Multidisciplinary
SCIENTIFIC JOURNAL
OF MARITIME RESEARCH

University of Rijeka
FACULTY OF MARITIME STUDIES

Multidisciplinarni
znanstveni časopis
POMORSTVO

https://doi.org/10.31217/p.36.2.11

Facilitating trade in intermediate goods: case of EU

Vinko Zaninović

University of Rijeka, Faculty of Economics and Business, I. Filipovića 4, 51000 Rijeka, Croatia, e-mail: vinko.zaninovic@efri.hr

ABSTRACT

A side effect of economic globalisation and new information and communication technologies is the increasing fragmentation of the production process across different countries and continents, contributing to the rise of trade in intermediate goods, which has increased to almost 2/3 of total world trade. Most of this trade, i.e., intermediate goods, are transported by sea. Maritime trade is one of the most economical but also complex ways of trading and transporting goods, requiring good coordination, various stops and controls, transhipments, storage, ICT technology to track the cargo, etc. Therefore, the objective of this paper is to quantify the impact of trade facilitation on trade in intermediate goods on the sample of EU28 countries, using biennial data for the period 2010-2018. We estimate augmented gravity model on bilateral trade data using a Poisson Pseudo Maximum Likelihood (PPML) estimator. Our results suggest that, as expected, logistics, and in particular ICT development, has a significant and positive effect on trade in intermediate inputs, when controlling for other variables in the gravity model such as GDP of trading partners, distance, contiguity, existence of a free trade agreement, exchange rate, and common cultural proxies. Our results support the global trend of development and investment in logistics, and, in particular, new ICT technologies, which can not only contribute to the continued growth of trade in intermediates, but also help mitigate the negative effects of recent global economic shocks.

ARTICLE INFO

Preliminary communication
Received 7 November 2022
Accepted 29 November 2022

Key words:
Logistics
Trade facilitation
Intermediate goods trade
Seaborne trade
Gravity model

1 Introduction

International trade went through different structural changes from the second part of the eighteen century and the First Industrial Revolution. According to Baldwin (2016), from the beginning of the 19th century until 21th century, there were three shifts in the relationship between the production and consumption process, that had detrimental influence on international trade. Common to these changes was an increase in the production and trade in intermediate goods that was accompanied with rising globalisation. One of the primary reasons firms use international trade is to acquire intermediate products from other companies that are in demand because of their higher quality and/or lower prices than those of local producers. The development of technology, both the one related to the production processes itself, as well as that connected to the transportation and logistics, was the trigger for beforementioned shifts. The variety of goods handled by maritime shipping has increased considerably, but raw materials and intermediate goods are still predominantly transported by sea (Rodrigue 2020). Without the efficient transportation system and logistics operations, trade as we know it today would not exist. Transportation, especially maritime, and logistics are one of the main elements of trade facilitation that enable the smooth trading of intermediate goods along the complex global supply chains. One of the best proxies for the quality of logistics services at the country level is the Logistics Performance Index (LPI), developed by the World Bank. The LPI is a composite index, it is a weighted average of the country's scores on six dimensions: (1) the efficiency of the clearance process, (2) quality of trade and transport-related infrastructure, (3) ease of arranging competitively priced shipments,

(4) competence and quality of logistics services, (5) ability to track and trace consignments, (6) timeliness of shipments in reaching the destination within the scheduled or expected delivery time.

