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Trade Effects of Non-Tariff Barriers in Tanzania: A Case of the Dar es Salaam-Namanga Busy Border Trade Post

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ABSTRACT

The main objective of this study is to examine and quantify the effects of Non-Tariff Barriers (NTBs) on cargo trade movement in Tanzania, focusing on the Dar es Salaam-Namanga Border Post. Specifically, the study aims to identify the main administrative or technical requirements along this trade route (both old and new), analyze the regularity of these requirements based on respondents' feedback, and provide recommendations for mitigating NTBs. The study utilized an empirical survey design, collecting mostly qualitative data on border trade performance and perceived non-tariff barriers. The research was guided by economic theory and targeted formal and informal cross-border traders, transport companies, truck drivers, weighbridge attendants, and customs and revenue authorities. Data was collected through desk research, interviews, questionnaires, and stakeholder consultations. The Dar es Salaam-Namanga route was chosen for its importance as the busiest commercial corridor in the East African Community (EAC). The study employed both probability and non-probability sampling techniques, restricted to the Arusha-Namanga roadway. Four data collection methods were used: desk research, interviews, questionnaires, and stakeholder consultations. The data were analyzed using thematic analysis for qualitative information, and an econometric model based on Newton's gravitational equation (a modified gravity model) was used to quantify trade effects. Statistical Package for Social Sciences (SPSS) was employed for stepwise multiple linear regression analysis. The model's predictive power was tested using an F-test, and it was verified to meet assumptions of linearity, homoscedasticity, and multicollinearity. The results revealed that roadblocks, customs clearance, permits, and road infrastructure significantly affected trade performance. Unethical practices at weighbridges, frequent police checks, and customs procedures lead to monetary losses and time delays for cross-border traders. Bribery, police checks, and unloading processes during inspections were identified as factors contributing to the perception of NTBs as costly and time-consuming. On a positive note, improved road conditions have reduced transportation costs by lowering vehicle repair expenses and decreasing travel time. The study concludes that there is a need for regional cooperation within the EAC to eliminate existing NTBs. It recommends streamlining administrative procedures and working hours at border points, and implementing monitoring systems to ensure the effective removal of unnecessary barriers to trade. These measures are essential to improving trade efficiency and promoting the goals of the re-established East African Community.

Keywords: Cargo Trade Movement, Dar-Namanga Border, East African Community, Non-Tarrif Barriers

I. INTRODUCTION

The importance of trade in the development of countries is widely acknowledged. Economic theory and empirical evidence support the view that trade and investment promote economic growth and reduce poverty (Calabrese & Eberhard-Ruiz, 2016). Countries that have improved their trade performance have seen significant income growth, leading to the general acceptance of trade as a key determinant of economic prosperity. To achieve this prosperity, countries have entered into regional trade agreements, expecting to benefit from broader market access, increased competition, product variety at lower prices, enhanced trade between members, and the promotion of national security and peace (Hangi, 2010).

While regions like America, Europe, and, more recently, Asia have leveraged trade to boost services, labour, capital, and investment to grow their economies, African countries, including those in East Africa, have lagged behind. As a result, Africa has experienced poor trade and growth performance, resulting in widespread poverty and marginalization in the global economy (Oatley, 2019). Fisher (2006) notes that accelerated economic development through free trade has been a key driver of global economic integration. Regional trading blocs have been adopted by countries as a strategy to increase their global competitiveness.

In an effort to reverse these unfavourable economic and trade trends, Sub-Saharan African (SSA) countries have recently intensified their efforts toward regional and economic integration. These initiatives, by promoting intra-

regional trade and cross-border investments, aim to stimulate industrialization and help the region counter the unfavourable trends it has been facing (Mkuna, 2014).

Successful economic trading blocs, such as the European Union (EU), Economic Community of West African States (ECOWAS), Common Market for East and Southern Africa (COMESA), Association of Southeast Asian Nations (ASEAN), Southern African Development Community (SADC), and East African Community (EAC), highlight the potential benefits of integration. However, non-tariff measures (NTBs) continue to endure, evolving like a chameleon. These challenges suggest that, while member countries are committed to regional transformation, NTBs still pose significant barriers to trade (Oatley, 2019).

Mkuna (2014) notes that despite significant tariff reductions since the re-birth of the EAC, non-tariff barriers remain a major constraint to both intra-regional trade and cross-border investment. NTBs increase the cost of doing business, leading to trade losses and the closure of potential markets. The costs and trade implications of these NTBs within EAC member states are not well understood (Mkuna, 2014).

To address this gap, this paper aims to identify and quantify the trade effects of NTBs along the Dar es Salaam-Namanga trade route, using a multiple regression model derived from the traditional, yet modified, gravity model. According to Charalambides (2010), NTBs include market-specific trade and domestic policies such as import quotas, voluntary export restraints, state trading interventions, export subsidies, countervailing duties, technical barriers to trade, sanitary and phytosanitary policies, rules of origin, and domestic content requirements. Gathii (2011) defines NTBs as any governmental practice, other than tariffs, that impedes imports and discriminates against them, while not equally applying to domestic production or distribution.

