

Does the Logistics Performance Affect International Trade of Vietnam?

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Abstract

Logistics performance is strongly connected to international trade. This means increasing international trade simultaneously requires continuous advancement in logistics infrastructure of the economy. In turn, a better logistics performance will promote international trade. This relationship has been evident in a number of empirical studies.

This paper aims to examine the effect of logistics performance on Vietnam's international trade by employing the Gravity model and a panel data set of her 19 trade partners during 2005-2018. Our empirical results confirm a statistically significant relationship between logistics performance and international trade of Vietnam.

Keywords: Exports, Gravity model, Imports, Logistics performance, Vietnam.

Introduction

International trade is the exchange of goods and services among countries. Recently, the development of international trade has encountered significant challenges, particularly in the field of logistics, and is inextricably linked to global trade and cross-border fragmentation of production process. Logistics is, thereby, not only challenged in a special way, but also represents the necessary prerequisites and a driver for international trade and global operations (Shepherd, 2013; Verhetsel *et al.*, 2015). Furthermore, Straube *et al.* (2008), Luttermann and Kotzab (2020) argue that technological advances in transport and communication systems and the removal of trade barriers are regarded as the most important drivers that may have led to the expansion of international trade. Since the production of various products and intermediate goods takes place in different countries, the quality of physical infrastructures is an important prerequisite for a country when participating in global value chains or production networks (Shepherd, 2013). Efficient logistics facilitate the transportation of goods, ensure their safety and speed, and provide cost reductions when trading among countries. If a country has an inefficient logistics performance, this will result in higher costs in terms of time and money and thereby affects a company's performance and may also isolate a country from world markets (Martí *et al.*, 2014). Logistics connect companies to domestic and international markets through reliable supply chain networks. These supply chains are complex, and their performance is largely dependent on country characteristics such as infrastructure. Therefore, Arvis *et al.* (2018) recognize logistics performance as one of the most important indicators of a country's competitiveness.

Located in the Eastern Indochina Peninsula in Southeast Asia, Vietnam has a north-to-south distance of 1,650 km and a coastline of 3,260 km. The country commenced the embarkation on Renovation in 1986 and officially opened-door policy to the world since 1990. The country has gradually integrated into global economy since the US lifting of its embargo in 1995, joining the World Trade Organization (WTO) and multiple Free Trade Agreements (FTAs), including those of new generation. Vietnam's international trade has continued to increase sharply in recent years, even in the context of COVID-19 pandemic breakout. According to the General Department of Customs of Vietnam, the total value of exports and imports of Vietnam in 2021 reached to about USD 668.5 billion, up 22.6% compared to 2020, accounting for USD 123 billion. This arises a research question of How does logistics performance affect international trade of a country?

The aim of this paper is to examine the effect of logistics performance on international trade of Vietnam during 2005-2018 using the Gravity model and a panel data set of 19 trade partners during 2005-2018. The authors assume that the country's logistics performance operates as location advantage will help to promote its international trade.

The remainder of the paper is constructed as the following. Section 1 provides a brief literature review on the relationship between the logistics performance and international trade. The subsequent section describes the study's economic model and panel data set. Section 3 summaries and discusses the estimation results. The final section concludes the paper and provides main policy implications for Vietnam.

1. A brief literature review

The interaction between the logistics performance of a country and international trade has been investigated in a myriad number of studies in recent years. Jouili and Allouche (2016a) use the Cobb-Douglas production function to investigate the relationship between countries' merchandise trade and quality of logistics performance, seaport infrastructure quality, and liner shipping connectivity among the major maritime nations in the world. The findings of the study confirm that there exists a significant relationship between the merchandise trade and the aforementioned variables. Kabak *et al.* (2018) examines the relationship between logistics performance (the six sub-dimensions of LPI-Logistics Performance Index) and trade at country level of Turkey, Burundi, Zimbabwe, Brazil, and Portugal using the scenario analysis. They conclude that improvement in some of the logistics performance indicators has an important positive impact on the trade level of those countries. Wang and Choi (2018) employ a gravity model and show that logistics performance of 43 countries has a significant and positive impact on trade volume. Munim and Schramm (2018) analyze the impacts of logistics performance on seaborne trade using structural equation model and argue that it is vital to continuously improve logistics performance to increase seaborne trade. Wang *et al.* (2018) use an augmented gravity model to examine the relationship between international trade and green logistics and figure out that the logistics performance index of exporting and importing countries are positively correlated with the trade volume. Furthermore, Ornegi *et al.* (2018) also employ gravity model to analyze the impacts of logistics performance on the international trade of the European Union and Middle East and North Africa countries. They confirm that logistics performance could be one of the fundamental determinants for the competition among countries.