The goal of this paper is to investigate the impact of different LPI subindices, in particular those connected closely with the Information and Communication Technology (ICT), that is, tracking and trace consignment LPI subindex, on bilateral international trade between EU countries and Rest of the World. It is well known fact that "ICT provides a convenient way of improving the tracking and traceability performance by enabling gathering, organizing and distributing information on products, services and trade regulations" (Ojala and Celebi, 2015). When it comes to research done on the impact of trade facilitation (proxied by the logistics performance) on trade in intermediates, most of the existing research is not particularly focused on idiosyncrasies between EU and Rest of the World countries. We believe that this area of research is important considering the role of trade in intermediates within the global value chains, on which European multinational firms are relying on. Moreover, as can be seen just from the descriptive statistics that we show later in the paper, there are significant differences in the quality of logistics between the groups of countries, with the EU countries being on average more economically developed and subsequently having better logistics elements scores in comparison to the ROW. This creates bottlenecks in the bilateral flow of goods that needs to be addressed, particularly since the COVID-19 pandemic and war in Ukraine showed the importance of the trade for the global economy. In the second section we present literature review. The third section is devoted to the explanation of methodology employed and data that we use. In section four, we present results and discuss their implications, while section five concludes.

Table 1 Summary of studies on the relationship between trade facilitation and bilateral trade

Author (s)/year	Sample countries	Period	Methodology	Findings
Wilson, Mann, Otsuki (2004)	75 countries	2000-2001	Gravity, OLS	TF → X,M↑
Nordas & Piermartini (2004)	Quality on inf. → total bilateral trade	WTO, 2000	Gravity, OLS, FE est.	T_{qual} → IT↑
Wilson et al. (2005)	TF (4 categories) → X and M (manuf.)	75 countries, 2000-2001	Gravity model, OLS	TF → X,M↑
Soloaga, Wilson, Mejía (2006)	Mexico	2000-2003	Gravity, OLS, PPML	TF → X,M↑
Behar, Manner (2008)	110 countries	2001-2005	Gravity, OLS	LPI → X,M↑
Hernandez & Taningco (2010)	TF (4 categories) → bilateral trade (import data) (BEC) 1 digit	East Asia, 2006-2008	Gravity model, OLS, FE	$T_{soft\&hard\ (qual)}$ → M↑
Portugal-Perez & Wilson (2012)	TF (4 categories) → export	101 countries, 2004-2007	Gravity model, OLS, PPML	$T_{soft\&hard}$ → X↑
Yadav (2014)	TF (4 categories) → total & parts and components (mach & trans. sector)	77 countries, 2004-2007	Gravity model, OLS, PPML	TF → X,M↑
Marti, Puertas, García (2014a)	South America, Africa, Middle East, Far East, Post-soviet States	2005, 2008	Gravity, OLS	LPI → X,M↑
Marti, Puertas, García (2014b)	South America, Africa, Middle East, Far East, Eastern Europe	2007, 2012	Gravity, Two stage Heckman	$LPI_{6\ sub\text{-}comp.}$ → X,M↑
Puertas, Marti, García (2014)	EU-26	2005-2010	Gravity, Two stage Heckman	$LPI_{6\ sub\text{-}comp.}$ → X↑M?
Maurel et al. (2016)	TF + embassy → export	EU15, CEE, Africa, 2005-2012	Gravity model, FE	Tsoft&hard → IT↑
Saslavsky and Shepherd (2014)	TF proxied with LPI → GPN (parts and components exports)	228 countries UN comtrade, 2007	Gravity model,OLS, PPML	LPI → X↑
Gani (2017)	60 countries	2007, 2010, 2012, 2014	Gravity, OLS	$LPI_{6\ sub\text{-}comp.}$ → X,M↑
Luttermann, Kotzab, Halaszovich (2017)	20 Asian countries	2006-2014	Gravity, Fixed effects	LPI, GCI → X,M↑ LPI, GCI → FDI?
Host, Pavlić Skender, Zaninović (2019)	150 countries	2007-2016	Gravity, OLS	LPI → tot IT↑ XLPI ++
Zaninović, Zaninović, Pavlić Skender (2021)	157 world countries, EU15, CEEC	2010-2018	Gravity, PPML	LPIsub diff → IT↓

Source: Author's elaboration

2 Literature review

The relationship between trade facilitation and international trade has been extensively researched and the academic literature in this research field focuses on the effects of trade liberalization and facilitation processes, with heavy emphasis on free trade agreements role in it. Since this papers focuses on other sources of trade facilitation, we show the summary of the most important studies on the relationship between various trade facilitation indicators and bilateral trade in Table 1.

