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The impact of the customs environment on Vietnam's exports

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ABSTRACT

This paper aims to study the impact of the customs environment on Vietnam's exports, using panel data with 11 variables collected from 81 trading partners of Vietnam in the period between 2014 and 2019. The customs environment index (CEI) is determined by four component indexes: i) ease of cross-border trading, ii) prevalence of non-tariff barriers, iii) trade tariffs, and iv) corruption perception, with weights for each component calculated by the Analytic Hierarchy Process (AHP). The gravity model is employed and run using R software version 4.0.4. The results indicate that the customs environment has a significantly positive impact on Vietnam's exports at the level of 1%; each percentage improvement in the CEI will lead to a 1.8105% increase in Vietnam's exports (ceteris paribus). In other words, the convenience of the customs environment could promote Vietnam's exports. By calculating the CEI of all countries, the results also show that the customs environment in Vietnam has improved during the investigated period, from 0.57 in 2014 to 0.59 in 2019, but this improvement is not considerable. When compared to Association of Southeast Asian Nations (ASEAN)-6 countries, Vietnam has a relatively modest customs environment record. These are critical findings for the implementation of necessary policies in Vietnam.

Contribution/Originality: When the Trade Facilitation Agreement entered into force in 2017, trade facilitation measures were implemented by the WTO's member countries to promote the transportation and clearance of goods. In this process, the customs environment is focused on reforming and improving its crucial role in international trade. Unlike other studies, we used a new framework with rigorous quantitative methods for gauging the CEI of 81 WTO member countries and measuring the impact of the CEI on Vietnam's exports. Based on the empirical results, policy implications are suggested that are very practical and highly compatible with the program of reforming capacity and improving Vietnam's customs, as well as boosting Vietnam's exports.

1. INTRODUCTION

International economic integration has always been an important aspect in Vietnam's economic development policy. The integration has brought great achievements, promoting the growth and development of the national economy. Vietnam has established economic and trade relationships with over 200 countries and territories worldwide (Ministry of Industry and Trade, 2019). Vietnam's trade openness sharply increased from 23.2187% of gross domestic product (GDP) in 1986 to 186.4682% in 2021, behind the Slovak Republic (187.8275%), Ireland (229.446%), Malta (287.6734%), Singapore (338.3098%), Luxembourg (388.1204%) and Hong Kong (402.2232%).

In 2021, despite the severe impacts of the Covid-19 pandemic, Vietnam was still the 22nd largest country in the world in terms of the export of goods and services, with an export value of 341.576 billion USD (World Bank, 2023). Vietnam saw a huge growth in exports after opening its economy, especially in 2007, when it officially became the 150th member of the World Trade Organization (WTO). Figure 1 illustrates the export turnover of ASEAN-6 countries in the 1986–2021 period. In comparison to the six leading economies in the ASEAN region, Vietnam's exports surpassed the exports of Brunei Darussalam, the Philippines, Indonesia, Malaysia, and Thailand in 2020.

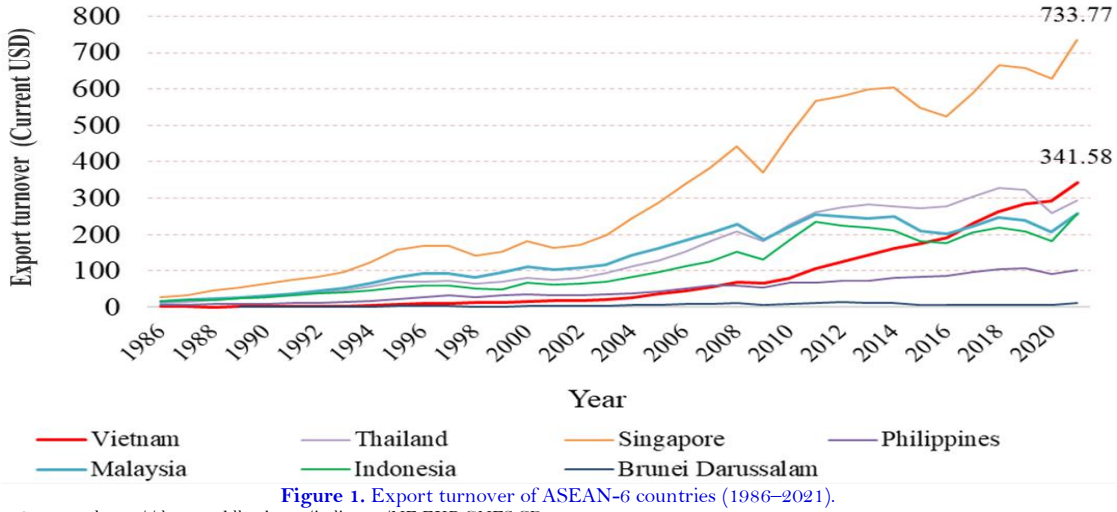

Figure 1. Export turnover of ASEAN-6 countries (1986–2021).

