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TARANDIĞIMIZ INDEXLER

METHODOLOGICAL STUDY ON THE EFFECT OF AVIATION ON SERVICE EXPORT AND LPI MAINLY BASED ON THE CARGO DATA OF ALL INTERNATIONAL AND TURKISH NATIONAL AIRLINES'

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ÖZET

Dünyada rekabetin en yoğun yaşandığı dönemlerden birinde olduğumuz açık ve net bir şekilde görülmektedir: Bu rekabet içerisinde öncelikle ülkeler daha sonralarında şirketler kendilerine yer bulmak zorundadırlar ve bunu yaparken rekabette avantaj sağlamaları çok önemlidir. Rekabette avantaj sağlayabilmek için ülkeler ve şirketler yatırım yapmadan önce yapacakları analizlerin iyi bir şekilde yapıldığından ve verilerin doğru olduğundan emin olmalıdır. Yapılan araştırmaların sonucunda ülkeler ve şirketler yüksek miktarda yatırımlar yapacakları görülmektedir. Yaptığımız bu çalışmanın temel amacı ise, ülkelerin ve şirketlerin yapacakları yatırımların ileriki vadede iyi bir yatırım olması için yatırımcılar için bir gösterge niteliği taşımak ve onlara yön göstermektir. Rekabette avantajı elde etmeyi amaçlayan, şirketler ve ülkeler için yaptığımız bu çalışmada, dünyada kabul gören hava kargo taşımacılığı verisinin (milyon ton kilometre) ilk olarak 4 farklı ülkenin Türkiye, Rusya, İngiltere ve Almanya Toplam Servis İhracatı, Toplam Taşımacılık İhracatı, Toplam Hava Taşımacılık İhracatı ve Toplam Hava Kargo Taşımacılık İhracatı üzerine anlamlı bir etkisin var olup olmadığını araştırmaktadır. Daha sonra hava kargo taşımacılığı verisinin (milyon ton kilometre) 4 ülke Türkiye, Rusya, İngiltere ve Almanya'nın LPI ana ve alt faktörler olarak LPI skoru, Gümrük verimliliği, Altyapı, Uluslararası gönderiler, Lojistik kalitesi ve yetkinliği, İzleme ve takip en son Vakitlilik üzerine anlamlı bir etkisin var olup olmadığı araştırılmıştır. Sonuçta bulunan durumun ise, dünyadaki rekabette hem ülkelere hem de şirketlere avantaj sağlayacak bir gösterge olduğu bulunmuştur.

Anahtar Kelimeler: Hava Kargo Verisi, Lojistik Performans Endeksi, Servis İhracatı, Panel Veri Analizi.

ABSTRACT

It is clearly seen that we are in one of the most intense periods of competition in the world, and countries, and then companies have to find a place in this competition, and it is very important for them to gain an advantage in competition. Countries and companies should make sure that their analysis is well done and the data is correct before investing. As a result of the researches, countries and companies will make a high amount of investments. The main purpose of our study is to be an indicative and guide for investors so that the investments of both countries and companies will be a good investment in the future for aiming to achieve a competitive advantage. In this study, we have made for companies and countries firstly that the world recognized the air cargo data (million tonne kilometers) of 4 different countries of Turkey, Russia, Britain and Germany for Total Service Export, Total Transportation Export, Total Air Freight Export that investigates whether there is a significant impact on Total Air Cargo Transport Exports or not. Then secondly, air cargo data (million tonne kilometers) of 4 countries, Turkey, Russia, Britain and Germany for LPI score as main and sub-factors, customs efficiency, infrastructure, international shipments, logistics quality and competence, tracking. The last follow-up was investigated if there was a significant effect on timeliness or not. As a result, it has been found that it is an indicator that will give advantage to both countries and companies in the world competition.

Keywords: Air Cargo Data, Logistics Performance Index, Service Export, Panel Data Analysis.

1. INTRODUCTION

The "Logistics Performance Index (LPI)" developed by the World Bank was first adopted in 2007. Subsequently, the studies carried out in 2010 and in the following years are conducted every 2 years. The LPI is a survey performed through the data of 160 countries around the world, which allows countries to analyze themselves. The key goal of these analyses is to let countries observe how to better enhance their own service exports and sub-indicators, and achieve self-development where they find themselves short. The LPI is not only employed for the self-development of countries, but also allows companies to assess, in consideration of this index, which type of transport would be preferable when exporting their services and which products would yield more advantages in which countries they travel to and from.

The LPI is composed of 6 sub-indicators and 1 main indicator. There are 7 types of LPI Score (Main Indicator): Efficiency of customs clearance process, Infrastructure, International shipment, Logistics quality and Competence, Tracking and Tracing, and Timeliness. A total of 4 countries were selected for the LPI: Turkey, Russia, England and Germany.

