ANALYSIS OF THE LOGISTICS SECTORS OF E7 COUNTRIES BASED ON LOGISTICS PERFORMANCE INDEX

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Abstract

The aim of the study is to analyze the logistics performance index values of E7 countries (China, India, Indonesia, Turkey, Mexico, Brazil, Russian Federation). According to both the overall scores of the logistics performance index and the scores of the 6 sub-items of the index, the countries with the highest logistics performance are China and Turkey, and the country with the lowest is Russia. Although India has made significant leaps in some periods, it can be said that the logistics performance of the country is unstable. Improvements in logistics performance will positively affect global competitiveness by enabling countries to do their foreign trade more easily and effectively. For this reason, countries need to invest more in the logistics sector and increase their sectoral efficiency in order to increase their global competitiveness.

Keywords: E7 Countries, Logistics, Logistics Performance Index, Competition

E7 ÜLKELERİNİN LOJİSTİK SEKTÖRLERİNİN LOJİSTİK PERFORMANS ENDEKSİNE GÖRE ANALİZİ

Öz

Çalışmanın amacı E7 ülkelerinin (Çin, Hindistan, Endonezya, Türkiye, Meksika, Brezilya, Rusya Federasyonu) lojistik performans endeks değerlerinin analiz edilmesidir. Hem lojistik performans endeksi genel skorlarına hem de endeksin 6 adet alt kalemine ait skorlara göre lojistik performansının en yüksek olduğu ülkeler Çin ve Türkiye, en düşük olduğu ülke ise Rusya'dır. Hindistan bazı dönemlerde önemli sıçramalar gerçekleştirse de, ülkenin lojistik performansının istikrarsız olduğu söylenebilir. Lojistik performansındaki iyileşmeler ülkelerin dış ticaretini daha kolay ve efektif bir biçimde yapmasını sağlayarak küresel rekabet gücünü pozitif bir şekilde etkileyecektir. Bu nedenle, ülkelerin küresel rekabet güçlerini yükseltmek için lojistik sektörüne daha fazla yatırım yapması ve sektörel etkinliğini arttırması gerekmektedir.

Anahtar Kelimeler: E7 Ülkeleri, Lojistik, Lojistik Performans Endeksi, Rekabet

1. Introduction

In today's world, where the level of competition between companies and countries has reached its peak, the conditions for getting ahead in competition have also changed. Of course, the minimum cost and added value of the product at the company and country level is an important indicator of superiority. Because the cheaper a country/company manufactures a product, the greater its competitive advantage. In addition, one of the conditions for the increase of the global competitiveness of the countries is undoubtedly to increase the added value and technology level of the products they produce and export. However, one of the conditions for countries to increase their global

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competitiveness in recent years is to increase their effectiveness in the logistics sector. Especially after the global Covid-19 pandemic, supply problems, container shortages, customs problems, etc. emphasized the importance of the logistics sector.

In this context, in this study, we comparatively analyzed the logistics performances of E7 countries, which are considered to be the pioneers of developing countries. In the study, we first examined the main macroeconomic indicators of the E7 countries. Then, we analyzed the logistics performance indexes of these countries and the sub-headings of the index.

Table 1: Macroeconomic Indicators of E7 countries (2021)

	inflation (%)	GDP growth (%)	unemployment (%)	export (billion $)	import (billion $)	current balance (% GDP)
China	1	8.1	4.8	3550	3090	1.8
India	5.1	8.9	6	660	725	-1.1
Indonesia	1.6	3.7	4.4	255	223	0.3
Turkey	19.6	11	13.4	288	292	-1.7
Mexico	5.7	4.8	4.4	522	542	-0.4
Brazil	8.3	4.6	14.4	323	306	-1.7
Russian Federation	6.7	4.8	5	547	378	6.9

Source: (The World Bank Data, 2022)

When the basic macroeconomic data of E7 countries (inflation, GDP growth, unemployment, export, import, current balance) are analyzed (Table 1), it is seen that the country with the lowest inflation rate is China and the country with the highest is Turkey. The country in the best position in terms of economic growth rate is Turkey. Turkey is followed by India and China. However, unemployment rates are relatively low in Indonesia, Mexico, and China. Unemployment rates in Turkey and Brazil are above 10 percent. China's exports are much higher than other countries and the country's foreign trade has a significant surplus. The country with the highest current account surplus level is the Russian Federation. On the other hand, the current account of countries other than China and Indonesia has a deficit.