The EAC defines NTBs as "quantitative restrictions and specific limitations that act as obstacles to trade." This paper adopts the World Trade Organization (WTO) definition, which considers NTBs as public policy interventions aimed at protecting domestic industries, national health, safety, and security.

NTBs can be classified based on two main aspects: legislative origin and desired objectives. These classifications include seven categories: government participation in trade, customs and administrative entry procedures, technical barriers to trade, sanitary and phytosanitary measures, charges on imports, specific limitations, and others. The WTO classification, adopted in this research, forms the basis for understanding NTBs in the EAC. Under Article 13 of the Customs Union Protocol, EAC partner states have committed to removing all existing NTBs and refraining from imposing new ones, placing the elimination of NTBs at the core of the EAC integration process.

1.1 Statement of the Problem

The narrative highlights several issues hindering the success of regional integration in Africa, with specific emphasis on the trade challenges between Tanzania and Kenya. Despite the long-standing strategy of regional economic integration through regional trade agreements (RTAs) and regional economic communities (RECs), African countries, including East African Community (EAC) member states, continue to struggle with both tariff and nontariff barriers (NTBs). NTBs, such as delays at border posts, inconsistent enforcement of trade regulations, and harassment of traders, have led to inefficiencies and significant trade losses, as seen in the case of the Namanga border between Tanzania and Kenya.

The incidents at the Namanga border, such as the blockage of Tanzanian goods and the detainment of traders, underscore the ongoing disputes between the two countries. These disputes, fuelled by NTBs, have disrupted trade flow and caused financial losses for businesses and traders on both sides of the border. Additionally, reports of traffic jams, delays due to roadblocks, and system failures further highlight the need for improved infrastructure and trade facilitation measures. The retaliatory actions between Kenya and Tanzania, like flight restrictions and truck blockages during the COVID-19 pandemic, demonstrate how NTBs can escalate tensions and undermine regional trade agreements, thus impacting the overall integration efforts of the EAC.

This study seeks to address these critical issues by empirically examining the trade effects of NTBs on cross-border trade between Tanzania and Kenya. By analysing these barriers, the study aims to propose practical solutions for enhancing cross-border trade within the EAC. It will focus on both "hard" infrastructure, such as improving road networks and border facilities, and "soft" infrastructure, such as regulatory harmonization and mutual recognition of standards, to promote seamless trade. Given Tanzania's strategic importance and its rapidly growing economy, overcoming NTBs is essential to maximizing the country's trade potential and furthering the region's economic growth.

This study is crucial, as Tanzania's position as a trade hub for landlocked countries in the region makes it a key player in the success of EAC integration. Improving cross-border trade through the removal of NTBs and better infrastructure development can unlock the full potential of regional integration, benefiting not only Tanzania but also the wider EAC region.

1.2 The Objectives

The main objective of the study is to examine and quantify the effects of Non-Tariffs Barriers (NTBs) on cargo trade movement in the Dar es salaam-Namanga Border Post. The study specific objectives are as follows:

i) To identify the main administrative/technical requirements (old and new ones) in the trade route across Namanga border post.
ii) To analyze empirically the respondents' perceptions, attitudes, and opinions, on regularity of administrative/technical requirements along the Namanga trade route from various response.
iii) To provide suggestions and recommendations on measures to mitigate trade-related barriers.

II LITERATURE REVIEW

2.1 Theoretical review

2.1.1 Economic Theory

Economic theory offers a mixed picture—both negative and positive—of how these measures affect the volume and direction of trade. For example, standards and technical regulations can raise producer costs because compliance is more expensive, but they may reduce consumer costs by providing more readily available product quality information. Whether trade increases or decreases depends on whether the positive effect on demand outweighs the negative effect on supply (Balassa, 1961). The relative contribution of Non-Tariff Measures (NTMs) to the overall level of protection tends to increase with the level of GDP per capita.

It is predicted that the value of trade between any two countries is positively related to the size of their economies and inversely related to the distance (and other trade costs) between them. To estimate the effect of policies such as tariffs and NTMs on trade, gravity equations typically include these policy factors as explanatory variables (UNCTAD, 2018). The economic impact of Non-Tariff Barriers (NTBs) has received significant attention in recent literature. Economists generally agree that NTBs are detrimental to regional trade. These barriers diminish the potential benefits of trade preferences, such as regional trade agreements. Furthermore, NTBs represent a significant impediment to the growth of intraregional trade and its associated benefits. The existence of NTBs increases the cost of doing business, ultimately leading to substantial welfare losses (UNCTAD, 2018).