Table 1 shows that the majority of previous studies have found that trade facilitation, especially transportation and logistics services, positively affect trade. Contribution of our paper to the existing field of knowledge in this research area is that we investigate trade of, on average, asymmetric trade relations between countries within one economic integration (EU), that share trade related policies, on one hand, and relatively heterogeneous countries with respect to trade policies, from the Rest of the World (ROW), on the other hand. The importance of our research lies in the fact that transport, specifically maritime and logistics are one of the key variables that underpin international trade and international trade growth, which in turn drives the growth of the economies. Moreover, we focus on estimating structural gravity models, that is, models which include multilateral resistance terms (MRT), which is not yet as common, as it should be, since estimation of the gravity models without the inclusion of MRT results in biased estimates. Our approach is therefore rooted in paper from Anderson and van Wincoop (2003), who developed proper specification of the gravity model by including both inward and outward MRT. This enabled them to control for the impact of "remoteness" of trading partners from the Rest of the World.

3 Methodology and Data

Since we are working with macroeconomic variables and given the fact that empirical international trade focuses on explanation of variation of bilateral trade, that is, we are working with country dyads, we use well established model in both theory and practice – a gravity model. Gravity model has long history of usage and was first used to explain trade flows by Tinbergen in 1969. Tinbergen got the idea from Newton's law of universal gravitation and applied it in international trade context. According to the gravity model, trade between two countries can be explained by economic size of the countries and trade costs. Usual proxy for economic size is gross domestic product, while bilateral distance in kilometres is usually used as a proxy for trade costs. When the original model with two regressors is updated, the model is called augmented gravity model. Variables like common language that serve as a proxy for common culture, and common currency that serves as a proxy for economic and monetary integration obviously add to the explanatory power of the model. Other, usually categorical variables, such as, regional trade agreements (RTAs) and contiguity dummies are used to explain better data generating process of trade. Overall, the main goal of "augmentation" of the model is to take into consideration all the supply and demand side characteristics of the trading partners, as well as characteristics that they share (such as RTAs).

In 1985 paper Bergstrand addressed an important critique of the gravity model, that is, that the gravity model lacked theoretical foundations and that important variable where omitted from the model such as prices or price indexes. Therefore, Bergstrand was one of the authors who laid the corner stones of the general equilibrium framework upon which gravity model rests, as well as introduced price variables in the form of GDP price deflators of the trade partners and exchange rates. One can observe that price variables present individual characteristics of the countries, while exchange rate presents joint characteristic of particular country pair. In our paper we also include exchange rate, but nominal effective exchange rate, not the bilateral one to account for individual country international price index characteristics.

In his following research, in 1990, Bergstrand also dropped the usual assumption of classical and neoclassical models of trade, that of perfect competition, and assumed monopolistic competition. In the context of gravity model, this means that each country specializes in production of specific variation of the product. Bergstrand, of course, was not the only one who studied gravity models, but can be considered as one of the main representatives of the main stream literature in this field of research. The revolution in the specification of the gravity model was brought by Anderson and van Wincoop (2003). They were first to account for the average barrier of the two trading partners with all other trading partners, that is, to account for multilateral resistance to trade. We first present the original, pre-revolution model, that was the starting model in all specification since its introduction in empirical trade analysis:

$$X_{ijt} = GS_{it} M_{jt} \Omega_{ijt}, \quad (1)$$

where X_{ijt} is the value of either exports or imports or total trade from country "i" to country "j" in time "t". S_{it} represents exporter-specific factors like GDP, whereas M_{jt} importer-specific factors. The term Ω_{ijt} represents the ease of access to market "j" for exporter "i". This can stand for any of the mentioned variables like exchange rate, common currency or FTA agreement in force.

