TRADE FACILITATION AND INTRA-REGIONAL TRADE: THE CASE OF EAST AFRICAN COMMUNITY (2007-2017)

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DECLARATION

I declare that this is my original work and has not been submitted for the award of a degree in any other university or institution.

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SIGNATURE: …………………. DATE: …………………………………..

This paper is submitted for the award of the Degree of Master of Arts in Economics with my approval as the University Supervisor.

DR. DANIEL O. ABALA

SIGNATURE: ………………… DATE: …………………………………..

DEDICATION

To my son, Gianni Peng'at Kombo, mum, Diana Kimining and dad, David Rotino.

ACKNOWLEDGEMENTS

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ABBREVIATIONS

CET	Common External Tariff
COMESA	Common Market East and Southern Africa
EAC	East Africa Community
ECOWAS	Economic Community of West African States
FTA	Free Trade Agreement
GDP	Gross Domestic Product
LPI	Logistics Performance Index
OLS	Ordinary Least Squares
REC	Regional Economic Community
RIA	Regional Integration Agreements
RTA	Regional Trade Agreements

ABSTRACT

This paper seeks to analyze the effect of Trade Facilitation on Intraregional Trade in the East African Community. Trade Facilitation in this case is captured by Logistics Performance Index, developed by the World Bank. The Index among other factors captures efficiency in customs clearance, logistics and infrastructure with respect to a specific country. Bilateral trade among the EAC partner states, namely Kenya, Uganda, Burundi, Rwanda and Tanzania is considered using the Augmented Gravity Model as the theoretical framework. The model makes the assumption that bilateral trade is explained by the economic size of the two countries, distance between the countries and other factors such as trade costs. The outcomes indicate that indeed the relationship between growth in intraregional trade and trade facilitation measures is positive and statistically significant.

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CHAPTER ONE: INTRODUCTION

1.1 Background

Trade facilitation entails harmonization and simplification of procedures in international trade. Specifically it refers to practices, formalities and activities relating to gathering, processing, presenting, and communicating information that are necessary in international trade (World Trade Organization, 2013). Trade Facilitation has two main elements: First, border procedures and policies relating to customs procedures, for instance requirements for inspection and documentation. Second, the transportation of goods to their final destination, involving factors such as condition of infrastructure, incidence of roadblocks and weighbridges (truck scales), transportation regulations and standards. Enhancing efficiency and predictability throughout this system reduces delays and uncertainty, thereby lowering costs for both importers and exporters (World Trade Organization, 2013).

Trade contributes significantly to the Gross Domestic Product (GDP) of a country, thus the motivation to engage in trade beyond its boundaries. Increased dependence on international trade by countries is partly driven by globalization which has seen the production process become more disjointed. Sub-components of a product are manufactured in different locations, making countries interconnected by trading with each other. Nevertheless, barriers to trade continue to be a salient policy concern, though they have considerably been reduced over the years. Regional Trade Agreements (RTAs) have substantially eliminated barriers to trade through the establishment of Free Trade Areas (FTAs) and Customs Unions (CU) (World Trade Organization, 2013).

A significant amount of international trade is accredited to intra-regional trade which refers to trade conducted by countries within the same region, for example, the five EAC countries (Burundi, Rwanda, Kenya Tanzania and Uganda). Three-quarters of the trade within Europe is intra-regional and half of North America's trade occurs internally. Intra-regional trade in Africa is often low but recent statistics show that it is on a rising trend (Dicken, 2007). Growth in intra-regional trade is mainly attributed to regional integration through the formation of RTAs. RTAs increase market accessibility and size to member

states and allow for production facilities to be located in regions where scale economies can be utilized. In addition, through the use of tariffs, goods from countries outside the RTAs become more expensive, further enhancing intra-regional trade (Musila, 2005).

Africa, has embraced intra-regional trade in order to bring their individual country resources together in order to form one powerful economy with the aim of increasing its competitiveness globally. The African paradigm is a gradual improvement that follows a stepwise intra-trade of first goods, then labor and capital, and ultimately fiscal and monetary integration. Ideally, the starting point of regional integration is an FTA, then a Common Market, Customs Union (CU), and eventually the harmonization of fiscal and monetary policies to form Economic Union. For many African Regional Integration Agreements (RIAs), the establishment of a political union features as the ultimate objective.

1.2 Evolution of the East African Community (EAC)

The history of the economic integration of the pioneer EAC countries (Tanzania, Uganda and Kenya) spans many years back. It dates back to 1900s where Kenya and Uganda shared a customs union that Tanzania joined in 1917. The three countries established EAC in 1967 which was dissolved ten years later due to social, ideological conflicts and economic nationalism. For instance, countries were predominantly agriculture-based thereby making the potential gains from regional trade integration somewhat uncertain.

To guide in future cooperation, members assented to an agreement on mediation, in 1984, for the division of assets and liabilities among themselves. This agreement led to the signing of the East African Co-operation Tripartite Commission in 1993. Tanzania, Uganda and Kenya resolved to re-establish the EAC in 1997. Following a series of negotiations, the Treaty for the Community entered into force in the year July 2000. In July 2007, Rwanda and Burundi formally joined the EAC family. The East African Community Treaty that was implemented in 2011 stipulated four levels of integration, that is; customs union which is the entry point, then the common market for partner states. The other levels are a Monetary Union and finally Political Confederation of

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Partner States. The ptotocol on establishment of an EAC Monetary Union was ratified in 2014. However, its implementation is yet to start.

Intra-EAC trade performance for East African Community has been vibrant exhibiting a lot of intra–EAC trade within itself. According to the Common Market Scorecard (CMS) 2016, the intra-EAC goods exports is at 20 percent while imports is estimated at 8 percent, for the period 2005 to 2014. The Kenya Economic Survey (2017) postulates that the growth of real GDP in the EAC is estimated to be 6.1 per cent, a significant growth compared to 5.8 per cent in 2015. Statistics further indicate that the EAC registered 6.1 percent growth even as Sub Saharan Africa grew by 1.4 percent. During this period, Tanzania was the best performer, recording 7.2 percent GDP growth followed by Rwanda that grew at 6 percent. Kenya came in third recording 5.8 percent, Uganda grew by 4.9 percent while Burundi reported a decline of 0.5 real GDP growth rate.

