

FACTORS AFFECTING CUSTOMS REVENUE IN KENYA

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DECLARATION

This is to certify that this Research project is my original work and has not been presented for a degree in any other university or Institution of higher learning.

Signature.....Date.....

Sindiga Edwin

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

Signature.....Date.....

Cyrus Mutuku

DEDICATION

This research project is dedicated to my family for their support and encouragement.

ACKNOWLEDGEMENT

I would like to extend my sincere appreciation to all who contributed to the success of this work. My supervisor, Mr. Cyrus Mutuku deserves a special mention for his professional and academic guidance. His experience and patience came in handy. I also wish to thank my colleagues at work their moral and spiritual support. Finally, I thank my family for their continued support in accomplishing this project.

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LIST OF ABBREVIATIONS

CoC	Certificate of Conformity
EAC	East African Community
GoK	Government of Kenya
JKIA	Jomo Kenyatta International Airport
KEBS	Kenya Bureau of Standards
KRA	Kenya Revenue Authority
NCR	Non Conformity Report
NTM	Non-Technical Measures of Trade
PSI	Pre-shipment Inspection
PVOC	Pre Export Verification of Conformity
TBT	Technical Barriers of Trade
TFA	Trade Facilitation Agreement
UNCTAD	United Nation Conference on Trade and Development
WTO	World Trade Organization

DEFINITIONS OF TERMS

Certificate of conformity -Document issued when goods imported or exported have been inspected and meet the quality standards of KEBS and KRA.

Pre export verification of conformity - Verification done to all imports into Kenya if they meet the required quality standards of KRA and KEBS.

Non Tariff Measures - Policy measures other than ordinary customs tariffs that can potentially have an economic effect on international trade in goods, changing quantities traded, prices or both.

Technical Barriers to Trade - Regulations that are introduced for environmental protection, safety, national security and consumer information that may hamper trade among trading partners .

ABSTRACT

This study sought to determine the factors that affects the customs revenue collection in Kenya by using a panel gravity model with monthly time series data spanning 2010-2017. Empirical analysis shows a positive impact of the quality standards on revenue (29%) but negative on import values by (11%) in Kenya. The positive effect on revenue post quality standards period translates to an increment of Ksh 79 Billion from January 2016 to June 2017 cumulatively. The decline in imports is explained by restrictive import standards that have netted out low quality imports. Consequently the revenue yield per shilling import (proportion of trade revenue to cif values) has increased from 0.19 cents in pre quality standards period to 0.23 cents post quality standards period. On the other hand procedural trade barriers associated with import standards have also contributed to imports decline. Several administrative and operational challenges were identified in this research. Therefore, the research paper recommends that management should address administrative challenges, seal legal loopholes and capacitate qualitystandards unit to undertake 100% imports verification.

CHAPTER 1

1.0 INTRODUCTION

Quality standards are applied on imports into the country to regulate goods/products in the respective exporting countries to ensure that they comply with the applicable Kenyan Technical Regulations and Mandatory Standards. For instance, Kenya Revenue Authority (KRA) in conjunction with the Kenya Bureau of Standards (KEBS) requires that all goods imported or exported must be inspected and issued with the Certificate of Conformity (CoC).

The general objectives of applying this quality standards is to ensure quality of products, health and safety, protect the environment for Kenyans and meet requirements of the Kenyan standards. Also quality standards are set by governments to protect domestic producers, as a source of revenue for developing economies, and for political reasons. The internal quality standards in Kenya as stated by KRA and KEBS are to curb undervaluation and mis-declaration of imports. Therefore, all consignments which are subject to the Kenya quality standards must obtain a Certificate of Conformity (CoC) issued by any of the four authorized quality standards agents. These agents are Messrs Bureau Veritas, China Certification and Inspection Group, Intertek International, and Société Générale de Surveillance (SGS), (GOK 2016).

1.2 Background of the study

For all the exporters to Kenya or importers in Kenya, CoC is a mandatory document for Customs Clearance. Consignments arriving at Kenyan Ports without this document are denied entry into the country. All import cargo is subject to pre export of verification of conformity (PVOC) except the following: Goods regulated by Pharmacy and Poisons Board (PPB), Kenya Plant Health Inspectorate (KEPHIS), Pest Control and Products Board (PCPB), vehicles imported by registered manufacturers, primary inputs imported by registered manufacturers, printed matter (textbook, magazines), products certified by KEBS under the Diamond Mark Scheme, Courier shipments through JKIA (Airport) which are currently cleared under the Memorandum of Understanding (MoU) between KEBS and Courier Industry Association of Kenya (CIAK).

Notably, these exceptional cases are at the sole discretion of KEBS. Specific consignments may be allowed to undergo destination inspections after receiving the appropriate application from importers. Such consignments are subject to a penalty of 15% of the CIF value of the goods, plus 15% bond, and the testing and inspection costs. All other expenses incurred at destination are borne solely by the importer. In a nutshell, key elements undertaken in the quality standards are:- physical inspection prior to shipment ,sampling, testing and analysis in accredited laboratories ,quality audit of production processes ,documentary review of conformity with regulations and issuance of Certificate of Conformity (CoC) or Non Conformity Report (NCR) as appropriate.

Empirical analysis has classified verification of conformity programme under non-tariff barriers of trade (NTB) known as Technical Barriers to Trade (TBT), (Fugazza 2013 and UNCTAD 2013). TBT mainly includes standards, conformity assessments, certification, and technical regulations that are introduced for environmental protection, safety, national security and consumer information. If TBTs are set properly, they can promote trade (trade catalysts) but they can also be used as an excuse for protection when they are set at a high level (trade barrier). The World Trade Organization, WTO's TBT Agreement tries to ensure that the imposed standards and technical regulations do not create unnecessary obstacles to trade (Bao and Qiu 2012). Given the increasing importance and the complexity of TBTs, researchers have increasingly developed interest in knowing whether TBTs impede or promote trade. Most of the studies apply the heterogeneous-firm approach of Melitz (2003) and Helpman et al. (2004) to investigate the impact of TBT on bilateral trade. The results are contradictory on the effect of TBT on trade flows.