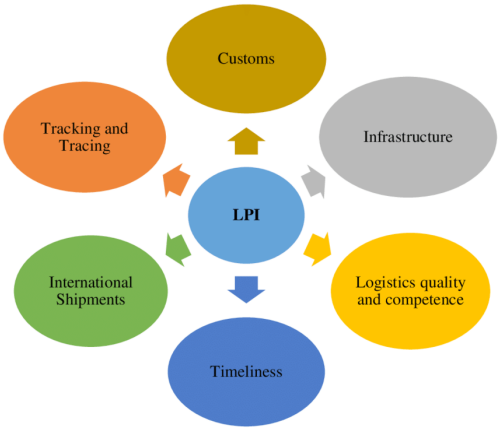

Figure 1: Components of LPI (The World Bank, 2018)

A research was conducted on the air transportation data of countries using the main indicator and 6 sub-indicators of LPI for 2010, 2012, 2014, 2016 and 2018. The sub-dimensions of service export are grouped under 12 individual topics: Business services, Travel services, Other business services, Charges

for the use of intellectual property, Financial services, Transportation services, Telecommunications, computer and information services, Maintenance and repair services, Government goods and services, Insurance and pension services, Construction services, and Personal, cultural and recreational services. The study carried out as part of the research includes transportation services among these sub-factors. The sub-indicators of transportation services are divided into three - air transportation, maritime transportation and other modes, while the sub-indicators of Air Transportation are similarly divided into three - passenger, cargo and others. In parallel, this study was extended in accordance with the data on the Service export, Transportation export, Air Transportation and Air Cargo Transportation of Turkey, Russia, England and Germany.

The study was basically characterized by the existence of a significant effect of Air cargo data on main and sub-indicators of LPI as well as on sub-indicators of service export. Thus, the study sought the answer suggesting that the LPI could serve as an indicator to achieve better returns on future investments. Subsequently, it shows that service export and its sub-indicators should provide a significant benefit to make estimations.

The research projects conducted in this respect are very few, and the initial research area is logistics. The results obtained demonstrate that air cargo transportation data has a significant effect on main and sub-indicators of the logistics performance index. Therefore, the LPI is an indicative tool that enhances the competitiveness of countries and helps them see where to make the necessary investments to enhance that competitiveness. It is observed during the studies that the LPI is used to enhance the competitiveness of OECD countries, thus enabling the countries to improve their own positions in the future and consequently increase their foreign trade volumes. (Demirbilek, 2018)

2. SERVICE EXPORT AND SUB-INDICATORS

The service export is grouped under a total of 12 main topics as follows:

1- Commercial Services, 2- Travel Services, 3- Other Business Services, 4- Fees for the use of intellectual property, 5- Financial Services, 6- Transportation Services, 7- Computer, Telecommunications and information Services, 8- Maintenance and Repair Services, 9- Government Goods and Services, 10- Insurance and pension Services, 11- Construction Services, 12- Personal, Cultural and Entertainment Services.

Main topic addressed by my research is transportation services. Transportation is referred to as "the movement of people and goods from one place to another." Transportation is included in 3 major groups: air, road and maritime. The most critical criteria for selecting these modes are cost, time and legislation. Although companies opt for the one that suits them best when selecting these modes, they must comply with the legislation of the countries. (Erdal & Çancı, 2013)

2.1. MODES AND VALUES OF TRANSPORTATION IN TURKEY

Export and import values of the modes of transportation used in Turkey are as follows;

Table 1: Maritime Transportation Statistics (Million US Dollars)

Years	2014	2015	2016	2017	2018
Export Value	86,304	78,037	148,655	91,315	105,512
Overall Share in Export (%)	54.8	54.3	55.0	58.2	62.8
Import Value	141,381	124,440	129,184	136,672	146,699
Overall Share in Import (%)	58.4	60.0	55.3	63.6	65.8

(Source: Ministry of Commerce, 2019)

Table 2: Road Transportation (Million US Dollars)

Years	2014	2015	2016	2017	2018
Export Value	55,271	46,709	37,800	45,810	46,666
Overall Share in Export (%)	35.1	32.5	31.4	29.2	27.8
Import Value	37,301	34,364	34,307	37,800	35,408
Overall Share in Import (%)	15.4	16.6	14.7	16.2	15.9

(Source: Ministry of Commerce, 2019)

Table 3: Air Transportation Statistics (Million US Dollars)

Years	2014	2015	2016	2017	2018
Export Value	14,103	17,276	34,286	16,992	13,755
Overall Share in Export (%)	9.0	12.0	12.5	10.8	8.2
Import Value	24,697	20,003	22,970	34,286	28,517
Overall Share in Import (%)	10.2	9.7	9.8	14.7	12.8

(Source: Ministry of Commerce, 2019)