Following aforementioned Anderson and van Wincoop paper, conceptually, we based our econometric model on the following equation:

$$trade_{ij} = \frac{Y_i Y_j}{Y_w} \left(\frac{t_{ij}}{\pi_i P_j} \right)^{1-\sigma} \quad (2)$$

where Y_i and Y_j stand for particular countries' GDP and Y_w for the world aggregate GDP, while t_{ij} stands for the tariff

Table 2 Descriptive statistics of augmented gravity model variables

Variable	Observations	Mean	Standard deviation	Minimum	Median	Maximum
total trade	20692	1.95e+09	1.04e+10	0	3.54e+07	2.72e+11
exports	20692	9.51e+08	5.35e+09	0	1.67e+07	1.52e+11
imports	20692	1.00e+09	5.18e+09	0	9238558	1.46e+11
rGDP	20692	6.32e+11	9.53e+11	8.75e+09	2.37e+11	3.95e+12
pGDP	20608	5.01e+11	1.79e+12	3.48e+08	5.13e+10	2.05e+13
rGDPpc (PPP)	20104	38.25	16.527	14.963	35.741	116.786
pGDPpc (PPP)	20248	19.81	20.976	.634	12.61	127.61
distance	20692	5595.33	3763.280	59.61723	5108.826	19586.18
contiguity	20692	0.02	0.154	0	0	1
common language	20692	0.05	0.227	0	0	1
regional Trade Agr.	20692	0.41	0.492	0	0	1
rnom. eff. fx	19635	0.95	0.191	.5710137	.9873545	1.264163
pnom. eff. fx	20139	0.74	0.260	.2722666	.653104	1.810502

Source: Author's calculation

equivalent of overall trade costs. Elasticity of substitution between goods is represented with σ, while π_i and P_j represent MRTs, that is exporter and importer ease of market access. Failing to include MRT causes a bias in the estimated coefficients. Since we estimate econometric equation [3] for each year separately, we include importer and exporter dummies, that is standard empirical way of accounting for multilateral resistance.

Basing it on the aforementioned gravity model equation and empirical literature we developed and estimated following structural gravity model:

$$\begin{aligned} trade_{ij} = {} & \beta_0 + \beta_1 \, lgdp_i + \beta_2 \, lgdp_j + \beta_3 \, ldist_{ij} + \\ & + \beta_4 \, alpisub_{ij} + \beta_5 \, contig_{ij} + \beta_6 \, comlang_{ij} + \\ & + \beta_7 \, RTA_{ij} + \beta_8 fx_{it} + \beta_9 fx_{jt} + \sum_{i=1}^{k} \delta_i + \sum_{j=1}^{k} \gamma_j + u_{ij}, \end{aligned} \quad (3)$$

where $trade_{ij}$ is the value of trade (we also estimate same model with exports and imports as dependent variables) in US dollars. First index, *i,* denotes EU28 countries, while second index, *j*, denotes Rest of the World countries. Furthermore, we include natural logarithm of GDPs of both trading partners ($lgdp_i$ and $lgdp_j$) and natural logarithm of bilateral distance. Our main variable of interest is the absolute difference of the values of trading partners' LPI subindices ($alpisub_{ij}$). We estimate model [2] for each subindex separately due to the high degree of correlation between them (on average higher than 0.8). Other included variables are included to control for trade costs from other aspects besides distance, such as contiguity dummy ($contig_{ij}$) with value one if countries share land border, zero otherwise, RTA dummy (RTA_{ij}) with value one if countries have RTA in force, zero otherwise, and the levels of nominal effective exchange rates (fx_i and fx_j) with indirect quotation used meaning that rise in exchange rates means appreciation of the domestic currency vis-à-vis foreign currency. We estimate the same model for each year in the sample, that is, for the years 2010, 2012, 2014, 2016 and 2018.

We standardize all regressors to get comparable results. We estimate equation [3] using PPML, which usual and proven choice when estimating gravity models.

