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Current Overview and Interpretation of Linked Data on Transport Modes in Turkey in 2023

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Abstract
Logistics can be considered as the main tool of international trade and integration in the world. Logistics, known for its frequent application activities, especially in the military field, until the 1900s, literally became one of the main actors of a global revolution that took place in the mid-1900s. As we approach 2023, the logistics industry continues to exist with a GDP share of 10% - 15% in developed world countries. The sector appeals to a very wide area in economic terms, based on the breadth of its fields of activity. It is stated in UTIKAD reports that the logistics market will exceed 10.68 trillion US dollars as it enters 2023. In this regard, it is possible to say that the global trade dimensions of especially the developed world countries have increased. It should be noted that some wars between countries have caused changes in everything from the energy crisis to logistics trade routes, and the embargoes imposed between countries have periodic financial effects.

Türkiye will enter the 100th anniversary of its founding on October 29, 2023. It has been determined that the policies and practices of transportation systems, the foundations of which were laid by Mustafa Kemal Atatürk, the founder of the Republic of Turkey, have developed from time to time over the years and have also entered a period of stagnation from time to time. In this article, an overview of the activities that took place from the establishment of the Republic of Turkey to this year is presented. In the study, information was provided by examining Turkey's current situation in the land, air, railway and maritime transportation sector, as well as its position in pipeline transportation. Additionally, with a critical approach to the logistics sector implemented in Turkey, the steps that need to be taken for the development of the sector will be explained. It is also suggested that the data can be used in a new study by presenting averages of some of the variables in proportion to the relevant parameters in order to obtain meaningful results, especially for monitoring the development of the country. In this regard, it is necessary to pay attention to disadvantages such as the lack of transportation-communication network, which has been one of the investment areas since the 2000s.

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1. Giriş

Logistics, which is one of the sectors that have developed in recent years in Turkey and in the world, is also an important part of the global economy. Logistics is indispensable, especially during the production phase. Unless a logistics network is established in any market where international trade is involved, it is not possible to talk about full international trade. Although the basic production factors are based on "labor, capital, natural resources, enterprise", it is impossible not to mention the concept of "logistics" in general production factors.

The transportation system consists of highway, seaway, airline, railway and pipeline subsystems, each of which has its own unique characteristics (Lambert et al., 1998: 219). However, by designing transportation systems to complement each other, multiple transportation systems that allow transportation at lower costs are being developed. This process also shows the market spectrum of economic need for logistics.

As it is known, the "producer-to-consumer" model in the distribution network in marketing also existed before. In this system, the manufacturer needs a supply model to realize production outputs. This supply chain model starts with a feasibility study and the production process created during this time. The supply process takes place with the continuous support of logistics systems. At the same time, storage and inventory control along with information flows are also included in this process. In the light of these data, it is possible to talk about an important multi-supplier economic network.

The logistics sector is seen as one of the three most important sectors in the last century, along with the technology and health sectors. Logistics, which is one of the determinants of the inter-sectoral competitive network, is one of the sectors in which developed countries make serious investments. The logistics market, which has reached 10.68 trillion dollars, will gradually increase its share and investments in this field will expand.

The key element of logistics activities is transportation. The transportation system in the modes of road, air, sea, railway and pipelines is generally seen as the main building block of logistics. The integrations in each mode also attract attention in these systems. These transportation systems have evolved over time and have become integrated models.

In this sense, it involves companies making logistics investments in some components such as many transportation networks, storage systems, information and communication tools, packaging services, financial supply chain management. Logistics investments have many outcomes. However, it also has important objectives such as integration with trade and supply chains, better use of national transportation resources, creating new employment opportunities and providing lower costs in more competitive imports and exports. Although institutional infrastructure investments are still insufficient for load distribution, investments need to be made within a broader framework, including logistics support activities (Rodrigue, 2012).

At this point, it is important for countries to tend towards foreign trade surplus in order to increase their economic growth rates and take a more functional place in the global market. This is a situation that can only happen with exports. It is a reality that exports can be at a satisfactory level only if the countries' production networks and product diversity are high. Based on the data announced by the Ministry of Commerce in Turkey, the foreign trade deficit in 2023 is stated as 360 billion dollars. In 21017, it was 77 billion dollars. The USA is the country with the largest foreign trade deficit. After 2017, the USA derived a series of import-blocking policies to reduce the foreign trade deficit and produced policies aimed at becoming an investment center. The US foreign trade deficit will increase by around 20% by 2023 compared to 2017. However, foreign trade transactions, which have a complex appearance in recent years, have increased the importance of logistics, and it has become necessary for countries to develop and integrate the mentioned policies and strategies with their logistics strategies.