Source: https://data.worldbank.org/indicator/NE.EXP.GNFS.CD.

In the context of deep integration, there are many factors affecting Vietnam's commercial achievements, in which logistics play a key role. From a logistics perspective, customs issues are always important and are one of the main aspects mentioned in free trade agreements; "promoting the transportation and clearance of goods" is a main goal of the Agreement on Trade Facilitation, with the reduction of traditional tariffs and non-tariff trade barriers as trade facilitation measures (Zhang, Li, Liu, & Cheng, 2019). However, customs environment issues are not only related to taxes and non-tariff barriers, but also include management processes, procedures, compliance with regulations, and customs clearance costs. Therefore, measuring the impact of the customs environment on a country's international trade is not easy. On this topic, in Vietnam, there have not been many rigorous quantitative studies with large enough samples, and the research results are contradictory. Therefore, this study investigates the impact of the customs environment on Vietnam's exports to assess the effectiveness of Vietnam's international economic integration. Furthermore, based on the study results, necessary policy implications can be suggested to boost Vietnam's exports.

2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1. Literature Review

Customs is an important pillar of logistics and trade facilitation. Therefore, most studies on the impact of the customs environment are found in studies on trade facilitation and logistics. Firstly, as key experts in the field of

trade facilitation, Wilson, Mann, and Otsuki (2003) used the gravity model to estimate the relationship between four general indicators of a country: port efficiency, customs environment, regulatory environment, and e-business usage with commerce flow. The results showed that improving port efficiency had a significant and positive impact on trade and that legal barriers prevent trade. It's more important when authors confirm that an improvement in customs will significantly expand the intra-APEC manufacturing trade. On the same topic, Wilson, Mann, and Otsuki (2005) used irregular payments, low import fees, and hidden import barriers from the Global Competitiveness Report (GCR), bribery and corruption (from the World Competitiveness Yearbook), the Corruption Perceptions Index (Transparency Int'l), and E-business (the percentage of companies that use the internet for e-commerce (GCR) for each APEC member. The dataset used was collected to study the relationship between trade facilitation and trade flows for 75 countries in the 2000–2001 period. The results of the gravity model indicated that a 1% increase in the improvement of the customs environment index will lead to a trade increase of 0.8%, equivalent to 32.87 billion USD. The methodology and results from this study have been used and cited by many researchers.

Cui and Dao (2019) studied the impact of trade facilitation on trade between Vietnam and other ASEAN countries. The authors defined the customs environment through four sub-indexes – Trade Barriers, Trade Tariffs, Burden of Customs Procedures, and the Corruption Index – with corresponding weights determined by the Analytical Hierarchy Process (AHP). With only 86 observations, the gravity model is used for ordinary least squares (OLS) regression, fixed effects (FE), random effects (RE), and feasible generalized least squares (FGLS) methods. The results show that every 1% increase in the customs environment raises the exports and imports of Vietnam by 2.03% and 0.53%, respectively. However, the small sample size may be a limitation of this quantitative study.

With the increasing development of e-commerce, especially after the COVID-19 pandemic, unlike traditional trade, e-commerce has become a new driver for the growth of global trade and also for the economic growth of many economies around the world. Liang, Guo, Li, Zhang, and Fei (2021) studied the impact of trade facilitation on cross-border e-commerce (CBE) transactions between China and countries along the "Belt and Road". As per the usual way, the authors used the customs clearance environment as a critical factor of trade facilitation among logistics facilities, governmental governance environment, and logistical efficiency. The generalized method of moments (GMM) was applied to study the impact of trade facilitation on the scale effect of CBE. The results showed evidence that the customs clearance environment and governmental governance environment have the second strongest impact after marine and land transport infrastructure. However, another study on the impact of the customs environment on Vietnam's trade was conducted by Yu and Luu (2020). In this study, the authors defined the customs environment variable through two component indexes, the burden of customs procedures and the customs services index from the Global Enabling Trade Report. The results showed that customs clearance has not been a factor in promoting trade flows, and the customs environment variable was not statistically significant.