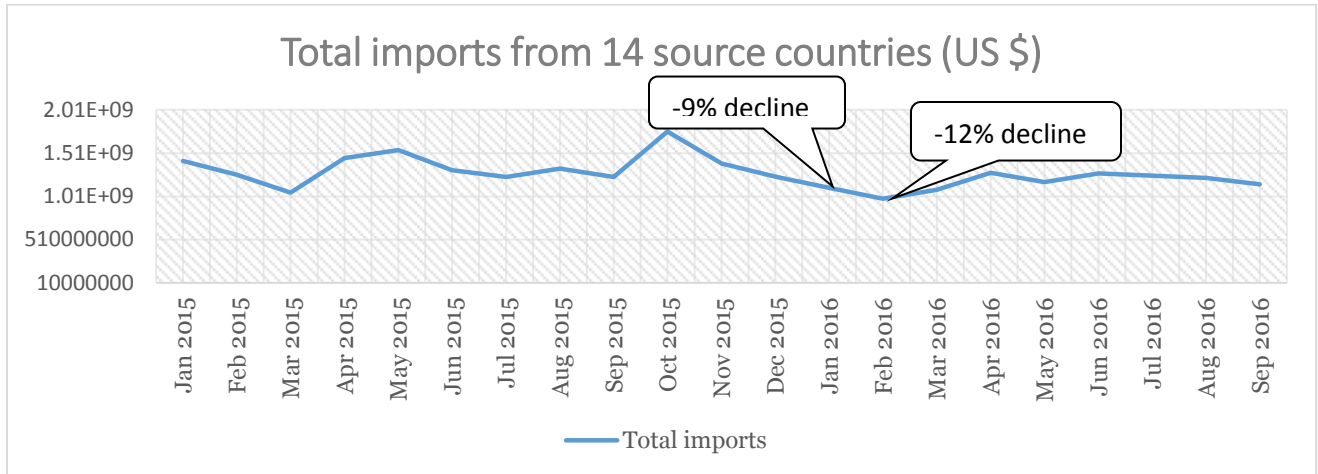
There are two opposing arguments on the effect of TBT on trade and revenue. One postulates that TBT promote trade hence more revenue is collected while the other is to the contrary. Theoretical argument linking TBT to reduction of imports and tax revenue has that if a country imposes a TBT, it raises both the fixed cost and variable cost to exporters of other countries. Exporting firms' variable cost of production increases as they invest in new technology and inputs so as to improve their product quality to meet the new standards. In addition, they incur cost on material investment in inspection equipment, quarantine process, and the coordination of technique experts to pass the examination consequently raising the fixed cost for exporting to the TBT imposing country. Hence, the total cost of production increases reducing both export

extensive margin (the number of exporting countries) and intensive margin (the export volume or value of each exporting country), (Chemnitz et al 2007 and Otski et al 2001)

On the other hand, the theoretical argument linking TBTs to increase in imports hence increase in tax revenue postulates that TBTs inform the consumers that the imported products have met specific standards consumers' demand, thereby raising both the extensive and intensive margins. Quality attracts demand of importing country, changes consumer preference, and increases imports especially in developed markets. However, this will be realized in the long run but in the short run producers/exporter incur compliance cost but stabilize in the long run. Empirical analysis by Maskus et al. (2005), Chen et al. (2008), Chevassus-Lozza et al. (2005) , Essaji (2008) Czubala et al. (2009) and Portugal-Perez et al. (2009) show that TBTs have a significant effect on trade flows and therefore effect on tax revenue generated.

In Kenya, quality standards programme was implemented with effect from 1st December 2015. The implementation of the quality standards programme was to tackle the issues of under valuation and mis-declaration, quality of products, health and safety and to protect the environment by ensuring that imports are verified at source. In the wake of the implementation of the quality standards programme, import entries, number of containers and values of imports declined.

Figure 1: Aggregated Monthly imports volume trend between 2015-2016 in US\$

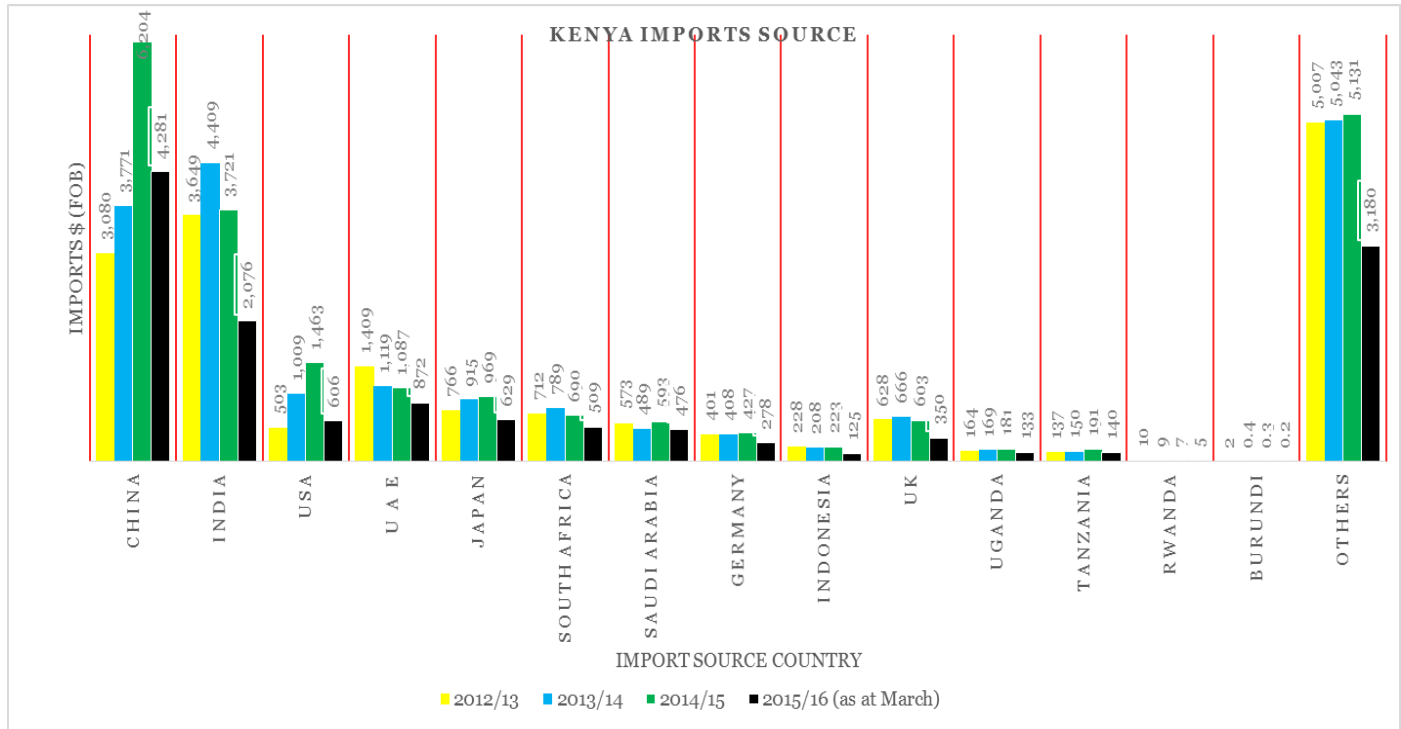


Data source: Author, IMF data.