Table 4: Rail Transportation (Million US Dollars)

Years	2014	2015	2016	2017	2018
Export Value	923	807	1,178	684	727
Overall Share in Export (%)	0.6	0.6	0.4	0.4	0.4
Import Value	1,207	1,170	1,428	1,178	1,237
Overall Share in Import (%)	0.5	0.6	0.6	0.5	0.6

(Source: Ministry of Commerce, 2019)

Considering the data, the mode of transportation used for export in Turkey are Maritime, Road, Air and Rail, respectively. This is primarily due to costs, followed by the position of Germany, England, Italy, Iraq, US, Spain, France, Netherlands, Belgium and Israel as the top 10 destinations based on the shares of goods that we sold in 2018. Given the data, 7 of the top 10 export destinations are European countries with a total share of 36% (Ministry of Commerce, 2019).

Turkey uses Maritime, Road, Air and Rail transportation for import, respectively. The top 10 export destinations are Russia, China, Germany, US, Italy, India, UK, France, Iran and South Korea. 5 of these destinations are eastern countries, and Turkey carries out domestic production by supplying raw materials from the east or ships goods to the western countries in assembled condition since it serves as a bridge between the east and the west (Ministry of Commerce, 2019).

2.2. AIR TRANSPORTATION

Air cargo transportation has been used more actively in the last 20 years depending on the reduced costs of aircrafts and lower freights caused by the technological advance despite the increase in oil prices. Mostly, air cargo transportation is far preferable in transporting lightweight but valuable commodities and living things that need to be hauled fast. Its greatest advantage is the time it saves. Some statistics according to the countries with the highest air transport are as follows;

Airports By The Number Of Aircraft Landings And Take-Offs In 2017;

1. Atlanta Ga, Usa (Atl) 879,560
2. Chicago Il, Usa (Ord) 867,049
3. Los Angeles Ca, Usa (Lax) 700,362
4. Dallas/Forth Worht Tx, Usa (Dfw) 654,344
5. Beijing, Cn (Pek) 5 97,259

(Source:Airports Council International, 2019)

Number Of Loading And Unloading Operations By Cargo Movements In 2017;

1. Hong Kong, Hk (Hkg) 5,049,898 Metric Tons
2. Memphis Tn, Usa (Mem) 4,336,752 Metric Tons
3. Shanghai, Cn (Pvg) 3,824,280 Metric Tons
4. Incheon Kr (Icn) 2,921,691 Metric Tons
5. Anchorage Ak, Usa (Anc) 2,713,230 Metric Tons

(Source:Airports Council International, 2019)

Airports By Passenger Traffic In 2017;

1. Atlanta Ga, Usa (Atl) 103,902,992
2. Beijing, Cn (Pek) 95,786,442
3. Dubai, Ae (Dbx) 88,242,099
4. Tokyo, Jp (Hnd) 85,408,975
5. Los Angeles Ca, Usa (Lax) 84,557,968

(Source:Airports Council International, 2019)

3. METHODOLOGY

The data from 4 countries were used for the logistics performance index: Turkey, England, Russia and Germany. Divided into a total of 1 main topic and 6 sub-topics, 25 data items were used under the main topic and a total of 150 data items were used under 6 sub-topics, 25 for each. For the air cargo transportation data measured in AFTK, a total of 50 different data items were used, 10 for each country.

The data used in the study was taken from the World Bank. The comparative air cargo data (AFTK) was analyzed by taking the average values of 2 years since the LPI data are announced every 2 years. In brief, the LPI data for 2010 were used with the air cargo data (AFTK) for 2009 and 2010.

a. https://data.worldbank.org/indicator/IS.AIR.GOOD.MT.K1

b. https://lpi.worldbank.org/international/global

The study analyzed the correlation of air cargo transportation data (AFTK) with the LPI and one main topic and six sub-topics of this index.

H1: The significant effect of air cargo transportation data (AFTK) on the LPI main indicator "LPI Score",

H2: The significant effect of air cargo transportation data (AFTK) on the sub-indicator "Efficiency of customs clearance process",

H3: The significant effect of air cargo transportation data (AFTK) on the sub-indicator "Infrastructure",

H4: The significant effect of air cargo transportation data (AFTK) on the sub-indicator "International shipment",

H5: The significant effect of air cargo transportation data (AFTK) on the sub-indicator "Logistics quality and competence",

H6: The significant effect of air cargo transportation data (AFTK) on the sub-indicator "Tracking and Tracing", and

H7: The significant effect of air cargo transportation data (AFTK) on the sub-indicator "Timeliness" were analyzed.