1.3 Statement of the Problem

For many years, regional integration has featured as an important component of development in countries (Hartzenberg, 2011); one of the main motivations being to enhance trade within a region. Indeed, trade plays a critical role in economic transformation and development processes. Empirical evidence suggests that economic development and trade are positively related (Sachs and Warner, 1995). However, trade is multi-faceted in the sense that there are several factors that determine the extent trade can take place between and among countries. An important factor is trade facilitation which is minimization of the costs of doing business that come into play in the process of enforcing regulations and policies. Similar to trade liberalization, trade facilitation is expected to favorably impact trade expansion and hence economic development. Trade facilitation contributes to economic development as it elicits an expansion of exports and imports.

Trade Facilitation has increasingly become a subject of interest globally. This is due to the need for freedom of movement of goods and services resulting from growth in trade volumes that is directly attributed to the worldwide liberalization of trade. In the EAC

region, for example, the Partner States, which are Burundi, Kenya, Rwanda, Tanzania, and Uganda have undertaken various trade facilitation initiatives such as one-stop border posts, single customs territory, infrastructure and elimination of the wider non-tariff measures among others. However, the impacts of these initiatives have not been explored. Major reforms on trade in the EAC have occurred over the last few years to embrace the emerging trends in international trade and regional integration.

Therefore, this paper considers effects of trade facilitation measured by logistic performance index (LPI) on Bilateral Trade among the Partner States of the East African Community (Kenya, Rwanda, Burundi, Tanzania and Uganda). The LPI is a score which captures the perceptions of the logistics arrangements of a country based on the following, infrastructure (the quality of transport and trade infrastructure); customs clearance process (efficiency of the process); logistics, availability of competitively priced shipments; possibility of tracking and tracing consignments and the time taken to export in days, which is a measure of how efficient the customs clearance process of a county is.

1.4 Research Questions

   i.   What is the effect of improvement in logistics on bilateral trade among countries in EAC ?

  ii.   What policy prescriptions can we draw from the study ?

1.5 Objectives of the Study

The main objective of the study is to analyze the effects of trade facilitation, measured by the Logistic Performance Index (LPI), on bilateral trade between countries of the EAC. Specifically, this study sought to:

   i.   Estimate the effects of improvement in logistics on bilateral trade among countries in EAC.

  ii.   Recommend policy inferences from the results of the study.

1.6 Justification of the Study

This research aims at analyzing the effect of trade facilitation on trade between member countries of the EAC region. The study is justified as it seeks to answer the questions: "Have trade facilitation initiatives undertaken by the EAC partner states had an impact on trade flows over the years, and more so, does improvement in the trade logistics enhance or hamper trade in the EAC? This paper contributes to knowledge by analyzing facilitation measures undertaken uniformly within the EAC. The findings of this study lead to better understanding of economic integration. The study is also useful to the policy makers, such as Ministries of Foreign Affairs, as they develop new policies aimed at bolstering trade both at the regional and global levels.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The section discusses both theoretical and empirical literature on trade facilitation, trade performance and the impact of these measures on intra-regional trade. The discussion is presented in 3 parts, theoretical literature review, empirical and finally the overview of the reviewed literature.

2.2 Theoretical Literature Review

The roles of trade facilitation on trade performance at both aggregate as well as firm-level have been explained by a number of theories. Wilson and Portugal-Perez (2012) consider Trade Facilitation as policies that are geared towards reducing trade costs particularly export and import costs between countries. The authors argue that trade facilitation is the strategies that are aimed at reducing costs arising from border transactions by simplifying and standardizing the administrative as well as customs procedures relating to international trade.

Further, Wilson and Portugal-Perez (2012) also provide that facilitation goes far beyond the transactions at the border and involves domestic business environment and regulations of an economy as well as the nature of infrastructure. Another study by Akinkugbe (2009), argues that trade facilitation strategies involve the infrastructure and standards associated with goods across borders, domestic policies regulations and institutions. He observes that trade facilitation improves the efficiency of an economy by improving trade outcomes. Hoekman and Nicita (2008) also demonstrate that reforms in trade logistics positively influence the trade performance of an economy.

Apart from the definition of Trade Facilitation by Wilson and Portugal-Perez (2012), Wilson *et al*., (2003) posit Trade Facilitation can be estimated on the basis of 4 broad categories; first the port environment which proxies the quality of maritime and rail transportation infrastructure; secondly, the customs formalities which measures among others, costs arising from the customs processes and transparency in management of affairs at the borders; thirdly, the regulation/legal environment which captures how an

economy reacts to regulations. The final criteria is the use of e-business that measures the degree an economy has put in place necessary infrastructure domestically for instance financial intermediaries and telecommunication among others that are designed to improve efficiency.

The study found that enhancement in the efficiency at the port, which is an indicator of Trade Facilitation, positively increases the trade in economies. Wilson, Mann and Otsuki (2005) studied the effects of Trade Facilitation on trade performance of 75 countries. Their findings confirm that infrastructural development in the services sector followed by efficiency at the port and business environment, in particular, the regulatory and customs is crucial in enhancing trade flows.

Trade facilitation is also considered to alter trade flows and overall trade performance through the cost channel. According to Hoekman and Shepherd (2015), trade costs usually drives a wedge between export and import prices leading to firms exporting less amount of goods and services than they would otherwise trade under lower trade costs. The disadvantages of trade costs on consumers are two-fold: consumers buy lesser in addition to having to choose from diminished range of commodities that are available in the market. The authors however argue that trade facilitation has a great potential of reducing the wedge caused by the trade costs by bringing enterprises and consumers together thereby improving producer surplus in exporting country as well as consumer surplus in importing countries.