2.2. Theoretical Framework

In this study, the concept of "customs environment" is followed by Wilson et al. (2003) as a classic citation. According to John, Catherine, and Tsunehiro (2003); Zhang et al. (2019) and Cui and Dao (2019), a customs environment will be constructed from the corruption perception index, the prevalence of non-tariff barriers, and trade tariffs (%). Additionally, Zhang et al. (2019); Cui and Dao (2019) and Yu and Luu (2020) used the burden of customs procedures to measure the customs environment, while Portugal-Perez and Wilson (2009) used the number of documents to export, the number of days to export, the number of documents to import, and the number of days to import to measure the border and transport efficiency indicator. Combined with Liang et al. (2021) for this research, the dimension of 'ease of trading across borders' measured by 'doing business' is used as a dimension for the customs environment because this dimension covers documentation requirements and procedures at customs and other regulatory agencies as well as at the port. Ease of cross-border trading measures the time and cost of procedures, documentary compliance, and border compliance. The prevalence of non-tariff barriers is used to measure the level of

non-tariff barriers (health and product standards, technical and labeling requirements, etc.) and to limit the ability of imported goods to reduce competition in the domestic market. The customs environment framework in this study is shown in Figure 2.

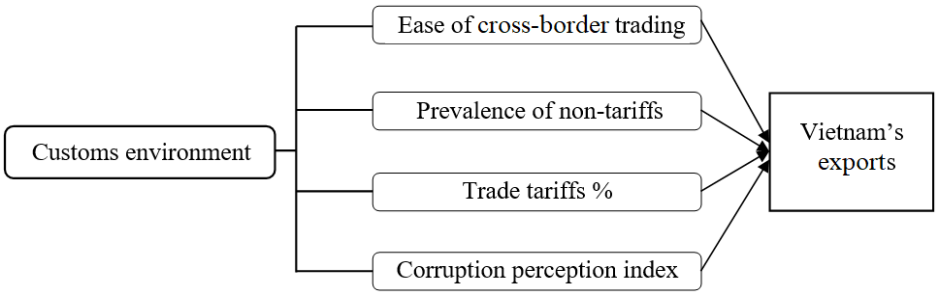

Figure 2. Framework for the study.

3. RESEARCH METHOD AND DATA COLLECTION

3.1. Research Method and Model

A rigorous quantitative method was applied with the strong support of R version 4.0.4.

a) Weights for the components of the customs environment indicator determined by the AHP.

The AHP method is used to determine the respective weights for four dimensions of the customs environment index. According to Saaty (2008), the AHP is a general theory of measurement through pairwise comparison that relies on the judgments of experts to derive priority scales. The AHP is used to process measurement, especially on a ratio scale (Bernasconi, Choirat, & Seri, 2010). The AHP process can be decomposed into six main consecutive steps listed below:

Step 1: Determine goals and develop a hierarchical structure from the top to the lowest level.

Step 2: Conduct a pairwise comparison.

For each pair of comparisons, the relative importance of the ith criterion compared to the jth criterion judged by the respondent (expert) k is c_ij^k, which has a numerical scale from 1 to 9, as shown in Table 1.

Table 1. The fundamental scale.

Value of c_{ij}^k	Definition	Explanation
1	Equally important	Criteria i and j are equally important
3	Slightly important	Criterion i is slightly more important than criterion j
5	Strongly important	Criterion i is strongly more important than criterion j
7	Very strongly important	Criterion i is very strongly more important than criterion j
9	Extremely important	Criterion i is absolutely more important than criterion j
2, 4, 6, 8	Intermediate values between two adjacent judgments	There is a compromise between the two adjacent values

Step 3: Establish the pairwise comparison matrix.

The matrix $C = [c_{ij}]_{nxn}$ is synthesized from the raw data collected from the interviews with $c_{ij} = \frac{\sum_{k=1}^{k=m} c_{ij}^k}{m}$, where m is the number of respondents to the questionnaire.

Step 4: When matrix C is perfectly consistent, it is transformed into a normalized matrix $W = [w_{ij}]_{nxn}$, where $w_{ij} = \frac{c_{ij}}{\sum_{i=1}^{i=n} c_{ij}} \forall\, i,j = \overline{1,n}$.

Step 5: The vector of relative weight $w = (w_1, w_2, \dots, w_n)$ associated with matrix C is computed from the normalized matrix W, where $w_i = \frac{\sum_{j=1}^{j=n} w_{ij}}{n}$ and $\sum_{i=1}^{i=n} w_i = 1$.

