

Makalenin geliş tarihi: 03.08.2022 1.Hakem Rapor Tarihi: 27.01.2023 2.Hakem Rapor Tarihi: 26.02.2023 Yayına Kabul Tarihi: 14.03.2023

eISSN:2148-0710 - pISSN:1301-6229

ÜLKELERİN TİCARETİ KOLAYLAŞTIRMA ENDEKSİ İLE DIŞ TİCARET HACMI ARASINDAKİ İLİŞKİDE LOJİSTİK PERFORMANS ENDEKSİNİN ARACI ETKİSİ

Şefik BONCUKÇU *- Hasan Hüseyin YILDIRIM **

Öz

Bu çalışmanın temel amacı, ticareti kolaylaştırma endeksi ile dış ticaret hacmi arasındaki ilişkide lojistik performans endeksinin aracı etkisinin tespit edilmesidir. Bu amaç doğrultusunda çalışmada, Dünya Ekonomik Formu tarafından yayınlanan ticareti kolaylaştırma endeksi, Dünya Bankası tarafından yayınlanan lojistik performans endeksi ve ülkelerin dış ticaret hacmi verileri kullanılarak basit aracılık modeli oluşturulmuştur. Çalışmada 94 ülkeye ait 2012, 2014 ve 2016 yılları verileri kullanılmış ve toplamda 282 örneklem derlenmiştir. Araştırmanın uygulama kısmında IBM SPSS 20 Paket Programı ile değişkenler arasındaki korelasyon katsayıları belirlenmiş, ardından Andrew F. Hayes tarafından geliştirilen, SPSS programına eklenen PROCESS 3.5 makrosu kullanılarak basit aracılık analizi yapılmıştır. Analizler sonucunda elde edilen bulgulara göre, lojistik performans endeksinin, ticareti kolaylaştırma endeksi ile dış ticaret hacmi arasındaki ilişkiye aracılık ettiği tespit edilmiştir. Aracılık etkisinin tam standardize etki büyüklüğü (K2) .5564 olarak tespit edilmiş, aracılık rolünün yüksek etki seviyesinde olduğu ortaya konulmuştur. Ayrıca dolaylı etki değeri (a.b) 6.670 olarak tespit edilmiştir.

Anahtar Kelimeler: Dış ticaret hacmi, Ticareti kolaylaştırma endeksi, Lojistik performans, PROCESS, Aracılık etkisi.

Jel Kodu: F10, O57, P50

The Mediating Effect of the Logistics Performance Index on the Relationship Between the Enabling Trade Index and Foreign Trade Volume of Countries

The main purpose of this study is to detect the mediation effect of the logistic performance index in the relationship between the enabling trade index and the volume of foreign trade. the simple mediation model was created by using the enabling trade index published by the World Economic Forum, the logistics performance index published by the World Bank, and the foreign trade volume data of the countries. The study used 94 countries' data for the years 2016, 2014, and 2012, compiled 282 samples in total. In the application part of the study, the correlation coefficients between variables were determined with IBM SPSS 20 Package Program, and then a simple mediation analysis was performed using PROCESS 3.5 macro developed by Andrew F. Hayes. According to the findings obtained as a result of the analysis, it has been determined that the logistics performance index mediates the relationship between the enabling trade index and the foreign trade volume. The fully standardized effect size of the mediation effect (K2) was determined as .5564, and it was revealed that the mediating role was at a high effect level. In addition, the indirect effect value (a. b) is determined as 6.670.

Keywords: Foreign trade volume, Enabling trade index, Logistic performance index, PROCESS, Mediation analysis.