2. Logistics Performance Index (LPI)

2.1. Theoretical Framework

LPI is calculated by comparing logistics data for 160 countries and the years 2007, 2010, 2012, 2014, 2016, 2018. The data are obtained as a result of the questionnaires applied to approximately 1000 people working in logistics companies in the countries. LPI consists of six subheadings (Almalki & Alkahtani, 2022; LPI, 2022):

- Customs: Effectiveness of customs and border procedures
- Infrastructure: Quality of trade and transport infrastructure
- International Transport: Ease of arranging international transport
- Logistics Competence: Quality and competence of logistics services
- Freight Monitoring: Tracking and tracking of shipments
- Timeliness: Making the shipments at the scheduled time

The LPI values announced for the countries are calculated by taking the weighted average of the 6 sub-titles mentioned. Examining the sub-parameters as well as the general scores of the developing countries will not only show the logistics performance of the countries but also give detailed information about their competitiveness.

Customs, infrastructure and logistics competence from the LPI components are inputs for the country's supply chain service delivery. Timing, international transport and freight monitoring are output (Cargoline, 2022). Therefore, positive developments in input indicators will also be reflected in output indicators, and the logistics performance of the country will increase (Erkan, Türkiye'de Lojistik Sektörü ve Rekabet Gücü, 2014).

2.2. Literature Review

When the literature is examined, it is seen that there are many studies on the logistics performance of countries. In some of these studies, the logistics performance index was used, and in some of them, different performance analyzes related to the sector were made.

De Faria (2014) compared Brazil's logistics performance index with other countries. It was observed that Brazil ranks 26th in the logistics performance ranking after South Africa, Kuwait and Saudi Arabia (Faria, Souza, & Vieira, 2015). Erkan (2014) examined the relationship between the sub-groups of the logistics performance index of 113 countries for 2014 and the global competitiveness index using regression analysis. The results revealed the importance of railway and port infrastructure in particular (Erkan, 2014). D'Aleo (2015) analyzed the impact of the logistics performance index on the global competitiveness index and gross domestic product in EU-28 countries in the 2007-2014 period. The results showed that the logistics performance index had significant effects on these indicators (d'Aleo, 2015). Danacı and Nacar (2017) compared Turkey's logistics performance with EU member countries using the 2014 logistics performance index data of EU 28 countries and Turkey. The results showed that Turkey was included in the cluster of countries with moderate foreign trade performance, which included Poland, Latvia, Hungary, Portugal, the Czech Republic and Slovenia (Danaci & Nacar, 2017). Selvavinayagam et al. (2018) analyzed the logistics performance of India's postal services. In the analysis using the sub-groups of the logistics performance index, it was stated that the productivity in the sector was low due to the presence of bureaucracy (Selvavinayagam, Francina, & Rameshkumaar, 2018).

Quintero et al. (2018) analyzed Colombia's logistics performance index for infrastructure and construction works for the years 2017 and 2018 by comparing it with similar countries. It was emphasized that the logistics infrastructure of the country was generally weak compared to the logistics infrastructures of countries with a similar level of development in the results of the analysis (Quintero, Ariza, & Mozo, 2018). Bardakçı et al. (2020) examined the relationship between the logistics performance of E-7 and G-7 countries and economic growth and financial development in the 2007-2018 period. The results obtained by panel data analysis showed that the logistics performances of the countries had positive effects especially on economic growth (Bardakçı & Aylin Erdoğdu, 2020).

Yingfei et al. (2021) examined the link between infrastructure and green logistics performance in the services sector in the China. Study results showed that infrastructure and green logistics performance had a beneficial effect on service trade and the environment (Yingfei, ve diğerleri, 2021). Song and Lee (2022) analyzed the impact of logistics performance on international trade in South Korea in their study of the 2010-2018 period. The results showed that logistics performance index components had significant effects on international trade (Song & Lee, 2022). Sanrı and Pişkin (2022) examined the impact of logistics performance index on global competitiveness index and economic growth in OECD countries during the 2007-2018 period. According to the results of the structural equation model, logistics performance had positive effects on both indicators (Sanrı & Pişkin, 2022).