2.2 Empirical Review

Okumu and Okuk (2011), in their analysis of sanitary, phytosanitary, and technical barriers to trade, reviewed methodologies to model and quantify non-tariff barriers (NTBs) in the agricultural and food sectors. The authors limited their analysis to sanitary, phytosanitary, and technical regulations that can impact trade, focusing on methods that provide quantitative estimates of these barriers' effects on market equilibrium, trade flows, economic efficiency, and welfare. They noted that no single analytical method is sufficient to quantify the cost of the entire spectrum of NTBs. Given the heterogeneous nature of NTBs, the authors concluded that a unifying methodology does not exist. Quantification of such measures has, therefore, been product-specific and has relied on methods from various fields of economic literature. They concluded that no unique or first-best method exists to appropriately quantify the size and impact of NTBs, with each methodology having its limitations and advantages based on the availability of information and data. As such, estimating the impact of NTBs remains a major challenge for trade analysts.

Jonyo (2018) critically analyzed the principles behind different approaches, reviewed past studies, and assessed each approach's practical validity in evaluating the impact of NTBs on trade and welfare. The discussion of practical validity is particularly relevant to this study. For instance, survey-based methods are reported to be useful when other information sources are unavailable. Given the lack of published data on NTBs, a survey approach would be appropriate for this study to identify and quantify the effects of NTBs along the Dar-Es-Salaam–Namanga trade corridor. Surveys allow the scope of analysis to be narrowed by asking practitioners, such as traders, which NTBs have the greatest impact on their activities. When combined with in-depth interviews, these approaches can sometimes reveal counterintuitive insights into the importance of trade barriers. Surveys can also provide data, such as the ranking of NTBs' significance, which can be used in econometric studies. This informed the choice of a survey methodology for this study.

In 2005, the East African Community (EAC, 2018) attempted to develop a business climate index by identifying the nature and extent of NTBs within the EAC using descriptive measures. The EABC study found that NTBs existed in several areas, including business registration and licensing, customs procedures, police road checks, road axle regulations, and standards and certification requirements. In decreasing order of severity, the authors ranked the major NTBs as: (i) administration of duties/taxes, (ii) corruption, (iii) customs administration, (iv) transit checks,

(v) police checks, (vi) immigration procedures, and (vii) licensing procedures. While the study highlighted the main NTBs affecting EAC trade, it did not quantify the trade impacts of these NTBs.

Using an extended version of the gravity equation, Van Den Bossche (2006) affirmed that bilateral trade flows (BTF) of Romania were explained by GDP, the partner country's foreign direct investment in Romania, the existence of common borders, and the distance between the two countries, with a negative correlation found for the latter. With the help of a gravity model, Van Den Bossche (2006) also estimated the trade effects of Sanitary and Phytosanitary (SPS) and Technical Barriers to Trade (TBT) regulations on pistachio exports from Iran. The results suggested that these regulations had a negative impact on Iran's pistachio exports.

It is also worth acknowledging that NTBs add to transportation costs, which ultimately increase the domestic relative price of importable goods, leading to implicit tariff effects. The actual costs of trade (transportation and other costs of doing business internationally) are significant determinants of a country's ability to fully participate in the global economy. Trebilcock & Howse (2005) found that the elasticity of implicit tariff effects is substantial, with a 10 percentage-point increase in transport costs typically reducing trade volumes by approximately 20 percent. High transportation costs diminish profits, thereby reducing trade.

Van Houtte (1995) observed that transport costs as trade barriers exceeded tariff barriers for both Australia and the United Kingdom, underscoring the role of freight costs in limiting international trade flows. The findings highlight the importance of measures to reduce transport costs as a stimulus to trade.

Mkuna (2014) noted that recent studies on trade policies for low-income nations have established that high transportation costs, due to low-quality infrastructure and illegal, unethical, and bureaucratic practices such as bribery and corruption at roadways and border points, represent additional barriers to trade. These practices provide protection to local producers of import-competing goods. High transport costs increase the wedge between domestic and international import prices, providing extra protection to domestic industries.

This section presented a theoretical and empirical review of available evidence on the likely implications of NTBs on trade flows. The literature on NTBs can be categorized into two types: rigorous empirical analyses and descriptive studies. The studies surveyed here provide a methodological and empirical foundation for the methodology and results of this study.

2.3 Conceptual Framework

Based on the literature review, a conceptual framework was developed to reflecting the stated objective of the study and thus the study was conducted using the conceptual framework from the literature. The conceptual model for this study is developed from the concept that various forms of NTBs significantly influence trade performance. This conceptual framework provide a causal link that exist between two main variables namely; NTBS (to be proxied by condition of road and communication network, unethical and illegal practices at weighing bridges, police check points, customs officials at Dar es salaam to Namanga border point) and trade performance (to be proxied by number of times a trader uses the Namanga border post).