Jel Code: F10, O57, P50

1. Introduction

International trade, which began with geographical discoveries by exchanged, has rapidly increased through the development of tools used in both the production phase and logistics services

^{*} Bilim Uzmanı, Balıkesir Üniversitesi Sosyal Bilimler Enstitüsü, Uluslararası Ticaret ve Pazarlama, sefikboncukcu@gmail.com, https://orcid.org/0000-0003-0436-4138

^{**} Doç. Dr., Balıkesir Üniversitesi, Burhaniye Uygulamalı Bilimler Fakültesi, Finans ve Bankacılık Anabilim Dalı, hhyildirim@balikesir.edu.tr , https://orcid.org/0000-0002-5840-8418

following the industrial revolution. Today, the widespread concept of globalization, the increase in the number of manufacturing companies and the spread of internet usage have increased competition in international markets. Meanwhile people can reach the products they demand faster and easier. At this point, policymakers must provide firms with the necessary opportunities to compete in international markets and take steps to facilitate international trade, which benefits companies in their own countries.

The best way for countries to see the progress they have made in facilitating trade is indices published by international organizations, whose validity and reliability are accepted. At this point, the enabling trade index (ETI) and logistics performance index (LPI) are quite functional.

ETI measures the level of practices, policies, and services made to facilitate countries' foreign trade processes, from national borders to the destination of the item. The index structure consists of four basic sub-indexes, including market access, border administration, infrastructure and operating environment.

LPI is also a useful measuring tool for assessing the quality of logistics services in countries. Companies in countries with good logistical infrastructure quality performance can connect faster and more effectively in international markets through supply chain networks. In low-performance countries, firms may face problems due to high costs of integrating and competing in global chains. The index consists of six sub-indexes that are; customs, infrastructure, tracking & tracing, ease of international shipments, logistics services quality, and timeliness.

The main purposes of the ETI and LPI indices are; To increase international trade by removing barriers to trade and contributing to a transparent and easy trade environment. When the literature is examined, it is seen that there are studies in which the indices examined as a single model in this study are examined in separate models. Zhao and Zhang (2020) examined the relationship between the development of Chinese exports and the enabling trade index, using the trade volume data for the years 2009-2019 and the data of 18 countries to which China exported the most between 2017-2018. According to the results; found that the development in the enabling trade index had a significant effect on the development of imports and exports. In a similar study, Addey (2017) tried to estimate the effect of the increase in trade index and its sub-indices on wheat, soybeans and corn exports from the 48 US states using the gravity model. The study concluded that the index of facilitating trade was meaningful in explaining the agricultural export request from the United States and that the impact of the sub-indexes on the export of the three selected crops was statistically significant.

In the literature, it is possible to come across studies emphasizing the importance of the logistics performance index in foreign trade. Host et al. (2019) The study, in which they examined the foreign trade and logistics performance data of 150 countries for the years 2007-2016 with the gravity model, showed significant results in this context. The study found that logistics performance has a positive impact on trade flows and, in particular, on exports. Pablo Coto-Millan et al. (2015) have found similar results in their work. Using stochastic frontier analysis, they examined the impact of logistics and information and communication technologies on domestic technical productivity in countries grouped by the World Bank (WB) as upper middle income and high-income countries. According to the results of the research, the economic impact of the logistics performance index on efficiency (while other conditions are stable) is estimated to be 0,59% for each 1% increase.

During the literature review, it is possible to come across mediation analyses made with the PROCESS method and different methods. Aktaş (2019) used LPI, economic freedom index (EFI) and ETI data from 103 countries in his study. He studied the data through correlation analysis, linear regression and hierarchical regression analysis, and he also conducted mediation analysis using the

Sobel test and bootstrap method. According to the results of the study; he found that the relationship between ETI and EFI was mediated by LPI.

Yeo, D. and Deng, A. (2020) analyzed the data of 62 countries for the years 2010, 2012, 2014 and 2016 with the structural equation model. The mediation effect of the logistics performance index in the relationship between the trade facilitation scale developed by Portugal-Perez and Wilson (2012) and international trade was examined. According to the results of the study, it has been determined that the logistics performance index has a mediating effect on the relationship between trade facilitation and international trade.