From the researches mentioned above, the gravity model is mostly employed. The traditional variables used in the gravity model are the GDP of trade partner countries, the distance between them, the LPI, and other indicators/indexes such as the regulatory quality of the trade partner countries, common border, common languages, *etc.*

Tahar (2020) analyzes the relationship between logistics performance and maritime exports in Tunisia. Findings confirm that only Logistics Performance Index sub-dimension related to the quality of infrastructure (e.g., seaports, railroads, roads, information technology) has a significant and positive impact on Tunisian maritime exportation. Luttermann and Kotzab (2020) also prove a statistically significant relationship between logistics performance and trade for the case of 20 countries in between 2006-2017. Study by Gani (2017) also points out that the overall logistics performance is positively and statistically significant correlated with exports and imports. Bensassi *et al.* (2015) estimate the impacts of logistics and transport infrastructure on bilateral trade from 19 Spanish regions to 64 destinations. Their findings show that logistics are important for the analysis of trade flows of goods in terms of number, size, and quality of logistics facilities. Martí *et al.* (2014) examine some sub-dimensions of the performance logistics (customs procedures, logistics costs and the quality of transport infrastructure) on the trade. The research results reveal that amelioration in any of the aforementioned sub-dimensions could take to significant growth in

a country's trade flows. Puertas *et al.* (2014) study how the development of logistics performance has affected European Union trade. Findings show that logistics is more important for exporting nations than importing nations. Hausman *et al.* (2012) examine the effects of logistics performance in global bilateral trade among 80 countries. They concluded that logistics performance is statistically significant related to the volume of bilateral trade.

As for the case of Vietnam, to date, there has been no articles examining the relationship between the logistics performance and exports and imports of the country. To ensure the originality and significance of the research, this paper will employ a Gravity model and a panel data set of international trade between Vietnam and 19 trade partners to examine the relationship between the logistics performance and merchandise exports and imports of Vietnam during 2006-2017. Due to lack of data of LPI offered by the World Bank in 2018-2021, the authors only can collect the data of 2006-2017. However, this research still ensures both theoretical and practical significance.

2. The econometric model specification and data sources

2.1. The econometric model specification

The gravity model in international economics, similar to other gravity models in social science, can be employed to predict bilateral trade flows based on the sizes of the economy (often using common variables such as Gross Domestic Product (GDP), GDP per capita, Gross National Product (GNP), and GNP per capita), and the distance between two trade partners. The model was first used by Tinbergen in 1962. It was given the name "gravity model" for its analogy with the Newton Law of universal gravitation, which also takes into consideration the distance and physical size between two objects. The basic theoretical model for trade flows between two countries i and j takes the following formula:

$$F_{ij} = G(M_i M_j) / D_{ij} \quad (1)$$

In which:

- F_{ij} is the bilateral trade flow between country i and country j ;
- M_i is the economic mass of country i (often using GDP, GNP measurements);
- M_j is the economic mass of country j (often using GDP, GNP measurements);
- D_{ij} is the distance between country i and country j ; and
- G is a constant.