For the purposes of our analysis, we created the dataset by merging data from UN Comtrade bilateral trade dataset (exports, imports and total trade between trading partners), World Bank data (LPI data) and CEPII database (all other gravity model variables). We present descriptive statistics of the gravity model variables in the dataset in Table 2, while in Table 3 we show descriptive statistics of LPI and LPI sub-indices levels for reporter (EU28) and partner countries (ROW).

Tables 2 and 3 show statistics calculated for each year in our sample. Just from eyeballing the statistics presented in these tables, we can see that on average reporting (EU28) countries have more developed economies (one can compare Reporter GDP vs Partner GDP and Reporter GDPpc vs Partner GDPpc), than their ROW partner countries. In more than 40% of the observations, trade has been conducted under some form of trade agreement. In Table 3 we show average statistics for both main LPI index, as well as for LPI subindices ("r" and "p" prefixes for each entry of the variable names stand for reporter and partner country respectively).

Statistics from Table 3 clearly indicate significant differences in the development levels of logistics between analyzed groups of countries. On average these differences are equal to 0.82 index points (calculated as the mean of differences between six LPI subindices between reporter and partner countries), which is around 18% of the maximum possible score in the sample. We expect that the

Table 3 Descriptive statistics of LPI and LPI subindices between reporter and partner countries

Variable	Observations	Mean	Standard deviation	Minimum	Median	Maximum
rlpi	20692	3.53	0.413	2.77	3.52	4.23
rcustoms	20692	3.34	0.458	2.36	3.36	4.12
rinfrastructure	20692	3.47	0.539	2.25	3.35	4.44
rinternational	20692	3.39	0.340	2.69	3.41	4.24
rlogistics	20692	3.49	0.471	2.53	3.54	4.31
rtracking	20692	3.58	0.458	2.54	3.61	4.38
rtimeliness	20692	3.92	0.400	2.88	4	4.8
plpi	20692	2.90	0.561	1.61	2.76	4.23
pcustoms	20692	2.69	0.592	1.5	2.55	4.21
pinfrastructure	20692	2.75	0.683	1.27	2.56	4.44
pinternational	20692	2.86	0.497	1.57	2.8	4.24
plogistics	20692	2.83	0.602	1.43	2.69	4.32
ptracking	20692	2.91	0.619	1.54	2.8	4.38
ptimeliness	20692	3.31	0.567	1.67	3.22	4.8

Source: Author's calculation

bigger the difference in the levels of LPI subindices between trading partners will have a negative impact on international trade. As already mentioned, since ICT has become backbone of doing business, we expect that differences in Tracking LPI subindex between trading partners will have bigger significant negative impact on international trade than most of other LPI subindices.

4 Results and discussion

The results of estimating the impact of logistics performance on total trade, exports, and imports are shown in Tables 4, 5, and 6, respectively. We show only the estimated coefficients for the LPI sub-indices. The results for the gravity variables are consistent with theoretical

Table 4 Estimation results of the Model 3 for total trade

Years	EU28-ROW (2010)	EU28-ROW (2012)	EU28-ROW (2014)	EU28-ROW (2016)	EU28-ROW (2018)
Ind./Dep. var.	**Total trade**	**Total trade**	**Total trade**	**Total trade**	**Total trade**
Customs LPI	-0.176***	-0.210***	-0.167*	-0.231**	0.00355
	(0.0442)	(0.0543)	(0.0717)	(0.0751)	(0.0836)
Infrastructure LPI	-0.106**	-0.158***	-0.130**	-0.192**	0.0762
	(0.0397)	(0.0448)	(0.0484)	(0.0681)	(0.0817)
International LPI	-0.285***	-0.215***	-0.155	-0.460***	0.0406
	(0.0696)	(0.0612)	(0.168)	(0.0694)	(0.114)
Logistics LPI	-0.175***	-0.241***	-0.196**	-0.276***	-0.0360
	(0.0481)	(0.0529)	(0.0677)	(0.0729)	(0.0991)
Tracking LPI	-0.148**	-0.275***	-0.305***	-0.236***	0.0221
	(0.0520)	(0.0562)	(0.0608)	(0.0704)	(0.122)
Timeliness LPI	-0.333***	-0.199**	-0.351***	-0.151	0.150
	(0.0604)	(0.0685)	(0.104)	(0.111)	(0.159)
Reporter FE	Yes	Yes	Yes	Yes	Yes
Partner FE	Yes	Yes	Yes	Yes	Yes
N	3276	3248	3360	3276	2415

Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Source: Author's calculation

Table 5 Estimation results of the Model 3 for exports

Years	EU28-ROW (2010)	EU28-ROW (2012)	EU28-ROW (2014)	EU28-ROW (2016)	EU28-ROW (2018)
Ind./Dep. var.	**exports**	**exports**	**exports**	**exports**	**exports**
Customs LPI	-0.0737	-0.0393	-0.0321	-0.0146	0.255**
	(0.0493)	(0.0648)	(0.0910)	(0.0888)	(0.0979)
Infrastructure LPI	-0.0360	-0.0587	-0.0420	-0.0575	0.248**
	(0.0432)	(0.0454)	(0.0599)	(0.0835)	(0.0957)
International LPI	-0.179**	-0.250***	-0.0598	-0.427***	0.170
	(0.0654)	(0.0534)	(0.171)	(0.0846)	(0.135)
Logistics LPI	-0.0840	-0.141**	-0.00165	-0.135	0.276*
	(0.0559)	(0.0511)	(0.0811)	(0.0881)	(0.129)
Tracking LPI	-0.0447	-0.176**	-0.190**	-0.112	0.335*
	(0.0555)	(0.0560)	(0.0679)	(0.0907)	(0.136)
Timeliness LPI	-0.201***	-0.0964	-0.0646	0.117	0.407*
	(0.0570)	(0.0660)	(0.106)	(0.122)	(0.182)
Reporter FE	Yes	Yes	Yes	Yes	Yes
Partner FE	Yes	Yes	Yes	Yes	Yes
N	3276	3248	3360	3276	2415

Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Source: Author's calculation

Table 6 Estimation results of the Model 3 for imports

Years	EU28-ROW (2010)	EU28-ROW (2012)	EU28-ROW (2014)	EU28-ROW (2016)	EU28-ROW (2018)
Ind./Dep. var.	**imports**	**imports**	**imports**	**imports**	**imports**
Customs LPI	-0.193***	-0.267***	-0.237**	-0.403***	-0.148
	(0.0516)	(0.0611)	(0.0750)	(0.0789)	(0.0791)
Infrastructure LPI	-0.114*	-0.179***	-0.151**	-0.274***	-0.0171
	(0.0451)	(0.0541)	(0.0559)	(0.0701)	(0.0746)
International LPI	-0.307***	-0.144	-0.172	-0.446***	-0.0511
	(0.0886)	(0.0778)	(0.194)	(0.0952)	(0.132)
Logistics LPI	-0.180***	-0.249***	-0.293***	-0.357***	-0.231*
	(0.0545)	(0.0653)	(0.0782)	(0.0793)	(0.0940)
Tracking LPI	-0.173**	-0.283***	-0.347***	-0.303***	-0.167
	(0.0639)	(0.0684)	(0.0714)	(0.0722)	(0.114)
Timeliness LPI	-0.353***	-0.210*	-0.505***	-0.369**	-0.0464
	(0.0739)	(0.0816)	(0.128)	(0.116)	(0.145)
Reporter FE	Yes	Yes	Yes	Yes	Yes
Partner FE	Yes	Yes	Yes	Yes	Yes
N	3276	3248	3360	3276	2415

Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Source: Author's calculation

expectations and are available upon request. Except for 2018, for which there are significantly fewer observations – more than 25% fewer than the average of the other data/years – which we believe is a reason for results that are opposite to the theory, our expectations, as well as those of other years (also, they are mostly non-significant). We can see that the larger the differences in the LPI sub-indices, the smaller the total trade, exports, and imports. Of course, there are peculiarities; the LPI sub-index for tariffs is not significant for exports, but it is for imports since tariff procedures usually affect importers. Moreover, imports are more sensitive to differences in LPI subindices, and that can be observed for all six of them.