The main purpose of the study is to determine whether there is an intermediary effect of the logistics performance index in the relationship between the trade facilitation index and the foreign trade volume and the size of the effect. In order to determine the mediation effect, the PROCESS method based on bootstrap technique, which has become increasingly common in academic studies, has been used. As a result of the analysis, the confidence interval values obtained by the bootstrap technique were examined and whether the trade facilitation index had an indirect effect on the foreign trade volume was interpreted.

In this study, indices published by institutions whose international validity and reliability are recognized, in which processes in international trade are evaluated, were subjected to analysis. Since the studies in which the variables used in the research are used together in the same model are rare in the literature, it is thought that this study will make important contributions to the literature and offer different perspectives to researchers.

2. Method

2.1. Model of The Study

During the literature review, it was seen that in most of the studies, ETI and LPI were considered as independent variables in separate models and their effects on foreign trade volume (FTV) were examined. In the application part of the study, the models of Aktaş (2019), Yeo, D. and Deng, A. (2020) and Portugal-Perez and Wilson (2012) studies in the literature were used.

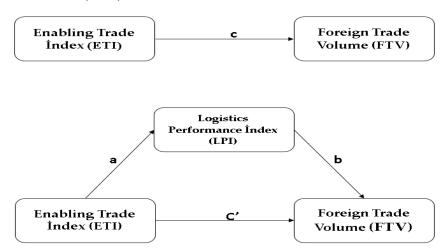


Figure 1. Model of the Study

When the index methodologies were examined, it was thought that ETI might affect FTV through LPI. In this context, the model shown in Figure 1 has been created to see how LPI has an impact between ETI and FTV.

In the mediating effect model, the effect of the independent variable (ETI) on the mediating variable (LTI) is shown as (a), the effect of the mediating variable on the dependent variable (FTV) shown as (b), and the effect of the independent variable on the dependent variable shown as (c). In addition, the effect of the independent variable (indirect effect) on the dependent variable when the mediating variable is included in the model is shown by way (c').

The hypotheses developed in the context of the theoretical model created are as follows:

- H1: There is a linear relationship between the enabling trade index and the logistic performance index.
- H2: There is a linear relationship between the logistic performance index and the foreign trade volume.
 - H3: There is a linear relationship between the enabling trade index and the foreign trade volume.
- H4: The logistic performance index has a mediation effect in the relationship between the enabling trade index and the foreign trade volume.

2.2. Universe of Research

In this study, enabling trade index, logistics performance index and foreign trade volume data of the countries involved in the research were compiled. The indexes included in the model of the research were obtained from sources that have accepted validity and reliability. However, since these indices were compiled using different sources, firstly the common time periods of the data to be used in the research and the countries existing in both indices were determined. At this point, the common time zones were identified as 2012, 2014 and 2016, and the number of common countries was 94. In total, 282 samples have been included in the analysis.

2.3. Data Collection

The independent variable enabling trade index data included in the model in the research were obtained from the Global Trade Facilitation Report published by the WEF. The logistics performance index data included in the model as a mediation variable was obtained by WB and the foreign trade volume data of 94 countries for these three years were obtained by WB. A list of 94 countries is given in Annex 1.

2.4. Analysis of Data

In the study, data from 94 countries were first subjected to correlation analysis through the IBM SPSS 20 Package Program, and their effects on each other were determined. The hierarchical regression model was then implemented to test the mediation effect.

Mediation is related to find out how the relationship between two variables is formed by an intermediary effect. The mediation effect analysis makes it possible to prove the research hypotheses about the link mediating the effect of the independent variable X on the dependent variable Y (Gürbüz and Bayık, 2018).

There are two basic approaches in the statistical testing of the mediation effect, namely the causal approach of Baron and Kenny, known as the traditional method, and the modern approach. The advocates of the modern approach have made many criticisms to the traditional approach and have put forward the modern approach that provides more valid and reliable results in determining the mediation effect.