In this paper, we construct two gravity models for exports and imports as below:

$$\begin{aligned} \ln EXP_{jt} = & \beta_{20} + \beta_{21} \ln DIS_{VNj} + \beta_{22} \ln GDP_{VNt} + \beta_{23} \ln GDP_{jt} + \beta_{24} \ln FDI_{jt} + \beta_{25} \ln IMP_{jt} + \\ & \beta_{26} \ln EXR_{USD/VNDt} + \beta_{27} \ln (ins_{VNt} * ins_{jt}) + \beta_{28} \ln LPI_{vnt} + \gamma_{21} \text{BothinWTO}_{VNjt} + \gamma_{22} ACFTA + \gamma_{23} AEC \\ & + \gamma_{24} AIFTA + \gamma_{25} AKFTA + \gamma_{26} AJCEP + \gamma_{27} USBTA + \gamma_{28} AANZFta + \gamma_{29} VKORFTA + \gamma_{210} JVCEP \\ & + \gamma_{211} EAEU + \gamma_{212} BOR_{VNj} + \gamma_{213} CRISIS_{2008} + \varepsilon_{2VNj} \quad (2) \end{aligned}$$

$$\begin{aligned} \ln IMP_{jt} = & \beta_{30} + \beta_{31} \ln DIS_{VNj} + \beta_{32} \ln GDP_{VNt} + \beta_{33} \ln GDP_{jt} + \beta_{34} \ln FDI_{jt} + \beta_{35} \ln EXP_{jt} + \\ & \beta_{36} \ln EXR_{USD/VNDt} + \beta_{37} \ln (ins_{VNt} * ins_{jt}) + \beta_{38} \ln LPI_{vnt} + \gamma_{31} \text{BothinWTO}_{VNjt} + \gamma_{32} ACFTA + \gamma_{33} AEC \end{aligned}$$

$$+ \gamma_{34}AIFTA + \gamma_{35}AKFTA + \gamma_{36}AJCEP + \gamma_{37}USBTA + \gamma_{38}AANZFTA + \gamma_{39}VKORFTA + \gamma_{310}JVCEP + \gamma_{311}EAEU + \gamma_{312}BOR_{VNj} + \gamma_{313}CRISIS_{2008} + \varepsilon_{3VNj} \quad (3)$$

In which:

- EXP_{jt} is the export value of Vietnam to country j at year t (USD);
- IMP_{jt} is the value of Vietnam's imports from country j at year t (USD);
- DIS_{VNj} is the distance between Vietnam and country j (km) - taken from the CEPII;
- GDP_{VNt} is the nominal GDP of Vietnam at year t (USD);
- GDP_{jt} is the nominal GDP of country j at year t (USD);
- FDI_{jt} is the approved FDI capital at year t of country j in Vietnam (USD);
- $EXR_{USD/VNDt}$ is the average exchange rate between USD and VND at year t ;

Regarding the exchange rate, theoretically, if $EXR_{USD/VND}$ increases, the VND has devaluation, will stimulate exports, decrease imports of Vietnam and *vice versa*.

- ins_{VNt} is a measure of the efficiency of the Vietnamese government at year t (Government effectiveness) provided by the World Bank with a value ranging from 0 to 100. A higher value indicates high government efficiency and *vice versa*;

- ins_{jt} is a measure of the efficiency of the partner government j at year t ;

- $ins_{VNt} * ins_{jt}$ reflects the quality of institutional interaction between Vietnam and trade partner j at year t . If $ins_{VNt} * ins_{jt}$ is higher, it proves that Vietnam and partner have higher institutional quality. This will promote exports and imports of Vietnam to/from partner j and *vice versa*;

- $BothinWTO_{VNjt}$ is a binary dummy variable, which is 1 if Vietnam and country j are WTO members at year t and otherwise is 0;

- $ACFTA$ is a binary dummy variable, which is 1 if Vietnam and country j are members of the ASEAN-China Free Trade Area at year t , and otherwise is 0;

- AEC is a binary dummy variable, which is 1 if Vietnam and country j are members of the ASEAN Economic Community at year t , and *vice versa*;

- $AIFTA$ is a binary dummy variable, which is 1 if Vietnam and country j are members of the ASEAN-India Free Trade Agreement at year t , and otherwise is 0;

- $AKFTA$ is a binary dummy variable, which is 1 if Vietnam and country j are members of the ASEAN-Korea Free Trade Agreement at year t , and otherwise is 0;

- $AJCEP$ is a binary dummy variable, which is 1 if Vietnam and country j are members of the ASEAN-Japan Comprehensive Economic Partnership Agreement at year t , and otherwise is 0.