For this study, limitations of the research, Air Cargo Data of 5 countries were based on the widely accepted unit of "Ton-KM" (AFTK/Available Freight Ton Kilometers) which is adopted in all countries by the World Bank, while the measurement of transportation performance of countries was based on the LPI)

4. CORRELATION OF AIR CARGO DATA WITH SUB-BRANCHES OF SERVICE EXPORT

The primary objective is to investigate whether there is a correlation between the air cargo data (AFTK) and the total cargo exports, total transportation exports, total air transportation exports and total air cargo transportation exports data of 4 different countries.

The AFTK data from 4 countries – Turkey, Russia, England and Germany – were used as the air cargo data. The data pertaining to Total Service Exports, Total Transportation Exports, Total Air Transportation Exports and Total Air Cargo Transportation Exports of these countries from 2010 to 2016 were used. The air cargo data (AFTK) were taken from the World Bank, while the other 4 data sets were taken from the International Trade Center, i.e. Trademap.

a. https://data.worldbank.org/indicator/IS.AIR.GOOD.MT.K1

b. https://www.trademap.org/

4 countries were designated for this study, which are Turkey, Russia, England and Germany. The study was then based on the Total Service Exports, Total Transportation Exports, Total Air Transportation Exports and Total Air Cargo Transportation Exports data of the remaining 4 countries and on the widely accepted unit of "Ton-KM" (AFTK / Available Freight Ton Kilometers) which is adopted in all countries by the World Bank.

H8: The significant effect of air cargo transportation data (AFTK) on the "Total Service Export",

H9: The significant effect of air cargo transportation data (AFTK) on the "Total Transportation Export",

H10: The significant effect of air cargo transportation data (AFTK) on the "Total Air Transportation", and,

H11: The significant effect of air cargo transportation data (AFTK) on the "Total Air Cargo Transportation Export".

5. ANALYSIS OF THE CORRELATION BETWEEN THE LPI AND AIR CARGO TRANSPORTATION

The EViews[1] 10™ Package Software was used in the analysis of all data from the study. The Panel Data Analysis was considered fit for use since it allows for the use of both time series and cross-sectional data at the same time.

Table 5. Effect of AFTK on the LPI

Dependent Variable: LPESKOR
Method: Panel Least Squares
Date: 07/13/19 Time: 02:44
Sample (adjusted): 2010 2018
Periods included: 5
Cross-sections included: 5
Total panel (balanced) observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AFTK	6.45E-05	2.56E-05	2.516213	0.0193
C	3.153409	0.197225	15.98889	0.0000

R-squared	0.215856	Mean dependent var	3.579405
Adjusted R-squared	0.181762	S.D. dependent var	0.559209
S.E. of regression	0.505840	Akaike info criterion	1.551427
Sum squared resid	5.885115	Schwarz criterion	1.648938
Log likelihood	-17.39284	Hannan-Quinn criter.	1.578473
F-statistic	6.331330	Durbin-Watson stat	0.113118
Prob(F-statistic)	0.019291		

As seen from the results in Table 5, the effect of AFTK on the LPI appears to be significant as a result of the analysis carried out to test the time hypothesis (p=0,0193<0,05). Given the goal of measuring the overall significance of the test, the F Test appears to be significant (p=0,19291<0,05). 18% of the variance (Adjusted R-squared) in the LPI is described by the AFTK factor included in the model.

Based on the hypothesis H1, the air cargo transportation data (AFTK) and the main indicator of LPI are significantly correlated. As a result of testing; the hypothesis H0 was rejected, and the hypothesis H1 was accepted. Consequently, the Main indicator of LPI could be considered an important element for the development of air cargo transportation and the enhancement of the competitiveness of countries.

1 Note: The EViews Software is a program that helps easily understand time series or cross-sectional data in many econometrics studies and make and assess statistical analyzes.

Table 6. Effect of AFTK on the Efficiency of customs clearance process

Dependent Variable: G_MR_K
Method: Panel Least Squares
Date: 07/13/19 Time: 02:51
Sample (adjusted): 2010 2018
Periods included: 5
Cross-sections included: 5
Total panel (balanced) observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AFTK	8.34E-05	3.21E-05	2.597542	0.0161
C	2.779428	0.247185	11.24433	0.0000

R-squared	0.226819	Mean dependent var	3.330592
Adjusted R-squared	0.193202	S.D. dependent var	0.705815
S.E. of regression	0.633977	Akaike info criterion	2.003010
Sum squared resid	9.244318	Schwarz criterion	2.100520
Log likelihood	-23.03763	Hannan-Quinn criter.	2.030056
F-statistic	6.747224	Durbin-Watson stat	0.139518
Prob(F-statistic)	0.016098		

As seen from the results in Table 6, the effect of AFTK on the Efficiency of customs clearance process appears to be significant as a result of the analysis carried out to test the time hypothesis (p=0,0161<0,05). Given the goal of measuring the overall significance of the test, the F Test appears to be significant (p=0,016098<0,05). 19% of the variance (Adjusted R-squared) in the efficiency of customs clearance process is described by the AFTK factor included in the model.