According to the modern approach,

- The total effect (c-way) may be mediation models with a significant mediation effect, even if it is not statistically significant.
- There is no requirement that the effect of the independent variable on the intermediary variable (path a) alone be statistically significant.
- The effect of the intermediary variable on the dependent variable alone (b) is not required to be statistically significant.
- Instead of the partial mediation and full mediation expressions used in the Baron and Kenny method, the evaluation of the findings by calculating the values of direct effect (c'), indirect effect (a.b) and total effect (c = c' + a.b) is more appropriate to the scientific approach. According to the modern method, the fact that the direct effect and the total effect are not statistically significant does not affect the existence of the indirect effect and does not invalidate the mediation model.
- It is more accurate not to use expressions such as mediation or no mediation during the interpretation of the outputs, but instead to observe the magnitude of the effect values by calculating the standardized direct, indirect and total effect values and to compare their relative magnitude with each other.
- The statistical significance of the indirect, direct and total effect values should be tested with the bootstrap confidence interval (if not possible, the Monte Carlo confidence interval). In the interpretation of the analyses, the findings from the bootstrap confidence interval calculations should be used instead of the Sobel test.

Advocates of the modern approach argue that the mediation effect may exist even if the conditions that should occur in traditional methods do not exist (Fritz and MacKinnon, 2007; William and MacKinnon, 2008; Preacher and Selig, 2012; Hayes, 2018). Another point of distinction is that the modern approach suggests testing the indirect effect with the bootstrap technique, which is more powerful and valid than the Sobel test. In the Bootstrap method, reliable results are obtained by correcting the bias and skewness related to the distribution. Corrected bias and accelerated confidence range values (bias corrected an accelerated bootstrap confidence interval, BCA CI) are reported as a result of Bootstrap analysis (Tibshirani, 1993, transmitting Gürbüz and Bayık, 2018, p. 24).

While the number of tests applied in the Bootstrap method is less, indirect effects are generated through the road coefficients. In addition, no assumptions are made about the shape of the distribution of the indirect effect (Hayes, 2017). This prevents the emergence of primary errors due to inaccuracies in the determination of the confidence range, which are common in traditional approaches (MacKinnon et al., 2004).

As shown in Figure 1, the model created to identify the mediation impact of the logistic performance index in the relationship between the enabling trade index and the foreign trade volume, tested by PROCESS version 3.5 which developed by Andrew F. Hayes. analyses were conducted within 95% confidence range. The existence of the mediation effect and the effect size of this mediation were determined according to the confidence intervals obtained as a result of the bootstrap technique. The bootstrap technique was performed by selecting 5000 resampling options.

2.5. Research Ethics

The ethical principles required by the scientific discipline were carefully followed at all stages of the research, and the data obtained were reflected in the research report in an objective way. All sources used in the research are indicated both in the text and in the references.

3. Findings of The Research

In this section of the study, the results of regression analysis (paths a, b, c and c') are given and interpreted as tables.

Table 1 gives information about the variables used in the analysis. In the research, ETI (enabling trade index) was used as the independent variable (X), FTV (foreign trade volume) was used as the dependent variable (Y), and LPI (logistics performance index) variables were used as the mediation variable (M).

Table 1. Summary table of variables

		Model No: 4	
	S	ample Size: 282	
X	ETI (Enabling Trade Index)	Independent variable	
Y	FTV (Foreign Trade Volume)	Dependent variable	
M	LPI (Logistic Performance Index)	Mediation variable	

Correlation analysis results are given in Table 2. When reviewing the correlation coefficients given in the table; there is a positive and strong relationship (.821) between the logistics performance index and the enabling trade index, a moderate relationship (.345) between the enabling trade index and the foreign trade volume, and finally, a moderate relationship between the foreign trade volume and the logistics performance index. relationship (.504) is seen.