- $USBTA$ is a binary dummy variable, which is 1 after the years Vietnam and the United States signed a bilateral trade agreement (BTA) and *vice versa* is zero for the previous years;

- $AANZFTA$ is a binary dummy variable, which is 1 if Vietnam and country j are members of the ASEAN-Australia-New Zealand Free Trade Agreement at year t and otherwise is 0;

- $VKORFTA$ is a binary dummy variable, which is 1 after Vietnam and South Korea signed the Vietnam-Korea Free Trade Agreement and is 0 for the previous years;
- $JVCEP$ is a binary dummy variable, which is 1 after Vietnam and Japan signed the Japan-Vietnam Comprehensive Economic Partnership Agreement and is 0 for the previous years;
- $EAEU$ is a binary dummy variable, which is 1 if Vietnam and country j are members of the Eurasian Economic Union at year t , and otherwise is 0.
- BOR_{VNj} is a binary dummy variable, which is 1 if Vietnam and country j share a border and otherwise is 0;
- $CRISIS_{2008}$ is a binary dummy variable, which is 1 if country j is affected by the 2008 crisis and *vice versa* is 0. As we know the Global crisis 2008 affects most countries in the world. In this study, the variable $CRISIS_{2008}$ has a value of 1 in the period from 2008 to 2012 and is 0 in 2013-2018;
- LPI_{vnt} (Logistics Performance Index): Logistics Performance Index provided by the World Bank (WB). This variable reflects the quality and performance of Vietnam's logistics operations at year t . This is one of the most important variables of these models. Because it examines how the improvement of logistics performance contributes to Vietnam's exports and imports; and
- ε_{2VNj} , ε_{3VNj} are random errors/white noise where $E(\varepsilon_{2VNj}) = 0$ and $E(\varepsilon_{3VNj}) = 0$ and their variances are constant.

All quantitative variables will use the natural logarithm form (Ln) except for binary dummy variables in the models to make them smoothly.

3.2. Data sources

For data sources, the authors use a panel data set of 19 most important trade partners of Vietnam including Australia, Belgium, Brazil, Canada, China, France, Germany, Hong Kong, India, Japan, Malaysia, the Netherlands, the Philippines, Russia, Singapore, South Korea, Thailand, UK, and the USA from 2005 to 2018. Those 19 trade partners account for about 80% of the total exports and imports of Vietnam recently. Data is collected from reliable sources such as the General Statistics Office of Vietnam (GSO), WTO Center, the World Bank, and the World Trade Organization (WTO). If trade or FDI partner j at year t does not have data on FDI, exports, imports to/with Vietnam, the authors will add USD 1 to the dataset to address "zero trade" or "Zero FDI". The next section will present the estimation results and discussion.

3. The Econometric estimation results and discussion

3.1. The estimation results

The unit root test results show that the panels are stationary. The Hausman test results favor choosing the Random Effects models. Table 1 and Table 2 below show the summary of the estimated results of Gravity model (2) and (3), using the Stata 11 Software and Random Effects technique.

Table 1: The estimated results of Gravity model (2) using the random effects technique and Stata 11 Software. Dependent variable LnEXP_{jt}

Independent variables	Coefficients	Independent variables	Coefficients
LnDIS _{VNj}	-0.18 ^{***}	AKFTA	0.14
LnGDP _{VNt}	-0.01	AJCEP	0.15
LnGDP _{jt}	0.43 ^{***}	USBTA	0.90 ^{**}
LnFDI _{jt}	0.00	AANZFTA	-0.98 [*]
LnIMP _{jt}	0.22 [*]	VKORFTA	0.24
LnEXR _{USD/VNDt}	3.70 [*]	JVCEP	-0.48 ^{**}
Ln(ins _{VNt} *ins _{jt})	0.26	EAEU	-0.18
BothinWTO _{VNjt}	0.15 ^{**}	BOR _{VNj}	-0.73
ACFTA	0.94 [*]	CRISIS ₂₀₀₈	-0.11 ^{**}
AEC	-0.54 [*]	LPI	1.30 ^{**}
AIFTA	0.39 ^{**}	Const	-34.18 [*]
R ²	Within = 0.8684; Between = 0.7310 Overall = 0.7882		

Notes: * is statistically significant at the 1% level;
 ** is statistically significant at the 5% level;
 *** is statistically significant at the 10% level.