They observe that the reduction in the time taken to process customs formalities, which is an indicator of trade facilitation, greatly improves the participation of African enterprises in international trade through improved direct imports and exports. Additionally, they state that export diversification and supply chain trade can be significantly enhanced by Trade Facilitation due to reduction in time taken to trade.

According to Seck (2016) trade facilitation measures that are aimed at reducing trade transactions costs as well as direct trade costs tend to increase propensity of the non-

exporting entities to start to export and increase the profitability and trade volume of the already existing firms engaged in export trade. Freund, Djankov and Pham (2010) using time taken to export as a proxy for trade facilitation, discovered that time taken to export significantly determines bilateral trade. In particular, the study finds that a one day delay to export leads to a decline in bilateral trade by an estimated one percent. Further, Manchin and Francois (2007) note improvement in the quality of institutions, as well as transport and communication, positively influences trade performance.

2.3 Empirical Literature Review

Persson (2013), using days taken to export, studied the effect of Trade Facilitation. This study indicates that efficiency at the border may lead to increase in exports from developing nations to European Union. He used the augmented gravity model to test if trade facilitation affects the range of goods traded (extensive margin). To obtain results, the author counted 8-digit-products that were exported to the European Union by developing countries. Another study done by Wilson, et al., (2003) also found efficient ports and electronic business significantly increase the level of Asia-Pacific region trade since the barriers, through regulations, can act as impediments to trade. The authors carried out their study using country-specific data for efficiency at the port, customs, regulations and electronic business as the independent variables.

By using panel data of 124 countries from both developing and developed economies from 2003 to 2004, Iwanow and Kirkpatrick (2007) established that trade facilitation leads to improvements in the performance of exports in Africa. Furthermore, additional reforms such as the quality of the regulatory environment, transport and communication play an imperative role in enhancing trade in Africa. The study also found out that policies, both the on-the-border and behind-the-boarder increase the export levels in the manufacturing industry in Africa more than for other countries in the world. They employed the Gravity Model Augmented with Trade Facilitation indicators, which are infrastructural developments and regulatory quality, in order to estimate the results of the study. The findings on the paper on facilitation of trade on export diversification by Dennis and Shepherd (2009) provides the evidence that trade facilitation helps in the

diversification of the exports in the developing nations. They argued that reducing costs of international transport and exporting by 10 percentage points increases the gains from diversification by 4 and 3 percentage points respectively in developing nations.

Akinkugbe (2009) conducted a panel data analysis on Trade Facilitation on Africa's Manufactured Export from 1995 to 2004 and concluded that removing constraints and improvements in the policy regime play an important role on the exportation of manufactured goods from Africa. The writer studied 20 countries in Africa using pooled annual time-series data and found that trade expansion through trade facilitation is a crucial factor in promoting manufacturing exports in African countries. The study used a transport network, business requirements before the start, taxes on exports and corruption perception index in the selected countries as indicators of trade facilitation. In yet another study, Ramos and Zarmos (2008) find that a decrease in the days required in carrying out trade and low transport costs increase trade flows. The study used Ordinary Least Squares (OLS) as its estimation techniques, modeled on an Augmented Gravity Model, for 13 exporters and 167 importers. Data was obtained from the World Bank.

Similarly, study by Persson (2008) conducted on 100 developing nations and 22 countries in the European Union found that lowering border delays by the exporting country led to increase in amounts of goods exported. Particularly, he observes that increase in the costs of transactions decreases exports significantly. The author used both Instrumental Variable (IV) and Poisson estimation in the analysis to control for potential endogeneity in analysis. Anderson and Wincoop (2004) also examined the trade barriers on trade flows between Canada, United States and other countries. Their finding showed that border delays reduced trade, by 44%, between the United States and Canada, and among other industrialized countries by 29%. According to Engman (2005) improved and simplified customs procedures increases trade flows. Specifically, he observes that the implementation of modern customs programs which facilitates the movement of goods across the boarders improves the integration of the supply chains of a country globally and attracts Foreign Direct Investments (FDI).

In contrast to the studies indicating that various indicators of trade facilitation promote trade, Iwanow and Kirkpatrick (2007) concluded that in itself Trade Facilitation is unlikely to significantly lead to growth in export performance in Africa. They found out that, although trade facilitation is important, basic infrastructure both transport and communications and the quality of the regulatory environment play an important role in facilitating export growth. Their study aimed at quantifying the potential gains from Trade Facilitation using Gravity Model. The results indicated that an improvement of 10 percent in Trade Facilitation yields about 5 percent growth in exports. Using data on economic infrastructure, policy and regulation reforms in Kenya from Organization for Economic Corporation and Development, Otung (2016) undertook a study on the effects of Aid for Trade Facilitation and Trade Costs in the EAC using the Gravity Model. He found that aid for trade that improves economic infrastructure and the policy environment is a significant determinant of exports in Kenya. In particular, the study found that Aid for Trade in investment in economic infrastructure significantly contributes to trade performance in the East African Community.

2.4 Overview of the Literature

The reviewed literature generally elucidates that trade facilitation as measured by its different indicators such as improved logistics, reduced days taken to export, reformed customs formalities promotes trade performance of both developing and developed economies. Particularly, the reviewed literature indicates that Trade Facilitation reduces the trade costs (for example; Persson 2008; Wilson *et al*., 2003)). However, the work by Iwanow and Kirkpatrick (2007) indicates that even though trade facilitation promotes trade performance, trade facilitation only improves trade performance where there exists both communications and transport infrastructure in addition to quality regulatory frameworks. For the EAC, the study by Otung (2016) indicates that aid for trade that improves economic infrastructure and the policy environment is a significant determinant of exports in Kenya. The author, however, did not explicitly examine the effects of improvement in the logistics of bilateral trade among EAC. This study therefore seeks to add knowledge on the trade facilitation issue by examining trade facilitation indicators based on the logistic performance index on bilateral trade in EAC.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The section presents the technique and methodology adopted by this study and discusses the types and source of data as well as the measurement of variables. The chapter also presents both the theoretical and empirical model.