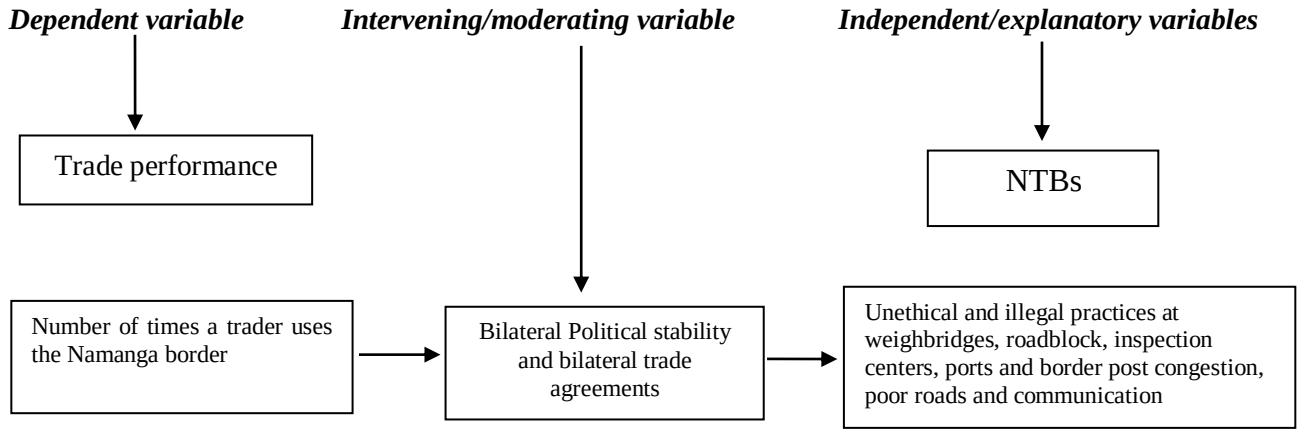


Figure 1
Conceptual Framework

The conceptual model for this study is developed based on the hypothetical belief that, while the intervening variable is held constant, the two variables—independent (NTBs such as unethical and illegal practices at weighbridges, roadblocks, inspection centers, ports, and border post congestion, as well as poor roads and

communication) and dependent (trade performance) - have a linear relationship, which may either slow down movement or reduce trade volume along the studied border post.

III METHODOLOGY

3.1 Research Design

Research designs are procedures for collecting, analyzing, interpreting and reporting data in research studies (Patton, 2015). This study is an empirical survey design, collected mainly qualitative information on border trade performance and perceived non-tariff barriers and incentives in the use of Dar- Namanga border way.

3.2 The Model

In much of the trade literature, the trade effects of non-tariff measures are estimated through "gravity equations". These are econometric models of trade which acquire their name from the similarities to Newton's theory of gravitation. They predict that the value of trade between any two countries will be positively related to the size of their economies (measured by their relative GDP or per capita incomes) and inversely related to the distance (and other measures of trade costs) between them. In order to estimate the effect of policies such as tariffs and NTMs on trade, gravity equations include measures, which capture these policy factors, as explanatory variables. The model is expressed as follows;

$$X_{ij} = \frac{GDP_h GDP_{row}}{Dist}$$

or in its linearized expression becomes;

$$In(Value\ of\ Exports,\ X_{ij}) = a + b_i(GDP^h + GDP^{row} - Dist) + e_t \quad \ldots\ldots(1)$$

Where;

X_{ij} = Value of country i exports to country j
GDP^h = Domestic GDP
GDP^{row} = GDP of trading partner
Dist = Distance (in KM) between two trading countries commercial cities
e_t = error term,
b_i = parameters estimates or elasticities (coefficients)

As noted in equation (1) above, the traditional gravity model says that bilateral trade is a function of two general factors, the size of each state's economy and a distance term. The size of a state's economy is a proxy for national income, indicating that one can only purchase, what one can afford. It is measured as a state's Gross Domestic Product (GDP), and is expected to be positive, more money means more imports.

As already pointed out in the literature review section, that there has been two time periods of intensive use on empirical gravity model of trade, separated by a period of theoretical foundations of the model. The first uses of gravity equations (1960, 1962 and 1963) was applied to explain the commercial trade between two partner countries using the classical equation, in which the factors are the product of GDP's of the two countries and geographical distance between the two partners. Then followed a time period of theoretical background for the gravity model, mainly through the scientific works where the papers were highly empirical, extending the model with a number of additional factors that may explain bilateral trade relationships between the partner countries.

It is thus apparent from practical application of gravity equation that, the gravity model can be extended to include a set of other factors/variables that may also affect trade flows. The NTBs is one of the variables advocated to affect trade performance in a negative direction just as the distance variable. In view of my study on trade effects of NTBs along the Dar-es-salaam –Namanga Corridor, the econometric model to be used for this purpose is not a proper gravity model as in equation (1) above, since we are not analyzing the determinants of bilateral trade flows, but rather, we are restricting our analysis on one side of the border (Dar-es Salaam-Namanga trade route) in identifying significant influence factors (barriers and incentives) on trade flow or passage along this trade route by use of survey data. That is, the dependent and explanatory variables to be used in modeling NTBs effects on trade performance in this study are restricted to those that are collected from the survey data. As such, the methods that was applied

involved a technique which models the variation in a key response variable (trade flows along the Namanga border post) or dependent variable, and identified set of potential explanatory variables which contribute significantly to this variation. While variables such as GDP^h and GDP^{row} seem to be redundant in our new quantitative estimation of NTBs effects on trade, the distance variable, however, still remain relevant. Thus, built on the Newton's gravitational equation, and following standard model specification for this study turns out to be;

In ($BTrP = In\{ cX + NTBs\}$ ……(2)

Where:

BTrP = Border trade performance (to be proxied by number of times traders have crossed the Namanga border last and this year).