Step 6: Check the consistency of the pairwise comparisons.

Mathematically, the pairwise comparison matrix C is considered consistent if $c_{ik} * c_{kj} = c_{ij}$ for all i, j and k. In order to check if a level of consistency is "reasonable", the consistency ratio (CR), $\mathrm{CR} = \frac{\mathrm{CI}}{\mathrm{RI}}$, is used to validate the AHP results, where the consistency index (CI) is $\mathrm{CI} = \frac{\lambda_{max-n}}{n-1}$, in which $\lambda_{max} = \sum_{j=1}^{j=n}\left(\sum_{i=1}^{n} a_{ij}\right) w_j$ and RI is the random index, which is the average random consistency index, and the values are extracted from Table 2. According to Saaty (2008) and Hamed (2017), the AHP results are acceptable if $CR < 0.1$ $(CR < 10\%)$. However, for the comparison matrix with a 4x4 dimension, the upper limit of the CR should be 9% (Ordoobadi, 2010). If the CR is higher, the comparison matrix is not consistent and the respondent's judgments should be reviewed often.

Table 2. Random consistency index (RI).

n	1	2	3	4	5	6	7	8	9	10
RI	0	0	0.579	0.892	1.115	1.235	1.332	1.395	1.453	1.488

Source: Golden and Wang (1990).

Since some of the data are actual values and some come from surveys with different response ranges (e.g., 1 to 7, or 0 to 100), the raw data need to be put on a comparable basis to create the CEI. In general, when transforming the original value $x_i \in [a; b]$ to $y_i \in [c; d]$, the formula $y_i = f_{(x)} = c + \frac{(x_i - a)(d-c)}{(b-a)}$ is applied to normalize all values of a_{ijt}^k in the four sub-indexes (variables) to be b_{ijt}^k in the same interval range $[0; 1]$. For the sub-indexes, in which a higher value indicates a worse outcome (trade tariffs %), the transformed formula should be adjusted to $b_{ijt}^k = 1 - \frac{(x_i - a)}{(b-a)}$ to ensure that 0 and 1 still correspond to the worst and best possible outcomes respectively.

b) Research Model and Estimations

Developed by Tinbergen (1962), the gravity model of international trade has been applied until now as the classic model for most of the quantitative research on trade. The gravity model has long been one of the most successful empirical models in economics, allowing enormous observed variations in economic interactions across space in both trade and factor movements (James, 2011). This empirical study also uses the gravity model, and following the models applied by John et al. (2003); Zhang et al. (2019); Cui and Dao (2019) and Yu and Luu (2020), the econometric gravity model for this study can be written as follows:

$$\mathrm{X_{ijt}} = \alpha \mathrm{CEI_{jt}^{\beta} GDP_{jt}^{\gamma} POP_{jt}^{\sigma} DIST_{ijt}^{\delta}} e^{\varepsilon_{ijt}} \quad (1)$$

X_{ijt} is the value of Vietnam's exports to its trading partner (country j) in the year t; $\mathrm{CEI_{jt}}$ is the target variable that measures the customs environment of the partner country j; $\mathrm{GDP_{jt}}$ is the gross domestic product of country j; $\mathrm{POP_{jt}}$ is the population of country j; $\mathrm{Dist_{ijt}}$ is the distance between Vietnam and country j; and ε_{ijt} is a stochastic error term. Equation 1 will calculate the logarithms for both sides. The dummy variables $\mathrm{D.ASEAN}_{jt}$ and D2017 are then added to the econometric model to gain more information about Vietnam's exports. Then, we obtain Equation 2:

$$\mathrm{lnX_{ijt}} = \alpha + \beta \mathrm{lnCEI_{jt}} + \gamma \mathrm{lnGDP_{jt}} + \sigma \mathrm{lnPOP_{jt}} + \delta \mathrm{lnDIST_{ijt}} + \rho \mathrm{D.ASEAN}_{jt} + \tau \mathrm{D2017}_{tj} + \varepsilon_{ijt} \quad (2)$$

Additionally, to assess the impact of each component of the customs environment on Vietnam's exports, based on model 2, the study also performs separate regressions for these components: TAB (M3), PNTB (M4), T, tariffs (M5) and CPI (M6).

There are many different ways to estimate Model 2, M3, M4, M5, and M6; however, this study uses the feasible generalized least squares (FGLS) estimation to overcome the diagnostics of heteroscedasticity in the regression models to obtain a better result (Chia-Yen, Ting-Syun, Meng-Kun, & Chen-Yang, 2019).