As shown in figure 1 above, the aggregate imports per month shows a declining trend especially the post quality standards period of December 2015. The same period is marked by decline in number of containers with growth rate of the number containers decreasing from 4% in December 2015 to a drastic decline of -9% in January 2016.

On the other hand, Figure 2 below shows a trend of Kenya imports from more than 14 source countries. Notably, import volumes decreased drastically in post-quality standards compared to pre-quality standards period. Specifically, there 5.8% and 12.6% in the pre-quality standards and post-quality standards periods respectively decline in import values from 10 countries where Kenya sources about 70% of its imports. China and India recorded post-quality standards import value declines of 5.2% and 11.5% respectively with China imports shifting from a growth of 22.0% pre-quality standards to register decline in value of imports of 5.2% post-quality standards.

Figure2: Kenya imports by source country



Source: Author 2016, Data from KRA customs Department.

Other economies contributing to this decline in import values in the post-quality standards period are United States of America (51.1%), South Africa (21.5%) and United Kingdom (25.4%). Consequently, customs and border control revenue has declined by 73.2% in 2013/14, 69.1% in 2014/15 and further down to 68.5% in 2015/16. This underperformance in Customs is majorly attributable to trade taxes whose contribution to total C&BC revenue has been on a downward trend. Therefore, this study seeks to understand the trade dynamics and revenue implications occasioned by the implementation of quality standards, understand the factors behind the decline in the value of imported goods, containers landed and entries declared and give appropriate policy recommendations.

1.3 Statement of the problem

Import quality standards imposes pre-shipment requirements that ensure safety, quality and security of goods imported. Similarly, they reduce potential losses from the import of non-compliant products. Some of the factors that led to the adoption of the quality standards included

mis-declaration and undervaluation of imported goods. This affects performance in Customs which is majorly attributable to trade taxes whose contribution to total Customs and Border Control (C&BC) revenue. In Kenya, quality standards programme was implemented with effect from 1st December 2015. Since then no study has been done to address the decline in the customs revenue in Kenya. Therefore this study intends to determine the effect of quality standards on trade flows and revenue collection.

1.4 Research Objectives

1.4.1 General Objective

This study aims to investigate the factors affecting customs revenue in Kenya.

1.4.2 Specific objectives

The specific objectives for this study are:-

1. To determine the effect of exchange rate on customs revenue in Kenya
2. To determine the effect of GDP on customs revenue in Kenya
3. To determine the effect of PVOC on customs revenue in Kenya
4. To determine the effect of distance on customs revenue in Kenya

1.4.3 Research questions

1. Does exchange rate impacts customs revenue in Kenya?
2. Does GDP impacts customs revenue in Kenya?
3. Do quality standards affect customs revenue in Kenya?
4. Does distance affect customs revenue in Kenya?

CHAPTER 2

2.0 LITERATURE REVIEW

2.1 Introduction

This section reviews theoretical and empirical literature on quality standards, specifically on technical barriers to trade and their impact on import flows. The theoretical review highlights various theories that have been used to measure the impact of technical barriers to trade.

2.2 Theoretical review

2.2.1. Protectionist Theory

The theoretical underpinnings of TBTs, which includes quality standards programme, are protectionist theories. Protectionist theories are based on mercantilists' trade doctrine of 16th to 18th century which promoted government interventions to boost the accumulation of species through trade. Mercantilists argued that the best way for a nation to enjoy faster growth was to export more than it imported. The revenue would be a real inflow of gold. Since the amount of gold was fixed in the short run, not all nations could have such inflows simultaneously and gains from trade might be enjoyed only at the expense of the other nations. That is why mercantilist advocated for import restrictions and export promotion. (Mitchell and Dorfman, 1967).

Mercantilists' views were challenged by Adam Smith who advocated free trade based on absolute advantages of nations. He proved that the advantages of international division of labor and specialization would be shared by all nations who may benefit simultaneously from free international trade. Thus, when nations specialize in industries where they have absolute factor advantages, gains from trade come to every nation and not at the expense of others and there is no need for government intervention that only deteriorates allocation of resources and productivity (Mitchell and Dorfman, 1967).

2.2.2. Ability to pay theory of Taxation

The ability to pay theory suggests that every citizen should pay taxes according to his ability to pay, to meet the cost of Government expenditure. It is a progressive taxation principle where taxes are levied according to a taxpayer's ability to pay. Tax is progressive when the average rate of tax is increasing with income or when the average net of tax rate is decreasing with income

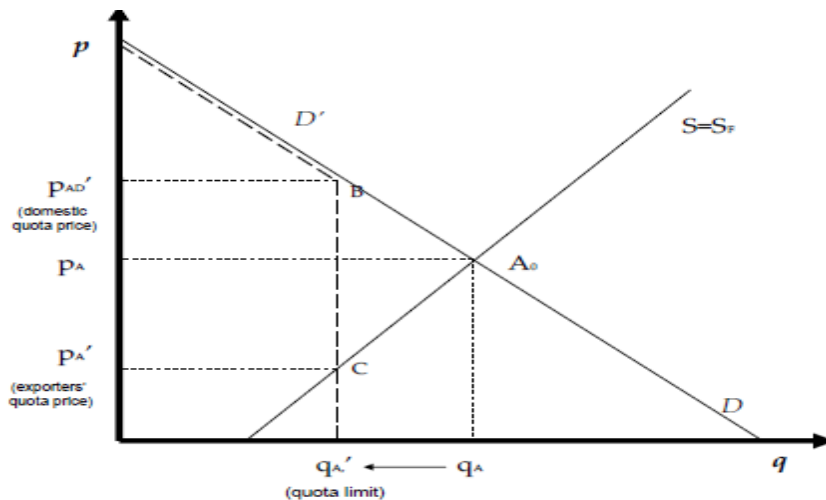
but it does not need to have an increasing marginal tax rate (Trannoy A, 2012). This principle is closely connected with the principles of equality and equity. Taxes shall have an individual character and shall be graded according to the economic capacity of the taxpayer. Those who earn more or have greater wealth pay more, whether they benefit from the government program or not. It is cumbersome to determine those with the “ability to pay”. Ability to pay is measured in terms of level of income, wealth and consumption expenditure. The ability to pay principle has been incorporated in many constitutions like Brazil, Netherlands, The Dutch and German (Konings, 2012).

2.2.3. Partial equilibrium model

A partial equilibrium model based on single market approach is more precise in analyzing the effect of a TBT on the economy using a quota for illustration. Based on this single market approach, one can assess the effect of trade restrictions at the border (Fugazza, 2013). An analysis done on quotas can be extrapolated to make similar analysis for non-tariff measures using demand and supply diagram for imports

Looking at the quotas, an introduction of a quota limits import levels at q_A^1 as shown in figure 1. This causes a rise in the imports domestic price to p_{AD}^1 , a price above world price a p_A . This causes the world price of the imported good to fall to p_A^1 . In a case where the quota is set above the level of free trade, the quota has no effect. Non-tariff measures could have similar effects but also are bound to generate other various economic effects. The cost-price raising effect of a TBT is due to compliance cost which changes the fixed cost of production from producers’ point of view. Fixed cost manifests in upgrading of equipment, operations, obtaining certificate, quality checks and altering production strategies, (Otsuki et al 2001). This is the trade barrier effect of a TBT.