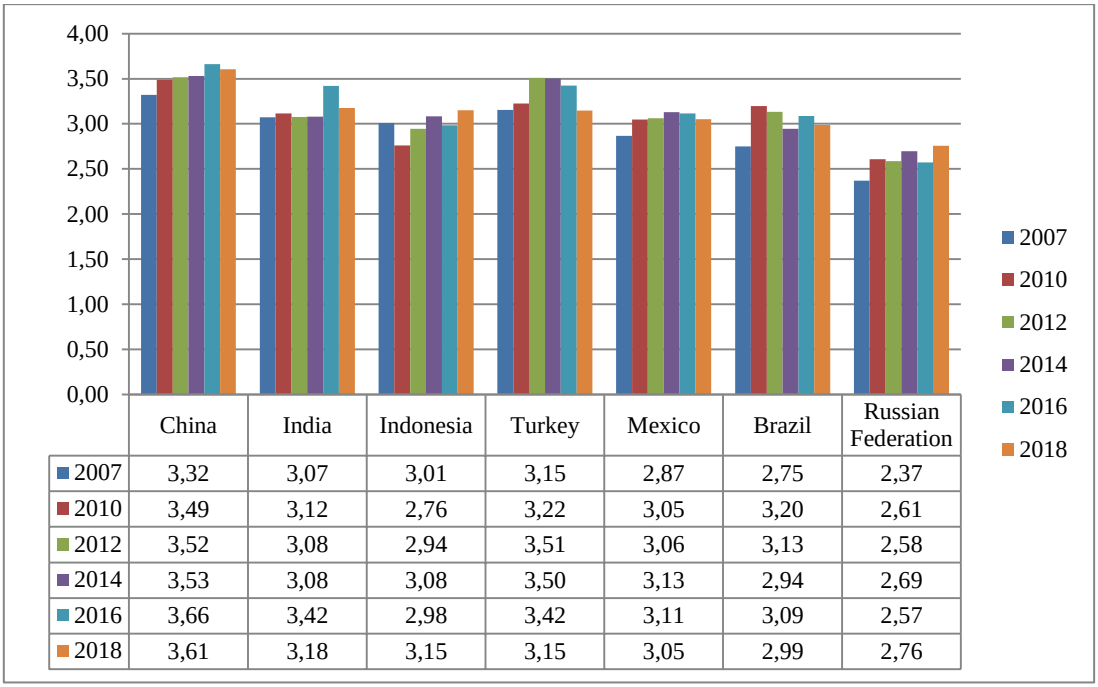
In this study, a comparative analysis of the logistics performance index of E7 countries and its subgroups is made. In this perspective, it is thought that the study can contribute to the literature.

3. LPI Analysis in E7 Countries

LPI overall scores show that among developing countries, China and Turkey are in better condition than other countries (LPI, 2022). However, the country with the lowest index value among the E7 countries is the Russian Federation. The Russian Federation lagged behind other countries in all subgroups of the index (Graph 1).

When the course of the LPI scores of E7 countries is analyzed by years, it is seen that there is a relative improvement. Because the index values of these countries generally increase from year to year.

Graph 1: LPI Overall Scores of E7 Countries



	China	India	Indonesia	Turkey	Mexico	Brazil	Russian Federation
2007	3,32	3,07	3,01	3,15	2,87	2,75	2,37
2010	3,49	3,12	2,76	3,22	3,05	3,20	2,61
2012	3,52	3,08	2,94	3,51	3,06	3,13	2,58
2014	3,53	3,08	3,08	3,50	3,13	2,94	2,69
2016	3,66	3,42	2,98	3,42	3,11	3,09	2,57
2018	3,61	3,18	3,15	3,15	3,05	2,99	2,76

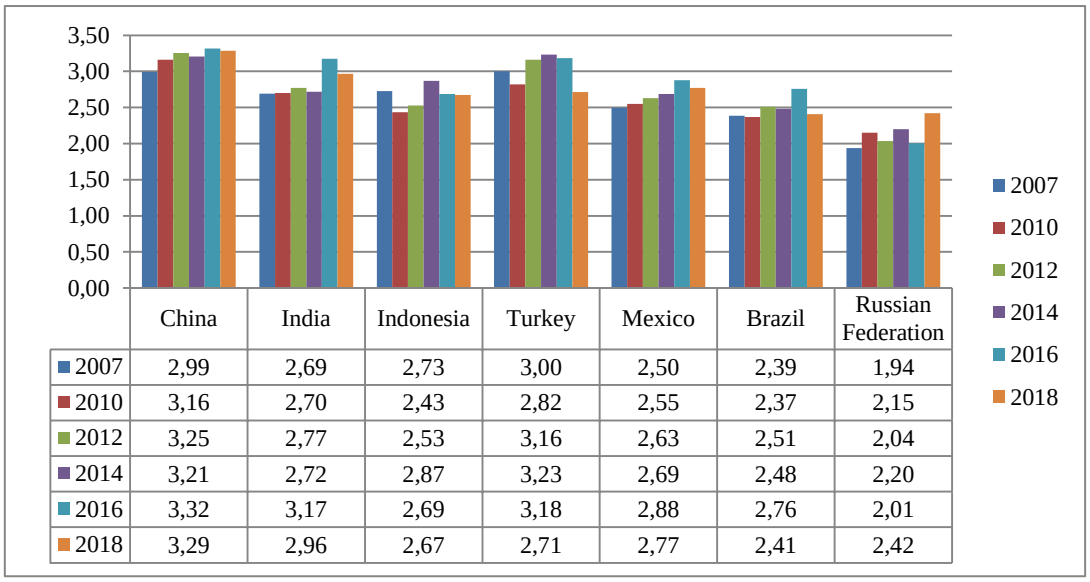
Source: (LPI, 2022)