3.2. Data

The dataset was collected from 81 countries (including Vietnam) from 2014–2019 (refer to the list of countries in Annex 1) for regressing the gravity models. The weights of four dimensions regarding the customs environment were computed from the results of a questionnaire survey, which was conducted by nine experts/scholars in the fields of logistics, trade facilitation, and international trade in Vietnam, Thailand and Japan.

4. RESULTS ANALYSIS AND DISCUSSION

4.1. Descriptive Statistics

Table 3 shows the list of all variables used for computing the CEI and regressing the gravity models of the study. Data for 11 variables were taken from different sources and some variables were created by authors.

4.2. Results and Discussion

The results of the respective weights of the four dimensions of the CEI are presented in Table 4 with the final weight of each dimension in the last column. It shows that the 'prevalence of non-tariff barriers' plays the most important role in the customs environment as its final weight is the largest (0.4017). 'Customs procedures' is also very important (0.372), while the role of corruption is more important than trade tariffs, with relative weights of 0.137 and 0.0893, respectively. The CR for the AHP is less than the upper limit of 9% for the comparison matrix proposed by Ordoobadi (2010). So, the pairwise comparison matrix used for the AHP method is consistent and reliable for computing the respective weights of the CEI's four dimensions.

The results of the AHP show that the descending order in terms of importance is the prevalence of non-tariff barriers, customs procedures, corruption perception, and trade tariffs. This is easy to understand because, today, tariff barriers have been substantially reduced or terminated. On the contrary, there has been increasing interest in non-tariff barriers, which may distort and restrict international trade. In addition, cutting customs procedures and focusing on transparency are also critical to boosting the implementation of trade facilitation; this process can be seen in most developing countries, including Vietnam.

Figure 3 shows the CEI averages of the 81 countries in the data sample, and Figure 4 shows the CEI of Vietnam during the 2014–2019 period compared to ASEAN-6 countries. Generally, the average CEI of all countries improved consistently from 2014 to 2019. There was a great improvement, in particular, from 2017 compared to the years before, which may have resulted from the Agreement on Trade Facilitation when it came into force in 2017. Regarding the improvement in the customs environment index during this period, Argentina was the leading country, followed by Saudi Arabia, India, China, and Romania. For Vietnam, the CEI also showed an improvement during this period; there was an increase from 0.5705 points in 2014 to 0.5920 points in 2019. With this performance, Vietnam joined the group of countries that showed a moderate performance in terms of the CEI and ranked 36th out of 81 investigated countries in terms of the CEI improvement from 2014–2019. However, compared to ASEAN-6 countries, Vietnam had a modest performance in terms of the CEI, while Singapore always had the best performance. This implies that Vietnam needs to set clear targets and make a big effort to improve its customs environment.

Table 3. Descriptive statistics of variables used to estimate the gravity model.

Name of variable	Explanation	Expectation	Obs.	Mean	Std. dev.	Min.	Max.	Data source
X_{ij}	Total exports of Vietnam to country j	Dependent variable	474	2,485,639	6,323,404	872	61,403,966	UN Comtrade
CEIj	Customs environment of country j	(+)	480	0.693	0.113	0.346	0.881	Created by the authors
GDPj	Gross domestic product of country j	(+)	480	958.972	2.600	10.682	21,374	WB WDI
POPj	Population of country j	(+)	480	74,600,000	214,000,000	327,386	1,397,715,000	WB WDI
$DIST_{ij}$	Distance between Vietnam and country j	(-)	480	8,748.625	4,660.655	392	19,366	Geodatos
D.ASEAN	Dummy variable (D.ASEAN takes the value of 1 if country j is a member of ASEAN, and 0 otherwise)	(+)	480	0.087	0.282	0	1	Created by the authors
D2017	Dummy variable (Which takes the value of 1 if the years are > or = 2017, and 0 otherwise)	(+)	480	0.5	0.500	0	1	Created by the authors
TAB	Ease of cross-border trading	(+)	480	0.802	0.189	0.16	1	Doing business
PNTB	Prevalence of non-tariff barriers	(+)	480	0.589	0.084	0.245	0.836	GCR/WEF
Tariffs	Trade tariffs (%)	(+)	480	0.951	0.044	0.8	1	GCR/WEF
CPI	Corruption perception index	(+)	480	0.539	0.198	0.2	0.92	Transparency Int'l

Note: Export turnover in thousands of current USD; GDP in billions of current USD; $Dist_{ij}$ = distance in kilometers; WB WDI = World bank world development indicators; GCR = Global competitiveness report; WEF = World economic forum.

