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EVALUATION OF TURKEY'S LOGISTICS PERFORMANCE INDEX WITH A STRATEGIC PERSPECTIVE

TÜRKİYE'NİN LOJİSTİK PERFORMANS ENDEKSİNİN STRATEJİK BAKIŞ AÇISIYLA DEĞERLENDİRİLMESİ

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ÖZ

Lojistik, ülkelerin uluslararası arenada rekabet gücünü sağlamada önemli bir rol oynamaktadır. Ülkelerin uluslararası rekabet gücünü yansıtan Lojistik Performans Endeksi, bir ülkenin ticaretteki etkinliğini gösterir. İlaveten, Lojistik Performans Endeksi, ülkelerin ticaret tedarik zincirlerinin veya lojistik hizmetlerinin yerinde verimliliğini belirler. Bu çalışma, Lojistik Performans Endeksi ve alt boyutlarının lojistik firmalarının lojistik performansı üzerindeki etkilerini stratejik bir bakış açısıyla incelemeyi amaçlamaktadır. Araştırma maksatlı veriler, Dünya Bankası veri tabanından ve Uluslararası Taşımacılık ve Lojistik Hizmet Üretenler Derneği veri bankasından toplanmıştır. Temel alınan verilerin sağlamlığı, bireysel lojistik firmalarının faktörleriyle ilgilidir. Ölçümler için regresyon analizleri ile varyans tabanlı yapısal eşitlik modellemesi kullanılmaktadır. Sonuçlar, lojistik ve tedarik zinciri literatürünün aksine, Lojistik Performans Endeksi'nin altyapı ve takip etme alt boyutlarının Türkiye'deki firmaların lojistik performansı ile negatif ilişkili olduğunu göstermektedir.

ABSTRACT

Logistics plays a vital role in ensuring the competitiveness of countries in the international arena. The Logistics Performance Index, which reflects countries' global competitiveness, shows a country's efficiency in trade. Moreover, the Logistics Performance Index determines the countries' on-the-ground efficiency of trade supply chains or logistics services. This study aims to examine the effects of the Logistics Performance Index and its sub-dimensions on the logistics performance of logistics companies from a strategic point of view. The data related to the study is gathered from the World Bank database and the International Association of Forwarding and Logistics Service Providers sectoral databank. The robustness of the underlying data is related to individual logistics firms' factors. Variance-based structural equation modelling with regression analyses is used for measurements. Contrary to the joint logistics and supply chain literature, the results show that infrastructure and tracking sub-dimensions of the Logistics Performance Index negatively relate to firms' logistics performance in Turkey.

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Introduction

Logistics has been playing an increasingly vital role in the international competitiveness of the countries (Kálmán & Tóth, 2021). The Logistics Performance Index (LPI) of the World Bank is the measure that its dimensions can simultaneously express competitiveness and logistics development level, thus, competitive logistics of countries (Rezaei et al., 2018). Moreover, any increase in LPI dimensions significantly affects a country's trade (Martí et al., 2014). Unfortunately, the LPI index is subjective, and the respondents of the surveys' are based on international logistics companies and experts in the international transportation and logistics area (Stepanova, 2022). However, countries' logistics performance depends on the cumulative sum of the individual logistics firms. As a result, the effects of LPI on the firms' logistics performance rather than macro effects must be clearly analyzed.

The Logistics Performance Index (LPI) analyzes national customs, logistics costs, and the logistics infrastructure for transportation. Dimensions are formed according to the competitiveness factors of the country that influence the logistics cost and are influenced by the enablers (d'Aleo, 2015; Logistics Performance Index, 2018). However, in the literature, these enablers are generally measured economically and socially (Eyob & Kahsai, 2019; (Ulutaş & Karaköy, 2019); Kálmán & Tóth, 2021). According to national economic and social enablers, Marti et al. (2017) divided LPI into two main areas. These are two areas regulatory policies and the performance process of governmental services. However, these enablers are nationwide causalities, and the actual logistics performance of the region is the cumulative sum of the individual logistics firms (Liu et al., 2020).