Between 2007 and 2018, China has the highest scores, while the Russian Federation has the lowest scores. Turkey, on the other hand, made a leap especially in 2012 and 2014. However, Turkey's score in 2018 lagged behind its 2007 score. This situation reveals the instability in Turkey's logistics performance. However, another noteworthy detail is that India has a higher index value in 2016 compared to other years. Mexico, India, Indonesia and Brazil are similar to each other in terms of logistics performance index. The annual average of the LPI scores of the mentioned countries is about 3. However, LPI scores show an unstable outlook from year to year.

3.1 Customs

When the customs quality of E7 countries is analyzed by year and country, it is seen that the highest scores belong to China and Turkey (Graph 2). The countries with the highest scores in 2007 are Turkey and China. In 2010 and 2012, China, and in 2014 Turkey became the country with the highest customs quality. However, Turkey, which showed a significant decrease in 2016, lagged behind China.

Graph 2: LPI Customs Scores of E7 Countries



	China	India	Indonesia	Turkey	Mexico	Brazil	Russian Federation
2007	2,99	2,69	2,73	3,00	2,50	2,39	1,94
2010	3,16	2,70	2,43	2,82	2,55	2,37	2,15
2012	3,25	2,77	2,53	3,16	2,63	2,51	2,04
2014	3,21	2,72	2,87	3,23	2,69	2,48	2,20
2016	3,32	3,17	2,69	3,18	2,88	2,76	2,01
2018	3,29	2,96	2,67	2,71	2,77	2,41	2,42

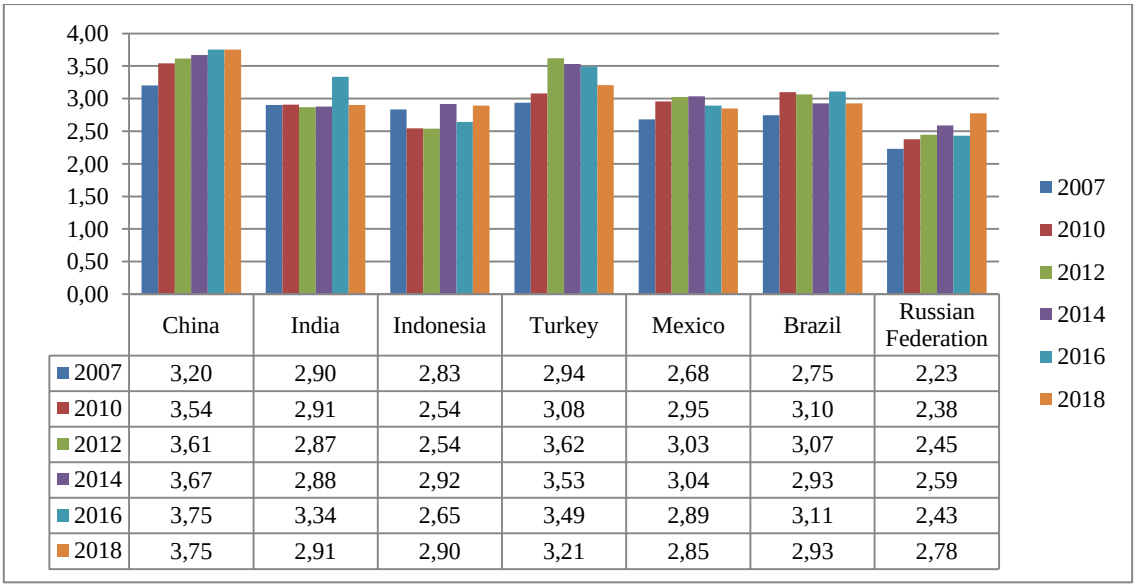
Source: (LPI, 2022)

Between 2007 and 2018, the country with the lowest customs quality was the Russian Federation. Especially in 2007, the Russian Federation's LPI score below 2 is a negative indicator. Although there was an increase in LPI scores in the following years, the Russian Federation lagged behind other countries in the customs subgroup.