Table 4. The pairwise comparison matrix regarding the customs environment.

Dimensions	Customs procedures	Prevalence of non-tariff barriers	Trade tariffs %	Corruption perception	Final weight
Customs procedures	1	1.055	4	2.481	0.372
Prevalence of non-tariff barriers	0.947	1	4.7778	3.148	0.401
Trade tariffs %	0.25	0.209	1	0.666	0.089
Corruption perception	0.403	0.317	1.5	1	0.137
CR					0.004

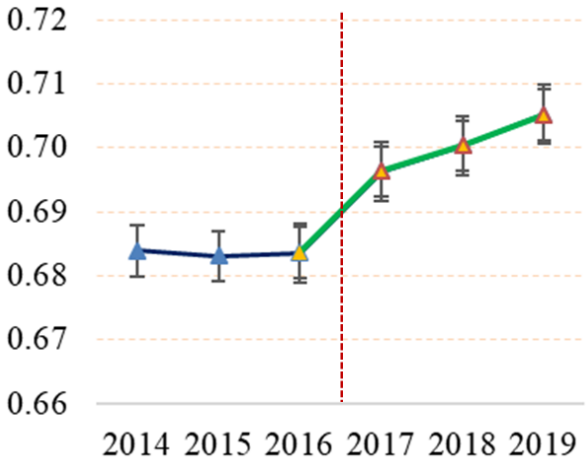

Figure 3. The CEI average of all countries (2014–2019).

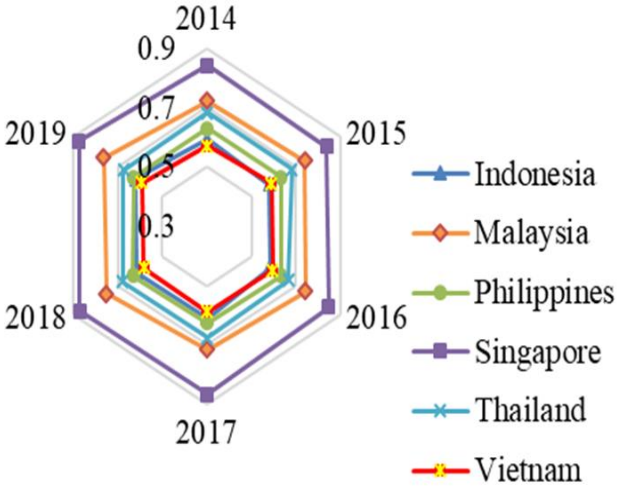

Figure 4. Vietnam's CEI compared to other ASEAN-6 countries (2014–2019).

Table 5 shows the regression results of Model 2, M3, M4, M5 and M6. All the FGLS regression models are statistically significant at the 1% level.

In model 2, all of the variables' regression coefficients (CEIj, GDPj, POPj, $DIST_{ij}$) are statistically significant at 1%. Moreover, the variables CEIj, GDPj, and POPj have positive regression coefficients, but the coefficient of DISTij is negative. These conclusions are supported by the research results of John et al. (2003); Portugal-Perez and Wilson (2009) and Cui and Dao (2019).

In particular, the customs environment has the largest impact on Vietnam's exports, when a 1% increase in the CEI will lead to an increase in Vietnam's exports by an average of 1.8105%, ceteris paribus. This implies that the customs environment plays an extremely important role in exports. This result is consistent with those of Cui and Dao (2019) on trade between Vietnam and ASEAN countries. The authors concluded that every 1% increase in the

customs environment raised Vietnam's exports by approximately 2.026%, which is a slightly larger figure than the 1.8105% found in this study. This is reasonable, because Vietnam exports more to ASEAN countries than to the rest of the world.

Similarly, a 1% increase in GDPj and POPj will increase Vietnam's exports by 0.8254% and 0.1924%, respectively. This is an understandable conclusion since a GDP and POP increase in a partner country may lead to an increase in demand for imported goods and services from Vietnam, but the impact of the GDP increase is larger than the population. Like most related studies, the regression coefficient of the $DIST_{ij}$ variable is negative and statistically significant, which means the longer the distance to the importing country, the higher the logistics costs, hence distance is still a partial limitation for Vietnam's exports.