There are three main contributions to literature. First, the outcomes of LPI are relevant to economic levels. Logistics performance indicators have different outcomes at the organizational and national levels. At the organizational level, better LPI performance is associated with improved organizational performance and financial outcomes (Ayantoyinbo & Gbadegesin, 2021; Fugate et al., 2010). At the national level, LPI is generally linked to economic growth, competitiveness, disaster resilience, and sustainability (Çelebĩ & Cĩvelek, 2019; Furkan FahriAltıntaş, 2021; Khan et al., 2017; Mahlet Demere Tadesse et al., 2022; Santos et al., 2020). Second, limited impacts of LPI subdimensions were explored in specific sectors like retail (Green et al., 2008) and healthcare (Cagliano et al., 2022). However, to our knowledge, the impacts of LPI with all dimensions have not been explored in general logistics firms. Third, logistics performance is important for the development and competitiveness of any nation and for the competitiveness and efficiency of all enterprises (Stepanova, 2022). Thus, this paper studied the effects of LPI on individual logistics companies.

Literature Review

Effects of Logistics Performance Indicators on Logistics Firms

The Logistics Performance Index (LPI) has 33 questions with six dimensions (Logistics Performance Index, 2018). These dimensions are customs, infrastructure, quality of service, punctuality, international shipments, tracking, and tracing.

The customs dimension is about the efficiency of the clearance process (i.e., speed, simplicity, and predictability of formalities) by border control authorities, including customs. Infrastructure is the quality of trade and transportation-related infrastructure, including ports, railways, roads, and information technology. Service quality is the overall level of competence and quality of logistic services (e.g., transport companies, customs brokers). Timeliness is the customer's arrival at the recipient within the planned or expected delivery time. International shipments are about how easy it is to arrange shipments to other countries at competitive prices. Shipment tracking and tracing is all about tracking and tracing the shipments from companies as they are shipped. Customs, infrastructure, and quality of service are inputs from policy regulations, while outcomes are the results of service delivery in terms of time, cost, and reliability.

The Effect of LPI and Its Sub-Dimensions on the Performance of Firms

The logistics performance index was created to measure and compare the performance indicators of logistics indicators at the country level. The measurement data has been collected from global individual logistics firms. Thus, it actually measures the perceived performance indicators of individual global firms. However, till now,

much research has been analyzing the models at the country or international level (Sy et al., 2020; d'Aleo, 2015; Kinra et al., 2020; Song & Lee, 2022). Therefore, this study analyzes the impact of the logistics performance index on individual logistics performance. In other words, we analyzed the country-level policy regulations and service delivery outcomes on logistics firms' performance. Moreover, it needs to be made clear which sub-dimensions of LPI affect firms' performance and how they affect it.

Green et al. (2008) examined the impact of logistics performance on organizational performance in a supply chain context. The results showed that logistics performance positively influenced both marketing and financial performance. The study emphasized the role of logistics performance as a focal construct in enhancing overall organizational performance. Logistics performance has been found to directly impact various indicators of organizational performance, including supply chain performance, marketing performance, financial performance, and the performance of the quality management system (Aćimović et al., 2022).

The literature suggests that Logistics Performance Indicators (LPI) positively impact organizational and firm performance. LPI can enhance marketing and financial performance, improve customer loyalty, contribute to supply chain performance, and support sustainability efforts. The findings highlight the importance of monitoring and improving logistics performance to achieve better overall organizational outcomes.

H1: LPI increases the performance of individual logistics firms.

Customs are formed to legitimate trade, collect taxes, and protect the countries (Urciuoli et al., 2013). Thus, customs simultaneously have trade facilitation, revenue mobilization, and protection roles. As a result, from the individual perspective, customs must fill in numerous documentaries and/or carry out physical controls at the border (Cariolle et al., 2019). For LPI customs index represents the clearance process (speed, simplicity, and predictability of formalities) by border management, including customs (Arvis et al., 2016). However, customs clearance is commonly seen as a barrier hindering global logistics performance, even with national regulations compliance roles. At the same time, improving customs can increase firms' competitiveness and employees' performance (Erceg, 2014). Effective customs processes and collaboration can lead to improved logistics service performance. Collaboration between logistics service providers and customers is crucial for service improvement and enhanced performance (Lai et al., 2020). As a result, increasing the capacity of checkpoints or reducing the workloads may increase individual logistics firms' performance (Malevich et al., 2020). However, it will ruin the general economic state of the national logistics.

H1a: Developed customs and their services increase the logistics firms' performance.