Table 2: The estimated results of gravity model (3) using the random effects technique and Stata 11 software. Dependent variable LnIMP_{jt}

Independent variables	Coefficients	Independent variables	Coefficients
LnDIS _{VNj}	-0.12	AKFTA	0.00
LnGDP _{VNt}	0.00	AJCEP	-0.13
LnGDP _{jt}	0.23 ^{***}	USBTA	-0.08

Independent variables	Coefficients	Independent variables	Coefficients
LnFDI _{jt}	0.00	AANZFTA	0.05
LnEXP _{jt}	0.30*	VKORFTA	0.69*
LnEXR _{USD/VND_t}	0.76***	JVCEP	0.39**
Ln(ins _{VN_t} *ins _{jt})	-0.18	EAEU	0.02
BothinWTO _{VN_{jt}}	0.28*	BOR _{VN_j}	0.82
ACFTA	1.17**	CRISIS ₂₀₀₈	0.00
AEC	0.31	LPI	1.56**
AIFTA	-0.27	Const	0.58
R ²	Within = 0.7063; Between = 0.6044 Overall = 0.6197		

Notes: * is statistically significant at the 1% level;

** is statistically significant at the 5% level;

*** is statistically significant at the 10% level.

Table 3: Summary of the statistics

Variables	Mean	Std. Dev.	Min	Max
LnIMPORT _{vnjt}	21.36	1.34	18.14	24.90
LnDIS _{vnj}	8.43	0.88	6.76	9.75
LnGDP _{vnt}	25.51	1.63	0	26.22
LnGDP _{jt}	27.85	1.23	25.35	30.65
LnFDI _{jt}	17.03	6.56	0	23.42
LnEXPORT _{vnjt}	21.61	1.14	17.29	24.58
LnEXR _{rusdvd}	9.86	0.13	9.67	10.02
LnINST _{vnjt}	8.24	0.27	7.48	8.61
BOTHin	-	-	-	-

Variables	Mean	Std. Dev.	Min	Max
ACFTA	-	-	-	-
AEC	-	-	-	-
AIFTA	-	-	-	-
AKFTA	-	-	-	-
AJCEP	-	-	-	-
USBTA	-	-	-	-
AANZFTA	-	-	-	-
VKORFTA	-	-	-	-
JVCEP	-	-	-	-
EAEU	-	-	-	-
BOR	-	-	-	-
CRISIS2008	-	-	-	-
LnLPI	1.28	0.13	0.86	1.44

Source: The model regression results.

3.2. Analysis of the estimation results

The model regression results show the following. First, the estimation results of the $LnEXP_{jt}$ model (2) presented in Table 1 point out that the coefficients of the $LnGDP_{VNI}$, $LnFDI_{jt}$, $Ln(ins_{VNI} * ins_{jt})$, AKFTA, AJCEP, VKORFTA, EAEU, BOR_{VNj} variables are not statistically significant, so we can conclude that those factors have had no effects on merchandise exports of Vietnam. The growth of GDP_{jt} , the increase of Vietnam's imports, the increase of $EXR_{USD/VND}$, accession to WTO, ACFTA, AIFTA, USBTA, and the better logistics performance have promoted Vietnam's exports. Meanwhile, the distance, accession to the AEC, AANZFTA, JVCEP and $CRISIS_{2008}$ are factors that decreased Vietnam's exports.

The result from the regression model that AKFTA, AJCEP, VKORFTA, EAEU have had no effects on merchandise exports of Vietnam is intriguing. This "phenomenon" may stem from the Vietnam's trade diversion effect to her relevant trade partners. Vietnam tends to diversify the country's exports from South Korea, Japan and EU to USA, India, and China. Specifically, the merchandise exports of Vietnam to some European and Asian countries dropped from 8.5%, in total, in 2005 to 3.6% in 2021. The merchandise exports of Vietnam to USA, India and China increased from 28.5%, in total, in 2005 to 46.42% in 2021. To date, USA is the largest export

market of Vietnam, accounting for about 27% of Vietnam's total exports. Furthermore, the $LnGDP_{VNt}$, $LnFDI_{jt}$, $Ln(ins_{VNt}*ins_{jt})$ and BOR_{VNj} are not indicated their roles for promoting Vietnam's merchandise exports. This may be explained with their moderate roles when the authors put them in the regression model to interact with other significant variables.