3.2 Theoretical Framework

The study used the Gravity Model to analyse the effects of Trade Facilitation on intraregional trade. Tinbergen (1962) and Poyhonen (1963) pioneered the use of this model in studying International Trade. In this case, the model resembles the Newton Gravity Theory which hypothesizes that the attraction force between two separate objects or entities, for instance i and j, is directly dependent on the masses of the entities and inversely proportional to the square distance between them.

Following Bacchetta *et al.* (2008), the Gravity Model can generally be specified as:

$$X_{ij} = GS_i M_j \phi_{ij} \quad \text{...} \quad (1)$$

In the equation:

X_{ij}: denotes exports from country i to j (Monetary Value)

G: a variable that depends on neither country i nor j e.g. liberalization in trade

S_i: is the specific characteristic of the exporting country. They are captured by the exporter's GDP

M_j: are the specific factors associated with the importing country. They are captured by the GDP of the importer.

ϕ_{ij}: represents the ease of the exporter i reaching the market of county j.

However, the Traditional Gravity Model does not explain other costs and barriers relating to bilateral trade, such as the propensity to import, the resistance to export and the remoteness of a country (Anderson and Wincoop, 2003)

3.3 Empirical Model

It is assumed that flow in bilateral trade depends positively on the GDP of the countries and negatively on distance from one country to the other. Based on this, we can, therefore, express the gravity model as:

$$X_{ij} = \beta_0 Y^{\beta_1}{}_i Y^{\beta_2}{}_j D^{\beta_3}{}_{ij} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \text{ (2)}$$

In the model, i is exporter country while j, importer country.

The bilateral exports from country i to j *is* denoted by X_{ij},

β_s, are parameters, Y_j and Y_i the GDP of the importing and exporting country respectively. D_{ij} represents distance, in kilometers, from country i and j.

But since bilateral trade flows involve relative costs, we differentiate equation 2 and introduce trade costs variables such as whether an economy is landlocked or not, belongs to multiple regional trade agreements or not or even share the common language. By adding the highlighted trade costs and introducing logarithmic transformation to normalize the equation, we have;

$$InX_{ij} = \beta_0 + \beta_1 InY_i + \beta_2 InY_j + \beta_3 InD_{ij} + \beta_4 MRTA + \beta_5 LANDL + \beta_6 LAN + \varepsilon_i$$
$$\dots\dots\dots \text{ (3)}$$

Where *In* denotes the natural logarithm and β_s parameters.

MRTA, LANDL LAN are dummy variables and therefore take the value 1 if one or both trading partners in the bilateral trade have membership in more than one RTA; if the country is landlocked; and if countries i and j share a common official language and 0 otherwise, respectively.

The language variable is introduced because it is assumed that the countries that share similar language would experience reduced trade costs since the same language tends to eliminate communication barriers during negotiations as well as the cost of translating documents and therefore facilitates trade.

We include the dummy variable for the MRTA to capture the effects of an EAC country belonging to more than one RTA in order to assess the costs relating to an EAC member belonging to multiple regional trade agreement. It is argued that if a country joins more than one RTA, inefficiencies are introduced especially when different RTAs have different policies and regulations that can impede the implementation of trade facilitation policies by member states. Buyonge and Kireeva (2008) argue that overlapping membership in RTAs results in countries having to comply with multiple customs procedures and paperwork, thus dampening gains from trade facilitation.

But since our study focusses on the Facilitation of Trade and intra-regional trade in the EAC, we also augment equation (3) by introducing the trade facilitation variable, which is a policy variable that directly influences bilateral trade. In this study, Trade Facilitation is measured using Logistic Performance Index (LPI) which according to Garcia, Marti and Puertas, (2014) is an indicator of the Facilitation of Trade for a group of countries since it reveals the quality of the infrastructure, customs procedures, and logistics costs which are critical in bilateral trade.

Now to empirically determine the effects of trade facilitation, captured by the logistic performance index, on exports among the EAC countries, we estimate the following equation:

$$InX_{ij} = \beta_0 + \beta_1 InY_i + \beta_2 InY_j + \beta_3 InD_{ij} + \beta_4 MRTA + \beta_5 LANDL + \beta_6 LAN +$$
$$\beta_7 LPI + \varepsilon_i \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (4)$$

Equation (4)is the empirical model, where:

LPI is the Logistic Performance Index;

Where, ε_i is the error term.

The description of variables is shown in Table 1 below.

Table 1: Description of Variables

Variable	Definition and Measurement	Expected Sign	Source
Export (X_{ij})	The dependent variable		
Economic size of country i (Y_i)	Measured by the GDP of the exporting country.	Positive	Limao and Venables (2001) and Iwanow and Kirkpatrick (2007)
Economic size of country j (Y_j)	Estimated by GDP of the importing country.	Positive	Limao and Venables (2001)
Distance (D_{ij})	Captures the Distance between capital Cities of the importing and exporting country. The Gravity Model hypothesizes that trade performance and distance between trading countries have an inverse relationship. This arises because distance between countries brings about trade costs such that countries that are very far away from each other incur more in transportation costs.	Negative	Ghemawat (2001) and Iwanow and Kirkpatrick (2007)
Multiple Regional Trade Agreements ($MRTA$)	A dummy variable that shows whether an EAC member country belongs to multiple regional trade agreement or not. We hypothesize that belonging to multiple trade agreement tends to introduce inefficiencies since overlapping membership in RTAs results in countries having to comply with multiple customs procedures and paperwork, thus dampening the effect of trade facilitation.	Undetermined	Dennis (2006) and Yeats (1999)
Landlocked	Dummy variable with 1 if country is	Negative	Faye et al.