When it comes to the importance of ICT, where we use Tracking LPI subindex as a proxy variable, the size of the coefficient is one of the highest for all observed years, indicating the differences in ICT levels between trading partners is one of the key bottlenecks to international trade. According to experts in ICT, one of the biggest benefits of using ICT in trade with intermediates is the increase in traceability. Knowing in real time where the goods are is important for planning other activities that are necessary to get the goods in the right place at the right time.

The infrastructure variable, which actually represents transport infrastructure and related transport activities (with most of it attributable to maritime transport), shows significant negative effects on total trade and imports, leading to the conclusion that the greater the differences between trading partners in terms of the quality of transport infrastructure and the efficiency of transport operations, the lower the trade.

Our results empirically show that, when it comes to transportation and logistics development, policies and investments should be made at the international level because transportation should be smooth along the entire supply chain, i.e. through all countries, and the differences between countries in transportation infrastructure are clearly significant bottlenecks to trade and act as barriers to trade.

5 Conclusion

Advances in transportation and logistics services promote international trade, that is a fact. The invention of the container has changed the face of world trade and pushed maritime trade to unprecedented heights, however, current transformation of the business processes is underpinned by the efficiency of transport and logistics services that heavily relies on the digital technology. Efficient transport and logistics services are one of the main trade facilitators, especially when it comes to the trade in intermediate goods, but inefficient transport and logistics services can also be a great trade barrier. Therefore, the aim of this paper was to quantify the impact of trade facilitation, measured through the prism of transport and logistics variables on trade in intermediate goods in the sample of EU28 countries. We used LPI subindices and augmented structural gravity model to achieve the aim of the research. Our results undoubtedly point to the conclusion that quality of logistics services, from those related to customs procedure to those related to any other segment in the trading process, have significant impact on trade, and that differences in the levels of logistics services between trading partners have strong negative effect on bilateral trade. It has been shown that transport infrastructure is of great importance for trade in intermediate goods, or more precisely, that differences in the quality of transport infrastructure between trading partners are a major obstacle to trade. Since EU member states are already distributing funds through Structural and Cohesion Funds to countries with less developed transport and logistics services within integration, policy makers at the EU level are clearly aware of the importance of the transport and logistics. The problem lies in the limited short- and long-term plans to help increase the quality of transport logistics services of trading partners outside of EU, that are less developed, but provide EU with relatively cheap and high-quality intermediate goods. China's Belt One Road Initiative is an example that EU should try to copy if it wants to help domestic firms to keep and increase their competitiveness vis-a-vis ROW competitors.

Funding: The research presented in the manuscript did not receive any external funding.

References

[1] Anderson, J. and van Wincoop, E. (2003). Gravity with gravitas: a solution to the border puzzle. *The American Economic Review*, 93(1), 170-192.

[2] Baldwin, R., (2016) The Great Convergence: Information Technology and the New Globalisation, Cambridge: The Belknap Press of Harvard University Press.

[3] Behar, A. and Venables, A. J. (2011). Transport Costs and International Trade, Chapters, in de Palma, A, Lindsey, J, Quinet, E, & Vickerman, R (ed.), *A Handbook of Transport Economics*, Edward Elgar Publishing, UK, pp. 97-115.

[4] Conte, M., Cotterlaz P. and Mayer T. (2022). "The CEPII Gravity database". CEPII Working Paper N°2022-05, July 2022.