Based on the hypothesis H2, the air cargo transportation data (AFTK) and the LPI sub-indicator 'Efficiency of customs clearance process' are significantly correlated. As a result of testing; the hypothesis H0 was rejected, and the hypothesis H2 was accepted. Consequently, the Sub-indicator of 'Efficiency of customs clearance process' could be considered an important element for the development of air cargo transportation and the enhancement of the competitiveness of countries. The more efficient the customs are, the more remarkable the investment they will create for the country; because the customs are the gateway to and from countries.

Table 7. Effect of AFTK on the Infrastructure

Dependent Variable: ALTYAPI
Method: Panel Least Squares
Date: 07/13/19 Time: 03:10
Sample (adjusted): 2010 2018
Periods included: 5
Cross-sections included: 5
Total panel (balanced) observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AFTK	7.99E-05	3.03E-05	2.640511	0.0146
C	3.112380	0.233054	13.35475	0.0000

R-squared	0.232625	Mean dependent var	3.640632
Adjusted R-squared	0.199261	S.D. dependent var	0.667979
S.E. of regression	0.597735	Akaike info criterion	1.885279
Sum squared resid	8.217597	Schwarz criterion	1.982789
Log likelihood	-21.56599	Hannan-Quinn criter.	1.912324
F-statistic	6.972296	Durbin-Watson stat	0.115918
Prob(F-statistic)	0.014618		

As seen from the results in Table 7, the effect of AFTK on the Infrastructure appears to be significant as a result of the analysis carried out to test the hypothesis (p=0,0146<0,05). Given the goal of measuring the overall significance of the test, the F Test appears to be significant (p=0,014618<0,05). 20% of the variance (Adjusted R-squared) in the infrastructure is described by the AFTK factor included in the model.

Based on the hypothesis H3, the air cargo transportation data (AFTK) and the LPI sub-indicator 'Infrastructure' are significantly correlated. As a result of testing; the hypothesis H0 was rejected, and the hypothesis H3 was accepted. Consequently, the Sub-indicator of 'Infrastructure' could be considered an important element for the development of air cargo transportation and the enhancement of the competitiveness of countries, where the continuity and improvement of infrastructure investments also contribute to the employment and trade in the country.

Table 8. Effect of AFTK on International shipments

Dependent Variable: ULUSLAR ARASI G NDER LER
Method: Panel Least Squares
Date: 07/13/19 Time: 03:14
Sample (adjusted): 2010 2018
Periods included: 5
Cross-sections included: 5
Total panel (balanced) observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AFTK	5.60E-05	2.04E-05	2.740035	0.0117
C	3.005407	0.157380	19.09650	0.0000

R-squared	0.246094	Mean dependent var	3.375578
Adjusted R-squared	0.213316	S.D. dependent var	0.455094
S.E. of regression	0.403646	Akaike info criterion	1.100064
Sum squared resid	3.747401	Schwarz criterion	1.197574
Log likelihood	-11.75080	Hannan-Quinn criter.	1.127109
F-statistic	7.507791	Durbin-Watson stat	0.348820
Prob(F-statistic)	0.011666		

As seen from the results in Table 8, the effect of AFTK on International shipments appears to be significant as a result of the analysis carried out to test the hypothesis (p=0,0117<0,05). Given the goal of measuring the overall significance of the test, the F Test appears to be significant (p=0,011666<0,05). 21% of the variance (Adjusted R-squared) in International shipments is described by the AFTK factor included in the model.

Based on the hypothesis H4, the air cargo transportation data (AFTK) and the LPI sub-indicator 'International shipments' are significantly correlated. As a result of testing; the hypothesis H0 was rejected, and the hypothesis H4 was accepted. Consequently, the Sub-indicator of 'International shipments' could be considered an important element for the development of air cargo transportation and the enhancement of the competitiveness of countries. Additionally, the increasing quality of international shipments will be effective in creating brands on a global scale.

Table 9. Effect of ATFK on the Logistics quality and competence

Dependent Variable: LOJ ST K KAL TES VE YETK NL
Method: Panel Least Squares
Date: 07/13/19 Time: 03:19
Sample (adjusted): 2010 2018
Periods included: 5
Cross-sections included: 5
Total panel (balanced) observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AFTK	5.87E-05	2.63E-05	2.230410	0.0358
C	3.195841	0.202581	15.77562	0.0000

R-squared	0.177829	Mean dependent var	3.583705
Adjusted R-squared	0.142083	S.D. dependent var	0.560954
S.E. of regression	0.519577	Akaike info criterion	1.605017
Sum squared resid	6.209097	Schwarz criterion	1.702527
Log likelihood	-18.06271	Hannan-Quinn criter.	1.632062
F-statistic	4.974728	Durbin-Watson stat	0.118294
Prob(F-statistic)	0.035764		

As seen from the results in Table 9., the effect of AFTK on the Logistics quality and competence appears to be significant as a result of the analysis carried out to test the hypothesis (p=0,0358<0,05). Given the goal of measuring the overall significance of the test, the F Test appears to be significant (p=0,035764<0,05). 14% of the variance (Adjusted R-squared) in the logistics quality and competence is described by the AFTK factor included in the model.