Table 2. Correlation analysis results (pearson correlation sig. (2-tails)

	Logistic Performance Index	Enabling Trade Index	Foreign Trade Volume
Logistic Performance Index	1		
Enabling Trade Index	0,821	1	
Foreign Trade Volume	0,504	0,345	1

Table 3 shows the results of the regression analysis in which the relationship between the independent variable (ETI) and the mediator variable (LPI) is examined (path a). When the findings given in the table are examined, it is seen that the enabling trade index has a significant and positive effect on the logistics performance index (β = .6625, %95 CI [.6083; ,7168], t= 24,0426, p<,001). It is seen that the P value is less than .001 and the value of the confidence interval (CI) does not include 0 (zero) value. In line with these findings, the " β " (non-standardized beta) value was found to be significant (Gürbüz, 2019). The enabling trade index explains about 68% (R2=.6737) of the variation in the logistics performance index. According to the results of the analysis, the H1 hypothesis was accepted.

Table 3. The effect of enabling trade index on logistics performance index

		Independe	ent Variable: LPI			
		Mod	el Summary			
R	R-sq	MSE	F	df1	df2	р
.8208	.6737	.1004	578.0479	10000	280.000	.0001
			Model			
	Coefficients	se	t	p	LLCI	ULCI
Constant	.2470	.1222	2.0224	.0441	.0066	.4875
ETI	.6625	.0276	24.0426	.0001	.6083	.7168
		Standard	ized Coefficients			
	Coefficients					
ETI	.8208					

Table 4 shows the combined effects of the mediation variable, the logistics performance index, and the independent variable, the enabling trade index, on the dependent variable foreign trade volume (path b and c').

Table 4. The eff	ects of enablin	g trade index and	logistics per	rformance index on	foreign trade volume

		Dependent	Variable: FTV			
		Mode	l Summary			
R	R-sq	MSE	${f F}$	df1	df2	р
.5187	.2691	4.977	51.3582	20000	279.000	.0001
		I	Model			
	Coefficients	se	t	р	LLCI	ULCI
Constant	-1.61	2.739	-5.8952	.0001	-2.15	-1.08
ETI	-2.53	1.074	-2.3585	.019	-4.65	-4.19
LPI	1.007	1.331	7.5664	.0001	7.448	1.269
		Standardi	zed Coefficients			
	Coefficients					
ETI	2113					
LPI	.6779					

When the outputs of the analysis are reviewed, it is seen that the logistics performance index significantly and positively affects the foreign trade volume (path b) (β = 1.007, 95% CI [7.488; 1.269], t= 7.5664, p<.001). At the same time, it has emerged as a result of the analysis that the enabling trade index also affects the foreign trade volume (c' path) significantly and positively (β =-2.53, %95 CI [-4.65; -4.19], t= -2.3585, p<.01).

In addition, the findings presented in table 4 show that the effect of the enabling trade index on foreign trade volume deteriorates as soon as the logistics performance index is included in the model. This phenomenon is an expected result in mediation analysis. When the enabling index and the logistics performance index are included in the model together, it explains about 27% (R2=.2691) of the change in foreign trade volume. In the light of these findings, H2 and H3 hypotheses were accepted.

Table 5 shows a model with no mediation variable. Analysis results for the total impact (path c). When analysis outputs are examined, in a situation where there is no logistical performance index, the enabling index has a positive impact on the foreign trade volume (β =4.137, 95% CI [2.813; 5.460], t=6.1531, p<.001).

Table 5. Total effect of enabling trade index on foreign trade volume

		Mod	lel Summary			
R	R-sq	MSE	F	df1	df2	р
.3451	.1191	5.977	37.8601	10000	280.000	.0001
			Model			
	Coefficients	se	t	р	LLCI	ULCI
Constant	-1.37	2.980	-4.5842	.0001	-1.95	-7.80
ETI	4.137	6.723	6.1531	.0001	2.813	5.460
Standardized (Coefficients					
	Coefficients					
ETI	.3451					

Table 6 shows the indirect impact value of the enabling index on the foreign trade volume and the confidence ranges obtained by the bootstrap technique.