NTBs = Non-tarrif barriers to be represented by frequency or regularity of unethical and illegal practices at weighbridges (WBRG), police roadblock (PRBlc), ports and border post congestion (BPCg), condition of roads and communication(RC) along the trade route under the study.

cX = A set of other additional variables that may also act as barriers and incentives to trade flows along the trade route of Dar es salam to Namanga (such as travel distance, hooligans and gansters robbery, or others factors as may be pointed out by the survey respondents)

Following Anderson and van Wincoop's formula, we come to the linearized expression:

$$In(BTrP) = a_0 + a_1 lnWBR + a_2 lnPRBlc + a_3 lnBPCg + a_4 lnRCC + a_5 lncX + u \quad \ldots\ldots(3)$$

Where; u = error term to represent all other factors which affect BTrP but not explained in the equation

a_i = are the coefficients or parameters elasticities, (i = 1,2,3,….5) *measuring the size and direc*tion of relationship between dependent variable and explanatory variables. Parameters were estimated using Ordinary Least Squares method, within the multiple regression analysis through SPPS software by using the stepwise method, which is highly recommended for this type of analysis.

Equation (2) above is therefore our modified gravity type model to be applied in our econometric estimation of trade effects of non-tariffs barriers along the studied route of Dar-es salaam to Namanga border post.

3.4 Research Hypotheses

The main hypothesis of this empirical study is that; the study predicts negative coefficients for all predictors (explanatory variables) except for some such as RC and cX which may assume either negative or positive signs. A negative coefficient would therefore indicate that; a high rate of unethical and illegal practices at any of explanatory variables is related to lower border trade border performance- which is what we would expect. Using statistical jargon, the null (H_0) and alternative hypotheses (H_1) of the F-test should be as follows:

$$H_0: a_1 = a_2 = a_3 < 0;\ a_4 = a_5 \neq 0$$
$$H_1: a_1 = a_2 = a_3 = a_4 = a_5 = 0$$

It is worth to emphasis that, before conduct up any econometric estimation, a number of checks must be done to make sure that the study can firmly stand behind expected results. The study started by examining the data by getting more familiar with the survey data, doing preliminary data checking, and looking for errors in the data by use of descriptive statistics cum frequency tool kits. Wherever the data checking was found with errors, then some variables were adjusted accordingly.

3.5 Data Collection

Four main approaches or framework have been used in collecting data from the survey of formal and informal traders along the Dar es salaam to Namanga roadway and the Namanga border point. These include: i) desk research that include secondary data and information collection - by reviewing relevant literature and past studies to guide the entire research process through literature review, review of past NTBs surveys and gathering of relevant statistics. To largely supplement documentary evidence that has often been the core of previous successfully studies, the following methods were also used in gathering stakeholders' perceptions, attitudes, and opinions, on what is being studied herewith in this study. The methods include; ii) interviews with key informants to collect primary data and information, both in the form of structured interviews and administered questionnaires, iii) stakeholder's workshops to

consult, nourish and validate the findings of the first draft survey before the final conclusion. Some of the key stakeholders that were approached include; formal and informal cross-border traders and transporters companies, truck drivers, weighbridge attendants, customs and revenue authorities at border point.

3.6 Sampling

In terms of population and sampling techniques, the study used both probability and non-probability sampling techniques and are restricted to Arusha –Namanga roadway due to the fact that it is the busiest commercial corridor of the East African Community (EAC) and that the concentration and predominance of imports and export businesses and target stakeholders in Arusha are easily reachable. Under probability sampling, simple random sampling was employed. This was chosen because under this sampling technique, every item of the universe has an equal chance of inclusion in the sample. This also helps to reduce the sampling bias. In this case, every stakeholder of intra-regional trade had an equal chance to be involved in the sample by randomly pick and assign a questionnaires to potential respondents of the survey.

Non-probability is a selection of samples based on the interest of the research and researcher. Under this sampling technique, and for effective coverage and lower cost, and also due to the logic and power of purposive sampling which lies in selecting information-rich cases, purposive sampling was used to select the participating population who will give the information about the research questions and objective.

3.7 Data Analysis

In terms of data analysis and as shown in section 3.3 above, data collected was processed, analyzed using Ms excel and SPSS – statistical packages to quantify perceptions, attitudes and opinions and other defined variables using a linear regression model, where responses are numerically quantified in terms of their rate of regularity or occurrence and generalize results and interpreted accordingly and in relation to the guiding research questions and objectives of the study. Data gathered through documentary and secondary sources were subjected to content analysis (analysis based on the content of materials).

