs. Distance and bilateral trade are found to be negatively correlated in other literature.

3.3 Empirical Model Specification

To estimate the gravity equation, it is common practice to take logs of the variables and thereafter convert them into a log-linear equation which can be estimated using OLS regression.

This yields an estimation equation as is with the augmented Anderson and van Wincoop model:

$$\ln X_{ij} = a_0 + a_1 \ln Y_i + a_2 \ln Y_j + a_3 \ln \tau_{ijt} + a_4 \ln \Pi_i + a_5 \ln P_j + \varepsilon_{ij} \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where; X_{ij} indicates exports from country i to country j, τ_{ij} represents trade costs between the two countries, t represents time periods and ε is the error term. Y is GDP, Π_i and P_j represent country i's outward and country j's inward bilateral resistance terms.

The concept of iceberg-costs was used by Anderson and van Wincoop (2003), to insert trade costs into their model. In their augmented gravity model, they indicate that monitoring trade costs is essential for a well-specified gravity model. Their findings indicate that, rather than the absolute trade costs between the countries, bilateral trade is determined by relative trade costs and the average "resistance" faced by exporters in country *i*.

From the Van Wincoop model, we can estimate our gravity equation as:

$$\ln \tau_{ij} = \beta_0 + \beta_1 \ln D_{ij} + \beta_2 \, \text{comBord}_{ij} + \beta_3 \, \text{comLangOff}_{ij} + \beta_4 \, \text{landlock}_{ij} + \beta_5 \text{Transport} + \beta_6 \, \text{ICT} + \beta_7 \text{Electricity} + \beta_8 \text{Corruption} + \varepsilon_{ij}$$

(4)

In the equation above countries i and j are in members of the same Regional Trade Agreement and in this case the EAC. The assumption is that goods traded between the two is driven by demand. The gravity model expresses country *j*'s demand for goods made in country *i*.

Where: Trade costs are represented by the dummy variable τ_{ij}, D_{ij} represents the bilateral distance between the EAC countries' capital cities, comBord_{ij} represents a Common Border, comLangOff_{ij} represents Common Official Language, landlock_{ij} represents whether the countries are landlocked, Transport represents Transport infrastructure index, ICT represents ICT infrastructure index, Electricity represents Electricity infrastructure index, Corruption represents Corruption Index and ε_{ij} represents the error term.

Transport, ICT and Electricity infrastructure indices are composite indices sourced from the Africa Infrastructure Development Index. During construction, the composites go through a normalization procedure where the normalized components are adjusted to take values between 0 and 100. The composite index is computed as the weighted average of all indicators for every element that comprise one indicator. The transport composite index, for example, analyses the status of infrastructure in terms of total road network and total paved roads. Electricity Composite index comprises of the total electricity produced in the country measured in millions of kilowatt-hours per household per hour. The following variables make up the ICT composite index: total number of phone subscriptions, number of internet users, broadband internet subscribers and international internet bandwidths.

The control for corruption index is sourced from the World Governance Indicators. The index ranges from 0 to 100 percentile rank and is constructed by combining the perceived corruption ratings from a range of different sources including international development banks, and surveys of firms and households using unobserved component model to aggregate the responses. The model assumes that corruption is not observable and can only be approximated by aggregating the scores from the provided indicators.

The various sources are combined by merging all indicators in the Control of Corruption cluster from the same source into one indicator. Following that, each constructed indicator is resized to decide whether the source covers a large enough number of countries in various income categories and regions to be classified as a representative source. These representative sources are then combined to form a preliminary composite indicator of corruption control. The non-representative sources are regressed on the pre - computed composite index to find estimations of their error variances.

3.4 Variable definitions, measurements and a priori expectations

Variable Name	Measurement	Expected Sign
Trade Costs (τ)	US Dollars ($)	
Distance (D)	Distance in kilometres between most capital cities	Positive
Common Border(comBord)	A dummy variable of 1 to indicate whether the countries share a common border and 0 if not	Negative
Common Official Language (comLangOff)	A dummy variable of 1 to indicate whether the countries share a common official language and 0 if not	Negative
Landlocked (landlock)	A dummy variable of 1 to indicate countries which are landlocked and 0 if otherwise	Positive
Transport	Transport infrastructure Index	Negative
Information Communication Technology (ICT)	ICT infrastructure Index	Negative
Electricity	Electricity infrastructure Index	Negative
Corruption	Corruption Control Index	Negative

The priori expectations were that Distance and Landlockedness would have a positive relationship to Trade costs. A positive relationship infers that an increase in those variables results in a corresponding increase in the other. On the other hand, it was expected that a Control for Corruption, Transport, ICT and Electricity index alongside a common official language and border would be inversely related to trade costs.