Transport infrastructure is critical to the spatial distribution of logistics firms (Holl & Mariotti, 2018a). To be competitive, logistics firms should consider the speed of delivery as much as costs. If infrastructure charges too much, customers will see phantom costs, and the customer abandonment rate can skyrocket. If infrastructure is not developed, logistics firms must absorb a part of the transportation costs, and hence logistics firms' bottom profit lines can quickly disappear. Phantom cost is a shipping charge imposed upon a customer over the actual shipping cost incurred by the seller. Absorption cost is a geographic pricing strategy in which a seller absorbs a part of the shipping cost in delivering the goods to capture the business (Sarder, 2021a). Single zone pricing refers to charging the same price to all customers regardless of their geographical locations. Multiple zone pricing refers to charging different prices to customers based on their geographical locations (Sarder, 2021b). According to this literature, logistics firms price their services relative to the geographical distance to customers or transportation infrastructure. For example, highways are essential for logistics firms' performance (Holl & Mariotti, 2018b), but the infrastructure is complementary for distribution rather than a single factor.

Transportation infrastructure also plays a crucial role in logistics firms' international trade and export flows (Aldakhil et al., 2018). The accessibility and efficiency of transportation infrastructure facilitate the smooth flow of goods and information, enabling logistics firms to enhance their innovation capabilities and improve their overall performance. Additionally, poor transportation infrastructure, such as inadequate and lack of communication infrastructure, can hinder improving logistics services and firm performance (Han et al., 2009). Furthermore, the location of logistics firms is closely related to transportation infrastructure. Logistics firms tend to locate closer to highways and other transport infrastructure than other sectors (Holl & Mariotti, 2018a).

H1b: Competitive transportation infrastructure positively affects logistics firms' logistics performances. In other words, the higher the LPI score of the infrastructure dimension, the higher the logistics performance of the firms.

National logistics services sustain the flow of supplies through subsequent configurations of nodes and paths, which are specifically organized and integrated within a given business system (Fechner, 2010). These national services are essential in two complementary ways to the logistics firms. First, logistics firms have been increasingly outsourcing (Bolumole, 2003). Thus, these services determine the profits and competency of the company (Sarder, 2021b). National logistics services regulate and control logistics firms' services (Sharahi & Abedian, 2009). These governmental services include business and political environments, human resources, information systems, and customs administrations.

Logistics service capabilities have been identified as crucial in transforming intrafirm resources and interfirm relationships into logistics performance (Yang & Lirn, 2017). The specific capabilities of logistics service providers, such as container shipping firms, play a vital role in achieving logistics performance and meeting customer needs. in a nutshell, efficient logistics services and infrastructure contribute to reducing costs and delays in cross-border transactions (Yekini & Seyed, 2021).

H1c: The competence and quality of logistics services increase logistics firms' performance.

Timeliness is reaching the customer to the consignee within the scheduled or expected delivery time. It can be five forms: choice of the delivery date, delivery time slot, delivery on the first date arranged, delivery within a specified time slot, quick/fast delivery (Sweeney & Waters, 2021). However, shortening delivery time may result in ignored quality, cost-efficiency, and service process efficiency (Coyle et al., 2020; Sweeney & Waters, 2021). In other words, fast delivery times decrease the 4R framework that is resiliency, reliability, and realigns. Because faster delivery services like air distribution may disrupt receipt, validation, and creation of customer orders (Miller & Liberatore, 2021). Nevertheless, timeliness in LPI covers expected or scheduled delivery times. Logistics organizations have culture (Cameron & Quinn, 2006) or management processes for effective organizations at a country level.

H1d: Timeliness increases the individual logistics firms' performance.

International shipments are the ease of arranging competitively priced shipments (Arvis et al., 2016). When consolidating shipments and transportation services reaches economies of scale and reduces transportation costs, firms' performance will increase. However, the economies of scale of shipments may result from some big logistics firms instead of smaller, high-frequency shipments of smaller logistics firms. So, in the LPI, the shipments negatively influence the load factor (Sweeney & Waters, 2021). On the other hand, competitive price shipments can deliver products directly from manufacturing to the customer by eliminating intermediate distribution investments and capabilities. For example, Ismail and Mahran (2021) found that competitive international shipment prices can influence customer loyalty in manufacturing companies that use third-party logistics (3PL) services. They mentioned that changes in the trade environment, including pricing competitiveness, can impact companies that provide low-cost services to their clients. Moreover, the ease of arranging competitively priced international shipments is one of the indicators analyzed in the Logistics Performance Index (LPI) (Olyanga et al., 2022).