Based on the hypothesis H5, the air cargo transportation data (AFTK) and the LPI sub-indicator 'Logistics quality and competence' are significantly correlated. As a result of testing; the hypothesis H0 was rejected, and the hypothesis H5 was accepted. Consequently, the Sub-indicator of 'Logistics quality and competence' could be considered an important element for the development of air cargo transportation and the enhancement of the competitiveness of countries, where the better the competence is planned and the more accurate it is rendered, the more optimal results can be obtained in terms of time, cost and quantity.

Table 10. Effect of ATFK on Tracking and Tracing

Dependent Variable: ZLEME VE TAK P
Method: Panel Least Squares
Date: 07/13/19 Time: 03:23
Sample (adjusted): 2010 2018
Periods included: 5
Cross-sections included: 5
Total panel (balanced) observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AFTK	6.03E-05	2.67E-05	2.259406	0.0336
C	3.229470	0.205403	15.72259	0.0000

R-squared	0.181638	Mean dependent var	3.627850
Adjusted R-squared	0.146057	S.D. dependent var	0.570091
S.E. of regression	0.526816	Akaike info criterion	1.632687
Sum squared resid	6.383301	Schwarz criterion	1.730197
Log likelihood	-18.40858	Hannan-Quinn criter.	1.659732
F-statistic	5.104914	Durbin-Watson stat	0.151419
Prob(F-statistic)	0.033640		

As seen from the results in Table 10, the effect of AFTK on Tracking and Tracing to be significant as a result of the analysis carried out to test the hypothesis (p=0,0336<0,05). Given the goal of measuring the overall significance of the test, the F Test appears to be significant (p=0,033640<0,05). 15% of the variance (Adjusted R-squared) in tracking and tracing is described by the AFTK factor included in the model.

Based on the hypothesis H6, the air cargo transportation data (AFTK) and the LPI sub-indicator 'Tracking and tracing' are significantly correlated. As a result of testing; the hypothesis H0 was rejected, and the hypothesis H6 was accepted. Consequently, the Sub-indicator of 'Tracking and tracing' could be considered an important element for the development of air cargo transportation and the enhancement of the competitiveness of countries. The good quality of trackability and traceability of their cargo will enhance customer satisfaction, and the additional plans intended for customers will make it easier to provide control.

Table 11. Effect of AFTK on Timeliness

Dependent Variable: VAK_TL_L_K
Method: Panel Least Squares
Date: 07/13/19 Time: 03:25
Sample (adjusted): 2010 2018
Periods included: 5
Cross-sections included: 5
Total panel (balanced) observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AFTK	5.22E-05	2.16E-05	2.414078	0.0241
C	3.604691	0.166506	21.64897	0.0000

R-squared	0.202158	Mean dependent var	3.949739
Adjusted R-squared	0.167469	S.D. dependent var	0.468039
S.E. of regression	0.427054	Akaike info criterion	1.212805
Sum squared resid	4.194622	Schwarz criterion	1.310315
Log likelihood	-13.16006	Hannan-Quinn criter.	1.239850
F-statistic	5.827771	Durbin-Watson stat	0.126182
Prob(F-statistic)	0.024135		

As seen from the results in Table 11, the effect of AFTK on Timeliness appears to be significant as a result of the analysis carried out to test the hypothesis (p=0,0241<0,05). Given the goal of measuring the overall significance of the test, the F Test appears to be significant (p=0,024135<0,05). 17% of the variance (Adjusted R-squared) in timeliness is described by the AFTK factor included in the model.

Based on the hypothesis H7, the air cargo transportation data (AFTK) and the LPI sub-indicator 'Timeliness' are significantly correlated. As a result of testing; the hypothesis H0 was rejected, and the hypothesis H7 was accepted. Consequently, the Sub-indicator of 'Timeliness' could be considered an important element for the development of air cargo transportation and the enhancement of the competitiveness of countries.

