

# IMPACT OF TRADE FACILITATION ON TRADE PERFORMANCE IN CASE OF VIETNAM, KENYA AND GERMANY

*Areej Aftab Siddiqui<sup>1</sup>*

*Le Phuong Dung<sup>2</sup>*

## Abstract

*The paper focuses on the comparative analysis of the impact of trade facilitation measures on the export performance of countries such as Vietnam, Kenya, and Germany. The countries have been selected based on the differences on their income, development levels, and locations in various continents but common in successful application of the e-custom clearance system to reduce the trade cost. The paper employs panel data analysis to assess the impact of trade facilitation on export performance across such countries from 2007 to 2017. The parameters denoting trade facilitation adoption include time for export (time\_ex), cost for export (cost\_ex), the Logistic Performance Index (LPI), and the e-clearance procedure of World Bank. Results obtained through empirical analysis indicated that trade facilitation measures i.e. electronic clearance, time for exports, cost of export cause, and impact exports significantly. The study suggested that the government of each nation should focus on adapting trade simplification and facilitation measures to help further in reduction of time and cost of exports. There is a need to implement electronic data interface for promotion of exports, especially in Vietnam.*

**Keywords:** Trade Facilitation, Exports, Panel data, Logistics

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## 1. Introduction

Trade facilitation - the simplification, modernization, and harmonization of export and import processes has emerged as a key issue for the world trading system. Trade facilitation is critical in reducing trade costs, which remain high despite the steep decline in the cost of transportation, improvements in information and communication technology,

and the reduction of trade barriers in many countries. Therefore, the WTO Agreement on Trade Facilitation (TFA), the most significant trade deal since the establishment of the World Trade Organization in 1995, has entered into force on February 22<sup>nd</sup> of 2017.

Apart from the Trade Facilitation Agreements, to help nations improve their border procedures, reduce trade costs,

<sup>1</sup> Indian Institute of Foreign Trade, India, Email: areej@iift.edu

<sup>2</sup> An Giang University, Vietnam Email: lpdung@agu.edu.vn

boost trade flows and reap greater benefits from international trade, Organization for Economic Co-operation and Development (OECD) has developed a set of Trade Facilitation Indicators (TFIs) which identify areas for action and enable the potential impact of reforms to be assessed. Estimates based on the indicators provide a basis for governments to prioritize trade facilitation actions and mobilize technical assistance and capacity-building efforts for developing countries in a more targeted way.

The theory predicts that trade costs can have a disproportionately adverse impact on small developing economies. Typically, small developing economies have large agricultural or natural resource sectors typified by constant returns to scale, and only a small manufacturing sector. In contrast, big developed economies have a large manufacturing sector operating under increasing returns to scale. In this setting, trade costs lead both to less trade and to a disproportionate relocation of manufacturing to the big developed countries (the “home market effect”). Meanwhile, small developing countries become concentrated in the agricultural or natural resource sector. The key to explaining this result lies in the tension created between the consumer’s love of variety and increasing returns to scale. With open trade and zero trade costs, consumers in the big developed country will purchase both foreign and domestic manufactured goods because of their preference for variety. All things being equal, love of variety leads to more trade. On the other hand, increasing returns to scale gives a cost advantage to manufacturing firms in the developed country because of the size of the market and the larger scale of production that could be

achieved by firms there. All things being the same, consumers in the developed country will prefer to purchase lower-cost domestic varieties than higher cost foreign varieties. Inefficient trade procedures that lead to higher trade costs upset this balance by making purchases (imports) of foreign varieties costlier. As a consequence, consumers in the developed country substitute away from foreign varieties towards domestic varieties. This shift in demand towards domestic manufactured goods gives greater scope for what are already powerful scale forces to operate. The manufacturing sector in the big developed country expands even more while it shrinks in the small developing country. This analysis suggests that small developing countries that want to diversify their economies have a strong interest in lowering trade costs, as this reduces incentives for manufacturing to concentrate in the biggest markets.