H1e: Competitive international shipment prices increase the logistics firms' performance.

The tracking and tracing dimension is about the ability to track and trace firms' consignments when shipping (Arvis et al., 2016). Tracking and tracing technologies are part of global supply chains and logistics industry surveillance and monitoring mechanisms (Kanngieser, 2013). In a competitive logistics sector, tracking and tracing systems are essential for providers to perform inventory management, value-added services, and supply chain management (Ozbekler & Ozturkoglu, 2020). Unfortunately, logistics firms should consider multiple factors when analyzing the investment in tracking systems (Coyle et al., 2020). First, these systems are economically expensive and time-consuming for any firm. Second, tracking systems require software to establish standardized data and reporting (Hofmann, 2014).

On the other hand, tracking and tracing have many advantages, like tracking vehicles, particularly fuel savings and timely delivery rates (Aydınocak, 2022). Tracking services enable logistics firms to differentiate themselves and meet the intense competition in the market. Moreover, tracking may increase the effectiveness of other dimensions of LPI because tracking enables a highly accurate mapping and prediction of pickup and drop-off times-timeliness, and effective use of routes-infrastructure (Demir et al., 2019).

H1f: Effective tracking and tracing positively increases logistics firms' performance.
The overview of proposed hypotheses and the model can be seen in Figure 1.

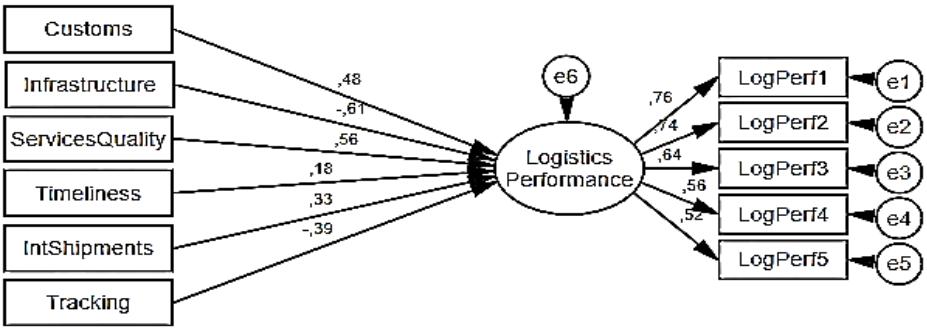

Figure 1. Impact scores of sub-dimensions of LPI on logistics firms' performance

Methodology

Data and sample

The research aims to analyze the relative performance level of Turkish logistics companies' performance between 2007-2018 according to the effect of the logistics performance index. Since the Logistics Performance Index (LPI) data reflect country-based economic indicators, data for Turkey were analyzed. The Logistics Performance Index (LPI) data obtained from the World Bank' logistics performance data base. Then data were analyzed with the structural equation modeling method. Moreover, hierarchical regression analysis was performed to see the effects of LPI individual dimensions on firms' logistic performance. In the study, customs, infrastructure, services quality, timeliness, international shipments, tracking and tracing variables were considered as independent variables, and logistics performance as dependent variables as LPI sub-components.

The logistics performance data, the dependent variable, were gathered from the International Association of Forwarding and Logistics Service Providers (UTIKAD) sectoral data bank between 2019-2020. The study considers trade volume, market coverage, growth, cost efficiency, and investment rate variables sub-components of logistics performance.

The research analyzes logistics performance index values and logistics performance values at different time intervals. The main reason is that the enterprises' performances do not appear immediately. In other words, performance emerges after a certain process or operation is performed. In this respect, the performance data of enterprises reflect the situation of previous years, not the current year's situation. For example, the logistics performance index values discussed in our research show the past few years' average, not the specified years. For this reason, to make an accurate assessment of the company's performance, the values of a few years later, which will reflect the company's logistics performance, are discussed.