Fig 3 Partial equilibrium model



However, quality standards may signal high quality of imports via information disclosure e.g trademarks, labeling requirements etc. leading to an increase in imports. This demand enhancement effect of a TBT is also known as standards catalyst argument, (Fugazza 2013, Henson & Humprey, 2008, Maertens & Swinney 2009).

2.2.4 Gravity model

One of the models frequently used to measure the presence of non-tariff barriers is the gravity model. The trade gravity framework is cited by Roy and Rayhan, (2013) as one of the most successful models in empirical economics so far. In the basic form of the gravity equation, trade between a pair of countries is modeled as an increasing function of their sizes and a decreasing function of the distance between the two countries. This simple framework explains most of the variations in observed volumes of trade flows. For these reasons the gravity model has become one of the standard empirical tools for analyzing trade patterns.

The model assesses the impact of different applications of policy to trade flows. This model originates from the Newtonian physics notion and was first applied in international trade by Tinbergen, (1962). Newton's gravity law in mechanics states that two bodies attract each other proportionally to the product of each body's mass (in kilograms) divided by the square of the distance between their respective centers of gravity (in meters).

The gravity model for trade mirrors the Newton’s gravity law. The analogy is as follows: the trade flow between two countries is proportional to the product of each country’s economic mass, generally measured by GDP, each to the power of quantities to be determined, divided by the distance between the countries respective economic centers of gravity, generally their capitals, raised to the power of another quantity to be determined Achrya, (2013) and Roy and Rayhan, (2012).

The gravity model is occasionally extended by researchers to include gravity variables such as distance, contiguity, official language, colonial relationship, common colonizer and dummy variables capturing shared trade blocks and technical barriers of trade, 2008 including (Chaney et al 2008).

The estimable version of the model is expressed as:

$$TV_{ij} = \beta_0 \frac{y_i^{\beta_1} y_j^{\beta_2}}{D_{ij}^{\beta_3}} \dots\dots\dots 1$$

Where T_{ij} is trade volume, i represents origin country, j represents destination country, y is real GDP and D_{ij} is the distance between the two trading countries capital city. It is normally used as a proxy for cost of transportation. On the other hand, B_0 , B_1 , B_2 and B_3 are parameters to be estimated. The empirical form of the model is normally linearized to include policy variables.

2.3 Empirical Literature Review

2.3.1 Effect of Quality Standards (PVOC programme)

According to United Nations Conference on Trade and Development (UNCTAD) (2010 and 2013) NTMs are policy measures other than ordinary customs tariffs that can potentially have an economic effect on international trade in goods, changing quantities traded, prices, or both. NTMs are classified into sanitary and phytosanitary (SPS) measures and technical barriers to trade (TBTs) which hamper trade among trading partners in different ways (Kiriti, 2014). The Kenyan PVoC programme lies under TBTs.

TBT measures are increasingly being enacted in the world. UNCTAD (2013) and Fugazza (2013), attributes this increase to failure on tariff liberalization measures to restrict international

trade. Literature is rich with studies on the effect of non-tariff barriers/measures (NTMs) on trade flows both in developed and developing economies. However, whether the effect is positive or negative has been a debate (Maskus et al, 2001). There are a myriad of studies and policy initiatives supporting the argument that TBTs inhibit international trade.

For instance, World Trade Organization initiated trade facilitation talks in 2001. One of the major focus was to simplify pre-shipment inspections process. The talk generated World Trade Agreement on Trade Facilitation (TFA) geared towards simplification and streamlining of customs and border procedures as a trade facilitation measure. Through the TFA, exporters should have an easier time getting their products across borders and markets. According to OECD (2015), TFA could lead to 14.1% reduction in cost of production in Kenya.

A survey on barriers of trade in Kenya in relation to EAC trade partners (Kiriti, 2014) focused on the effect of technical barriers on businesses. This study classified KEBS and KRA quality standards and certificate of conformity as a TBT. The study identified a set of procedural barriers to trade that severely affect business operations by increasing the cost of operation. Some of the identified obstacles by businessmen respondents were: delays in clearance of goods at the port of Mombasa due to lengthy clearance processes, non-recognition of certificates of origin, verification and classification of goods, varying procedures for issuance of certification marks, technical standards, inspection and testing by bureaus of standards (83.3%), cumbersome testing procedures for certain imports, administrative levies and corrupt practices (90%). However a survey from customs agents denied that (PVoC) programme was a hindrance to trade citing that delays in clearance of goods at customs is as a result of customs departments' staff lack of institutional capacity, poor staffing levels, poor infrastructure and insufficient human resources.

A study by Bao and Qui (2012) covering 105 countries and regions from 1995 to 2008 estimated the trade effects of technical barriers to trade (TBT) using modified two-stage gravity model to control for both sample selection bias and firm heterogeneity bias. The study defined non-tariff trade barriers as technical trade barriers which mainly include standards and technical regulations introduced for a range of reasons like environmental protection, safety, national security and consumer information. The empirical findings revealed, firstly, that a country's TBT notifications decrease other countries' probability of exporting. This is explained by an increase in both variable and fixed cost that exporters incur in a bid to meet the standards.

Secondly, the study revealed that a TBT imposed by a developing country will significantly affect exports of other developing countries. However, the TBT has no effect on imports of developing countries. On the other hand, a developed country's TBT has significant effects on the exports from both developed and developing countries but the effect is more severe on the former. A similar argument is advanced by Anderson and van Wincoop (2003).

In another study, Maskus, et al (2001), raises a concern over the role of trade barrier techniques. The study associates TBTs with increase in cost for the importing foreign firms compared to the domestic firms. This makes TBTs a trade barrier. The increase in cost may be attributed one-time costs of compliance to the administrative system and product redesign. Recurrent costs arise from quality control maintenance, testing and certification. Verifications to ensure that regulations are met pose as the greatest technical barrier to trade. Importing governments have to ensure that their goods pass the conformity assessment for every product they are exporting. These governments may refuse to recognize the tests provided by the clearing agencies or other public authorities. This subjects the process to unwanted bureaucratic procedures. Moreover, time delays also affect products with short life cycle such as perishable goods.