Thus, it becomes important to assess the impact of trade facilitation measures on trade facilitation and promotion of exports in case of Vietnam, Kenya and Germany. The following countries have been chosen considering their location in various continents and difference in scale of development. Vietnam and Kenya are at the same developing nations; meanwhile Germany is the developed country. Although there are various aspects on location, scale of development, they are common in successful application of the e-custom clearance system to reduce the trade cost. It is the reason which three countries are chosen in this study. To the overview of trade facilitation among 3 countries, there is the supporting information including in this paper.

This paper aims at exploring a relationship between trade facilitation indicators and trade performance of each country. A major limitation of the study was non-availability of data pertaining to time and cost of export before 2006. Logistic Performance Index has also been recently adopted and the index gives ranking once in two years. Similarly, the adoption of e-clearance measures has also been recently adopted by most of the countries. The adoption of trade facilitation measures doesn't usually ensure smooth and timely trade among countries because the procedures for export from each nation are not standardized and also not clearly informed.

## 2. Literature Review

Trade facilitation means to reduce the import and export cost, moderate the tariff and non-tariff barriers, and increase the infrastructure quality also competitiveness in service suppliers (Wilson et al., 2009). In the member countries of Association of Southeast Asian Nations the import and export costs vary considerably, from very low to moderately high levels. These countries possess tariff and non-tariff barriers are generally low to moderate. Infrastructure quality and services sector competitiveness range from fair to excellent. The paper indicates that trade flows in Southeast Asia are particularly sensitive to transport infrastructure and information and communications technology. The results suggest that the region could make significant economic gains from trade facilitation reforms. These gains could be considerably larger than those from comparable tariff reforms. Trade facilitation measures can be undertaken along two dimensions: a "hard" dimension related to tangible infrastructure such as roads, ports, highways, telecommunications,

as well as a "soft" dimension related to transparency, customs management, the business environment, and other institutional aspects that are intangible (Perez and Wilson 2012). Estimates shows that trade facilitation reforms do improve the export performance of developing countries. This is particularly true with investment in physical infrastructure and regulatory reform to improve the business environment. The findings provide evidence that the marginal effect of the transport efficiency and business environment improvement on exports appears to be decreasing in per capita income. In contrast, the impact of physical infrastructure and information and communications technology on exports appears increasingly important the richer a country becomes.

Trade facilitation includes five main elements as follows: (1) simplification of trade procedures and documentation, (2) harmonization of the trade practices and rules, (3) more transparent information and procedures of international flows, (4) recourse to new technologies to promote international trade, and (5) more secured means of payment for international commerce (Zaki 2014). Gains derived from trade facilitation are more significant for developing economies (especially for the Middle East and North Africa region and Sub-Saharan countries) than for developed ones, whether in terms of welfare gain (either in the short or long run) or increase in trade. Clearly, long-run welfare effects of trade facilitation are much higher than in the short run. Trade facilitation helps boost both intra-regional trade and inter-regional trade. Fourth and most interestingly, it also helps improve export diversification, leading to an expansion in those sectors that

are more sensitive to time, such as food, textiles, and electronics.

There are a number of studies which specify and analyze the relationship between inefficiencies of trade facilitation measures and trade performance. A major inefficiency in trade performance is the time taken to export which if longer leads to reduction in trade volume (Nordas et al., 2006). Trade time and cost may also increase while moving consignments from manufacturing sites to ports of shipment (Djankov et al., 2006), which at times attributes to fall in trade volumes by 1 percent. Trade facilitation measures include time taken to export (Djankov et al., 2006), reduction in costs of international trade, improvement in international transport and import (Wilson et al., 2003). Other major trade facilitation indicator is the World Bank's LPI (Hertel and Mirza 2009). Other studies have enumerated indicators of trade facilitation as port efficiency, customs regulations and use of e-commerce (Wilson et al., 2005). The relationship between trade performance and these trade indicators has been established using econometric tools like multiple regression models (Felipe and Kumar, 2012) or single regression techniques (Hertel and Mirza, 2009; Puertas et al., 2013).

Country specific studies for Mexico (Soloaga et al., 2006) and Africa (Iwanow and Kirkpatrick 2009) have also indicated that adoption of trade facilitation measures enhances trade performance.