Looking at Turkey's logistics performance between 2007 and 2018 from the World Bank Logistics Performance Index (LPI) data, it is 34th in 2007 (150 countries in total), 39th in 2010 (155 countries in total), 27th in 2012 (total). 155 countries), 30th place in 2014 (a total of 160 countries), 34th place in 2016 (a total of 160 countries), and 47th place in 2018 (a total of 160 countries). According to the LPI ranking in recent years, it is seen that Turkey's LPI ranking has regressed. However, in the context of Turkey, the effect of LPI sub-components on the logistics performance of Turkish logistics companies and which components need to be developed and improved have been determined by this study.

Results and Discussion

Logistics literature generally agreed upon the positive effects of LPI on logistics performance (Bensassi et al., 2015; Civelek et al., 2015; Erkan, 2014). However, the research on LPI has three main constraints. First, the LPI has been discussed as a single construct instead of second order construct with subdimensions. Second, for

example, one or more dimensions are separately analyzed (Gunasekaran & Kobu, 2007; Limao, 2001; Uca et al., 2016). Third, the difference among the logistic performance indexes also appears to be relevant to governments' policies or organizations (Faria et al., 2015; Green et al., 2008; Töyli et al., 2008). In other words, LPI is context-related, so research in different nations, levels, or sectors is necessary.

According to the structural equation model, standardized regressions of the sub-dimensions' impact on firms' performance are in Table 1. All the regression coefficients are statistically significant. Nevertheless, two of them harm firms' logistics performance. The infrastructure sub-dimension decreases the logistics performance of the firms by -.61. In other words, every one-point increase in the infrastructure decreases firms' logistics performance by 0.61. Khadim et al. (2021) also found that the contribution of logistics to economic growth is negative for developing countries. However, even if they used LPI for logistics performance measurement, they didn't clearly express which index's subdimension or subdimensions are significant on this negative impact. Thus, our research results clarified that infrastructure and tracking subdimensions negatively affect logistics firms' performance.

According to LPI, infrastructure is related to transport basic structure and the trade framework of interdependent systems and institutions (Logistics Performance Index, 2018). The negative impact of competitive transportation infrastructure is an exciting result of this paper even if the previous research found a positive relationship (Cigu et al., 2018; Vlahinić Lenz et al., 2018). However, Nannan et al. (2012) explored that, especially in underdeveloped areas the transportation infrastructure is ineffective and must be supported by other factors of LPI. Moreover, the effects of transportation infrastructure are relative to the transportation modes. For example, railways' positive effects are more significant than road ones (Dehghan Shabani & Safaie, 2018). In a nutshell, the negative impact of infrastructure proposes that regional development of trade systems and institutions and transport/logistics structure development are not mutually evolving (Carlucci et al., 2017). More than that the existence of trade services is required. Providing low-quality services to consumers will result in inconvenient and less profitable outcomes (Nechaev et al., 2021).

Moreover, Olyanga et al. (2022) paper showed that infrastructure is not related to logistics competitiveness. They explained that by increased transport expenditures such as road tolls, axle load limitations. Thus, improving transportation infrastructure also increases transportation costs, decreasing logistics performance of the logistics firms.

If any logistics firms can track and trace consignments, this process is called tracking and tracing. Our results showed that tracking LPI's subdimension negatively affects logistics firms' performance (-.338). in other words, every one-point increase in tracking subdimension will decrease logistics firms' performance by approximately 0.4 points. This result is interesting from both the customer and logistics firms view. We interpreted this negative impact by the mounting investment costs for the exhibition but against the current economic situation, which requires more technology spending.

Moreover, Václav and Dana (2021) argued that supply chains without storage operations (warehouses) are ineffective. Therefore, we can arguably say that an effective supply chain process is not direct but nodes of warehouse dependent. In that case, tracking and tracing the goods while waiting in the warehouse is inefficient, which can be the case for the Turkish logistics system.

Effective sub-dimensions are customs, service quality, timeliness, and international shipments. Of all positive dimensions, service quality has the highest impact on logistics performance (.560), and timeliness is the lowest (.184). According to LPI, service quality represents logistics services' competence and quality. These results are coherent with the general service industry's research that quality perceptions in the service sector are among the most critical performance factors (Kaswengi & Lambey-Checchin, 2019).