Second, the estimation results of the $LnIMP_{jt}$ model (3) shown in Table 2 provide the evidence that coefficients of the $LnDIS_{VNj}$, $LnGDP_{VNt}$, $LnFDI_{jt}$, $Ln(ins_{VNt}*ins_{jt})$, AEC, AIFTA, AKFTA, AJCEP, USBTA, AANZFTA, EAEU, BOR_{VNj} , $CRISIS_{2008}$ variables are not statistically significant, implying that those factors have not affected Vietnam's imports. The growth of GDP_{jt} , the increase of Vietnam's exports, joining the WTO, ACFTA, VKORFTA, JVCEP and the better logistics performance have been a supporting factor for Vietnam's imports.

Similarly, the AEC, AIFTA, AKFTA, AJCEP, USBTA, AANZFTA, EAEU have not induced Vietnam's merchandise imports is noteworthy. This also explained with the effect of trade diversion in imports of Vietnam from country partners. Vietnam tends to import more from China, South Korea and Japan. Indeed, to date, China is the largest import market of Vietnam, occupying about 32% of her total imports. China, Japan and South Korea cover about 57.64% of Vietnam's total imports. There is no surprising when China is one of the largest suppliers of input material in the world with very cheap prices. Japan and South Korea are the two largest direct investors in Vietnam. Japanese and South-Korean enterprises tend to import more parts and components from home countries serving for manufacturing the exporting merchandises in Vietnam. The $LnDIS_{VNj}$, $LnGDP_{VNt}$, $LnFDI_{jt}$, $Ln(ins_{VNt}*ins_{jt})$, BOR_{VNj} and $CRISIS_{2008}$ have not promoted Vietnam's merchandise imports. Those factors are not the determinants of Vietnam's merchandise imports. Moreover, mostly, 2/3 of unit cost of merchandise in Vietnam was imported from the world market serving for manufacturing merchandise exports. So, anyway, the country still needs to import the parts and components as well as the final goods such as machines and technologies... serving for manufacturing and consumption domestically.

Overall, from the estimated results and analysis, it can be concluded that the significant improvement in Vietnam's logistics capacity and performance is a factor that has helped the recent increase in the country's exports and imports to/from her trade partners. This is completely in line with the author's expectations and predictions. It is noteworthy that our research results support for the cases of Wang and Choi (2018), Wang *et al.* (2018), *etc.*

4. Concluding remarks and implications

Logistics performance provides a general picture of customs procedures, logistics costs and the quality of the infrastructure necessary for overland and maritime transport. Logistics performance became an important variable to take into account when the analyses concern international trade. Geographical factors and transport infrastructure are among the most relevant determinants that affect international competitiveness. In this regard, the geographical distance between a region and its main trading partners, together with trade facilitation, are often considered the factors that explain a region's competitive position in international markets. However, it is

important to take into account other physical and geographical aspects that the literature on the topic has largely neglected, namely factors related to access to logistics services. The quality of logistics infrastructure together with the number of logistics operators are considered increasingly important as a means of enhancing international trade. Transport and logistics services facilitate international trade and play an important role in the growth and development of the local economy that has been indicated in the previous studies (Devlin and Yee, 2005; Wang and Choi, 2018; Wang *et al.*, 2018, *etc.*).

As a developing country and an economy in transition, Vietnam's logistics infrastructure, including transport and warehousing infrastructure as well as seaports system, has been improved recently. By employing the gravity model and Random effects estimation technique, the authors found out that the improvement of the logistics performance of Vietnam is one of the most important factors that promotes the country's international trade recently. This confirms the above-mentioned evidence that the improvement of logistics performance will contribute for the trade expansion of a developing country, including Vietnam.