3.5 Estimation Techniques

This study used panel data estimation techniques. This is because the data used is Panel or longitudinal dataset which comprises of multiple observations of the five EAC countries trade costs and infrastructure data over a specific timeframe. The dataset used in this study contains observations from 5 countries which have traded with each other over time, 19 years or time-periods. The study observed data from five EAC countries between 1997 and 2015 with a maximum of 364 number of observations. In contrast to cross-sectional data analysis, panel data analysis allows for non - observable variances across elements to be correlated with the study variables whose impacts are to be measured.

In estimating the data, the following panel data model estimation techniques were applied; Pooled, Fixed and Random Effects models. To evaluate the impact of variables whose effect changes over time, a fixed effect model was used. It captures variances among cross-sectional components as a result of changes in the egression model's constant and intercept term. The model assumes that a component within the individual may bias the independent variable.

The random effect model was relevant when randomly identifying a representative of individuals from a large population. The rationale is that the gap between entities and the explanatory variables have no correlation. The model assumes that the error term and the independent variables are uncorrelated. On the other hand, the pooled model also referred as pooled least square was used to investigate observations in the data that do not denote to the same entity.

3.6 Pre-estimation Tests

The Breusch-Pagan Lagrange Multiplier and Hausman tests are pre-estimation diagnostic models which were used to determine the appropriateness of the estimation models. The diagnostic tests were performed to identify possible concerns with error terms and model specification so that the estimated coefficients could be considered accurate depictions of the parameters.

The Hausman test

The Hausman test (Hausman, 1978) was applied to identify and choose the most appropriate model between Fixed Effect and the Random Effect. The Hausman tests identifies endogenous regressors in regression models. The Hausman test looks for differences in the model estimates, and uses the analysis to decide whether the two estimates are significantly different. If the assumptions of the Random Effect model are correct, then the null hypothesis of the Hausman test is that the Random Effect model produces better estimated parameters than the Fixed Effects model. If the assumptions of the Random Effects assumptions are not met, then the parameter estimates differ significantly and the model estimates are biased. If the null hypothesis is rejected, it follows that the Fixed Effects estimates are reliable. Furthermore, if we accept the null hypothesis in the Hausman test, we then use Random Effects.

From the estimation, I found that the null hypothesis implies that the preferred model is random effects whereas the alternate hypothesis is that the preferred model is fixed effects. Therefore, the study used the random effects model.

The Breusch-Pagan Lagrange Multiplier Test

Adrian Pagan and Trevor S. Breusch (1980) developed the Breusch-Pagan Lagrange multiplier Test (LM Test). This is a statistical test to identify the suitability between the Random Effect model and Pooled Model. The test looks for heteroskedasticity in linear regression models and holds the assumption that the error terms are distributed normally.

The null hypothesis for this test is that the individual error term variances are zero meaning there is no variance between units. If it is zero that means that there are no significant differences across countries hence we resort to a simple OLS regression. If the error term is not zero we therefore accept the alternative hypothesis and surmise that the random effects model is suitable showing significant differences across the countries.

From this test, the null hypothesis is that the pooled model is preferred whereas the random effects model's alternate hypothesis is preferred. Therefore this study rejects the null hypothesis and the random effects model was chosen.

3.7 Data Types and Sources

Bilateral trade costs for all goods from EAC countries; Burundi, Uganda, Rwanda, Tanzania, and Kenya was sourced from ESCAP World Bank Trade Costs Database in US dollars. The study uses total trade cost data for the EAC countries by country within the period of 1997 to 2015, a period of 19 years with observations ranging from 260 to 380. Observations were especially fewer for infrastructure indices due to underdeveloped infrastructure in Rwanda and Burundi.

The infrastructure indices data was acquired from African Development Bank Socio-Economic Database due to the data source's credibility. The transport index comprises of Air, Road and Rail data while the ICT index was built comprising of Internet usage statistics, telephone and mobile cellular usage and subscription. The Electricity index is made of subcomponents such as electricity usage in kilowatts and access to electricity (% of population)

The transport composite index, for example, analyses the status of infrastructure in terms of total road network and total paved roads Electricity Composite index comprises of the total electricity produced in the country measured in millions of kilowatt-hours per household per hour. The ICT composite index comprises of; total number of phone subscriptions, number of internet users, broadband internet subscribers and international internet bandwidths indicators.