Table 1. Standardized Regression Weights with "p" Values of the Model

Dependent variable		Independent variable	S.E.	C.R.	P	Estimate
Logistics_Performance	<---	Customs	,135	8,111	***	,478
Logistics_Performance	<---	Infrastructure	,112	-10,211	***	-,607
Logistics_Performance	<---	ServicesQuality	,142	9,457	***	,560
Logistics_Performance	<---	Timeliness	,130	3,161	,002	,184
Logistics_Performance	<---	IntShipments	,177	5,634	***	,329
Logistics_Performance	<---	Tracking	,113	-6,623	***	-,388

Additionally, LPI grouped dimensions as Input and outcome LPI indicators (Logistics Performance Index, 2018, p. 8). Inputs are related to policy regulations that are customs, infrastructure, and service quality. Service delivery performance outcomes are timeliness, international shipments, tracking and tracing. Therefore, we also checked the grouping effects of input and outcome LPI indicators on firms' logistics performance.

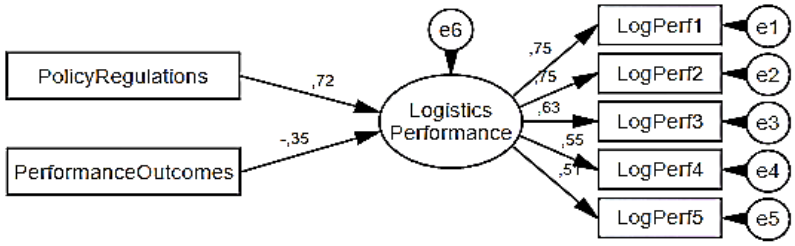

Figure 2. Input and Outcome LPI Indicators' Impact on Firms' Logistics Performance

According to standardized regression weights (Table 2), inputs (policy regulations) statistically and significantly affect firms' logistics performance by .716. This means every one-point input in LPI will increase logistics firms' logistics performance by 0.72 points. On the other hand, outcomes of service delivery performance are statistically insignificant. The previous sub-dimension model supports these results that we found the impact of tracking subdimension negative and the effect of timeliness very low (.18) on firms' logistics performance. These results are exciting research outcomes of this paper. Performance outcomes are related to service delivery performance outcomes (LPI, 2018). Thus, the existence of service premises is not enough, but their service quality and human resources also have important.

Table 2. Standardized Regression Weights

Nomenclature			S.E.	C.R.	P	Estimate
Logistics_Performance	<---	Policy Regulations	,344	4,133	***	,716
Logistics_Performance	<---	Performance Outcomes	,648	-1,618	,106	-,348

Conclusions and Practical Impacts

The World Bank's Logistics Performance Index (LPI) analyzes countries from the perspective of international company surveys. Consequently, LPI has been used for country performance measurements to determine their logistic competitiveness in trade logistics (Alptekin & Çağatay, 2019). However, the LPI is the cumulative sum of the effectiveness of individual logistics companies tied to nationwide logistics investments and services. Therefore, unlike in the usual literature, we measured LPI's effects on individual logistics companies' logistics performance. For this study we proposed one main and six sub-hypotheses (Table 3). The dependent variable is the logistic performance of the logistic companies, and the independent variables are LPI and its sub-dimensions. According to our analysis, all hypotheses are accepted except infrastructure and route dimensions. These results contrast with the expected literature, as infrastructure has been studied as a positive factor in logistics. However, according to LPI explanations, infrastructure is the quality of trade and transport-related infrastructure (Logistics Performance Index, 2018). As a result, the infrastructure in Turkey (this result can be generalized to all developing countries) is not oriented toward trade or logistics. These results agree with the previous study by Khadim et al. (2021). The authors found that their labor and capital factor inputs differed slightly even when developed and developing countries had similar LPI scores. Another coherent study (Wang et al., 2021) found that not all infrastructure but only maritime transport has an accident effect on LPI. The practical meaning of this result is to build infrastructure without the holistic approach (not connecting all logistic and transport nodes); The skilled workforce is not effective in the logistic performance of the enterprises. On the contrary, adequate strategic infrastructure negatively affects the logistic performance of companies due to insufficient maintenance, low quality of service, fees, etc. (Nechaev et al., 2021).