6. ANALYSIS OF THE CORRELATION BETWEEN THE SERVICE EXPORTS AND AIR CARGO TRANSPORTATION

Analysis of the hypothesis between H8 – H11 can be found with interpretations below;

Table 12. Effect of AFTK on Total Service Export

Dependent Variable: LTOPLAM_SERVIS_HRACAT
Method: Panel Least Squares
Date: 07/15/19 Time: 03:05
Sample: 2010 2016
Periods included: 7
Cross-sections included: 4
Total panel (balanced) observations: 28

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LAFTK	1.427431	0.211131	6.760894	0.0000
C	6.610764	1.778158	3.717759	0.0010

R-squared	0.637427	Mean dependent var	18.61134
Adjusted R-squared	0.623482	S.D. dependent var	0.913796
S.E. of regression	0.560715	Akaike info criterion	1.749541
Sum squared resid	8.174431	Schwarz criterion	1.844698
Log likelihood	-22.49357	Hannan-Quinn criter.	1.778631
F-statistic	45.70969	Durbin-Watson stat	0.111584
Prob(F-statistic)	0.000000		

As seen from the results in Table 12, the effect of AFTK on the Total Service Export appears to be significant as a result of the analysis carried out to test the time hypothesis (p=0,0000<0,05). Given the

goal of measuring the overall significance of the test, the F Test appears to be significant (p=0,000<0,05). 62% of the variance (Adjusted R2) in the LPI is described by the AFTK factor included in the model.

Based on the hypothesis H1, the air cargo transportation data (AFTK) and the main indicator of Total Service Export are significantly correlated. As a result of testing; the hypothesis H0 was rejected, and the hypothesis H8 was accepted. Consequently, the Main indicator of Total Service Expot could be considered an important element for the development of air cargo transportation and the enhancement of the competitiveness of countries.

Table 13. Effect of AFTK on Total Transportation Export

Dependent Variable: LTOPLAM TA MAC L K HRACAT
Method: Panel Least Squares
Date: 07/15/19 Time: 03:17
Sample: 2010 2016
Periods included: 7
Cross-sections included: 4
Total panel (balanced) observations: 28

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LAFTK	1.048296	0.110062	9.524571	0.0000
C	8.268669	0.926953	8.920264	0.0000

R-squared	0.777240	Mean dependent var	17.08181
Adjusted R-squared	0.768672	S.D. dependent var	0.607737
S.E. of regression	0.292301	Akaike info criterion	0.446681
Sum squared resid	2.221429	Schwarz criterion	0.541838
Log likelihood	-4.253528	Hannan-Quinn criter.	0.475771
F-statistic	90.71746	Durbin-Watson stat	0.177781
Prob(F-statistic)	0.000000		

As seen from the results in Table 13, the effect of AFTK on the Total Transportation Export appears to be significant as a result of the analysis carried out to test the time hypothesis (p=0,0000<0,05). Given the goal of measuring the overall significance of the test, the F Test appears to be significant (p=0,000<0,05). 77% of the variance (Adjusted R2) in the LPI is described by the AFTK factor included in the model.

Based on the hypothesis H2, the air cargo transportation data (AFTK) and the main indicator of Total Transportation Export are significantly correlated. As a result of testing; the hypothesis H0 was rejected, and the hypothesis H9 was accepted. Consequently, the Main indicator of Total Transportation Expot could be considered an important element for the development of air cargo transportation and the enhancement of the competitiveness of countries.

Table 14. Effect of AFTK on Total Air Transportation Export

Dependent Variable: LTOPLAM HAVA TA MAC L HRACAT
Method: Panel Least Squares
Date: 07/15/19 Time: 03:10
Sample: 2010 2016
Periods included: 7
Cross-sections included: 4
Total panel (balanced) observations: 28

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LAFTK	0.616763	0.101877	6.053993	0.0000
C	11.22338	0.858017	13.08061	0.0000

R-squared	0.585002	Mean dependent var	16.40857
Adjusted R-squared	0.569040	S.D. dependent var	0.412144
S.E. of regression	0.270562	Akaike info criterion	0.292121
Sum squared resid	1.903303	Schwarz criterion	0.387278
Log likelihood	-2.089689	Hannan-Quinn criter.	0.321211
F-statistic	36.65083	Durbin-Watson stat	0.232720
Prob(F-statistic)	0.000002		

As seen from the results in Table 14, the effect of AFTK on the Total Air Transportation Export appears to be significant as a result of the analysis carried out to test the time hypothesis (p=0,0000<0,05). Given the goal of measuring the overall significance of the test, the F Test appears to be significant (p=0,000002<0,05). 57% of the variance (Adjusted R2) in the LPI is described by the AFTK factor included in the model.

Based on the hypothesis H3, the air cargo transportation data (AFTK) and the main indicator of Total Air Transportation Export are significantly correlated. As a result of testing; the hypothesis H0 was rejected, and the hypothesis H10 was accepted. Consequently, the Main indicator of Total Air Transportation Expot could be considered an important element for the development of air cargo transportation and the enhancement of the competitiveness of countries.