Table 6. Total, direct and indirect effects of enabling trade index on foreign trade volume

	Indirect Effect of F	Enabling Trade Index or	n Foreign Trade Volume (Med	liation Effect)
	Effect	BootSE	BootLLCI	BootULCI
LPI	6.670	1.307	4.430	9.530
	Partially Standardize	ed Indirect Effect of En	abling Trade Index on Foreigi	n Trade Volume
	Effect	BootSE	BootLLCI	BootULCI

LPI	.8112	.1050	.6222	10.319
	Fully Standardi	zed Indirect Effect of E	nabling Index on Foreign Tra	de Volume
	Effect	BootSE	BootLLCI	BootULCI
LPI	.5564	.0718	.4276	.7089

According to the findings, it is seen that the indirect effect of the enabling trade index on the foreign trade volume is significant and the values of the confidence interval (BLLCI, BULCI) do not include the 0 (zero) value. Therefore, it has been determined that the logistics performance index mediates the relationship between the enabling trade index and foreign trade volume (β = 6.670, 95% BCA CI [4.430; 9.530]). Accordingly, that finding, the H4 hypothesis was accepted. It is also seen that the indirect effect value (a.b) is 6.670. It means; The foreign trade volume of the country, whose enabling trade index score is one unit higher than the other country, is 6,670 units higher.

In the last part of Table 6, the full and partial standardized impact sizes on the foreign trade volume of the enabling trade index are given. According to the findings, the confidence ranges of both impacts do not cover 0 (zero) and the effect is significant. Another important point to be considered while determining the mediating effect with the PROCESS method is the effect sizes. When interpreting the impact sizes; If K2= close to .01, it is a low effect, if it is close to K2=.09, it is interpreted as medium effect, if it is close to K2= .25, it is interpreted as a high effect. When the findings are examined, it is seen that the fully standardized effect size is .5564. According to this result, it has been revealed that the logistics performance index has a high mediation effect in the relationship between the enabling trade index and foreign trade volume.

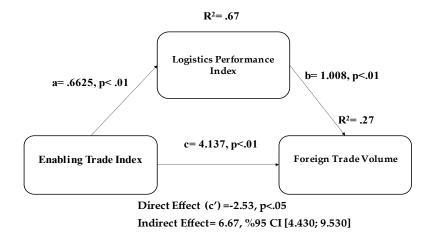


Figure 2. The mediation role of the logistics performance index in the relationship between enabling trade index and foreign trade volume (n=282)

Note: Non-standardized beta coefficients have been reported. R2 values show the explained variance.

4. Conclusions, Discussion and Recommendations

With the increase in globalization and the development of technology, it has become easier for consumers to access goods and services. This phenomenon has increased competition and provided the consumer with a wealth of product options. In an increasingly competitive environment, factors such as logistics service opportunities, infrastructure development levels, countries' removal of barriers to trade and facilitating procedures provide advantages to manufacturers and retailers.

In this study, the enabling trade index published by the World Economic Forum, which reveals the ease of doing international trade in countries, the logistics performance index data published by the WB, which measures the logistics service quality of the countries, were used. Foreign trade volume data

of the countries included in the research were obtained through WB. The scores of the 94 countries for the years 2012, 2014 and 2016, obtained from the sources, whose validity and reliability are accepted, were compiled. The data obtained has been subjected to various analyzes using the SPSS 20 Package Program. First, correlation analysis was performed to determine relations between variables. The model, which is created to determine the mediation impact of the logistic performance index in the relationship between the enabling trade index and the foreign trade volume, analyzed by PROCESS 3.5 macro developed by Andrew F. Hayes. The analysis results obtained are presented in the findings section of the study.