country (*LANDL*)	landlocked; 0 otherwise. We introduce this variable because landlocked countries tend to experience high costs of transacting since lack of a port can act as a barrier to easier and efficient international trade.		(2004) and Arvis et al. (2011).
Language (*LAN*)	Dummy variable with 1 if the 2 trading partners speak the same official language; otherwise 0. It is assumed that countries with a similar language would experience reduced trade costs since the same language tends to eliminate communication barriers during negotiations as well as the cost of translating documents and therefore facilitates trade.	Positive	Iwanow and Kirkpatrick (2007)
Logistic Performance Index (LPI)	We will use the overall LPI score. The score captures the perceptions of the logistics arrangements of a country based on the following, infrastructure (the quality of transport and trade infrastructure); customs clearance process (efficiency of the process); logistics, availability of competitively priced shipments; possibility of tracking and tracing consignments and the time taken to export in days, which is a measure of how efficient the customs clearance process of a county is. The LPI is developed by the World Bank. It ranges from one to five, whereby a high score implies better performance in terms of Trade Facilitation by that country.	Positive	Boudet and Personn (2011), dennis and Shepherd (2011) and Moïsé. and Sorescu (2013)

3.4 Estimation Techniques

This study will use the panel data estimation techniques. This is because of the dataset of this study contains N number of countries trading with each other over a period of time, T. In panel data estimation techniques, we will adopt the standard methods of estimation, i.e. Random Effects Model, Fixed Effects Model and Pooled Ordinary Least Squares (OLS).

The assumption of Homoskedasticity (constant variance of error term across all observations) is important in pooled OLS. However, this method of estimation yields biased and inconsistent results whenever the unobserved factors that influence bilateral trade such as the country's culture are correlated with the error term. By compounding observations from the time series and cross-sections together, this method of estimation ignores the panel data structure. Concerning the fixed-effects model, pooled OLS accounts for the unobserved effects in the error term by undertaking simple averages. For the random effects model, the unobserved factors are accounted for by assuming that the factors are randomly distributed just like the error term.

3.5 Data, Data Types, and Sources

The data used in the study were acquired from WDI (World Development Indicators) of the World Bank from 2007 to 2017. In particular, these are data for the export values between EAC countries, size of the countries measured by a country's real GDP and the Logistic Performance Index (LPI). For comparison purposes, data for the export values between the EAC countries as well as GDP will be presented at the 2010 constant US dollars. Concerning data relating to the distance variable, common language and landlocked countries, they were obtained from CEPII data base which offers a wide range of data on international trade flows. To determine whether a country belongs to a multiple regional trade agreements (MRTA), this information was obtained from the website of the trade ministries of each country.

3.6 Diagnostic tests

The Hausman and Breusch-Pagan Lagrange Multiplier tests were undertaken to determine the appropriateness of the models for the study. The Hausman test assesses the appropriateness of the Random Effects Model versus the Fixed Effects Model. The other test, the Breusch-Pagan Lagrange Multiplier is used to determine whether to use pooled Ordinary Least Squares (OLS) or the Random Effects Model. Serial correlation, cross sectional dependence and heteroscedasticity tests were also performed to inform if the obtained results were unbiased and consistent.

3.6.1 Hausman test

Following Gujarati (2009), the basic panel data model can be modelled as:

$$y_{it} = \beta_1 + \beta_2 X_{it} + u_{it} \quad \text{..} \quad (5)$$

Where y_{it} is the dependent variable, β's are parameters, β_1 is the intercept, X_{it} is the set of regressors and u_{it} is the disturbance term. The subscripts i is the ith cross-section unit while t- denotes time period. The assumption of the Fixed Effects Model is that each cross-section has its own specific characteristics which influence the outcome. The fixed effects model is formalized as:

$$y_{it} = \beta_1 + \beta_2 X_{it} + \alpha_i + \varepsilon_{it} \quad \text{..} \quad (6)$$

All terms are defined as in equation (5) apart from the error term that is decomposed into two: α_i which is the intercept for each entity and captures the specific effects of each cross-section unit or the individual unobserved heterogeneity. In this study they are referred to as country specific effects. ε_{it} represents the error term.

The Random Effects Model makes an assumption that there are two errors. ε_{it} the error term with both cross section and time series components and u_i which is the cross - section error component. Therefore, $u_i + \varepsilon_{it} = w_{it}$. Thus, the random effects model is given by:

$$y_{it} = \beta_1 + \beta_2 X_{it} + w_{it} \quad \text{...} \quad (7)$$

The Fixed Effects Model assumes that in the regression equation, individual groups have different intercepts. The Hausman test informs the appropriate model for the study (Fixed or Random Effects Models). The null hypothesis for this test is that the Random Effects Model is a true model. We reject the null hypothesis if we get a small p-value for the chi-squared statistic associated with the test and therefore apply a Fixed Effects Model.

3.6.2 Breusch-Pagan Lagrange multiplier Test (LM Test)

Pagan and Breusch (1980) developed a test which helps to decide whether to apply Pooled OLS or Random Effects Model once the Hausman Test suggests the latter. In this test, the null hypothesis states that there are no significant differences in all EAC countries and there are no panel effects. In this test, in the event that the null is not rejected, i.e. when the p-value is greater than 5 percent level, we infer that the random effects model is not appropriate for interpretations; otherwise, Pooled-OLS model should be used.

3.6.3 Heteroscedasticity test

Heteroscedasticity relates to a phenomenon where the error term exhibits non-constant variance. Heteroscedasticity is a problem because it can lead to biased standard errors. This test is usually done to examine whether the error varies across units. In case heteroscedasticity is an issue, the use of robust standard errors can correct for it.

3.6.4 Cross Sectional Dependence Test

Cross-Sectional Dependence is more evident in multilateral trade because each country tends to have specific reactions to spillover effects or global shocks from small local economies (Pesaran and Tosetti, 2011, Chudik, Pesaran and Tosetti, 2011).According to Baltagi *et al*. (2003), cross-sectional dependence is basically a macro panel issue. However, whenever, N<T, where N is the number of countries and T time period, cross sectional dependence is very likely to be observed. It occurs when residuals across entities, in this case countries, are correlated.