Other measures of trade performance can be the economy's financial structure, interest rates, trade openness and growth (Sehrawat and Giri 2017). Human Development i.e. education also plays a major role in determining the trade performance of a

country (Jawaid and Waheed 2017). Apart from parameters like time and cost of export and the LPI, such parameters are also useful in estimating the relationship between trade performance and trade facilitation.

### 3. Methodology

The present study is an attempt to examine the causal relationship between trade performance and trade facilitation in the case of Vietnam, Kenya and Germany at the national level. Time series data over 2007-2017 has been taken into consideration. The data has been extracted from Trade map and World Bank. Trade stands for export and import. The export performance is measured by the percentage of export in trade. The economic indicators include domestic credit (cr) and inflation (inf).

Trade facilitation is defined in terms of time for export (time\_ex), cost for export (cost\_ex), the Logistic Performance Index (LPI) and the e-clearance procedure as extracted from Doing Business Reports, World Bank. The study uses the methodology of Doing Business 2014 and calculates time for export in number of days rather than hours.

The model has been modified to suit the present scenario of the Economies of Vietnam, Kenya and Germany based on the literature review. To Ahmed and Ismail, 2015, the relationship between trade performance and trade facilitation along with other variables for panel estimation is expressed as:

$$\ln(\text{ex\_tr})_{it} = \beta_0 + \beta_1 \ln(\text{time\_ex})_{it} + \beta_2 \ln(\text{cost\_ex})_{it} + \beta_3 \ln \text{cr}_{it} + \beta_4 \text{LPI}_{it} + \beta_5 \text{ECL}_{it} + \beta_6 \ln \text{inf}_{it} + \varepsilon_{it} \quad (1)$$

for  $t=1, 2, N$  and  $i=0, 1$

Where LPI and ECL are dummy variables; they will be 0 if there is no application in the Logistic Performance Index or E clearance declaration. They will be 1 if there is an application in the Logistic Performance Index or E clearance declaration.

All the variables have been transformed into natural logs in order to overcome the problem of heteroscedasticity.

In this present study, availability of data is limited and it has been suggested by econometricians to use panel estimates in such cases. It is expected that panel estimates handle issues of measurement bias and limited degrees of freedom efficiently. The current data series consists of 51 cross section spread over 17 years with 3 countries (Vietnam, Kenya and Germany). Thus, panel estimation method is suitable in our case.

### *Test for non-stationary*

It is important to understand that in case of a non-stationary series, the results and inferences from regression are spurious and hence meaningless. Thus, the data series are checked for stationary through panel root tests. Four panel root tests have been applied to check the robustness. The Levin, Lin and Chu test, a panel based version of the ADF test will be applied in this case. It is represented by equation 2 below

$$\Delta X_{it} = \alpha_i + \beta X_{i,t-1} + \sum_{j=1}^p \theta_{ij} \Delta X_{i,t-j} + \varepsilon_{i,t} \quad (2)$$

Where,  $\Delta$  is the first difference operator,  $X_{it}$  is the variable being tested and  $\varepsilon_{i,t}$  is the white noise disturbance at time  $t$  in this test,  $\beta$  is identical across sectors and hence restrictive. It tests the null hypothesis  $\beta=0$  and acceptance of null hypothesis implies non-stationarity (World Bank, 2010).

In case of Im, Pesaran and Shin test,  $\beta$  varies across all sectors relaxing the assumption of Levin, Li and Chu test of identical first-order autoregressive coefficients. This test is based on mean group approach and can be represented as equation (3) below

$$\bar{Z} = \sqrt{N}[\bar{t} - E(\bar{t})] / \sqrt{Var(\bar{t})} \quad (3)$$

Where,  $\bar{t} = \left(\frac{1}{N}\right) \sum_{i=1}^N t_{\beta i}$ ,  $E(\bar{t})$  and  $\sqrt{Var(\bar{t})}$  are the mean and variance of  $t_{\beta i}$ .