Stephenson (1997) highlights one of the reasons that developing countries lag behind developed nations is their lack of capacity in effective certification and poor testing facilities. This implies that developing nations have not reached a consensus on conformity of assessment standards with other nations. It also implies that they have not integrated their systems with test requirements from abroad. Lastly, lack of trust from developed countries with inspection.

Contrary, Felbermayr and Jung (2011), argue that technical barriers to trade are often used as fixed regulatory costs in relation to market entry of exports. From their study which applied a model capturing heterogeneous firms, differentiated goods and variables capturing external economies of scale, their results showed that TBTs have a positive impact of trade. This impact is seen through increased number of productive firms participating in trade thus increasing trade volumes. A similar argument is advanced by Rippel (2011). In their paper, they cite an example of how trade facilitation has improved trade between Zambia and Zimbabwe. With the creation of the one stop border post, the countries have noted significant improvement in reduced waiting time at the border from five days to two days or even a few hours. However, for this to be realized, there's need to view the implementation of TBTs as a long term project.

In studying pre-shipment inspection programs, Dequiedt et al. (2012) uses a hierarchical agency model to understand the linkage between incentives governments (the regulator) can offer importing firms and pre shipment inspection (PSI) firms (the supervisors). The supervisors' role is to control an agent's declaration on imports. The regulator has to handle aspects of asymmetric information since the agents know more about the value of their imports, under declaration by the agent, and corruption by the customs officer in the event they collude with the agent. From the model, the authors concluded that the design of the PSI programs is critical to profitability. However, they caution that PSI programs may not be an optimal solution to all countries especially they with high levels of corruption. This is more so in developing countries.

Michael et al. (2012) did a study to determine whether customs trade facilitation programs enhance efficiency. From their study, they found that trade facilitation programs do impact trade facilitation by reducing corruption which in turn enhance efficiency at customs offices. On average, state treasuries lose over \$2 billion globally in trade taxes excluding excise taxes and VAT. In particular, World Bank estimates showed that Kenya lost on average \$9m annually. According to Ferreira (2007), traders give bribes for three main reasons; favorable classification of imports that will attract lower taxes, to have smoother conditions for clearance and as a way of avoiding inspections. The effect of this is undervaluation which in turn affects trade profitability. Therefore, one cannot ignore the relationship between trade facilitation and corruption within the customs offices. Trade facilitation programs are thus geared towards curbing corruption as well.

Pre shipment inspection programs are examples of such programs that are instrumental in the enhancement of trade. These programs have been adopted worldwide as part of custom related initiatives that can enhance efficiency of the customs departments. According to Jean and Mitaritonna (2010), trade facilitation programs have an overall impact on reducing customs tax trade evasion. These programs reduce cases of under declaration consequently increasing the revenue generated.

2.3.2 Exchange Rate

Exchange rate plays an important role in the international trade of an economy. According to Akhter and Faraqui (2015), exchange rate is used as a parameter for determining international competitiveness and indicates the global position of the economy of a country. The development of a country depends on its foreign exchange systems. Jhigan (2005), found out that the imports,

exports and other structural influences affects the exchange rate of an economy. The exchange rate has a negative effect on the trade revenues of a country.

2.3.3 GDP

Per capita income also referred to as per capita GDP has been used extensively in most of the studies to capture the country's level of development. It is assumed that as countries develop, their tax bases also expand and thus higher incomes (GDP) are associated with higher capacity to pay taxes thus increasing the tax revenues. In an earlier study on measuring tax effort in developing countries, Lotz and Morss (1967) used regression methodology and found a positive significant relationship for per capita GNP and tax revenue. A study done by Le et al (2008) on expanding taxable capacity and reaching revenue potential found also found a positive relationship between tax effort per capita GDP. These findings are consistent with those of Ghura (1998) who also used traditional regression; Botlhole (2010) on determinants of tax effort in sub-Saharan Africa and Murunga (2014) in his study in Kenya; Castanenda and Pardinias (2012) in their Mexican study as well as Ahmad et al. (2016) in their Pakistan study. Fenochietto and Pessino (2013) also found the level of development and income distribution to significantly influence countries tax effort in their study on 113 countries.

However, Addison and Levin (2012) while analyzing the determinants of tax revenue in Sub-Saharan Africa using a two-step GMM regression and found an insignificant positive relationship between per capita GDP and total tax revenues. In yet another study, Langford and Ohlenburg (2015) used the stochastic frontier technique to estimate tax capacity on set of 85 countries for a period of 27 years and found the level of GDP per capita insignificant once the level of education was included.