Data on the distance between two countries are from the Center d'Études Prospectives et d'Informations Internationales (CEPII) – UNCTAD. Data on being landlocked and the binary variables for common official language were also obtained from CEPII. Data on Corruption control was obtained from World Bank Worldwide Governance Indicators (WGI) website.

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSIONS

4.1 Introduction

The chapter feature data analysis and summary of findings. The chapter covers the following subsections; descriptive statistics of the variables, regression and correlation analysis. This analysis is based on data on the EAC for the period 1997 to 2015.

4.2 Descriptive Statistics

Descriptive statistics are represented below. This statistics include Mean, minimum, maximum and Standard deviation,

Table 4.1: Descriptive Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ln_TradeCo~s	364	18.7244	.3683877	18.00006	19.8011
ln_Distance	380	6.339133	.457818	5.19299	6.765532
TransportI~x	260	8.376455	3.631774	2.75216	14.41739
Electricit~x	260	1.150984	.9298935	.1193811	3.156494
ICTIndex	260	1.609189	2.522867	.0000282	10.85412
CommonBorder	380	.7	.4588617	0	1
Landlockedi	380	.6	.4905438	0	1
Common_Off~e	380	.7	.4588617	0	1
Corruption~i	320	27.37848	17.46012	1.421801	75.48077

The number of observations are mostly within the range of 260 to 380. This being as a result of variables with fewer observations in sub-components such as Volume of Cargo via Sea, Access to electricity, Rail connectivity and Road Infrastructure. The average transport index stands at 8.37% this is quite low while Electricity and ICT indices are at 1.15% and 1.6% respectively this is quite low given that they are all below the tenth percentile.

The EAC is doing favourably well in the control of corruption with the average corruption index standing at 27.37%. Three in five (60%) of the EAC countries is landlocked. There is need to constantly invest and upgrade EAC infrastructure especially electricity and ICT which still lag behind. EAC government should continue in their efforts to control for corruption.

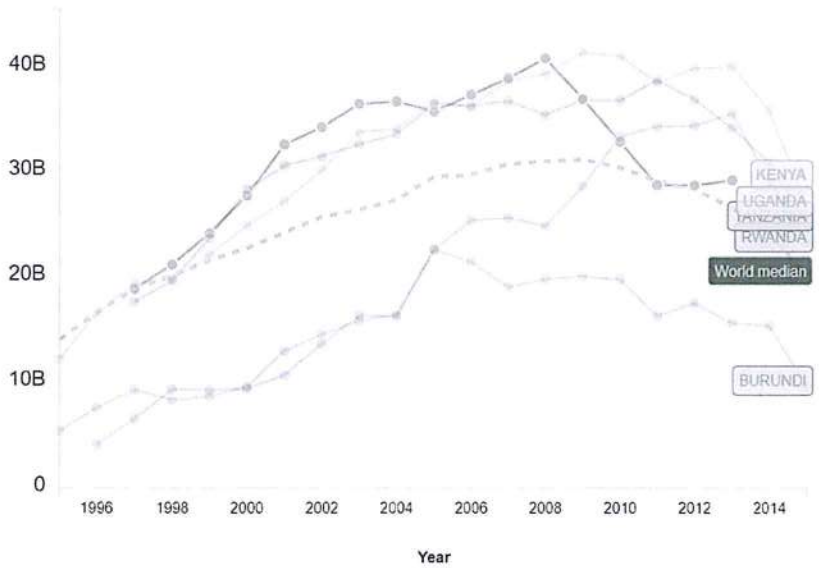
Investing in infrastructure is projected to reduce trade costs in the EAC. As at 2015, Rwanda and Burundi did not have a developed railway infrastructure. However, there are plans underway currently to connect the two countries to their EAC counterparts via rail.

Instances of corruption in the EAC were found to hamper trade where bribery of customs officials, cross-border illicit trade etc. The Corruption index measured as a percentage where the highest rating signaled higher incidences of corruption in the country. The index was used to evaluate governance reforms.

As a proxy for energy measuring electricity production an Electricity index was used. Transport composite index for total paved roads, total road and rail networks etc. The ICT index is composed of internet subscriptions, internet usage and cellular subscriptions.