In this test, the null hypothesis which is tested is  $\beta_1 = \beta_2 = \dots = 0$ . The other two tests applied are ADF and Phillips Peron Chi square tests. In both these tests, the null hypothesis is same as the IM, Pesaran test but individual roots are tested by them.

### *Panel co-integration tests*

In practice, non-stationary series are transformed by differencing into stationary series for empirically analyzing the series. In economic theory, questions are raised about the model after differencing. Engel and Granger are of the view that to analyze non stationary series at level, all the data series are integrated at same order and co-integrated. As per their study, in case of co-integrated series, long run equilibrium relationship may exist even in case of non-stationary data. Thus, panel co-integration tests are applied to the data series.

Kao test for assessing panel co-integration is applied to the data series. As per Kao test, the null hypothesis indicates that the residual series should be non-stationary if no co-integration exists. Kao's test is based on panel regression model and uses DF and ADF test statistic.

Granger causality test

Granger causality test for panel data is carried out to examine the causal relationship between Logistics performance and trade. The granger causality test is carried out by running bivariate regression in the panel data as per equation 4 and 5 although FE and RE is the best choice to evaluate effect of the parameters. This study expects the causality more than the fixed effect and random effect.

$$y_{i,t} = \alpha_{0,i} + \alpha_{1,i}y_{i,t-1} + \dots + \alpha_{p,i}y_{i,t-p} + \beta_{1,i}x_{i,t-1} + \dots + \beta_{p,i}x_{i,t-p} + \epsilon_{i,t} \quad (4)$$

$$x_{i,t} = \alpha_{0,i} + \alpha_{1,i}x_{i,t-1} + \dots + \alpha_{p,i}x_{i,t-p} + \beta_{1,i}y_{i,t-1} + \dots + \beta_{p,i}y_{i,t-p} + \epsilon_{i,t} \quad (5)$$

Where t is the time period and I are the cross sections.

Panel Granger causality test has been performed by treating the panel data as a large stacked set and then performing Granger causality test with the exception of limiting the entry of data from one cross section into

lagged values of data from the next cross section. It is assumed in this case that all the coefficients are same across all cross sections and is represented in equation 6.

$$\alpha_{0,i} = \alpha_{0,j}, \alpha_{1,i} = \alpha_{1,j}, \dots, \alpha_{p,i} = \alpha_{p,j}, \forall_{i,j} \quad (6)$$

$$\beta_{1,i} = \beta_{1,j}, \dots, \beta_{p,i} = \beta_{p,j}, \forall_{i,j}$$

The details have been summarized in the section on empirical analysis

#### 4. Findings

In this part we present the analysis and result of the panel data across the 3 countries which include Vietnam, Kenya and Germany. In order to assess the basic feature of the data, descriptive statistics are calculated. The descriptive statistics are depicted in Table-1.

The table 1 shows that the variables chosen are normally distributed. The mean to the median ratio of each variable is approximately one.

**Table 1. Descriptive Statistics**

Parameter	EX_TR	TIME_EX	COST_EX	CR	INF	LPI	ECL
Mean	3.75	2.78	7.08	4.34	4.49	0.62	0.35
Median	3.84	3.09	6.83	4.56	4.57	1.00	0.00
Maximum	4.02	3.80	8.26	5.10	5.11	1.00	1.00
Minimum	3.21	1.53	5.81	3.43	3.68	0.00	0.00
Std. Dev.	0.26	0.57	0.62	0.57	0.37	0.48	0.48
Skewness	-0.73	-0.54	0.35	-0.21	-0.55	-0.51	0.60
Kurtosis	2.03	1.81	2.20	1.32	2.43	1.26	1.37
Jarque-Bera	6.19	5.19	2.26	5.96	3.14	8.14	8.27

The standard deviation is also low compared to the mean, showing a small coefficient of variation. The range of variation between minimum and maximum is also reasonable. The coefficient of skewness of each variable is small and is mildly negative skewed. The

figure for kurtosis in each variable is under 3 which illustrates near normality. The Jarque-Bera statistics also accept the null hypothesis of normal distribution in each variable with changing probabilities. Therefore, the normal distribution is completely true.