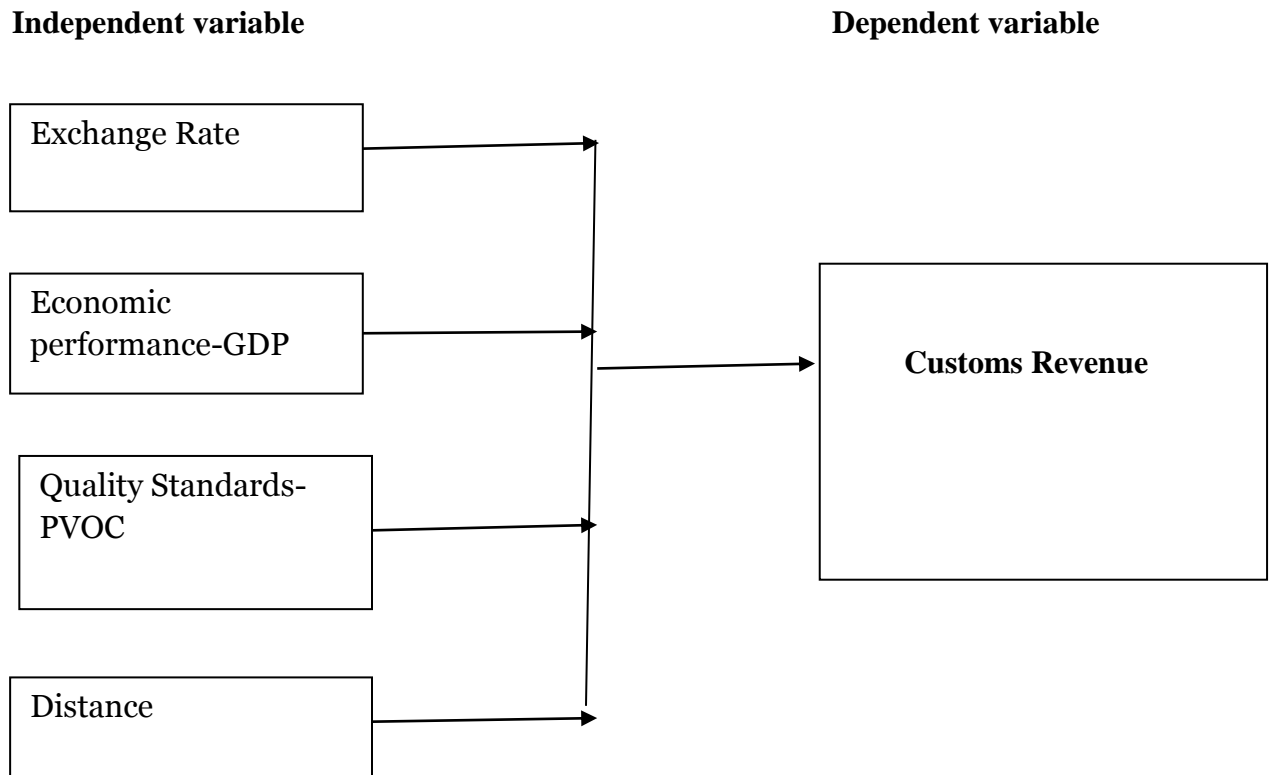
2.3.4 Distance

Distance between Kenya's capital city and that for exporters has a negative sign but it is not significant at the conventional statistical levels. Distance is used as a trade resistance factor in gravity model. It is a proxy for unit cost of transporting goods from one economy to another. According to Buch et al.2004, globalization and technology have gradually diminished the importance of distance in determine bilateral trade relationships although we expect economies that are close to trade more than those that are far from each other. The coefficient of exchange

rate is negative as expected in theory implying that exchange rate variations do influence trade flows between economies.

2.4 Conceptual framework

Figure 4 Conceptual Framework



2.5 Literature overview

Literature has highlighted two major arguments on the effect of technical trade barriers on trade. One is trade barrier effect, which shows that TBTs increase the cost of production and final product prices leading to decline in customs revenue. Similarly, the bureaucratic process of obtain a verification is also trade impairing especially for perishable goods. Notably, this effect may not exist in the long run. An opposing argument is the catalyst effect of a TBT. The empirical findings seem to be biased on application of gravity model, however the findings are contradicting. The catalyst argument suggests that quality goods resulting from TBTs lead to a rise in domestic demand for imports leading to increase imports and trade revenue. This study will investigate the effect of exchange rate, GDP, PvoC program and distance on trade and revenue flows in Kenya.

CHAPTER 3

3.0 RESEARCH METHODOLOGY

This chapter shows the research design, econometric model and data sources for this study.

3.1 Research design

This study used causal research design. The casual approach was applied to see how the introduction of the quality standards program affected trade values and revenue collection in Kenya using a panel gravity model.

3.2 Data collection, instruments and sources

This study used secondary data which was obtained from the World Bank, World Development Indicators (WDI) for the period between 2000 and 2015. Annual data was then transformed to quarterly data using E-Views. This was captured in a panel econometric model.

3.3 Target population

Fourteen countries where Kenya obtains 80% of its imports.

3.4 Data analysis and presentation

For the secondary data obtained, preliminary analysis on measures of central tendency and measures of dispersion were presented in a table. Data trends were presented on graphs and diagrams. An empirical panel econometric model capturing the factors that affect imports flows from specific countries were estimated using Eviews and STATA econometric softwares.

3.4.1. Econometric model specification

To capture the factors that affect customs revenue from specific economies, the study estimated a modified gravity model with both gravity variables, additional policy dummies and control macroeconomic variables.

The basic gravity model was captured as

$$TV_{ij} = \beta_0 \frac{y_i^{\beta_1} y_j^{\beta_2}}{D_{ij}^{\beta_3}} \dots\dots\dots 2$$

Applying natural logarithm transformation and modification, we obtain equation 3 below

$$\ln X_{ijt} = \beta_0 + \beta_1 \ln Y_{it} + \beta_2 \ln Y_{jt} - \beta_3 \ln D_{ij} + \beta_4 EACd_{jt} + \beta_5 \ln REER_{it} + \beta_6 X_{jt} + \varepsilon_{it} \dots 3$$

Where β_0 is the intercept of the model, $\beta_1, \beta_2 \dots \beta_8$ are corresponding coefficients to be estimated, $\ln y_{it}$ is natural logarithm of Kenya Real GDP at time t, $\ln y_{jt}$ natural logarithm of real GDP of Kenya trading partners at time t, $\ln exr$ is natural logarithm of real effective exchange rate, $EACd_j$ is a dummy variable for EAC membership. ε_{it} is the idiosyncratic error term while X_{ij} are exports from country i to country j.

Table 1: Variable description and expected sign.

SN	Variable	Description	Expected sign
1	LNx	Dependent variable -CIF or FOB imports and trade revenue values by source country in dollars	Dependent variable
2	lnYit	Natural logarithm of real GDP of Kenya trading partners at time t	+
3	lnYjt	Natural logarithm of real GDP of Kenya trading partners at time t	+
4	lnD	Natural logarithm of the distance between Nairobi and capital cities of Kenya's trading partners (see appendix 1), which is time invariant.	-
5	lnexr	Natural logarithm of real effective exchange rate	-
6	EACd _j	A dummy variable for EAC membership	+
7	pij	Proxy for procedural trade barrier.	-
8	PVOCdi	A dummy variable capturing PVOC programme with 0 and 1 for pre and post PVOC periods respectively	Indeterminate

CHAPTER FOUR

4.0 DATA ANALYSIS AND RESULTS

4.1 Introduction

This chapter presents the preliminary analysis and results for the study. The following is the empirical results based on gravity model estimates.

4.2 pre & post estimation tests

The study conducted various tests to ensure that the results obtained are free from biases and are consistent. Generally, in panel data modeling, we can use random effects, fixed effects or pooled OLS models. The first test was to determine the appropriate model to estimate using Hausman test.

4.2.1 Hausman test.

To decide between fixed or random effects we ran the Hausman test. The null hypothesis is that the preferred model is random effects vs. the alternative which states that fixed effects model is more appropriate. The statistic follows a chi-distribution as shown below. The p-value for the computed chi-statistic is 0.5746. Therefore, we cannot reject the null at all conventional significance level hence we do a random effects model.

Table 2 Hausman test results

	—— Coefficients ——		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) fe	(B) re		
PVOC_d	-.2002608	-.2071195	.0068587	.0070607
lnykn	.1231901	.1719194	-.0487293	.0346152
lnexr	-.0475274	-.0566865	.0091591	.0209531
lnx	.1803772	.1750594	.0053178	.0075564
lnyn	.5814991	.4879052	.0935939	.0732236

b = consistent under Ho and Ha; obtained from xtreg
 B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
 = 3.83
 Prob>chi2 = 0.5746

Source: Author 2018

4.2.2 Breusch and Pagan Lagrangian multiplier test

With random effect model preferred to fixed effect model, it is essential to confirm whether there is cross sectional variation across units basically referred to random effects. Otherwise, we should estimate a simple OLS. Therefore, Breusch and Pagan Lagrangian multiplier test for random effects was done where the null is: there are no panel effects hence we should do a pool model. The alternative hypothesis is that variance across entities is not zero hence we use random effects model. Breusch and Pagan Lagrangian multiplier test for random effects rejects the null suggesting that we have random effects across entities.