Two dummy variables are added to the model with the hope of learning more information about Vietnam's exports. The regression coefficient of the D.ASEAN variable is positive and significant at the level of 1%, indicating that the average export value from Vietnam to ASEAN countries is higher than that from Vietnam to the rest of the world. So, the ASEAN region is still an important market for Vietnam's exports in addition to emerging potential markets such the US and the EU. For the D2017 variable, which is added to the model to test the difference between the exports of Vietnam in the periods before and after 2017 when the Trade Facilitation Agreement came into effect. The regression coefficient of D2017 is positive (0.1113) but has a small critical value (z =1.41), so this difference is not statistically significant. This may mean that reforming countries' customs systems may happen in the long run.

Moreover, the regression results of models M3, M4, M5 and M6 in Table 5 show that all dimensions of the customs environment affect Vietnam's exports. These impacts are positive and statistically significant at the 5% level. The regression coefficients of the dimension variables of the customs environment (ease of cross-border trading, prevalence of non-tariff barriers, trade tariffs, and the corruption perception index) are all positive and their magnitudes are 0.5087, 1.4351, 3.6014, and 0.4988, respectively. This means that if the ease of cross-border trading is improved by 1%, then Vietnam's exports will increase by 0.5087%, ceteris paribus. If the prevalence of non-tariff barriers is improved by 1%, which means that the ability of imported goods to compete in the domestic market of foreign countries through health and product standards, technical and labeling requirements is facilitated more, then Vietnam's exports will increase by 1.4351%. If the facilitation on tariff rates applied by a customs administration on the imported goods of foreign countries increases by 1% (the average applied tariff rate decreases by 1%), Vietnam's exports will increase by 3.6014%. Similarly, when the corruption perception index is improved by 1%, Vietnam will increase its exports by about 0.4988%.

5. CONCLUSION AND POLICY IMPLICATIONS

5.1. Conclusion

The goal of this research is to examine the impact of the customs environment on Vietnam's exports by creating a customs environment index and regressing the gravity model by the FGLS method. Primary data is used to calculate the relative weights for the four dimensions of the customs environment. Secondary data, comprising 474 observations collected from 80 trading partner countries with Vietnam in the 2014–2019 period, was also used. The results of the study show that: i) regarding the customs environment, 'prevalence of non-tariff barriers' plays the most important role, followed by 'customs procedures', 'corruption perception', and 'trade tariffs'; ii) Vietnam had certain achievements in terms of improving the customs environment between 2014–2019, especially since the Trade Facilitation Agreement came into effect. However, compared to ASEAN-6 countries, the performance of Vietnam's customs environment was still low; iii) the most critical conclusion is that the customs environment and its four components have a significant positive impact on Vietnam's exports. When the CEI is improved by 1%, Vietnam's exports tend to increase by 1.8105%. This is the largest impact on Vietnam's exports among GDPj, POPj, and DISTij. For every 1% increase in GDPj and POP, Vietnam's exports will increase by 0.8254% and 0.1924%, respectively,

while if the distance increase by 1%, Vietnam's exports will decrease by about 0.6151%. The study also shows the important role of ASEAN countries as main market for Vietnam's exports.

Table 5. Results of Model 2, M3, M4, M5, M6 from the FGLS regression.

Cross-sectional time-series FGLS regression Coefficients: Generalized least squares Panels: Homoskedastic Correlation: No autocorrelation					
Variable	**Model 2**	**M3**	**M4**	**M5**	**M6**
Log(GDPj)	0.8254*** (0.0541)	0.9408*** (0.0444)	0.9438*** (0.0408)	0.9293*** (0.0505)	0.8964*** (0.0637)
Log(DISTij)	-0.6151*** (0.0732)	-0.6500*** (0.0739)	-0.5654*** (0.0760)	-0.6817*** (0.0752)	-0.6494*** (0.07426)
Log(POPj)	0.1924*** (0.0570)	0.0594 (0.0446)	0.0786* (0.0436)	0.0866 (0.0552)	0.1057* (0.0650)
Log(CEIj)	1.8105*** (0.3695)				
Log(TABj)		0.5087*** (0.1571)			
Log(PNTBj)			1.4351*** (0.3464)		
Log(Tariffsj)				3.6014*** (1.3262)	
Log(CPIj)					0.4988** (0.2031)
D.ASEAN	0.8384*** (0.2070)	0.8416*** (0.2108)	0.9608*** (0.2077)	0.7784*** (0.2171)	0.949*** (0.2101)
D2017	0.1113 (0.0789)	0.1408* (0.0797)	0.0709 (0.0811)	0.1459* (0.0799)	0.1525* (0.0801)
Intercept	-5.8526*** (1.0828)	-6.9178*** (1.057)	-7.4009*** (1.0165)	-6.7341*** (1.0994)	-6.337*** (1.1917)
Number of observations	474	474	474	474	474
Wald chi2(6)	2017.49	1949.81	1983.25	1934.26	1927.55
Prob > chi2	0.0000	0.0000	0.0000	0.0000	0.0000

Note: *** represents a 1% significance level; ** represents a 5% significance level; * represents a 10% significance level.