In summary, the effects of transformation infrastructure on organizational logistics performance are multifaceted. For example, introducing e-business applications as a tool for seamless and integrated supply chain

operations requires managers to recognize the impact of different e-business applications on their supply chains (Bak, 2016). This highlights the need for organizations to understand the impact of infrastructure, such as e-business applications, on their supply chain operations and overall organizational transformation. So, logistics organizations in developing countries may not adapt transformation infrastructure or use it effectively. For example, railroad logistics still need to be improved in Turkiye. The railway transportation system in Turkey has the advantage of releasing the lowest CO2 emissions and consuming less energy compared to other modes of transportation (Bilgili et al., 2019). However, the railway system in Turkey still faces challenges, such as inadequate infrastructure and low demand (Gökirmak, 2013).

Table 3. The Hypotheses Results

Relationships			Path Value Standardized ß		Conclusion
Hypothesis	Independent Variable	Dependent Variable	Model 1	Model 2	Supported/ Unsupported
H_1	Logistics Performance Index (LPI)	Logistics Perf. (LP)	0.682**		Supported
H1a	Customs	LP		0.478***	Supported
H1b	Infrastructure	LP		-0.607***	*Unsupported*
H1c	Services Quality	LP		0.560***	Supported
H1d	Timeliness	LP		0.184***	Supported
H1e	Inter-National Shipments	LP		0.329***	Supported
H1f	Tracking and Tracing	LP		-0.388***	*Unsupported*

Path coefficients are standardized. ****p < 0.01*, ***p < 0.05*, ad; *p>0.05*.

Similarly, the tracking and tracing factor is negatively associated with firms' logistics performance; thus, hypothesis H1f is rejected. Johansson and Pålsson (2009) coherently found that using tracking technologies without proper practices and a strategic logistics view has no significant impact on companies. The findings may indicate that logistics firms' managers and governors invest in technologies such as logistics systems, not individual sets.

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GENİŞLETİLMİŞ ÖZET

Ülkelerin uluslararası arenada rekabet gücü sağlamalarında lojistik sektörü, önemli bir rol oynamaktadır. Bir ülkenin ticaretteki etkinliğini, ülkelerin uluslararası rekabet gücünü yansıtan lojistik performans endeksi gösterir. Bununla birlikte, lojistik performans endeksi, dünya çapındaki lojistik firmalarının yöneticilerinin bakış açısıyla ülkelerin tedarik zincirlerinin veya lojistik hizmetlerinin bulundukları yerdeki ticaret verimliliğini belirler. Bu çalışma, lojistik performans endeksi ve alt boyutlarının lojistik firmalarının lojistik performansı üzerindeki etkilerini incelemeyi amaçlamaktadır.Lojistik performans endeksi, çalışmanın bağımsız değişkenidir. Lojistik performans endeksi verileri, ülke bazlı ekonomik göstergeleri yansıttığı için bu çalışmada Türkiye verileri analiz edilmiştir. Lojistik performans endeksi verileri Dünya Bankası'nın lojistik performans veri tabanından elde edilmiştir. Elde edilen veriler, 2007–2018 yılları arasını göstermektedir. Lojistik performans endeksi alt bileşenleri olan gümrük, altyapı, hizmet kalitesi, zamanlılık, uluslararası sevkiyatlar, izleme ve takip değişkenleri çalışmanın bağımsız değişkenlerdir. Lojistik performansı ise çalışmanın bağımlı değişkenidir. Bağımlı değişken olan lojistik performans verileri 2019-2020 yılları arasında, Uluslararası Taşımacılık ve Lojistik Hizmet Üretenler Derneği (UTIKAD) veri bankasından alınmıştır. Lojistik performansın alt bileşenleri olan ticaret hacmi, pazar kapsamı, büyüme, maliyet etkinliği ve yatırım oranı bağımlı değişken olarak kabul edilmiştir. Elde edilen verilerin ölçümlenmesi için regresyon analizleri ile varyans tabanlı yapısal eşitlik modellemesi kullanılmıştır. Veriler yapısal eşitlik modelleme yöntemi ile analiz edilmiştir. Ayrıca, lojistik performans endeksi boyutlarının firmaların lojistik performansı üzerindeki etkilerini görmek için hiyerarşik regresyon analizi yapılmıştır.Yapısal eşitlik modeline göre firmaların performansına etki eden alt boyutların standartlaştırılmış regresyonları çalışmada verilmiştir. Tüm regresyon katsayıları istatistiksel olarak anlamlıdır. Ancak bunlardan ikisi (altyapı ve izleme-takip) firmaların lojistik performansı üzerinde olumsuz etkiye sahiptir. Altyapı alt boyutu, firmaların lojistik performansını (-.61) oranında azaltmaktadır. Yani altyapıdaki her bir puanlık artış firmaların lojistik performanslarını 0,61 oranında düşürmektedir. Lojistik performans endeksine göre altyapı, ulaşım temel yapısı ve birbirine bağımlı sistem ve kurumların ticaret çerçevesi ile ilgilidir (Lojistik Performans Endeksi, 2018). Altyapının olumsuz etkisi, ticaret sistemlerinin ve kurumlarının bölgesel gelişiminin ve ulaşım/lojistik yapı gelişiminin karşılıklı olarak gelişmediğini öne sürmektedir (Carlucci ve diğerleri, 2017). Sonuçlarımız, lojistik performans endeksinin izleme alt boyutunun lojistik firmalarının performansı ile negatif ilişkili olduğunu göstermiştir (-.338). Yani takip alt boyutundaki her bir puanlık artış lojistik firmalarının lojistik performansını yaklaşık 0,4 puan azaltacaktır. Pozitif etkili alt boyutlar gümrük, hizmet kalitesi, zamanlılık ve uluslararası sevkiyatlardır. Tüm olumlu boyutlar arasında, hizmet kalitesi lojistik performans üzerinde (.560) en yüksek etkiye sahiptir ve zamanlılık en düşük (.184) etkiye sahiptir. Lojistik performans endeksine göre hizmet kalitesi, lojistik hizmetlerin yetkinliğini ve kalitesini temsil eder. Bu sonuçlar, genel hizmet sektörünün hizmet sektöründeki kalite algılarının en kritik performans faktörleri arasında yer aldığına ilişkin araştırması ile uyumludur (Kaswengi & Lambey-Checchin, 2019).