3.2 Infrastructure

When the logistics infrastructure of E7 countries is examined, it is seen that the country with the best infrastructure between 2007 and 2018 is China (Graph 3). After China, the country with the best logistics infrastructure is Turkey. Logistics infrastructure in Turkey has made significant progress especially after 2010. Among the E7 countries, India made a significant leap in logistics infrastructure in 2016. However, the country's logistics infrastructure could not display a stable outlook in the following years.

Graph 3: LPI Infrastructure Scores of E7 Countries



	China	India	Indonesia	Turkey	Mexico	Brazil	Russian Federation
2007	3,20	2,90	2,83	2,94	2,68	2,75	2,23
2010	3,54	2,91	2,54	3,08	2,95	3,10	2,38
2012	3,61	2,87	2,54	3,62	3,03	3,07	2,45
2014	3,67	2,88	2,92	3,53	3,04	2,93	2,59
2016	3,75	3,34	2,65	3,49	2,89	3,11	2,43
2018	3,75	2,91	2,90	3,21	2,85	2,93	2,78

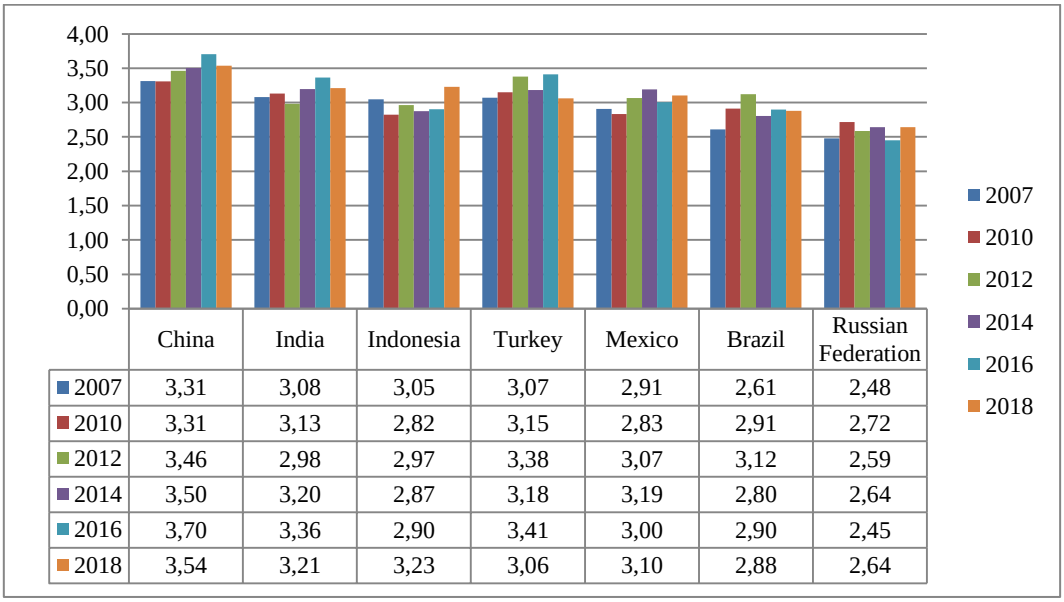
Source: (LPI, 2022)

As in other sub-categories, the country in the worst situation in the logistics infrastructure category is the Russian Federation. However, the fact that Russia has a higher score in 2018 compared to other years and the index values tend to increase shows that the country has made progress in this category.

3.3 International Shipments

When the LPI values of the E7 countries regarding international shipments are examined, it is seen that the countries with the best scores between 2007 and 2018 are China and Turkey (Graph 4). Although there was a relative improvement in its score for 2016, it was obvious that India performed better than China and Turkey in this sub-category, as in other sub-categories.