Table 3: Breusch and Pagan Lagrangian multiplier test

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

      lnm[id,t] = Xb + u[id] + e[id,t]

Estimated results:

```

	Var	sd = sqrt(Var)
lnm	4.241679	2.059534
e	.2331439	.4828498
u	.7696936	.8773218

```
Test:   Var(u) = 0
              chibar2(01) = 10378.20
              Prob > chibar2 = 0.0000
```

Source: Author 2017

4.2.3 Test for cross sectional dependence.

Cross sectional dependency is a common problem in macro-panels with longtime series. Cross sectional dependence is caused by common factors which are observed but uncorrelated with model regressors. In such cases, random effect estimates are consistent but not efficient and standard errors are biased. The study used both Peseran cd test and Friedman's test (see appendix 2). The tests show that there is a weak cross sectional dependency with an average absolute correlation coefficient of 0.236 and 0.236 for both tests respectively. The remedy for this problem is to use adjusted (Robust) standard errors.

4.2.4 Panel heteroskedasticity

In panel data, heteroskedasticity is caused by variations in country sizes. The study tested for heteroskedasticity using LR test. The results in appendix 3 shows presence of heteroskedasticity, therefore we used robust standard errors in estimation as a remedy.

4.3 Model estimates

Table 4 Gravity model estimated results

Independent Variables	ESTIMATOR			
	Model 1-RE	Model 2- RE	Model 3-RE	Model 4-RE
	Ln_imports (FOB\$)	Ln_imports (CIF\$)	Ln_trade revenue(\$)	Ln_imports(FOB\$)
Ln_distance	-0.9771 (0.6566)	-0.43337 (0.4924)		-0.3784 (0.5425)
<i>Border_dummy</i>	2.6282*** (0.9651)	3.6851*** (0.7101)		3.475*** (0.782)
<i>EAC_dummy</i>	-4.911**** (1.4611)	-5.1262*** (1.0008)	2.2698** (0.3565)	-4.468*** (1.146)
<i>PVOC_dummy</i>	-0.2071*** 0.0529	-0.1290** (0.0776)	0.2692* (0.1578)	-0.1790 (0.1428)
<i>Lngdp_kenya</i>	0.1719** (0.1103)	0.3972*** (0.1482)		1.267*** (0.2607)
<i>Lnmc4_imports</i>			0.5269*** (0.0584)	
<i>Ln_time trend</i>			0.2392*** (0.0571)	
<i>Ln_exchange rate</i>	-0.0656 (0.4912)	-0.0863 (0.0587)		-0.3146*** (0.0913)
<i>lnGDP_exporter</i>	0.5408 (0.1319)	0.3104** (0.1444)		0.4173** (0.1369)
<i>TTI</i>				-0.1800*** (0.0438)
<i>constant</i>	22.374 (5.084)	22.657*** (3.1914)	-3.4760*** (3.4760)	19.137*** (4.641)
R^2	0.84	0.81	0.61	0.85

***significant at 1%, **significant at 5%, *significant at 10%, and Standard error in parenthesis ()

4.3.1 Effect of exchange rate on customs revenue

The study sought to determine the effect of exchange rate on customs revenue in Kenya. The gravity model estimate shows that there is negative effect of exchange rate on customs revenue, significant at 1%. It shows that a 1% increase in exchange rate results into increase 0.0656% to 0.0863%. The coefficient of exchange rate is negative as expected in theory implying that exchange rate variations do influence customs revenue.

4.3.2 Effect of GDP on customs revenue

The study sought to determine the effect of GDP on customs revenue in Kenya. The gravity model estimate shows that there is positive effect of GDP on customs revenue, significant at 1%. It shows that a 1% increase in Kenya GDP results into increase of the value imports by almost 0.17% to 0.39%. The results in table 4 show that customs revenue in Kenya positively and significantly depend on Kenyan economic performance (GDP) which is also a proxy for imports demand, GDP of exporting economies-which also reflects their supply constraints or ability to produce export goods and sharing of borders. These findings are consistent with gravity model which assert that customs revenue are positively related to economic mass for the two economies.

4.3.3 Effect of quality standards on import flows

The study sought to determine the effect of quality standards on customs revenue in Kenya. The gravity model estimate shows that there is negative effect of quality standards on customs revenue, significant at 1%. It shows that a 1% increase in quality standards results into 0.2071% to 0.1290%.

4.3.4 Effect of distance on import flows

The study sought to determine the effect of distance on customs revenue in Kenya. The gravity model estimate shows that there is negative effect of distance on customs revenue, insignificant at the conventional statistical levels. It shows that a 1% increase in distance results into 0.9771%

to 0.4334%. Distance is used as a trade resistance factor in gravity model. It is a proxy for unit cost of transporting goods from one economy to another.

The rest of the variables are dummies, therefore interpretation of such variables in logarithmic equations requires some transformation for theoretically consistent results as suggested by Halvorsen and Palmquist (1980). The proper representation of the proportional impact of coefficient β_{ij} of a zero-one dummy variable, d, on the dependent variable x is expressed as,

$\beta_{ij}^T = [e^{\beta_{ij}} - 1] * 100$, where e is the exponential constant and β_{ij}^T is the transformed dummy coefficient.

Kenya being a member of EAC has negative effect on import flows and trade revenue collection suggesting a possibility of trade diversion other than the expected trade creation effect. Border dummy is positive and significant as expected. Economies that share borders are likely to share language, culture and they are likely to create more trade ties.

Our main variable is PVOC programme which was measured using a dummy variable of 1 in post PVOC period and 0 in pre-PVOC period. Estimates in model 1 and 2 reveals that PVOC lead to decline in CIF value of imports by 11 %. Similar findings are reflected in KRA brief report on imports trend and effect of PVOC based on regression discontinuity design. In model 3, we estimate a panel model using trade revenue as dependent variable, the effect of PVOC on trade revenue is positive (29%) and significant at 10% significance level. However, gravity variables and other control variables used can hardly explain revenue collection bearing in mind that revenue collection is largely driven by administrative factors. This is manifestly notable in coefficient of determination of 61%.

In model 4, we control for procedural trade barrier using the time it takes to import (TTI). TTI is based on average time it takes on documentary compliance (preparing documents, processing documents and presenting) and border compliance (clearance) within the overall process of exporting or importing a shipment of goods. TTI coefficient is negative and statistically significant at 1% implying that one hour increase in TTI reduces imports by 0.18%. Notably, in model 4, PVOC coefficient is negative but insignificant.

The PVOC negative sign on customs revenue may not necessarily mean that the stringent standard put by KRA and KEBS is impairment to trade. As noted in model 4, the coefficient is insignificant when we control for procedural trade barriers. Actually, the effect could be due to procedural obstacles related administrative, regulatory and agency based challenges as cited on various surveys on trade barriers other than in the stringent standard measures posed by pre-export verification assessment (ICT 2014 and ICT 2016). Alternatively, the decline can be explained by effectiveness of PVOC in netting out concealments and undervaluation.

CHAPTER 5