Table 15. Effect of AFTK on Total Air Cargo Transportation Export

Dependent Variable: LTOPLAM HAVA KARGO TA MAC L HRA

Method: Panel Least Squares
Date: 07/15/19 Time: 03:22
Sample: 2010 2016
Periods included: 7
Cross-sections included: 4
Total panel (balanced) observations: 28

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LAFTK	0.567434	0.167547	3.386704	0.0023
C	8.945971	1.411098	6.339725	0.0000

R-squared	0.306107	Mean dependent var	13.71645
Adjusted R-squared	0.279419	S.D. dependent var	0.524188
S.E. of regression	0.444968	Akaike info criterion	1.287120
Sum squared resid	5.147910	Schwarz criterion	1.382278
Log likelihood	-16.01969	Hannan-Quinn criter.	1.316211
F-statistic	11.46976	Durbin-Watson stat	0.125643
Prob(F-statistic)	0.002259		

As seen from the results in Table 15, the effect of AFTK on the Total Air Cargo Transportation Export appears to be significant as a result of the analysis carried out to test the time hypothesis (p=0,0023<0,05). Given the goal of measuring the overall significance of the test, the F Test appears to be significant (p=0,002259<0,05). 28% of the variance (Adjusted R2) in the LPI is described by the AFTK factor included in the model.

Based on the hypothesis H4, the air cargo transportation data (AFTK) and the main indicator of Total Air Cargo Transportation Export are significantly correlated. As a result of testing; the hypothesis H0 was rejected, and the hypothesis H11 was accepted. Consequently, the Main indicator of Total Air Cargo Transportation Expot could be considered an important element for the development of air cargo transportation and the enhancement of the competitiveness of countries.

7. CONCLUSIONS AND RECOMMENDATIONS

The LPI is a survey study that enables countries to both see the challenges they face when conducting foreign trade and observe which areas are necessary for achieving better quality (The World Bank, 2019).

In the modern world, countries and companies are now aware that we live in a world where the competition is most intense and the purchasing tendency is changing very rapidly as everyone reaches and examines any product anywhere within seconds. Therefore, countries and companies need the data that can be used on a going-forward basis so that they can achieve and maintain a good position

in this resulting environment of fierce competition, and it is highly important that these data are accurate, effective and continuous in this respect. This study investigated the effect of the provided air cargo transportation data on the LPI score, the main indicator of the logistics performance index, and on its sub-indicators, efficiency of customs clearance process, international shipments, logistics quality and competence, tracking and tracing and, lastly, timeliness. The primary objective of the research is to develop potentially indicative data that can pave the way for logistics operations, companies and countries to gain a competitive edge in today's world. Because no matter how good and reasonably priced a product is, competing for the future will become impossible when that product can neither be shipped to the desired location at the desired time nor rendered sustainable after the shipment. Therefore, it is very likely that companies will suffer problems and the country will undergo an economic crisis as a knock-on effect. The most important aspect of logistics thereafter is the importance of air cargo transportation for the mobility of goods and products of companies and countries in the world. A very small percentage of many products may be transported by air cargo, but the goods transported being usually lightweight but valuable is a clear indication of how important and precious goods are transported by this logistics operation. Therefore, the countries and companies with the capability to provide the best service throughout the transportation process are likely to be more successful, and thus have the opportunity to survive in a fierce competition environment.

The other important aspect of the research is investigating whether air cargo transportation has a significant effect on the service export, transportation export, air transportation export and air cargo transportation export of countries. The research is basically intended to check what capacity the countries will have in the following years and whether these capacities are backed by the infrastructure to satisfactorily meet the requirements for the following years. Accordingly, planning the infrastructure and actions needed as a result of these checks and performing the projects for the future will both contribute to the export of a country and allow the companies to become stronger in international competition due to the developing infrastructure.

The study adopted the panel data analysis using the data from Turkey, Russia, England and Germany. With the analysis, countries may eliminate deficiencies related to themselves and develop new projects for the future. Additionally, companies may use these data in their strategic planning processes and thus maintain their position in this fierce competition environment.

The air cargo data in the study was used as well as the data on the service export, transportation export, air transportation export and air cargo transportation export of Turkey, Russia, England and Germany. Consequently, it was concluded that air cargo data have a significant effect of the related modes of export. Therefore, countries may improve their necessary investments by estimating how much export increase may be available for the following years and making infrastructure and capacity planning in line with this increase.

To improve this study conducted, the number of countries may be increased, or the same method may be employed for local collaborations in addition to the results obtained. The most potentially important study is to estimate the air cargo data for the next years by providing access to the largest airports of 5 countries and predict which airport will achieve capacity increase to what extent in line with these estimations and present such predictions as an indicator to the competent institutions and organizations of the countries according to the results obtained. This study may be improved with a research project that includes the identification of which airports need what to meet these capacities and what actions could be taken for these circumstances.

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