For this purpose, in the study, the logistics of the countries It has been tried to emphasize its importance in economic development and its relationship with global competitiveness. Attention was drawn to Turkey's investments in transportation systems according to modes and investment suggestions were made for the logistics sector.

2. Conceptual Literature on Logistics

Logistics concept; It can be defined as the set of activities that control the organization of the product or service during its transportation from one place to another and the process of transportation of the product or service from the first point to the final consumer (Waters, 2003). The discipline of logistics, which includes the movement of people, information and goods, is gradually expanding its boundaries (Dinçel, 2016). Basically, logistics is defined as a discipline that includes the implementation of activity areas such as storage, packaging, order planning, service inventory of requested services with a feasible accessibility (Dinçel, 2019). Logistics is also Dr. It was expanded by Ömer Baybars Tek with a very sophisticated explanation, defining it as "making promises and keeping one's word" (Tek, 2012). At this stage, it can be said that the words "making a promise" and "keeping one's word" refer to a wide range of logistics, together with business science, within the scope of the business discipline that includes international trade. At this stage, it can be stated that logistics science is expected to expand within the academic framework.

Logistics involves different modes of transportation. The mode with the highest transaction volume is transportation. It is seen that the concept of transportation was expressed as transportation in our country until the 1960s, and today it was expressed as transportation. Transportation; It is expressed as the movement of people and goods from one place to another (Black, 2003). Transportation, which is thought to have existed since the beginning of human history, continues to increase in importance. Transportation, which we encounter in every aspect of our lives, has begun to make its importance felt even more with the advancement of technology and the globalization of the world. The product produced at one end of the world can easily return to production activity at the current location, thanks to transportation efficiency, and be reflected in society as physical output. Almost

every creature we see around us is a result of transportation activities. The transportation factor, which is so effective in our lives, is an area of activity that needs to be monitored, developed and emphasized. It is possible to talk about five different headings within transportation activities. These; road, air, sea, railway and pipeline transportation. Although these transportation activities do not have superiority over each other, it is not possible for them to be rivals. Transportation types are classified according to transportation vehicles, forms and features. In this section, each type of transportation will be discussed in detail (Geisler, 1986; Zehtabchi et al., 2011; Rasera&Teyssier, 2006; Lynn, 2019; Arnold, 2020). The transportation sector is a fundamental part of the economy with its role in the production of goods and services. It contributes to the development of the economy and the creation of added value. Economic activities differ according to regions and geographical structure through transportation and indirectly shape the economy. On the other hand, transportation systems are also shaped by regional and geographical reasons. In addition to the contribution of transportation to the economy, transportation systems are also fed by the economy. The mutual relationship between transportation and economy can also be understood from the relationships between countries' Gross National Product (GNP) values and freight traffic. It is seen that transportation (freight traffic) increases in an environment where economies are growing, and decreases in an environment where economies are shrinking (Çancı&Güngören, 2013:199).

3. Türkiye Data on Transport Modes

Freight transportation; According to the transportation methods used during the activity, it is divided into types/modes such as road transportation, maritime transportation, railway transportation, air transportation, inland waterway transportation and multi-modal transportation. Each of these transportation modes has various advantages and disadvantages (Dinçel, 2014). Road transport functions as a capillary in multi-modal transportation, which has an important place in contemporary freight transportation systems (Kaplan, 2012: 265). In multi-transportation, the main transportation services are provided by railway, airway and sea transportation, and the produced goods are collected to logistics centers such as ports and airports. The highway type delivers the collected goods to more local destinations (Tek, 2012). Road transportation is a useful and common type of transportation involved in all logistics processes. Today, road transportation is the most preferred type of transportation in national and international transportation in developed countries as well as in developing countries. However, in the world, road freight traffic other modes of transportation such as rail and maritime It is aimed to shift (Fortune, 2013: 9). Road transport; It is a transportation mode that provides non-stop door-to-door delivery of goods for a certain fee within the framework of contracts, procedures and principles, international agreements between the sender and the carrier, and also supports other transportation systems (Koban & Keser, 2015: 165). The logistics sector in Turkey is a sector focused mostly on transportation. For this reason, many services within the scope of logistics have not become widespread and transportation services and road transportation are more intense in the sector (Bayraktutan and Özbilgin, 2012: 82). In Turkey, after the 1950s, emphasis was placed on highway

construction and the country's industrial and agricultural products gained more effective distribution opportunities, thus accelerating economic development (Karluk, 2009: 261). The main purpose of the road construction policy between 1950 and 1970 was; The aim was to give priority to road types that have a predominant social quality and provide accessibility, and the road network was increased to 60 thousand km. After the 1970s, instead of increasing the length of the existing road network, physical capacity increase efforts gained priority (KGM, 2005: 17). Table 1 below shows the distribution of Turkey's foreign trade by transportation types.