Trade costs trends in the EAC

Figure: Total Trade Costs by country



Source: World Bank Trade portal

The table above shows a declining trend in the total trade costs among EAC countries and with its international trade partners. Kenya hit the highest mark in 2008 at approximately 40 billion US dollars which could be attributed to the strained political situation in the country. The country later recorded a sharp decline in trade costs between 2008 and 2010 which thereafter stabilized at roughly 23 billion USD.

Bilateral Trade Costs Descriptive Statistics

The table below indicates the mean values of bilateral trade costs which range from 0.068 to 0.197 billion US dollars for Kenya-Uganda and Burundi-Tanzania. This shows that bilateral trade costs between Burundi and her trade partners are quite high. Trade costs between Kenya and Uganda are the lowest followed closely by Kenya-Tanzania and Kenya-Rwanda.

Table 4.2: Descriptive Bilateral Trade Costs Statistics

Variable (Bilateral Trade costs)	Obs	Mean	Std. Dev.	Min	Max
Burundi – Kenya	19	0.1300875	0.066834	0	0.287531
Burundi - Rwanda	19	0.1746846	0.044813	0.128006	0.330287
Burundi - Tanzania	19	0.1972705	0.061765	0.132891	0.397658
Burundi - Uganda	19	0.1793106	0.052609	0.120658	0.295272
Kenya - Rwanda	19	0.0870792	0.031496	0	0.110132
Kenya - Tanzania	19	0.0787568	0.028633	0	0.103459
Kenya - Uganda	19	0.0677265	0.024566	0	0.087535
Rwanda - Tanzania	19	0.1872826	0.050415	0.112721	0.302178
Rwanda - Uganda	19	0.1355659	0.029514	0.089635	0.18075
Tanzania - Uganda	19	0.1520913	0.016448	0.127284	0.179203

From the above table trade costs between Burundi and Tanzania were at their maximum at 0.3976 billion US dollars followed by Burundi-Rwanda at 0.33 billion US dollars. The standard deviation signifies that dispersion from the mean value is low.

The descriptive statistics detailed in the sections above describes the basic data features used in the study. It also provides summaries regarding the characteristics of the dataset, such as the variables' mean, standard deviation, or frequency. This enables us to get a birds-eye view of the data and to get a simple interpretation.

4.3 Diagnostic Test Results

Diagnostic tests i.e. normality test and the test for heteroskedasticity were carried out to ascertain the statistical suitability of the results. Tests for normality and heteroskedasticity were conducted. From the diagnostic test, it was found that the dataset is normally distributed and that homoskedasticity is present

4.3.1 Normality Test

Normality test was conducted to determine if the sample dataset is normally distributed. The results are as shown below;

Table 4.3: Normality test results

Skewness/Kurtosis tests for Normality

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	joint adj chi2(2)	joint Prob>chi2
resid	244	0.0570	0.2094	5.24	0.0729

The significance level is 0.0729 which is greater than 0.05. The distribution is symmetric hence we do not reject the null hypothesis. The dataset is normally distributed.

4.3.2 Heteroskedasticity Test

This test set out to determine if the disturbance variance was constant (heteroskedastic) across observations or not for the purposes of valid regressions.

Table 4.4: Breusch pagan test for Heteroskedasticity

```
Ho: Constant variance
Variables: fitted values of ln_TradeCosts

chi2(1)      =     0.10
Prob > chi2  =   0.7493
```

The significance value is 0.7493 which is greater than 0.05. This means that there was absence of heteroskedasticity. This test was imperative in ensuring that we get the highest chance of deriving reliable results and validate statistical significance.

4.3.3 Hausman Test

The test was applied to ascertain the suitable model between Fixed and Random Effect

Table 4.5: Hausman test

```
. hausman fe re

                  ---- Coefficients ----
             |    (b)          (B)             (b-B)      sqrt(diag(V_b
> -V_B))
             |     fe           re          Difference          S.E.
-------------+--------------------------------------------------------------
> ------
 ln_Distance |  -.0130644    -.0142048        .0011404         .0016762
----------------------------------------------------------------------------
> ------
                           b = consistent under Ho and Ha; obtained fro
> m xtreg
            B = inconsistent under Ha, efficient under Ho; obtained fro
> m xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(1) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        0.46
                Prob>chi2 =      0.4963
```

The preferred model, according to the null hypothesis, is random effects while the alternate hypothesis is that the preferred model is fixed effects. From the above the p-value (0.4963) is > 0.05 therefore we used the random effects model.