Hoechle (2007) demonstrated that using robust standard errors may fail to correct for it and therefore proposed use of Panel-Corrected-Standard Errors. The Null Hypothesis for this test stipulates that residuals are not correlated across countries. The null hypothesis is rejected if the value of the chi2 statistic has p value that is significant at 5% level. Thus, concluding that cross sectional dependence across countries is present.

CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

The section contains the empirical results of the study, including the summary statistics and the correlation analysis. The chapter also presents several estimation results that include the Pooled, Fixed Effects and Random Effects model and their shortcomings before elaborating the final estimation results from the panel error corrected standard errors.

4.2 Descriptive statistics

As indicated in table 2 below, the descriptive statistics that are presented include the standard deviation, the mean, and the maximum and the minimum value for a given variable in the model. From 2007 to 2017, the EAC partner states, on average exported between them goods and services of the value of 91.6 million USD. The minimum value of traded exports being 14 732US Dollars (USD) and the maximum value is 655 million USD.

Table 2: Summary Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Exports_ value	198	91.6M	145M	14732	655M
GDP Exporter	220	22.7B	17.4B	1.8B	58.1B
GDP Importer	220	22.7B	17.4B	1.8B	58.1B
LP Index	220	2.41	.3168455	1.43	3.24
Distance	220	616.1875	210.4495	180.006	867.4281
Land locked	220	0.6	.4910152	0	1
Comlang	220	0.5	.5011403	0	1
MRTA	220	0.6	.4910152	0	1

Source: Author, 2018

Since the exporting country becomes an importing country for another country, as it could be expected, put together the GDP of the exporters and importers is the same if the countries are put together. The average GDP of EAC countries for the period from 2007

to 2017 is equal to 22.7 billion USD. The minimum value being 18billion USD while the maximum value equals 58.1 billion USD. The Logistics Performance Index, which is weighted from 1-5, indicates that on average, the index has the value of 2.41 for EAC countries. This value seems to be slightly lower than the average performance of 2.5 for the scale measure, however, the maximum value is equal to 3.24 while the minimum has the value of 1.43.

The average distance between capital cities within EAC countries is 616.1875 kms. The shortest distance has the value of 180 kms which is between Kigali and Bujumbura while the longest distance has the value of 867.4281 kms which is between Bujumbura and Nairobi. The variable landlocked is a dummy that indicates that 60% of the EAC countries are landlocked. These countries are Burundi, Rwanda and Uganda while 50% of EAC countries share common language. Despite the fact that all EAC Partner States have membership in the WTO, Tanzania is not a member of the Common Market of Eastern and Southern Africa (COMESA) while Burundi has been suspended from the Africa Growth and Opportunities Act (AGOA) agreements. Therefore, the two countries enter the model with the value of 0 for the dummy of Multiple Regional Trade Agreements.

4.2.1 Correlation analysis

The correlation analysis is very useful because it indicates the degree to which the variables that are used in an econometric model might be correlated. For instance, a very high correlation between two independent variables indicates that one has to encounter multicollinearity in the estimation.

Table 3: Correlation matrix

	GDP Exporter	GDP Importer	LP Index	Distance	Land locked	Comlang	MRTA
GDP Exporter	1.0000						
GDP_Importer	-0.1806	1.0000					
LP Index	0.5006	-0.0303	1.0000				
Distance	0.2625	0.2625	0.0593	1.0000			
Land locked	-0.8583	0.2146	-0.2039	-0.3322	1.0000		
Comlang	0.0753	0.0753	0.0321	-0.6709	-0.0000	1.0000	
MRTA	0.1534	-0.0383	0.2457	-0.1802	0.1667	0.4082	1.0000

Source: Author, 2018

The results from the correlation matrix do not reveal high levels of correlation among the variables. According to Gujarati (2009) a correlation is high if it is greater or equal to 0.8. Given the results in table 3, the highest correlation observed is 0.6709 which indicates a negative correlation between distance and common language. This is at least an indicator that if there is a big distance between countries, those countries are less likely to have a common language.

4.3 Estimation results

4.3.1 Random Effects, Fixed Effects Models and pooled Ordinary Least Squares

Analysis of Panel data entails estimating the pooled OLS as a starting point. However, this model may fail to assume random and uncorrelated errors with the independent variables and fail to capture country specific effects, hence, the rationale of using either the Random or Fixed Effects Models (Torres-Reyna, 2007). The results of the random effects model, pooled OLS and the fixed effects model, presented in table 4 below, indicate that the logistics performance of a country does not influence its exports for bilateral trade for the EAC countries. The Random Effects and Pooled OLS models indicate that the effects of GDP (economic size) of the exporter and speaking of a common official language on export performance is positive. However, the effect of GDP

is statistically insignificant whereas that of Common Official Language is statistically significant.

The Fixed Effects Model, on the other hand, did not report results for time invariant variables which are distance; landlocked; common language and MRTA. Nevertheless, the outcome informs that in the EAC, only the GDP (economic size) of the exporting country is statistically significant in explaining growth of exports. Finally, the random effects model and pooled OLS results indicate that first, the economic sizes of the importing and exporting countries have statistically significant effects which are positive on export volumes while distance has a statistically significant negative effect on exports performance. Additionally, the MRTA is negatively correlated with exports in both the random effects model and the pooled OLS.

The results are quite different from what we would have expected and somehow contrary to the literature. Therefore, several tests were performed to ascertain the appropriateness and validity of the results. The Hausman test was performed. From the test, the result supports the use of fixed effects models since the critical value of the chi2, that is 59.12 is greater than the tabulated chi2 with a p value (p=0.0000) that is significant at 1% level.