As a result of the analysis, a positive relationship has been established between the independent variable (ETI) and the dependent variable (FTV). It was also found that there was a positive and significant relationship between the independent variable and the mediation variable (LPI). In another finding of the research, a positive relationship between the logistics performance index and foreign trade has been statistically proven. The introduction includes the works that are parallel to this result (Zhao and Zhang, 2020; Addey, 2017; Aktaş, 2019; Host et al., 2019; Pablo Coto-Millan et al., 2015).

To determine the impact of mediation, The process method based on bootstrap technique has been used which has become increasingly common in academic studies in recent periods. The analysis analyzed the confidence range values obtained by bootstrap technique and interpreted whether the enabling trade index has an indirect effect on the foreign trade volume. When reviewing the analysis output in the findings and comments section, it is observed that the corrected bias and accelerated confidence interval values do not include 0 (zero). Accordingly, it was determined that the indirect effect of the enabling trade index on the volume of foreign trade is statistically significant. This result shows that the logistics performance index has a mediation effect in the relationship between the enabling trade index and the foreign trade volume.

The fully standardized impact size of the mediation effect is determined as (K2) .5564, and the role of mediation was found to be high impact. In addition, the indirect effect value (a. b) has been determined as 6,67. It means; The foreign trade volume of the country, whose enabling trade index score is one unit higher than the other country, is 6,670 units higher. In light of these results, the hypotheses of research, H1, H2, H3 and H4, were accepted.

During the literature review, concentrated studies on this subject were examined. Among the studies examined, only one study was found that used the enabling trade index, logistics performance index and foreign trade volume in one model. The research conducted by Yeo and Deng (2020) found that logistics performance has a mediation effect in the relationship between facilitating trade and international trade. Unlike this study, Yeo and Deng used the scale developed by Portugal-Perez and Wilson (2012) instead of the index of enabling trade published by the World Economic Form in their work. In addition, unlike this research, the mediation effect has been identified using the structural equity model (SEM).

As a result, if a country wants to increase the volume of foreign trade and wants to provide an advantage to its companies in an increasingly competitive environment, it is not enough to just make reforms in market access, border administration, infrastructure and operating environment (sub-indexes of ETI), it is also requiring customs, infrastructure, tracking and tracing, ease of international shipments, logistics services quality, and timeliness (sub-indexes of LPI) should also make improvements and facilitation.

More extensive analysis, such as panel data analysis, has not been performed because the indexes used in this study have not insufficient common time zones. In subsequent years, with the publication of indexes, researchers can take advantage of these data to conduct extensive analysis. In

addition, it is thought that the model created in the research may be a research issue to determine whether it differs from the economic developments of countries. And new relationships will contribute to literature by adding different variables to the model created in this study.