4.3.4 Breusch Pagan Langrage Multiplier Test

The Breusch Pagan Langrage Multiplier Test was applied to identify the most suitable model from the Random Effect model and Pooled Model.

Table 4.6: Breusch Pagan Langrage Multiplier Test results

```
Breusch and Pagan Lagrangian multiplier test for random effects

        ln_TradeCosts[Year,t] = Xb + u[Year] + e[Year,t]

        Estimated results:
                                 |       Var     sd = sqrt(Var)
                        ---------+-----------------------------
                        ln_Trad~s |   .1357095       .3683877
                                e |     .12924       .3594997
                                u |   .0069552       .0833981

        Test:   Var(u) = 0
                             chibar2(01) =     8.34
                          Prob > chibar2 =   0.0019
```

The null hypothesis is that the preferred model is pooled model while the alternate hypothesis is that the preferred model is random effects. The p-value (0.0019) is <0.05 therefore we will reject the null hypothesis and choose the random effects model.

In this case, individual effects are randomly distributed across the units, and the regression model includes an intercept term representing an overall constant term to capture the individual effects.

4.4 Correlation Analysis

This section evaluates the relations among the determinants of trade costs. The findings are as detailed below;

Table 4.7 Correlation Matrix for Trade Costs Determinants

	ln_Tra~s	ln_Dis~e	Transp~x	Electr~x	ICTIndex	Corrup~i	Common~e	Landlo~i	Common~r
ln_TradeCo~s	1.0000								
ln_Distance	-0.0228	1.0000							
TransportI~x	0.1593	-0.3811	1.0000						
Electricit~x	-0.4336	0.3138	-0.7660	1.0000					
ICTIndex	-0.0557	-0.0047	-0.0648	0.1750	1.0000				
Corruption~i	0.1202	-0.1238	0.3284	-0.2790	0.0430	1.0000			
Common_Off~e	-0.2728	-0.3349	0.0335	0.1074	0.0730	0.3811	1.0000		
Landlockedi	0.2243	-0.3632	0.9110	-0.8346	-0.0061	0.0868	-0.0826	1.0000	
CommonBorder	0.1106	-0.3031	-0.1156	-0.0185	0.0665	0.2248	0.5277	-0.0925	1.0000

Correlation coefficients typically range from -1 to 1. A negative correlation will be closer in value to -1 (form 0 to -1) while a positive correlation will be closer in value to +1 (from 0 to 1). The relationship between landlockedness and transport as well as electricity index are highly correlated since they were found to have values of above 0.8.

The results above show an inverse relationship between electricity and ICT infrastructure and trade costs. This means that an increase or an improvement in these sectors results in trade costs reduction.

Corruption Index is correlated with trade costs, this is also the case for Landlockedness. Common border and the transport infrastructure index variables displayed an unexpected positive correlation. Landlockedness was found to be a determinant of trade costs. An increase in landlockedness by 1% led to a 0.22% increase in trade costs. Corruption as well as the state of transport infrastructure were observed to be a significant determinant of trade costs as well.

The results also show that Landlockedness and the Transport as well as landlockedness and Electricity are highly correlated at 0.9110 and -0.8346 respectively. A high correlation indicates that the relationship between two variables is strong hence the factors supply redundant information. This was handled by removing highly correlated predictors from the model when conducting regression analysis.

4.5 Regression Analysis

The regression results for the impact of infrastructure on trade costs in The EAC are displayed in this section.