IV FINDINGS & DISCUSSION

4.1 Introduction

In this study, the trade impact of non-tariff barriers was empirically investigated using primary data collected from truck drivers, traders, public officials in customs, police road blocks and weighbridges along Dar-es-Salaam to Namanga road. The response rate for the survey was high. Forty two (42) representing 64% of questionnaires were returned out of 66, of which 35(83%) were from drivers and traders and the rest 7(16.6%) were from public officials in customs offices, police checkpoints and weighbridges posts. The high response rate from traders and truck drivers was attributed to their thirstiness of expressing to legal authority(s) what they perceived to be chronically burning issues of concern as they have often been encountered along their trade route. The predictability ability of the data in the model has been tested using the F-test having verified that the estimated model met the regression assumptions of linearity, homoscedasticity, serial correlation and normality. Of the response received from the respondents, 19(46%) also gave suggestions on how the non-tariff barriers should be worked with if it is to improve trade flows among the East African trading countries in a bid to put in practice the essence of re-established East African Community in the mind and eyes of target population. These suggestions formed the basis for practical actions against non-tariff barriers proposed in section ahead.

4.2 Descriptive Statistics

Preliminary analysis was also conducted to examine various descriptive statistics of the variables. Table 1 present the descriptive statistics of the variables, namely; regularity of unethical and illegal practices at weighbridges (WBRG), police roadblock (PRBlc), ports and border post congestion (BPCg), condition of roads and communication(RCC) along the trade route, and a set of other additional variables that may also act as barriers and incentives to trade flows such as inspection, lack of verification sheds and secured parking yards, other harassments encountered on border crossing including; yellow fever card, visa, security fee, environmental surcharge, introduction letter, certificate of analysis, cumbersome testing procedures for food exports and imports, blockage of re-exporting of exports, and lack of harmonized working hours between customs official of both sides. All these factors are grouped under the ‘OTHER’ variable row in Table 1 below.

Table 1
Descriptive Statistics

	N	Minimum	Maximum	Mean		Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Std. Error	Statistic	Std. Error
BCT	41	0	2	.83	.092	.587	.036	.369	-.132	.724
ADRs	41	1	3	2.46	.131	.840	-1.078	.369	-.679	.724
CPR	41	0	2	.66	.083	.530	-.155	.369	-.876	.724
RCC	38	2.00	3.00	2.6053	.08036	.49536	-.449	.383	-1.902	.750
PRB	37	3.00	5.00	3.8378	.08232	.50075	-.339	.388	.705	.759
OTHER	41	.00	2.00	.4390	.10505	.67264	1.269	.369	.414	.724

Although the values for Skewness and the Kurtosis indices are not very small, but they are not high enough to call for presence of outliers in the data. Thus, the influential cases or outliers in the variables are not likely to affect the predictability ability of the model.

4.3 Check Linearity Assumption

Before estimating the model, we first calculated the Pearson correlation coefficients to examine relationship between dependent variable (DV) and independent variables (IVs) to check an indication of the magnitude of relationship between variable pairs. The results indicate a moderate positive correlation between police road block and reluctance to cross the border, customs procedures and reluctance to cross the border, road condition and reluctance to cross the border, other illegal and unethical practices leading to increased trade route costs and reluctance to cross the border, a weak positive correlation between administrative requirement and reluctance to cross the border. Table **2** below (and ***appendix II***) summarizes the linearity assumptions results.

Table 2
Correlations

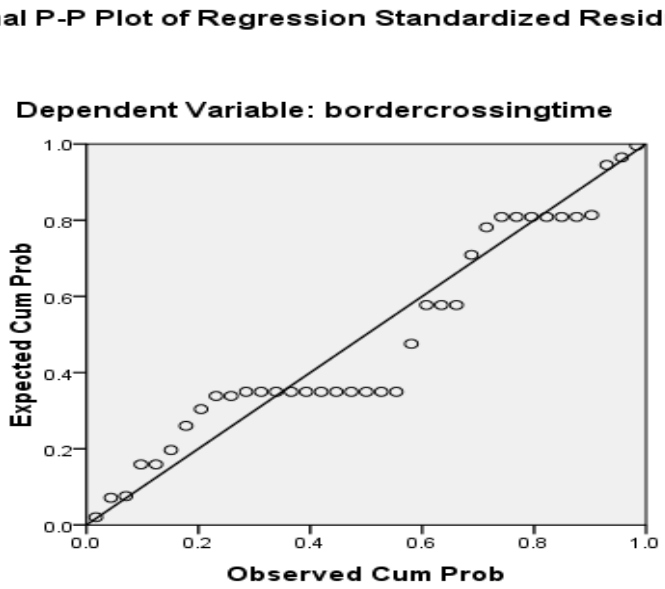
IVs	**DV:** Reluctance to Cross the Border (RCB)		
	Pearson Correlation	*Sig. (2-tailed)*	**Remark**
Administrative requirements (ADRs)	0.266	0.093	Weak positive correlation
Police road block (PRB)	0.357	0.030	Moderate positive correlation
Customs procedures (CPR)	0.361*	0.021	Moderate positive correlation
Road and communication condition (RCC)	0.386*	0.018	Moderate positive correlation
Other illegal and unethical practices leading to increased trade route costs (OTHER)	0.372*	0.023	Moderate positive correlation