In empirical analysis, if the panel data series are non-stationary there is a risk of obtaining spurious results. Thus, the present study checks the stationarity of the data through individual, trend and common test. In this view, the stationarity properties of panel data are examined and transformation of non-stationary series into stationary series is undertaken. The log transformed data for export as a percentage of trade (EX\_TR),

time required for exports (TIME\_EX), cost of export (COST\_EX), e-clearance from customs (ECL), availability of domestic credit (CR), inflation (INF) and Logistics Performance Index (LPI) were tested for stationarity. The results indicated in table-2 suggest that all the above stated variables have unit root at level and are non-stationary. While at the first difference level, none of the variables have a unit root and hence are stationary.

**Table 2. Summary of panel root test**

Test		Levin, Li and Chu t test for common unit root	Im, Pesaran and Shin W-test	ADF –Fisher Chi Square	PP-Fisher Chi Square
Variable	Level	Statistic	Statistic	Statistic	Statistic
Export as percentage of Trade	Level	-0.05	-0.02	6.25	7.30***
	First Diff	-1.79**	-3.15***	21.75***	28.08***
Time taken for Export	Level	-2.20***	0.956	13.46	23.24
	First Diff	-7.05**	-4.52**	44.91**	51.60**
Cost of Export	Level	6.07	4.46	0.99	6.41
	First Diff	4.07**	0.77**	4.03**	19.61***
E-clearance	Level	0.78	1.48	1.14	1.17
	First Diff	-1.92**	-1.73**	12.36**	24.84***
Domestic Credit	Level	-1.54	-0.93	7.92	6.38
	First Diff	-2.19**	-2.39***	15.77**	16.31**
Logistics Performance Index	Level	-0.85	0.33	3.08	2.71
	First Diff	-1.74**	-1.731**	12.36**	24.84*
Macroeconomic Stability	Level	1.42	3.22	0.99	0.90
	First Diff	-3.93***	-3.01***	19.33***	19.52***

\* Significant at 10%, \*\* Significant at 5% and \*\*\* Significant at 1%

In the Kao test for co-integration it can be seen that the null hypothesis is accepted as the probability is < 0.05 and hence there is the co-integration existed in the data set. Table-3 implies that exports as a percentage

of trade and trade facilitation have a long run equilibrium relationship. Thus, now it is advised to use regression model in equation 1 for estimating the relationship exports and trade facilitation.

**Table 3. Kao residual Co-integration Test**

Parameters	Null hypothesis	Maximum lag	t-statistic	P
All sectors	No co-integration	Automatic lag length selection based on AIC with a max lag of 3	-2.546	0.0054

The results of regression model for estimating the impact of trade facilitation on trade performance specifically exports are presented in Table-4.

**Table 4. Result of regression model for impact of Trade facilitation on Export**

Variable	Coefficient	Std. Error	t-Statistic	Probability
C	4.8147	0.6046	7.963	0.0000
Cost_Ex	-0.294	0.1201	-2.447	0.0190***
ECL	-0.071	0.0353	-2.0267	0.0496***
LPI	0.6254	0.1322	4.7280	0.5342
CR	0.3093	0.1555	1.9881	0.0151***
INF	-0.169	0.0687	-2.4649	0.0182***
Time_Ex	0.3504	0.1611	2.17447	0.0358***
R-squared	0.9301	Prob (F-statistic)	0.000	
Adjusted R-squared	0.9157	Durbin-Watson stat	1.0809	

\*\*\* Significant at 10%, \*\* Significant at 5% and \* Significant at 1%

The results indicate that cost for export, time for export and e-clearance procedure have significant impact on export performance. Time has a positive impact on export performance; meanwhile cost for export has a negative impact on exports. Credit available in each of these countries and inflation prevalent too has a significant impact on exports.

Apart from analyzing the impact of trade facilitation on export performance and vice versa, it is also important to examine causality amongst the variables. As per table-5 results, it can be inferred that cost of doing exports causes export performance.