Table 4.8 Regression results

```
Random-effects GLS regression                   Number of obs      =       244
Group variable: Year                            Number of groups   =        13

R-sq:                                           Obs per group:
     within  = 0.3403                                         min =         12
     between = 0.8010                                         avg =       18.8
     overall = 0.3531                                         max =         20

                                                Wald chi2(8)       =    128.29
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

ln_TradeCosts	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ln_Distance	.0127078	.0458001	0.28	0.781	-.0770587	.1024743
TransportInfrastructureIndex	-.0062607	.0172648	-0.36	0.717	-.0400992	.0275777
ElectricityEnergyIndex	-.2586105	.0476056	-5.43	0.000	-.3519158	-.1653052
ICTIndex	.0107898	.0098813	1.09	0.275	-.0085771	.0301567
CommonBorder	.1838914	.0511094	3.60	0.000	.0837188	.2840639
Landlockedi	-.1990505	.1542091	-1.29	0.197	-.5012947	.1031937
Common_OffLanguage	-.2739243	.0529243	-5.18	0.000	-.3776539	-.1701946
CorruptionIndexi	.0011462	.0015628	0.73	0.463	-.0019168	.0042093
_cons	19.04764	.3347893	56.89	0.000	18.39147	19.70382
sigma_u	0					
sigma_e	.27873828					
rho	0	(fraction of variance due to u_i)				

The significance level is 0.0000 which is less than 0.05 hence the variable is statistically significant. The R-Squared is 0.3531 which is significant but low, specifies that independent variables explain 35% of the total variation in trade costs.

A 1 unit increase in the common border variable will lead to a 0.18 unit increase in trade costs. The findings on the relationship between a common official language supports the priori expectations. However the findings regarding a common border reject the a priori expectations.

From the z-tests; we reject the null hypothesis since common border, electricity and common official language have a significant effect on trade costs.

Common official language, Common border and Electricity index have a P value of less than 0.05 hence they are not statistically different from trade costs. The coefficient has statistically significant impact on the dependent variable. The variables are also significant at the 0.01 level. These variables have a significant effect on trade costs.

The coefficient of Transport Infrastructure index, Corruption Index, Distance, ICT index and Landlockedness are not statistically significantly different from zero because their p-values are larger than 0.05.

The constant is 19.047, and this is the predicted value for trade costs when independent variables equal zero. The constant represents the slope of our equation.

Table 4.9 Regression results; after omitting transport and electricity infrastructure variables

```
Random-effects GLS regression                   Number of obs      =       244
Group variable: Year                            Number of groups   =        13

R-sq:                                           Obs per group:
     within  = 0.2596                                         min =         12
     between = 0.3376                                         avg =       18.8
     overall = 0.2579                                         max =         20

                                                Wald chi2(6)       =     82.35
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

ln_TradeCosts	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ln_Distance	.0074624	.0480183	0.16	0.877	-.0866518	.1015765
ICTIndex	-.0082162	.0092596	-0.89	0.375	-.0263646	.0099322
CommonBorder	.2687444	.0500347	5.37	0.000	.1706783	.3668106
Landlockedi	.1365463	.0434466	3.14	0.002	.0513926	.2217001
Common_OffLanguage	-.3841352	.0527629	-7.28	0.000	-.4875485	-.2807219
CorruptionIndexi	.0040179	.0010904	3.68	0.000	.0018807	.0061551
_cons	18.49793	.3338096	55.41	0.000	17.84367	19.15218
sigma_u	0					
sigma_e	.29188318					
rho	0	(fraction of variance due to u_i)				

The significance level is 0.0000 which is less than 0.05 meaning that the variable is statistically significant. The R-Squared is 0.2579 which is significant but low meaning that 26% of the total variations in trade costs are accounted for by the independent variables.

A 1 unit increase in the common border variable will lead to a 0.27 unit increase in trade costs. The findings on the link between a common official language supports the priori expectations. However the findings regarding a common border reject the a priori expectations.

From the z-tests; we reject the null hypothesis since corruption index, a common border and common official language have a significant effect on trade costs

Corruption index, Common official language, Landlockedness and a Common border have a P value of less than 0.05 hence they are not statistically different from trade costs. The coefficient has statistically significant impact on the dependent variable. These variables have a significant effect on trade costs.

The coefficient of Distance and ICT index are not statistically significantly different from 0 because their p-values are larger than 0.05.