Table 4: Estimation Results

VARIABLES	(1) Pooled OLS	(1) Fixed effects	(1) Random effects
LP index	0.179	-0.295	0.179
	(0.248)	(0.250)	(0.248)
lnGDP_Expoter	2.009***	2.983***	2.009***
	(0.185)	(0.680)	(0.185)
lnGDP_Importer	0.0833	-0.722	0.0833
	(0.107)	(0.658)	(0.107)
Distance	-0.00138	-	-0.00138
	(0.000935)		(0.000935)
Land locked	0.725	-	0.725

	(0.463)		(0.463)
Comlang	1.186***	-	1.186***
	(0.400)		(0.400)
MRTA	-1.055***	-	-1.055***
	(0.330)		(0.330)
Constant	-31.98***	-35.36***	-31.98***
	(4.628)	(7.688)	(4.628)
Observations	198	198	198
Number of paired	20	20	20
R squared		0.240	

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The LM test for Random Effects versus pooled OLS model was also performed. The Chi2 had the value of 52.52 which was significant at 1% level. The Null Hypothesis, which states that the Random Effects is not the appropriate model, was rejected.

A common feature that arises with panel data is cross sectional dependence (Torres-Reyna, 2007). De Hoyos and Sarafidis (2006) indicated that if in the errors there are cross sectional dependence, then the previous models are biased. The Pesaran test to ascertain cross sectional independence is performed (Pesaran, 2004). The Pesaran cross-sectional independence had a value of 7.084 which was associated with a p-value statistically significant at 1% level and indicated the mean absolute value is 0.379 of the off-diagonal elements. Therefore, we rejected null hypothesis and concluded that cross sectional dependence was an issue.

Heteroscedasticity, according to Cheng and Wall (2005) and Melitz and Ottaviano (2008), can be a major concern when using gravity models thus Wald Test for group wise heteroscedasticity is used. The results of this test indicated a critical chi2 greater than the tabulated chi2 with a p value of 0.0000. Kezdi (2003) demonstrated how for small panel

data, the fixed effects model can be biased due to serial correlation. We therefore rejected the null hypothesis of homoscedasticity and lack of first order autocorrelation at 1% level of significance and concluded that there was both heteroscedasticity and autocorrelation (Baum, 2001).

4.3.2   Panel error corrected standard errors estimates

Even though it is widely accepted that the use of Robust Standard Errors deals with the issue of autocorrelation and heteroscedasticity, robust standard errors may fail to produce consistent and unbiased estimates if Heteroscedasticity, Serial Correlation and Cross-Sectional dependence are present. Hoechle (2007) demonstrated through Monte Carlo simulations that if cross-sectional dependence is present, the estimates of a panel data are severely biased and proposed the use of standard errors that are not only robust to heteroscedasticity but also cross sectional correlation.

Table 5 presents the results of panel error-corrected standard errors. The estimated model has an R^2 of 0.8405. This means that 84.05% of the variations in the value of exports within the EAC countries are explained by independent variables within the model. The Wald test, which tests for significance and validity of the model has a chi2 which has the value of 2310.14 which is associated with p value 0.0000 meaning significant at 1% level. Given the value of p of the chi2 value, it can be said that the regressors in the model, that is, Logistics Performance Index, the GDP of the countries that are importing and exporting, distance between their capital cities, if a country is land locked (or not), if two countries share a Common Official Language (or not) and MRTA are jointly different from zero. Hence, these variables significantly explain export performance within the EAC countries.

Table 5: Panel error-corrected standard errors estimation results

VARIABLES	lnExport_value
LP Index	0.789*
	(0.433)
lnGDP_Expoter	1.879***
	(0.116)
lnGDP_Importer	0.0977*
	(0.0526)
Distance	-0.00141***
	(0.000441)
Land locked	0.517**
	(0.223)
Comlang	1.249***
	(0.187)
MRTA	-1.042***
	(0.168)
Constant	-30.65***
	(2.107)
Observations	198
Number of paired	20
R-squared	0.8405

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The results above indicate that the effect of logistic performance, which is our proxy for trade facilitation, on export performance for EAC countries is positive and statistically significant. LPI coefficient, at 10% level of significance, is positive and statistically significant. It indicates that a 1 point increase in the score of the logistic performance index increases the growth of exports by 0.789%. This outcome is common in literature. For example, Hausman and Subramanian (2005) found that logistic performance is

correlated positively with the level of bilateral trade. Their study also found that reduction in the sources of friction in logistics improves the trade competitiveness of a country. Hence, if the EAC countries improve their trade facilitation initiatives, such as logistical infrastructures and services, bilateral trade between these countries would increase significantly. Improvement in logistics can be done through trade facilitation, especially for developing countries (Bourdet and Persson, 20011) which can lead to increase in the volume of exports. Therefore, simplified trade procedures within the EAC region would improve export performance of each country in the bilateral trade.

The economic sizes, as captured by GDP, of the importing and exporting countries are significant determinants of exports performance. The results point out that the exporting country GDP has a positive effect on exports. The coefficient of GDP_export is positive and statistically significant. It entails that 1% growth in the GDP of the country exporting increases the volume of exports by 1.879%. On the other hand, the effect of importing county's GDP on exports is positive. It is also statistically significant. From the coefficient of the variable GDP_import, we can infer that 1% growth in the importing country's GDP translates to 0.0977% growth in the value of exports. This coefficient at 10% level is significant. Although the GDPs of countries involved in bilateral trade positively affect export performance, it can be observed that for the EAC countries, a rise in the GDP of the exporting nation seems to have a greater effect than a rise in the GDP of the importing nation since 1.879% is greater than 0.0977%. This finding matches the prediction of the gravity model which states that the masses of countries play big role in attracting the two countries in bilateral trade.

The variable distance which captures the cost of transportation is thought to negatively affect the performance export. Results indeed assert a significant inverse relationship between export performance and distance within the EAC countries with respect to bilateral trade. The coefficient on distance indicates that an additional 1 km from one capital city to another reduces the volume of exports by 0.141%. The coefficient is statisticaly significant at 1% level. This outcome affirms the prediction of the gravity model. Hence, for states that are far away from each another, we would expect to have

low levels of bilateral trade. For instance, the distance between Kigali and Nairobi and Bujumbura and Kampala are very long, therefore, we would expect that for Rwanda and Kenya or Uganda and Burundi, this negative effect would be more pronounced.