Table 1. Distribution of Turkey's Foreign Trade by Transport Types

Year	Unit	Total	Seaway	Railway	Highway	Airway	Other
2022	**Export** (Thousand $)	254 169 748	150 294 432	2 457 286	78 837 775	20 687 774	1 892 481
	Import (Thousand $)	363 710 575	193 796 320	2 967 903	59 447 025	38 582 413	68 916 915

As seen in Table 1, according to TUIK data in Turkey until 01.01.2023, exports are 254 million 169 thousand 748 dollars in all transportation modes and imports are 363 million 710 thousand 575 dollars. Maritime transportation stands out as the mode with the most liquidity in both imports and exports. The main reason for this is that maritime transportation is the most preferred mode of transportation in Turkey, as in the rest of the world.

Table 2. Turkey Highway Statistics

Year	Grand Total (Km)	Total (Km)		State road (Km)		Provincial road (Km)			
		Divided Road	Other	**Divided**	Other	**Divided**	Other	**Motorway**	**village road**
2022	259 072	27 358	41 331	21 467	9 473	2 258	31 858	3 633	190 383
	26 482 847	Number of Vehicles Registered to Traffic							

As seen in Table 2, the number of vehicles registered to traffic in Turkey is 2 6 million 482 thousand 847 according to Turkish Statistical Institute data until 01.01.2023. The total length of the highway is 259 thousand 72 km as of 01.01.20 23.

Table 3. Turkey Highway Statistics (Travel, Freight and Passenger)

Year	Movet- Km	Tonne-Km	Passenger-Km
	Total	Total	Total
2015	113 274	244 329	290 734
2016	119 671	253 139	300 852
2017	127 997	262 739	314 734
2018	131 625	266 502	329 363
2019	135 485	267 579	339 601
2020	126 053	272 913	288 992
2021	142 479	311 818	336 188
2022	140 531	323 512	348 489

As seen in Table 3, there will be an increase on a vehicle - km basis, Tonne - km basis and passenger - km basis from 2015 to 2022. has been missed. A decrease is observed only in 2020 during the pandemic period.

Table 4. Turkish Airline Statistics

	Traveller			Load (Tonne)		
Year	**Total**	***domestic line***	***international line***	**Total**	***domestic line***	***international line***
2022	181 789 339	*78 323 824*	*103 465 515*	4 163 142	*784 022*	*3 379 120*

As seen in Table 4, according to TUIK data in Turkey until 01.01.2023, the total number of domestic and international passengers in the airline is 181 million 739 thousand 339 people. When we look at the transportation part, the total of domestic and international lines is 4 million 163 thousand 142 Tonnes.

Table 5. Turkish Railway Statistics

	Outline	**Number of Passengers**	**Load Amount (Tonne)**	**Train-kilometer**	**Passenger-kilometer**	**Tonne-kilometer**
Year	(km)	(Thousand)	(Thousand)	(Thousand)	(Thousand)	(Thousand)
2022	10 651	318 114	38 897	64 657	19 668 556	16 551 138

As seen in Table 5, according to Turkish Statistical Institute data, the railway main line in Turkey is 10 thousand 451 km until 01.01.2023. The number of passengers is 318 thousand 114 people. The load amount is 38 thousand 897 Tonnes. Train-kilometer data is 64 thousand 657. While passenger-kilometer data is 19 million 668 thousand 556, Tonne-Kilometer data is 16 million 551 thousand 138.

Table 6. Turkish Maritime Statistics

Load Handling Statistics at the Port						
	Loading		**Ejaculation**		**Total**	
year	Total Exports	Total Loading	Total Exports	Total Loading	Foreign Trade	Load Handling
	Tonne	Tonne	Tonne	Tonne	Tonne	Tonne
2022	150 172 902	250 150 574	243 917 119	292 459 709	394 090 021	542 610 283

As seen in Table 6, according to TUIK data in Turkey until 01.01.2023, in the cargo handling statistics at the port, total exports within the total loading are 150 million 172 thousand 902 Tonnes, while total loading is 250 million 150 thousand 574 Tonnes. When it comes to total unloading, total exports are 243 million 917 thousand 119 Tonnes, while total loading is 292 million 459 thousand 709 Tonnes. When it comes to the general total, foreign trade is 394 million 090 thousand 021 Tonnes, while total cargo handling is 542 million 610 thousand 283 Tonnes.