Table 4.10 Regression results; upon omission of transport and electricity infrastructure and landlockedness variables

```
Random-effects GLS regression                   Number of obs      =       244
Group variable: Year                            Number of groups   =        13

R-sq:                                           Obs per group:
     within  = 0.2303                                          min =        12
     between = 0.2262                                          avg =      18.8
     overall = 0.2269                                          max =        20

                                                Wald chi2(5)       =     69.86
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

ln_TradeCosts	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ln_Distance	-.058434	.0439972	-1.33	0.184	-.1446668	.0277989
ICTIndex	-.007848	.0094299	-0.83	0.405	-.0263303	.0106343
CommonBorder	.2461106	.0504286	4.88	0.000	.1472723	.344949
Common_OffLanguage	-.4148245	.0528096	-7.86	0.000	-.5183294	-.3113196
CorruptionIndexi	.0045277	.0010982	4.12	0.000	.0023753	.0066801
_cons	19.02155	.2946041	64.57	0.000	18.44414	19.59896
sigma_u	0					
sigma_e	.29628376					
rho	0	(fraction of variance due to u_i)				

The significance level is 0.0000 which is less than 0.05 meaning that the variable is correctly specified. The R-Squared is 0.226 which is significant but low meaning that the independent variables account for 23% of the total variations in trade costs.

A 1 unit increase in the ICT index will result in a 0.078 unit decrease in trade costs while a 1 unit increase in Common official language would decrease trade costs by 0.42 units while a 1 unit increase in the common border variable will result in a 0.24 unit increase in trade costs. The findings on the relationship between a common official language and trade costs supports the priori expectations and are in line with Melitz, (2002) who postulated that a common language promotes trade and reduces information costs . However the findings regarding a common border reject the a priori expectations. From the z-tests; we reject the null hypothesis since common border, corruption index, and common official language have a significant effect on trade costs

Common official language, Common border and Corruption index have a P value of less than 0.05 hence they are not statistically different from trade costs. The coefficient has statistically significant impact on the dependent variable. The variables are also significant at the 0.01 level.

The coefficient of Distance and ICT index are not statistically significantly different from 0 because their p-values are larger than 0.05.

Table 4.11 Regression results; upon omission of landlockedness

Random-effects GLS regression		Number of obs =	244
Group variable: Year		Number of groups =	13
R-sq:		Obs per group:	
within = 0.3386		min =	12
between = 0.7379		avg =	18.8
overall = 0.3485		max =	20
		Wald chi2(7) =	126.26
corr(u_i, X) = 0 (assumed)		Prob > chi2 =	0.0000

ln_TradeCosts	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ln_Distance	.0093678	.0457914	0.20	0.838	-.0803817	.0991173
TransportInfrastructureIndex	-.0255646	.0086388	-2.96	0.003	-.0424962	-.0086329
ElectricityEnergyIndex	-.2166134	.0348009	-6.22	0.000	-.284822	-.1484048
ICTIndex	.0052549	.0089149	0.59	0.556	-.012218	.0227278
CommonBorder	.1766821	.0508749	3.47	0.001	.0769691	.2763951
Common_OffLanguage	-.2778266	.0529124	-5.25	0.000	-.3815329	-.1741203
CorruptionIndexi	.0025651	.0011124	2.31	0.021	.0003849	.0047454
_cons	19.03425	.3351004	56.80	0.000	18.37747	19.69104
sigma_u	0					
sigma_e	.27854107					
rho	0	(fraction of variance due to u_i)				

The significance level is 0.0000 which is less than 0.05 hence the variable is correctly specified. The R-Squared is 0.3485 which is significant meaning that the independent variables account for 35% of the total variations in trade costs.

A 1 unit increase in the transport infrastructure would lead to a 0.025 decrease in trade costs while a 0.18 unit increase in the common border variable will lead to a one unit increase in trade costs. The findings on the relationship between transport infrastructure and trade costs supports our priori expectations. However the findings regarding a common border reject the a priori expectations.

From the z-tests; we reject the null hypothesis since electricity, and common official language have a significant effect on trade costs.

Transport Infrastructure index, Electricity index, Common official language, Common border and Corruption Index have a P value of less than 0.05 hence they are not statistically different from trade costs. The coefficient has statistically significant impact on the dependent variable. The variables are also significant at the 0.01 level.

The coefficients of Distance, ICT index and Landlockedness are not statistically significantly different from 0 because their p-values are larger than 0.05.

CHAPTER FIVE

CONCLUSION AND POLICY IMPLICATIONS

5.1 Introduction

This section presents a summary of the findings, conclusion and the policy implications drawn from the results in the study

5.2 Summary and Conclusions

The main objective of the research was to examine the impact of infrastructure on trade costs in the five EAC partner states using panel data from1997 to 2015. This study was anchored on the gravity model to evaluate the determinants of trade costs.

The study categorized infrastructure into soft and hard infrastructure by using transport infrastructure index and Electricity (energy) infrastructure index sourced by the African Development Bank as a proxy for hard infrastructure. To represent soft infrastructure, the study used a corruption control index as a measure of transparency. In many instance restrictions to access to markets are known to be due to corruption.