**Correlation is significant at the 0.05 level (2-tailed)*

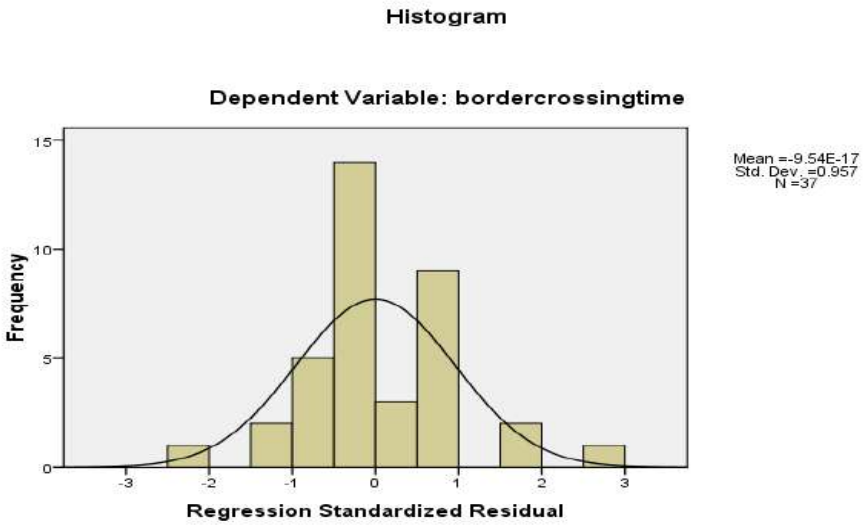
Where:
RCB = Reluctance to cross border (proxied by crossing border times) by users of Namanga border post
ADRs = administrative requirements referred herewith are: Trading and transport license, cess and excise duties in addition to other duties in form of council permits, and road blocks and road toll stations receipts
CPR = access to trade documentation and weighbridges
PRB = high rate of recurrence of traffic police check points in terms of being at every 1-5KM
OTHER = corruption and bribery/tips to police, weighbridge and customs staff, queue, environmental charges and security fee at border post-all leading to time lost and monetary cost

4.4 Check Normality Assumption

An examination analysis was carried out to check the normality assumption of the variables used. From the **Q-Q-Plot**, a graph that looks like a staircase (as shown below) is obtained. The plot indicates that in our multiple linear regression analysis there is no tendency in the error terms as to warrant no violation of normality assumption.



The same observation is also obtained from standardized residual plots (see histogram below) where regression standardized residual is equally skewed in a positive and negative direction suggesting no violation in the normality assumption by the model.



4.5 Model Estimation

A step-wise multiple linear regression was then run to predict BCT from a series of explanatory variables as gathered from the respondents' response with ADR, PRB, CPR, RCC and OTHER inclusive. The regression results of the general model is presented in Appendix I. The table presented in Appendix II also checks for multicollinearity (collinearity - predictors that are highly collinear, or correlated) in our multiple linear regression model. Tolerance should be > 0.1 (or VIF < 10) for all variables, which they are. This is one of *assumptions of linear regression* or regression diagnostics.

Tables 3, 4 and 5 below show the estimates of the final (specific) regression model and significance levels. From step-wise estimation, the some of independent variables were eliminated due to them being not significant in the prediction of BCT.

Table **3** is the Model Summary table showing the overall fit statistics. This table provides the *R*, R^2, adjusted R^2, and the standard error of the estimate, which was used to determine how well a regression model fits the data. *R*,

the *multiple correlation coefficient* measure the quality of the prediction of the dependent variable. A value of 0.700, in these findings, indicates a good level of prediction. We also find that the adjusted R^2 of our model is 0.443 with the R^2 (coefficient of determination-proportion of variance in the dependent variable that can be explained by the independent variables) = o.490 that means that the linear regression explains nearly 49% of the variance in the data. The Durbin-Watson d = 1.743, which is between the two critical values of $1.5 < d < 2.5$ and therefore suggesting that there is no first order linear auto-correlation or serial correlation (*the errors are independent of each other)* in multiple linear regression data.

Table 3
Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.700[a]	.490	.443	.408	1. 743

a. Predictors: (Constant), PRB, RCC and OTHER
b. Dependent Variable: BCT

4.6 The Analysis of Variance (ANOVA)

Table 4 below is the F-test which tests whether the overall regression model is a good fit for the data. The linear regression's F-test has the null hypothesis that there is no linear relationship between the DV and IVs variables (in other words $R^2=0$). The F-test is highly significant, suggesting that there is a linear relationship between the variables (predictors and dependent variable) in our model. The table shows that the independent variables statistically significantly predict the dependent variable, $F(3, 33) = 10.558$, $p(=0.000) < .0005$ suggesting significance of r and R^2 as an F statistic and thus the regression model is a good fit of the data.