Graph 4: LPI International Shipments Scores of E7 Countries



	China	India	Indonesia	Turkey	Mexico	Brazil	Russian Federation
2007	3,31	3,08	3,05	3,07	2,91	2,61	2,48
2010	3,31	3,13	2,82	3,15	2,83	2,91	2,72
2012	3,46	2,98	2,97	3,38	3,07	3,12	2,59
2014	3,50	3,20	2,87	3,18	3,19	2,80	2,64
2016	3,70	3,36	2,90	3,41	3,00	2,90	2,45
2018	3,54	3,21	3,23	3,06	3,10	2,88	2,64

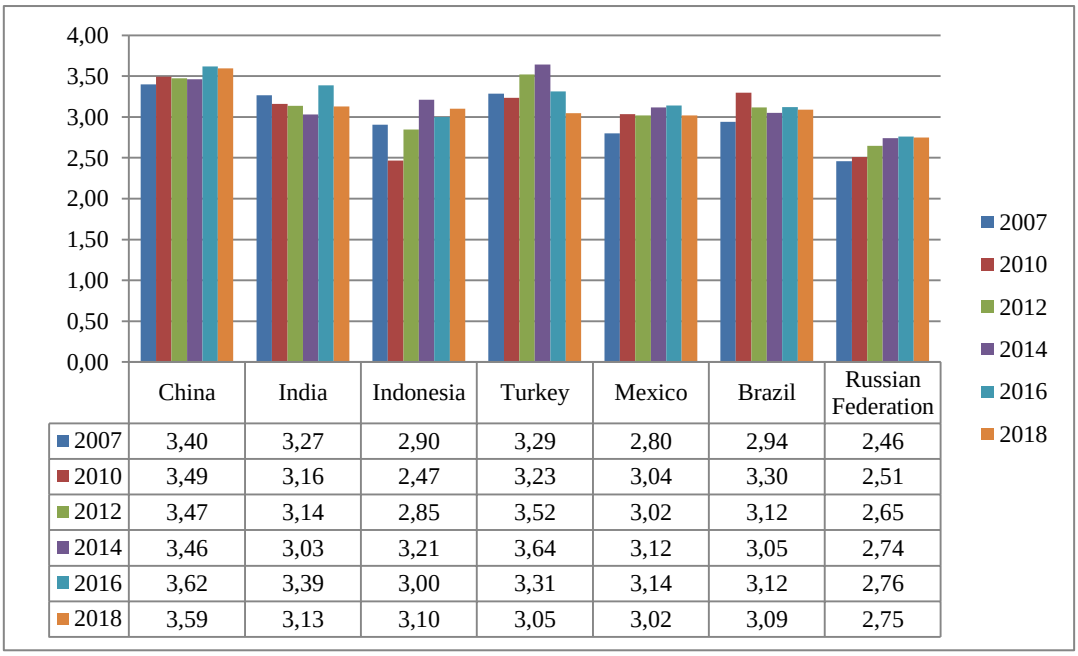
Source: (LPI, 2022)

When the international shipments LPI values are analyzed on a yearly basis, it can be said that China, Turkey, Indonesia and India were in a relatively better situation in 2007. The rise achieved by Brazil in 2010 continued to increase in 2012 as well. However, the country could not sustain this rise in 2014 and beyond. Russia, on the other hand, lagged behind other countries in this sub-category.

3.4 Logistics Quality and Competence

When the logistics quality and competence of the E7 countries in the logistics sector are examined, it is seen that the countries with the best scores between 2007 and 2018 are again China and Turkey (Graph 5). Turkey surpassed other countries in this field, especially in 2014, and had the highest score. Turkey's overtaking of countries such as China and India, which have an important place in world exports, is a positive and important development in the context of the development of the logistics sector.

Graph 5: LPI Logistics Quality Scores of E7 Countries



	China	India	Indonesia	Turkey	Mexico	Brazil	Russian Federation
2007	3,40	3,27	2,90	3,29	2,80	2,94	2,46
2010	3,49	3,16	2,47	3,23	3,04	3,30	2,51
2012	3,47	3,14	2,85	3,52	3,02	3,12	2,65
2014	3,46	3,03	3,21	3,64	3,12	3,05	2,74
2016	3,62	3,39	3,00	3,31	3,14	3,12	2,76
2018	3,59	3,13	3,10	3,05	3,02	3,09	2,75