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter covers the summary of findings, conclusion and recommendations of the study.

5.2 Summary of findings

The study sought to determine the effect of exchange rate, GDP, quality standards (PVOC programme) and distance on customs revenue in Kenya. To gauge the effects on customs revenue, the study estimated a modified gravity model with both gravity variables, additional policy dummies and control macroeconomic variables.

5.2.1 Exchange rate

The study sought to determine the effect of exchange rate on customs revenue in Kenya. The gravity model estimate showed that there is negative effect of exchange rate on customs revenue, significant at 1%. It shows that a 1% increase in exchange rate results into increase 0.0656% to 0.0863%. The coefficient of exchange rate is negative as expected in theory implying that exchange rate variations do influence customs revenue.

5.2.2 GDP

The findings of the study reveal that customs revenue in Kenya significantly depend on Kenyan economic performance (GDP) and sharing of borders. A 1% increases in Kenya GDP increases the value of imports by almost 0.17% to 0.39%. Similarly, the coefficient of GDP for the countries exporting into Kenya is positive, ranging from 0.54% to 0.31% and significant as expected. A 1% GDP growth for exporter increases the supply of Kenyan imports by 0.54% to 0.31% which in turn increases the revenue.

On the other hand, Kenya being a member of EAC has negative effect on import flows and trade revenue collection suggesting a possibility of trade diversion other than the expected trade creation effect. Border dummy is positive and significant as expected implying that Kenya trades more with the economies they share borders.

5.2.3 PVOC Programme

The quality standard (PVOC programme) was captured as a dummy variable. The result from panel gravity model reveals that PVOC lead to decline in import CIF value of imports by 11 %. Notably, the effect is insignificant when we control for procedural barriers measured by the time it takes to import or export a commodity from/to Kenya. However, the effect of PVOC on trade revenue is positive and significant at 10% level. The positive effect translates to cumulative additional revenue to a tune of KSh 79B for the period between January 2016 and July 2017.

The PVOC negative effect on trade values is partly explained by procedural obstacles related administrative, regulatory and agency based challenges as cited on various surveys on trade barriers other than in the stringent standard measures posed by pre-export verification assessment (ICT 2014 and ICT 2016). Secondly, the decline can be explained by effectiveness of PVOC in netting out concealments, undervaluation and low quality imports. Thirdly, the quality of imports has significantly improved post-PVOC period. This is supported by an observable increase in tax yield per import from 0.19 pre-PVOC period to 0.23 in post PVOC period.

5.2.4 Distance

Distance between Kenya's capital city and that for exporters has a negative sign but it is not significant at the conventional statistical levels. Distance is used as a trade resistance factor in gravity model. It is a proxy for unit cost of transporting goods from one economy to another. According to the reviewed literature, globalization and technology have gradually diminished the importance of distance in determine bilateral trade relationships although we expect economies that are close to trade more than those that are far from each other.

5.3 Conclusion

This study concludes that quality standards (PVOC) are effective in netting out low quality imports, undervaluation of imports and concealments. However, due to procedural barriers involved in obtaining COC, verification and clearance, quality standard can be a trade barrier. Therefore for KRA to reap maximum benefits from quality standard programme, such procedural barriers need to be addressed.

5.4 Recommendations

The study outlines the following policy recommendations based on gravity model estimates.

- a. Facilitate and support officers to effectively enforce 100% inspection even for consolidated cargo. To curb variations in COCs issued by different agents, KEBS should create a framework of uniformity for all the agents. Similarly, a follow up post clearance audit should be done on PVOC recoveries to check on compromised agents and inspectors
- b. To deal with fake COCs and inability to detect them, KEBS should create a data base of all issued COCs together with importers and goods exempted and allow KRA to have access to the data base to verify the authenticity of COCs at clearance point.
- c. It is essential to review and amend Legal Notice no. 78 of 2005 to end local inspections for consignments without COCs. The use of foreign COCs other than local COC will not only reduce congestions at clearance points but also enforce PVOC standards strictly and seal loophole of revenue loss.
- d. Human resource unit to come up with clear cut responsibilities for PVOC officers
- e. Facilitate officers with advanced verification tools (non-intrusive technology-scanners), printers, cameras, transport and office space. The management should ensure that officers use same standards of valuation. In similar vein, ICT department should make VDIs compatible with intertek system.
- f. Train officers on professional valuation, valuation refresher courses, fraud detection and intelligence gathering skills.
- g. Increase fines and penalties on noncompliance, concealment and undervaluation to discourage the vice.
- h. Reduce bureaucracy in PVOC office; shorten decision making process on inspection reports to reduce delay in clearance and importers complains.
- i. Sensitize importers on PVOC requirements and emphasize to all stakeholders especially agents on the need for 100% verification.
- j. Verification places like internal container depots (ICD) e.g Embakasi, pepe, and Kisumu should be better equipped with handling equipment to remove and stuff back bulky containers but as it is now, there is reluctance to remove goods for inspection. Management should guide on how to deal with bulky consignments.

- k. Cancellation of Contracts for inspection agencies not following the CoC Standard Operation Procedures by KEBS and KRA. This will eradicate the use of fake and irrelevant COCs. Secondly, improve on the level of customs control over the role of clearance agents probably through frequent audits and rectifying.

Suggestion for further study

Impact of African Continent Free Trade Agreements (AFCFTA) on import flows in Kenya

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Appendix 1: Countries Targeted

Burundi

China

Germany

India

Indonesia

Japan

Rwanda

Saudi Arabia

South Africa

Tanzania

Uganda

United Arab Emirates

United Kingdom

United States

Appendix 3 Test for heteroskedasticity

```
. *To indicate to lrtest the number of implied constraints  
. local df=e(N_g) - 1
```

```
. display e(N_g) - 1  
13
```

```
. *Run the lrtest  
. lrtest hetero . , df(13)stats
```

```
Likelihood-ratio test                LR chi2(13) =   1061.28  
(Assumption: . nested in hetero)    Prob > chi2 =    0.0000
```

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	1,098	.	-1185.437	9	2388.873	2433.885
hetero	1,098	.	-654.7977	23	1355.595	1470.624

Note: N=Obs used in calculating BIC; see [\[R\] BIC note](#).

```
. *Note: LR Chi2 should not be negative?
```