5.2. Policy Implications

i) Vietnam should enhance international cooperation with other WTO members and regions across the world regarding their customs environments to promote trade and improve Vietnam's customs environment performance.

ii) Vietnam should focus on establishing cooperation with ASEAN through a Vietnam–ASEAN customs cooperation. This would help to promote Vietnam's exports and contribute to the deep-seated economic integration goals of ASEAN countries. Additionally, Vietnam should participate extensively in cooperation programs with other partners such as China, Korea, Japan, Australia, New Zealand, Singapore, the EU, and the US on customs technical assistance, administrative support cooperation, information sharing, etc.

iii) Since customs procedures play a very important role in the customs environment, Vietnam needs to boost the process of customs reform, especially for procedures that apply to specialized inspections, and implement a risk management system to streamline procedures and control risks. Vietnam should follow international best regulatory practices in terms of customs to shorten the time and reduce the costs for imported and exported goods and to facilitate the movement of goods.

iv) Vietnam needs to develop and synchronize a database of customs software aimed at making customs more effective and efficient. It is necessary to accelerate the modernization of customs operations to further promote the effectiveness of the automatic customs clearance system and the national single window (NSW) and ASEAN single window (ASW). In the context of Industry 4.0, the customs sector in Vietnam needs to implement a digital

transformation and work toward the application of new digital technologies to identify, process, manage, and control customs activities.

v) Vietnam should promote exports by prioritizing trade with countries that have a high performance in terms of customs environment, which means the non-proliferation of non-tariff barriers that restrict imported goods, the simplification of customs procedures, being highly transparent, and having low tariff rates.

vi) Last, but not least, to ensure Vietnam's success in creating a good customs environment, it must build a system that is transparent and efficient.

6. LIMITATIONS AND FURTHER STUDY

The findings of this study are important for policymakers, but this research also has certain limitations. The first limitation is that all quantitative research comes from various sources and for a limited time range. At the same time, despite many efforts, the authors have not been able to analyze the specific criteria of the customs environment and cover more components of the customs environment to measure the impact of each on Vietnam's exports. This can be addressed in future research since the customs environment is very complicated. These are important practical bases for authors to propose policy implications for Vietnam to improve the national customs environment and to foster exports.

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Annex 1. List of countries included in the data sample.

Numerical order	Nation	Numerical order	Nation	Numerical order	Nation
1	Argentina	28	Hungary	55	Philippines
2	Australia	29	Iceland	56	Poland
3	Austria	30	India	57	Portugal
4	Bangladesh	31	Indonesia	58	Qatar
5	Belgium	32	Ireland	59	Romania
6	Brazil	33	Israel	60	Russian Federation
7	Bulgaria	34	Italy	61	Saudi Arabia
8	Cambodia	35	Japan	62	Senegal
9	Cameroon	36	Kazakhstan	63	Singapore
10	Canada	37	Kenya	64	Slovenia
11	Chile	38	Korea, Rep.	65	South Africa
12	China	39	Kuwait	66	Spain
13	Colombia	40	Lao PDR	67	Sri Lanka
14	Costa Rica	41	Latvia	68	Sweden
15	Croatia	42	Lithuania	69	Switzerland
16	Cyprus	43	Luxembourg	70	Taiwan, China
17	Czech Republic	44	Malaysia	71	Tanzania
18	Denmark	45	Malta	72	Thailand
19	Dominican Republic	46	Mexico	73	Tunisia
20	Egypt, Arab Rep.	47	Morocco	74	Turkey
21	Estonia	48	Netherlands	75	Uganda
22	Finland	49	New Zealand	76	Ukraine
23	France	50	Norway	77	United Arab Emirates
24	Germany	51	Pakistan	78	United Kingdom
25	Ghana	52	Panama	79	United States
26	Greece	53	Paraguay	80	Uruguay
27	Hong Kong SAR, China	54	Peru	81	Vietnam