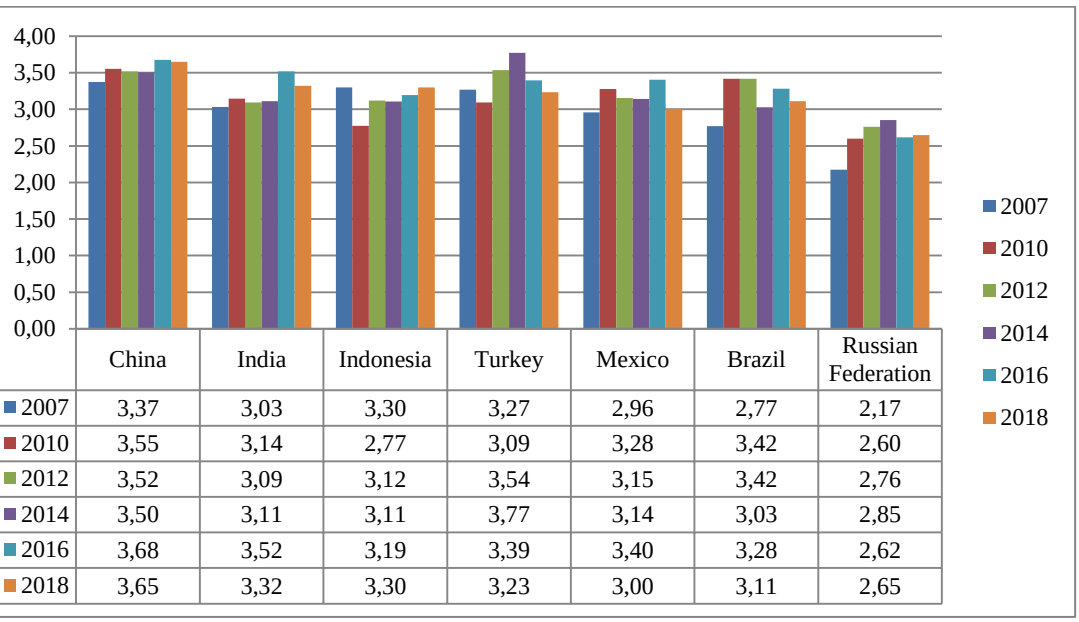
Source: (LPI, 2022)

The highest scores for logistics quality in terms of competence in the logistics sector were achieved in China in 2016 and 2018, India, Mexico and Russia in 2016, Indonesia and Turkey in 2014, and Brazil in 2010. In this sub-category, the Russian Federation lagged behind other countries.

3.5 Tracking and Tracing

When the tracking and tracing quality is examined in E7 countries, it is seen that all countries except Russia have values close to each other (Graph 6). The highest scores were achieved in China in 2016 and 2018, India, Mexico and Brazil in 2016, and Turkey in 2014.

Graph 6: LPI Tracking and Tracing Scores of E7 Countries



	China	India	Indonesia	Turkey	Mexico	Brazil	Russian Federation
2007	3,37	3,03	3,30	3,27	2,96	2,77	2,17
2010	3,55	3,14	2,77	3,09	3,28	3,42	2,60
2012	3,52	3,09	3,12	3,54	3,15	3,42	2,76
2014	3,50	3,11	3,11	3,77	3,14	3,03	2,85
2016	3,68	3,52	3,19	3,39	3,40	3,28	2,62
2018	3,65	3,32	3,30	3,23	3,00	3,11	2,65

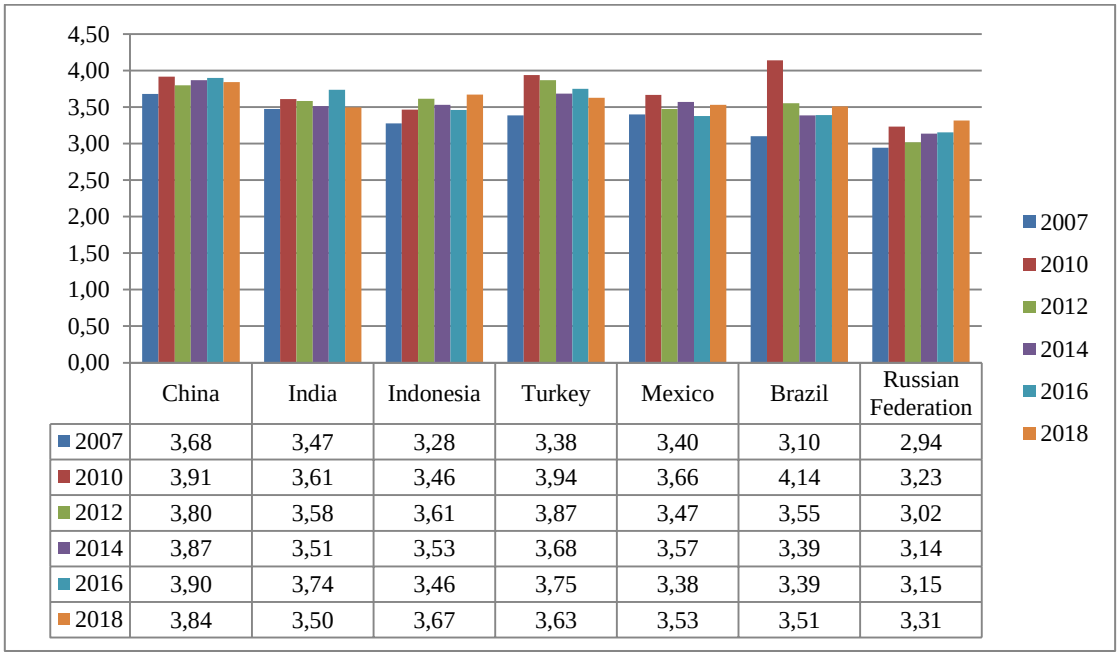
Source: (LPI, 2022)