[5] Hernandez, J. and Taningco, A. B. (2010). *Behind-the-border determinants of bilateral trade flows in East Asia*, ARTNeT Working Paper Series, No. 80, AsiaPacific Research and Training Network on Trade (ARTNeT), Bangkok.

[6] Gani, A. (2017). 'The Logistics Performance Effect in International Trade'. *The Asian Journal of Shipping and Logistics*, 33(4), pp. 279-288.

[7] Host, A., Pavlić Skender, H. and Zaninović P.A. (2019). Trade Logistics – the Gravity Model Approach. *Journal Zbornik radova Ekonomskog fakulteta u Rijeci/ Proceedings of Rijeka Faculty of Economics*, 71(1), p. 327-342. doi: https://doi.org/10.18045/zbefri.2019.1.327.

[8] Lutterman, S., Kotzab, H., Halaszovich, T. (2020). The impact of logistics performance on exports, imports and foreign direct investment, *World Review of Intermodal Transportation Research*, vol. 9, no. 1, pp. 27-46.

[9] Marti, L., Puertas, R. and Garcia, L. (2014a). Relevance of trade facilitation in emerging countries' exports. *The Journal of International Trade & Economic Development*, 23(2), pp. 202-222.

[10] Marti, L., Puertas, R. and Garcia, L. (2014b). The importance of the logistics performance index in international trade. *Applied Economics*, 46(24), pp. 2982-2992.

[11] Maurel, M., Lapeyronie, H. and Meunier, B. (2016). Impact of hard and soft infrastructure: Evidence from the EU partners, North Africa and CEECs, *Working Papers P148*, Fondation pour les études et recherches sur le développement international – FERDI, Paris.

[12] Nordas, H. K. and Piermartini, R. (2004). Infrastructure and trade, *WTO Staff Working Papers ERSD-2004-04*, World Trade Organization, Economic Research and Statistics Division, Switzerland.

[13] Ojala, L. & Celebi, D. (2015). "The World Bank's Logistics Performance Index (LPI) and drivers of logistics performance", Prepared for the Roundtable on Logistics Development Strategies and their Performance Measurements, Queretaro, 9-10 March.

[14] Portugal-Perez, A. & Wilson, J. (2012) Export performance and trade facilitation reform: hard and soft infrastructure. *World Development*, 40(7), pp. 1295-1307.

[15] Puertas, R., Marti, L. and Garcia, L. (2014). Logistics performance and export competitiveness: European experience. *Empirica*, 41(3), pp. 467-480.

[16] Rodrigue, J. P. (2020). The Geography of Transport Systems, 5th edition, Routledge, London. Doi: https://doi.org/10.4324/9780429346323.

[17] Saslavsky, D. and Shepherd, B. (2014). Facilitating international production networks: The role of trade logistics. *The Journal of International Trade and Economic Development*, 23(7), pp. 979-999. Doi: 10.1080/09638199.2013.811534.

[18] Soloaga, I., Wilson, J. and Mejia, A. (2006). Moving forward faster: trade facilitation reform and Mexican competitiveness. *Policy Research Working Paper Series*, no 3953, The World Bank, Washington.

[19] Wilson, J., Mann, C. and Otsuki, T. (2003). Trade facilitation and economic development: A new approach to quantifying the impact. *World Bank Economic Review*, 17(3), pp. 367-389.

[20] Yadav, N. (2014). Impact of Trade Facilitation on Parts and Components Trade. *The International Trade Journal*, 28(4), pp. 287-310. Doi: 10.1080/08853908.2014.922040.

[21] UN Comtrade: International Trade Statistics. Data availability, 2021. https://comtrade.un.org/data/da (accessed November 27, 2020).

[22] Zaninović, P. A., Zaninović, V. and Pavlić Skender, H. (2021). The effects of logistics performance on international trade: EU15 vs CEMS. *Economic Research-Ekonomska Istraživanja*, 34(1), pp. 1566-1582, doi: 10.1080/1331677X.2020.1844582.