In the times to come, Vietnam should continue to improve her logistics infrastructure by focusing on building seaports, express ways, international airports as well as railway systems. Furthermore, building up a skilled labor force for the logistics industry is also important for promoting the country's international trade in the new context of development.

References

1. Arvis, J-F., Ojala, L., Shepherd, B., Raj, A., Dairabayeva, K. and Kiiski, T. (2018), *Connecting to Compete 2018 Trade Logistics in the Global Economy The Logistics Performance Index and Its Indicators*, World Trade Organization, Washington, DC.
2. Bensassi, S., Márquez-Ramos, L., Martínez-Zarzoso, I. (2015), 'Relationship between logistics infrastructure and trade: Evidence from Spanish regional exports', *Transportation Research Part A* 72, 47-61. <https://doi.org/10.1016/j.tra.2014.11.007>.
3. Devlin, J., and Yee, P. (2005), 'Trade logistics in developing countries: the case of the Middle East and North Africa', *The World Economy*, Vol. 28, pp. 435-456.
4. Gani, A. (2017), 'The Logistics Performance Effect in International Trade', *The Asian Journal of Shipping and Logistics* 334, 279-288. <http://dx.doi.org/10.1016/j.ajsl.2017.12.012>.
5. Hausman, W.H, Lee, H.L., and Subramanian, U. (2012), 'The Impact of Logistics Performance on Trade', *Production and operations management*, 00, 1-17. DOI 10.1111/j.1937-5956.2011.01312.x.
6. Jouili, T. and Allouche, M.A. (2016a), 'Impacts of Seaport Investment on the Economic Growth', *Promet - Traffic & Transportation* 28(4), 365-370.
7. Kabak, O., Ulengin, F., Ekici, S.O. (2018), 'Connecting logistics performance to export: A scenario-based approach', *Research in Transportation Economics* 70, 69-82.

8. Luttermann, Sandra and Herbert Kotzab (2020), 'The impact of logistics performance on exports, imports and foreign direct investment', *World Review of Intermodal Transportation Research* 9(1), 27-46.
9. Martí, L., Puertas, R. and García, L. (2014), 'The importance of the logistics performance index in international trade', *Applied Economics* 46(24), 2982–2992.
10. Munim, Z.H. and Schramm, H-J. (2018), 'The impacts of port infrastructure and logistics performance on economic growth: the mediating role of seaborne trade', *Journal of Shipping and Trade* 3(1), 1-19.
11. Ornegi, U. Ofluoglu, N.O., Kalayci, C. Artan, S. and Bal, H.C. (2018), 'Development in logistic performance on international trade', *GUSBEED, Gumushane Universitesi Sosyal Bilimler Enstitusu Elektronik Dergisi* 924, 92-109.
12. Puertas, R., Marti, L., and Garcia, L. (2014), 'Logistics performance and export competitiveness: European experience', *Empirica* 41, 467-480. DOI 10.1007/s10663-013-9241-z.
13. Shepherd, B. (2013), *Aid for Trade and Value Chains in Transport and Logistics*, OECD/WTO.
14. Straube, F., Ma, S. and Bohn, M. (2008), *Internationalization of Logistics Systems: How Chinese and German Companies Enter Foreign Markets*, Springer, Berlin.
15. Tahar, A. J. (2020), 'The Relationship Between Logistics Performance And Maritime Exports', *IJCSNS International Journal of Computer Science and Network Security* 20(3).
16. Verhetsel, A., Kessels, R., Goos, P., Zijlstra, T., Blomme, N. and Cant, J. (2015), 'Location of logistics companies: a stated preference study to disentangle the impact of accessibility', *Journal of Transport Geography* 42, 110-121.
17. Wang, D.F., Dong, Q-L., Peng, Z-M., Khan, S.A.R., and Tarasov, A. (2018), 'The Green Logistics Impact on International Trade: Evidence from Developed and Developing Countries', *Sustainability* 10, 1-19. Doi:10.3390/su10072235.
18. Wang, M.L. and Choi, C.H. (2018), 'How logistics performances promote the international trade volume? A comparative analysis of developing and developed countries', *International Journal of Logistics Economics and Globalization* 71, 49-70.

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