5. References

- Addey, K., Yeboah, O., & Shaik, S. (2017). Role of Trade Agreements and Enabling Trade Indexes on Trade Creation or Trade Diversion of US state Corn, Soybeans and Wheat (No. 1377-2016-109867), https://ageconsearch.umn.edu/record/252791/
- Aktaş, İ. (2019). Analysis of The Effect of Logistics Performance Index and Economic Freedom Index on Global Facilitating Trade (Tez No. 556892) [Doktora tezi, Maltepe Üniversitesi]. Yükseköğretim Kurulu Ulusal Tez Merkezi.
- Coto-Millán, P., Fernández, X. L., Pesquera, M. Á., & Agüeros, M. (2016). Impact of logistics on technical efficiency of world production (2007–2012). *Networks and Spatial Economics*, *16*(4), 981-995. https://doi.org/10.1007/s11067-015-9306-6
- Fritz, M. S., & MacKinnon, D. P. (2007). Required sample size to detect the mediated effect. *Psychological science*, 18(3), 233-239. https://doi.org/10.1111/j.1467-9280.2007.01882.x
- Hayes, A. F. (2018). Introduction To Mediation, Moderation, And Conditional Process Analysis: A Regression-Based Approach (2. Ed.). The Guilford.
- Hayes, A. F., & Rockwood, N. J. (2017). Regression-based statistical mediation and moderation analysis in clinical research: Observations, recommendations, and implementation. *Behavior research and therapy*, 98, 39-57. https://doi.org/10.1016/j.brat.2016.11.001
- Host, A., Pavlic Skender, H., & Zaninovic, P. A. (2019). Trade Logistics The Gravity Model Approach. *Journal Zbornik Radova Ekonomskog Fakulteta U Rijeci / Proceedings of Rijeka Faculty of Economics*, 37(1), 327–342. https://doi.org/10.18045/zbefri.2019.1.327
- Gurbuz, S. (2019). Mediator, regulatory and situational impact analysis in social sciences. Seçkin.
- L. Gurbuz, S., & Bayik, M. E. (2018, 2-3 November). *The Modern Approach to Analysis of Mediation Models: Should the Baron and Kenny Method be Abandoned Now*, 6. Proceedings of Organizational Behavior Congress, Turkey-Isparta.
- MacKinnon, D. P., Lockwood, C. M., & Williams, J. (2004). Confidence limits for the indirect effect: Distribution of the product and resampling methods. *Multivariate behavioral research*, *39*(1), 99-128, https://doi.org/10.1207/s15327906mbr3901_4
- Preacher, K. J., & Selig, J. P. (2012). Advantages of Monte Carlo confidence intervals for indirect effects. *Communication Methods and Measures*, 6(2), 77-98, https://doi.org/10.1080/19312458.2012.679848
- Yeo, A. D., & Deng, A. (2020). Logistics performance as a mediator of the relationship between trade facilitation and international trade: A mediation analysis. *South African Journal of Economic and Management Sciences*, 23(1), 1-11.
- Zhao, X., & Zhang, F. (2020). An Empirical Study on the Impact of Trade Facilitation on China's Export Trade, *The Journal of Industrial Distribution & Business*, 11(9), 7–16, https://doi.org/10.13106/jidb.2020.vol11.no9.7
- Williams, J., & MacKinnon, D. P. (2008). Resampling and distribution of the product methods for testing indirect effects in complex models. *Structural equation modeling: a multidisciplinary journal*, 15(1), 23-51, https://doi.org/10.1080/10705510701758166

Annex

Appendix 1. Countries included in the analysis

ALGERIA	GHANA	NIGERIA
ARJANTIN	GREECE	OMAN
ARMENIA	HONDURAS	PAKISTAN
AUSTRALIA	HONG KONG	PANAMA
AUSTRIA	HUNGARY	PARAGUAY
BAHRAIN	ICELAND	PERU
BELGIUM	INDIA	PHILIPPINES
BOLIVIA	INDONESIA	POLAND
BRAZIL	IRELAND	PORTUGAL
BULGARIA	ITALY	QATAR
BURUNDI	JAMAICA	ROMANIA
CAMBODIA	JAPAN	RUSSIA
CAMEROON	JORDAN	RWANDA
CANADA	KAZAKHSTAN	SAUDI ARABIA
CHAD	KENYA	SENEGAL
CHILE	KOREA	SERBIA
CHINA	KUWAIT	SINGAPORE
COLOMBIA	KYRGYZSTAN	SLOVAKIA
COSTA RICA	LATVIA	SLOVENIA
CROATIA	LEBANON	SOUTH AFRICA
CYPRUS	LESOTHO	SPAIN
CZECHIA	LITHUANIA	SWEDEN
DENMARK	LUXEMBOURG	SWITZERLAND
DOMINICAN	MADAGASCAR	THAILAND
EGYPT	MALAYSIA	TURKEY
EL SALVADOR	MEXICO	UAE
ENGLAND	MOLDOVA	UKRAINE
ESTONIA	MONGOLIA	URUGUAY
FINLAND	MONTENEGRO	USA
FRANCE	NEPAL	VIET NAM
GERMANY	NETHERLANDS	
HONG KONG	NEW ZEALAND	