**Table 5. Panel Ganger Causality Test**

Null Hypothesis	F-statistic	Prob
Time_ex does not cause cost_e	0.01914	0.8906
xcost_ex does not cause time_ex	0.25256	0.6179
Ex_tr does not cause cost_e	2.24276	0.1417
xcost_ex does not cause ex_tr	5.79256	0.0206***
ecl does not cause cost_e	5.18055	0.0280***
xcost_ex does not cause ecl	0.04763	0.8283



<b>Null Hypothesis</b>	<b>F-statistic</b>	<b>Prob</b>
LPI does not cause cost_e xcost_ex does not cause LPI	3.64625 0.65628	0.0630* 0.4224
INF does not cause cost_e xcost_ex does not cause INF	7.17869 5.01797	0.0105*** 0.0304***
cr does not cause cost_e xcost_ex does not cause cr	0.52051 8.13154	0.4746 0.0067**
Ex_tr does not cause time_e xTime_ex does not cause ex_tr	1.34157 1.45418	0.2533 0.2346
ecl does not cause time_e xTime_ex does not cause ecl	4.23787 0.13216	0.0458*** 0.7180
LPI does not cause time_e xTime_ex does not cause LPI	1.61543 0.44894	0.2107 0.5065
INF does not cause time_e xTime_ex does not cause INF	5.07256 21.3752	0.0296*** 4.E-05
Cr does not cause time_e xTime_ex does not cause Cr	0.07599 0.99491	0.7842 0.3243
ecl does not cause ex_tr ex_tr does not cause ecl	0.00015 0.00021	0.9902 0.9884
LPI does not cause ex_tr ex_tr does not cause LPI	0.01825 0.00866	0.8932 0.9263
Inf does not cause ex_tr ex_tr does not cause Inf	0.01442 8.24265	0.9050 0.0064**
Cr does not cause ex_tr ex_tr does not cause Cr	5.12019 2.24243	0.0289*** 0.1417

\*\*\*Significant at 1% level of significance

\*\*Significant at 5% level of significance

\*Significant at 10% level of significance

Automation of clearance procedures and Logistics Performance Index also causes cost of exports. Automation of clearance procedures also causes time of exports. It is also seen that in order to enhance the position of the nation in the Logistics Performance Index, automation of customs clearance is usually adopted.

Considering the empirical studies and theoretical framework for trade facilitation, it is seen that trade facilitation parameters like time to export, cost of export, logistics performance, adoption of e-clearance mechanisms and other parameters like inflation, availability of credit enhance

trade performance of the countries. It can be inferred from the empirical analysis of the current paper that time to export, cost of export, adoption of e clearance measures, availability of credit and inflation have a significant relationship with enhancing exports from Vietnam, Kenya and Germany. Ease of doing business which is a culmination of various trade facilitation indicators leads to trade promotion under Hoekman and Nicita (2011), Weerahewa (2009), Lee and Kim (2016), Perez and Wilson (2012), Behar and Venables (2001) along with reduction of cost. As it can be assessed from the results of the current study, adoption of online clearance procedures, less inflation and availability of credit along with reduction in time and cost of exports leads to increase in exports of a country. Although there are differences in economic scale and various locations on continents, three nations have

It can be thus concluded that each nation should focus on adoption of trade facilitation parameters in order to increase its trade performance.

## 5. Conclusions

It is widely believed and has been validated theoretically and empirically that trade facilitation (e-clearance; cost for export and time for export) has a

significant impact on export performance. In the present study an attempt has been made to examine the cause and impact of trade facilitation on trade performance. The results obtained through empirical analysis indicate only time has positive impact on export while two elements of cost for export and e-clearance have the negative effects on trade performance.

The study suggests that three nations including developed (Germany) and developing countries (Vietnam and Kenya) should focus on reduction of cost for export; improve the e-clearance system and simultaneously consider the time for export. In term of cost for export, Vietnam and Kenya has a declining cost for export during 2007 to 2016, but Germany has the opposite trend. The time for export in Germany did not change significantly. This clearly explains the positive significant of time required for export clearance on export performance. The present study also suggests that the nation would promote the export performance if they have the efficient trade policies in place. These trade policies should mainly be directed to understand global requirements of trade harmonization and standardization and thus adoption of trade facilitation measures.

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