Table 4
ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.268	3	1.756	10.558	.000[a]
	Residual	5.489	33	.166		
	Total	10.757	36			

a. Predictors: (Constant), PRB, RCC, OTHER
b. Dependent Variable: BCT

Table 5 presents the final multiple regression estimates. The unstandardized coefficients indicate how much the dependent variable varies with an independent variable when all other independent variables are held constant. Coupled with the 'Sig' column, the unstandardized coefficients column is a column of our main interest in analyzing the estimated regression equation.

As already pointed out, not all independent variables however, added statistically significantly to the prediction, thus some insignificant independent variables such as ADR and CPR whose $p > .05$ was automatically dropped from estimation. The final regression model as presented in Table 5 below suggest that PRB, RCC and OTHER variables statistically significant predicted the border trade performance, $F(3, 33) = 10.56$, $p < .0005$ $R^2 = 0.490$. We also found a non-significant intercept (constant).

Table 5
Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.383	.378		-1.012	.319
	PRB	-.237	.068	-.455	-3.497	.001
	RCC	.513	.139	.467	3.690	.001
	OTHER	-.428	.106	.533	4.020	.000

a. Dependent Variable: BCT

Recall our modified gravity type model (equation 2) to be applied in our econometric estimation of trade effects of non-tariffs barriers along the studied route of Dar-es salaam to Namanga border post

$$In(BTrP) = a_0 + a_1 lnWBR + a_2 lnPRBlc + a_3 lnBPCg + a_4 lnRCC + a_5 lncX + u$$

The general form of the equation of predicting border trade performance (BCT) from police road block (PRB), illegal and unethical practices along weighbridges posts (WBR), border port congestion (BPCg), road and communication conditions (RC), and other factors (cX) is given in Table 5 above as follows

BCT= - 0.383 – 0.237 PRB + 0.513 RCC – 0.428 OTHER

The main hypothesis of the study was that; the study predicts negative coefficients for all predictors or explanatory variables ($H_0: a_1=a_2=a_3<0; a_4=a_5\neq 0$) except for some such as RCC and cX which may assume either negative or positive signs. A negative coefficient would therefore indicate that; a high rate of unethical and illegal practices at any of explanatory variables is related to lower border trade border performance- which is what we would expect. An alternative hypothesis (H_1) of the F-test was: $H_1: a_1=a_2=a_3=a_4=a_5=0$

We normally refer to the unstandardized coefficients of the equation when we want to analyze the effect of explanatory variables on the dependent variable. in view of the regression results, the null hypothesis that predict negative coefficients for explanatory variables except for RCC and cX cannot be rejected, and an alternative hypothesis of zero coefficients is strongly rejected.

For the obtained multiple regression above, the effect of police road block (PRB) on the number of times of crossing a border (BCT) is equal to -0.237. This means that, for each increase in police check-points along the trading route, there is a decrease in trade volume of 0.237 units or 23.7 percent along same trade route. Thus, frequency of road blocks you encounter impact border trade flow negatively. Equally so, are for other factors such as unfriendly weighbridges practices, tips and bribery along the trade route, customs checks such as inspection, lack of verification sheds and secured parking yards, other harassments encountered on border crossing including; yellow fever card, visa, introduction letter, certificate of analysis, cumbersome testing procedures for food exports and imports, blockage of re-exporting of exports, and lack of harmonized working hours between customs official of both sides. All these factors are grouped under the OTHER variable in the obtained regression equation with a coefficient of -0.428 suggesting that they all impact cross border trade negatively at 42.8 percent. The road and communication infrastructure condition have a positive impact on cross border trade of 0.513 as measured along the RCC coefficient in Table 5 above. This means that, as road and communication infrastructure improves, the trade flow across the border tend to escalate or increase

V CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusion

That, road block (*PRB)*, other factors such as trade permits and customs clearance (*cX)* and road infrastructure condition (*RCC)* affect border trade performance in different directions. More specifically, unethical practices at weighbridges, frequent police checks or road blocks and other customs checks lead to loss of cross border business. The loss include loss of potential markets as goods do not reach to their destination in time, thus lead to trade reduction across the border in question. The unfriendly police checks coupled with bribery or corruption, and the unloading process during inspection, have all led to growing perception of road blocks and customs procedures encountered in trade route in terms of being expensive in monetary cost and time lost incurred. On the other hand, improved road condition in terms of being passable at all weather time during the year has brought up major relief on transport cost in terms of reducing vehicle repair and maintenance expenses and transporters' allowance due to few time spent to reach the final destination.

5.2 Recommendations

The study recommends taking a regional commitment to eliminating the existing NTBS across all border points so as to exploit economies of scale as per the EAC custom's protocol. Further, research and policy analysts should invest more in research programmes aimed at estimating trade effects of various forms of non-tariffs barriers as this would enable more informed decision making by governments of East African countries to strategize on the matter in a bid to boost trade openness and performance in the region. Other policy recommendations include streamlining of administrative and working hours procedures at border points to improve efficiency. Finally, the study

recommend the need to design and implement a monitoring systems to provide feedback to the relevant authorities on the implementation of set measures to remove unnecessary barriers to trade within all trade routes of the EAC region.

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