Dünya Bankası'nın lojistik performans endeksi, ülkeleri uluslararası firmaların anketleri aracılığıyla analiz eder. Sonuç olarak, ülkelerin ticaret lojistiğindeki lojistik rekabet güçlerini belirlemek için performans ölçümlerinde lojistik performans endeksi kullanılmıştır (Alptekin ve Çağatay, 2019). Ancak lojistik performans endeksi, bireysel lojistik firmalarının ülke çapındaki lojistik yatırım ve hizmetlere bağlı etkinliğinin kümülatif toplamıdır. Bu nedenle, yaygın literatürden farklı olarak, bu çalışmada lojistik performans endeksinin bireysel lojistik firmalarının lojistik performansı üzerindeki etkilerini ölçümlenmiştir. Çalışmada bir ana ve altı alt hipotez önerilmiş ve analiz sonuçlarına göre, ikisi hariç (altyapı ve izleme boyutları) tüm hipotezler kabul edilmiştir. Bu sonuçlar Khadim ve diğerleri (2021) tarafından yapılan çalışma ile uyumludur. Khadim ve diğerleri (2021), gelişmiş ve gelişmekte olan ülkeler yakın lojistik performans endeksi puanlarına sahip olsalar bile emek ve sermaye faktörü girdilerinin biraz farklı olduğunu öne sürmüşlerdir. Benzer bir çalışma Wang ve diğerleri, (2021) tarafından yapılmıştır. Bu araştırmacılar, tüm altyapının değil, yalnızca deniz taşımacılığının lojistik performans endeksi üzerinde bir zayiat etkisi olduğunu ortaya koymuşlardır. Etkin bir stratejik altyapı olmadan yetersiz bakım, düşük hizmet kalitesi, ücretler vb. sebepler firmaların lojistik performansını olumsuz yönde etkilemektedir (Nechaev ve diğerleri, 2021). Yapılan çalışmada benzer şekilde, izleme ve takip etme faktörü de firmaların lojistik performansı ile negatif ilişkili çıkmış; dolayısıyla H1f hipotezi reddedilmiştir. Yapılan çalışmanın sonuçlarını özetlersek, lojistik ve tedarik zinciri literatürünün aksine, lojistik performans endeksinin altyapı ve takip etme alt boyutlarının Türkiye'deki firmaların lojistik performansı ile negatif ilişkili olduğunu göstermektedir.