The factors that influence trade costs examined in this study include; a common border, landlockedness, the distance amongst the countries' capital cities, common official language, transport, energy and ICT infrastructure as well as a corruption index. The results reveal an inverse relationship between infrastructure and trade costs. The study also established a positive correlation between distance and trade costs. A common official language led to disparity in trade costs as is evident for Burundi.

Random Effects, Fixed Effects and Pooled model was estimated. Hausman diagnostic test conducted led to Random effects being preferred over fixed effects model. Also a comparison between random and pooled model using the Breusch Pagan Langrange Multiplier test results in Random effects being preferred. Heteroskedasticity tests indicated the absence of variation in the error term.

The results indicate that increasing Transport infrastructure as well as energy infrastructure leads to a significant reduction in trade costs among the EAC partner states which in results in an increase in exports and trade in general. ICT infrastructure had a positive effect on trade costs. The results also show that an increase in corruption results in higher trade costs.

Analysis also proves that the distance between the EAC countries' capital cities has a positive effect on trade costs. This indicates that the further away from each other, the higher the trade costs incurred. A common official language leads to a decline in trade costs. Landlockedness reduces trade costs while the sharing a common Border increases trade costs

We can conclude that the formation of the EAC has greatly improved the trade and reduced trade costs. There is room for improvement in technology and the region can learn a lot from their counterparts.

5.3 Policy Implications

The study findings show the impact of infrastructure development on trade costs. This study had the following policy implications.

Transport and Electricity (a proxy for energy) infrastructure were discovered to have a significant impact on trade costs. According to the African Development Bank, infrastructure investment accounts for more than half of Africa's economic growth improvements. EAC partner states should therefore develop and promote policies that aim at increasing investments in infrastructure. Investments and the subsequent developments in infrastructure will in turn support growth.

Transport, and energy infrastructure are vital in the promotion of economic growth. Landlocked countries in the EAC i.e. Rwanda should hastily investing in an efficient railway system i.e. SGR to enable them gain access to their neighbours' sea ports i.e. Tanzania and Kenya.

Increased energy demand due to population growth, as well as concerns about climate change, have shifted the global trajectory toward renewable energy sources like solar, hydro and wind energy. The region should ensure that sound policies are in place so that efforts to invest more in energy, particularly renewable energies, can be better coordinated. Furthermore, the EAC should capitalize in long-term renewable energy programs, as this is essential for increasing trust in global SDG collaborations.

From the results, we find that a common language has significant impact on trade costs. Countries that share a common language find that it is much easier to trade with one another leading fewer costs. The use of a common language is a widely acclaimed determinant of trade. Speaking the same language facilitates communication and makes transactions easier and more transparent. The absence of a common language makes it complex and costlier to transact as well as the involvement of translators i.e. translating French and English between Burundi and Kenya. Translation results in the possibility of errors and misunderstanding which imply a further increase in trade costs. The EAC should learn from the North African Region where Arabic is the common spoken language which has generated huge trade gains for that region. Languages do not need to be formal i.e. English, to be used as a trade language. Local languages i.e. the use Swahili in countries where the language is yet to made official or the use of local languages shared along borders have the ability to foster trade.

The results showed that the occurrence of corruption plays a substantial role in increasing trade costs in the EAC. Studies have indicated incidences of bribery of customs officials at borders by importers and other inter-country government officials. The region should intensify its collective war against corruption. The EAC should create an enabling environment to allow for increase in trade flows, increase in trade activity. By eliminating the pitfalls and instances of bribery and corruption along the trade chain as a good move from one stage to another along the trade chain, the region will be able to sustain the success of micro, small and medium sized businesses.

The region should continue to foster economic integration to reduce trade barriers. Economic integration helps reduce the trade costs incurred by the producers and consumers in the neighbouring states. Strengthen EAC Regional Trade Agreements and the involvement of public and private organizations in promoting exports. A breakdown in integration leads to an increase in trade costs which may later cause a diversion of trade to other less-costly markets. In other cases, countries have been known to join other trading blocs.

The EAC should also work to lower trade costs at each stage by enhancing Border efficiency, reduction in documentation, doing away with lengthy administrative procedures and eliminating bureaucracies which cause transaction costs when goods cross the border. AfDB recommends that the future is in ICT. EAC countries should reduce the cost of internet access to allow for easy communication and operation of ICT systems at the border.

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