Having a common language increases the ease of communicating. It is expected that countries with a common official language are likely to experience more trade. At 1% significance level, the coefficient from the estimation is positive and statistically significant.

Contrary to expectation that land locked countries experience low export performance relative to countries with own ports, the results indicate that for the case of EAC countries, land locked countries engage more in bilateral trade than other countries. Specifically, Rwanda, Uganda and Burundi which are land locked countries seem to experience better export performance in the bilateral trade within EAC countries compared to Tanzania and Kenya, which are not landlocked.

Similarly, the results indicate that countries that belong to multiple trade agreements experience low levels of export performance relative to countries that do not belong to multiple regional trade agreements. The coefficient for MRTA is negative and highly statistically significant at 1% significance level. This may be explained by the fact that if an EAC country belongs to multiple trade agreements which facilitate trade between countries, the volume of exports by that country may be shared between EAC and non-EAC countries unlike an EAC country which does not belong to MRTA.

For robustness check, we also controlled for year dummies in order to see how the results might change if the estimated model included year dummies. This helps to control for time varying country specific effects. Table 6 below presents the estimation results. The results indicate that controlling for year dummies increases the magnitude and the significance to which the logistic performance index affects export performance in the bilateral trade within the EAC region. When controlling for year dummies, whereas the coefficient was positive and statistically significant at 10% level in table 5, the coefficient

remains positive and statistically significant at 1% level of significance. Equally, controlling for year dummies indicates a larger effect from the GDP of the importing country on performance of export. It can be observed that the coefficient of GDP_importer increases from 10% level to 5% level of significance while the elasticity increases from 0.0977 to 0.122 %.

Table 6: Panel error-corrected standard errors estimation results after controlling for year dummies

VARIABLES	lnExport_value
LP Index	1.482***
	(0.536)
lnGDP_Expoter	1.776***
	(0.135)
lnGDP_Importer	0.122**
	(0.0513)
Distance	-0.00142***
	(0.000474)
Land locked	0.429
	(0.264)
Comlang	1.285***
	(0.177)
MRTA	-1.063***
	(0.182)
Year2008	-0.0414
	(0.107)
Year2009	-0.268***
	(0.102)
Year2010	0.329***
	(0.0253)
Year2011	0.559***
	(0.121)
Year2012	0.828***
	(0.0864)
Year2013	0.159**
	(0.0808)

Year2014	0.0335
	(0.172)
Year2015	-0.0267
	(0.120)
Year2016	-0.878**
	(0.354)
Year2017	-0.437***
	(0.0964)
Constant	-30.43***
	(2.247)
Observations	198
Number of paired	20
R-squared	0.870

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Additionally, while the effect of distance between capital cities, MRTA, using a common language and the exporting country's GDP have almost the same effect in both estimation models, the effect of a country being landlocked looses statistical significance after controlling for year dummies.

CHAPTER FIVE: CONCLUSION AND POLICY IMPLICATIONS

5.1. Introduction

This section presents a summary of the findings, concluding remarks as well as implications on policy that can be drawn from the results.

5.2. Summary and Conclusion

In this study, the main objective was to analyze the effects of Trade Facilitation using Logistics Performance Index on intraregional trade within the EAC using panel data for the period 2007-2017. Other factors that influence export performance such as economic sizes of the importer and exporter state, access to sea/ocean transport, membership in Multiple Regional Trade Agreements, distance between capital cities and language were analyzed in the model. Gravity Model developed by Tinbergen (1962) and Poyhonen (1963) was applied as the theoretical framework.

The Random Effects Model, Pooled OLS and Fixed effects model, were estimated. The Hausman diagnostic test was run and the fixed effects model was chosen. Similarly, the results of Breusch-Pagan test allowed use of random effects model and not the pooled OLS. We performed modified Wald Test for Group Wise Heteroscedasticity and the Pesaran Cross Section Dependence Tests. The tests indicated that indeed heteroscedasticity and correlation of the errors between countries were issues to consider if one is to obtain consistent and unbiased estimates. Even if the use of robust standard errors corrects for heteroscedasticity, the same does not apply for cross-section dependence, hence the use of panel error-corrected standard errors.

The estimation results indicated that improvement in the Logistic Performance Index, and thus trade facilitation, has positive and statistically significant effect on performance of export by increasing the volume of trade among EAC countries. When year dummies are included in the model to control for time varying country-specific effects, this effect becomes more significant. The GDP of the exporter and that of the importer have statistically significant and positive effects on export performance on bilateral trade of

EAC countries. However, the impact of an increase in the GDP of the exporter on trade performance is greater than that of the country importing. The distance between two trading countries has a statistically significant negative effect on export performance, but when controlling for year dummies this effect becomes statistically insignificant while the effect of using a Common Official Language is significantly positive. The MRTA has been found negative and statistically significant meaning that Partner States belonging to many other regional blocs other than the EAC, seem to trade less with other EAC countries.

5.3. Policy Implications

The outcomes of this study lead to two major policy implications. The first, trade facilitation, measured by logistic performance, is positively linked to export performance. Therefore, in order to increase the volume of what EAC countries export to one another, there is need to increase the efficiency and effectiveness of the customs clearance processes, the quality of logistics services and infrastructural development such as communication, air, road and rail transport, which are some of the indicators captured by the logistic performance index. This will reduce trade costs substantially, and thus enhance trade within the region. Secondly, there is need to improve on the terms that govern trade within the EAC countries. The results indicated that countries which are engaged in multiple regional trade agreements tend to trade with those other countries outside the EAC bloc and hence benefit less from bilateral trade within the EAC than other EAC countries that are engaged in a few MRTA.

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