The logistics performance of the Russian Federation is also insufficient for this subcategory. The fact that the tracking and tracking systems are technological and of good quality, of course, ensures that the products with the logistics provided go to the destination in a safe and secure manner. In this respect, it is inevitable that the competitiveness of the Russian Federation with other countries will become difficult.

3.6 Timeliness

When the timeliness data showing whether a good or service is delivered on time or not, it is seen that Turkey and China have the highest LPI scores in E7 countries in general (Graph 7). In this sub-category, Brazil was the country with the highest score among the E7 countries in 2010. However, the country could not maintain the same performance in other years. Turkey could not maintain the relatively high LPI score it achieved in 2010 in the following years.

Graph 7: LPI Timeliness Scores of E7 Countries



	China	India	Indonesia	Turkey	Mexico	Brazil	Russian Federation
2007	3,68	3,47	3,28	3,38	3,40	3,10	2,94
2010	3,91	3,61	3,46	3,94	3,66	4,14	3,23
2012	3,80	3,58	3,61	3,87	3,47	3,55	3,02
2014	3,87	3,51	3,53	3,68	3,57	3,39	3,14
2016	3,90	3,74	3,46	3,75	3,38	3,39	3,15
2018	3,84	3,50	3,67	3,63	3,53	3,51	3,31

Source: (LPI, 2022)

In this subgroup of LPI, the worst performance among the E7 countries was the Russian Federation. Although the Russian Federation showed a positive performance over the years, the country's LPI score averages were behind other countries.

4. Conclusion

Today, the competitiveness of countries with each other is not only dependent on the quantity and quality of the products they produce and/or export. Of course, in order to increase global competitiveness, countries must first increase the added value of the products they export and the technological equipment in their content. It is obvious that exporting higher number of products with higher added value will increase the share of the country in global exports. However, although countries export more and better quality products, logistics performance and logistics competitiveness also play a key role in increasing the share of countries in global added value.

Especially after the Covid-19 pandemic and the subsequent Ukraine-Russia war, the importance of the logistics performance of the countries has emerged once again. Because many countries have faced serious difficulties in delivering their products to target markets due to national and/or global logistics and supply chain problems. This has led to a decrease in both national and international trade, as well as a decrease in consumer welfare due to general cost and price increases.

In this perspective, in this study, we aimed to analyze the global logistics performances of E7 countries, which are considered to be the pioneers of developing countries, in a comparative way. In this context, the scores of the mentioned countries in the LPI and LPI sub-categories for the years 2007, 2010, 2012, 2014, 2016 and 2018 were analyzed. According to the analysis, the country with the best logistics performance among the E7 countries is China. Both the LPI overall score and the LPI subcategory scores reveal China's industry leadership within the aforementioned country groups. After China, the country with the best logistics performance is Turkey. In many sub-categories, Turkey takes the lead along with China. Although its economic size and weight in world politics are undisputed, the relative weakness of the logistics performance of the Russian Federation is striking. Among the E7 countries, the fact that both the LPI general score and the LPI subcategory scores of the Russian Federation are very low leads to the fact that the country's competitiveness is not sufficient.

The Covid-19 pandemic and the aftermath of the Ukraine-Russia war have once again shown that the logistics performance of countries plays a key role in increasing their sectoral and global competitiveness. It is understood that countries have to deliver the produced product to other geographies of the world in a faster, safer and less costly way. In this context, companies and policy makers need to make long-term strategic plans for the sector, allocate more resources, and increase research and development activities for the sector in order to improve the performance of the logistics sector.

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