Table 7. Turkish Pipelines Statistics

	Oil Pipeline Length	**Amount of Oil Transported (Tonne-Km)**	**Natural Gas Pipeline Length (Km)**	**Amount of Natural Gas Transported**
Year	(km)	(Thousand)	(Thousand)	Million (Scm)
2022	3 060	49 685 236	17 736	56 103

As seen in Table 7, according to TUIK data, the length of the oil pipeline in Turkey until 01.01.2023 is 3060 km. The amount of oil transported (Tonne-km) is 49 million 685 thousand 236. The natural gas pipeline length is 17 thousand 736 km. The amount of natural gas transported is 56 thousand 103 Scm.

4. Result and Comment

Logistics is one of the fastest growing industries in the world. Increasing trade volumes with globalization and the resulting increase in production have accelerated the demand for supply chain management, including logistics services. In the last 50 years, logistics services have been among the most important factors determining competitiveness in the world economy. At this point, countries and businesses attach great importance to the development of logistics in order to ensure economic growth and avoid the competitive disadvantages caused by the lack of logistics services. Thus, countries attach importance to infrastructure investments to increase efficiency in logistics services and take steps towards investments with a number of applicable policies and incentives in development policies and incentives. It has now become an accepted fact that there is an intense relationship between economic development and the logistics sector, and contributions have been made to the literature in this direction. Developing technology, increasing trade and communication opportunities increase the importance of transportation activities day by day. Competition in world markets and the opening of countries to foreign markets accelerate the development of transportation activities, and companies that want to increase their market share need transportation services more and more every day. At this point, it is necessary to specify the main process needed as "state investments". Only logistics companies can direct the investments requested from the state.

The contribution of all transportation modes to the economy is an indisputable fact. Activities carried out in the transportation sector serve as a bridge between production and consumption in terms of their economic dimensions. Therefore, transportation activities have an important place in country economies. Transportation activity is always on the agenda as it enables people and goods to be moved from one place to another. Considering the active role of transportation

in economic and social development, it is a fact that the findings of theoretical and practical research on this sector will contribute to the policy-making processes of country managers. Data supporting this can be seen in Tables 1,2,3,4,5,6,7. However, whether it is sufficient or not is a matter of debate. In terms of economic efficiency, the most cost-effective system among alternative transportation systems should be preferred. The transportation sector receives a significant share of general investment appropriations; In terms of resource use, it makes the choice of transportation type even more important. The need for transportation services is based on costs to determine which type of transportation can be achieved at the least cost; In addition to construction, maintenance-repair and operating costs, social and environmental costs caused by transportation types should also be included. Based on this view, it can be commented that transportation policies and alternative transportation models need to be created.

Another issue is the existence of demands for transportation services. The intensity and diversity of economic activities also increases the demand for transportation services. Especially the condition of freight traffic gives an indication of the economic situation. Considering the importance of road transportation for the Turkish economy, it is essential to prevent all the load in the sector from piling up on the highways. For this, policies that will ensure regional and local development must gain priority, the infrastructure that will ensure sustainable development must be developed, and the share of railway and maritime transportation in transportation must be increased. The implementation of logistics centers on a provincial basis can be presented as a suggestion. In addition, the importance given to logistics centers and the increase in investments in recent years, which will provide great convenience to the production sector by integrating all transportation modes, is a great advantage for the transportation sector. The spread of international transportation corridors passing through our country further emphasizes the importance of logistics centers. The use of analytical methods will be effective in order to make sound decisions in these projects, whose investments amount to billions of lira.

Accordingly, with the effect of today's global developments, changes in technology and the expansion in the free trade volume, the contribution of investments in transportation infrastructure to the country's economy is now an accepted reality. Transportation infrastructure investments shorten travel times and activate idle resources through the network effect. At the same time, by reducing transportation costs, it can make positive contributions to production and investment processes and increase employment and foreign trade. The prevalence of studies confirming that changes in transportation infrastructure increase economic growth due to these resulting economic benefits is also supported in the literature. In Turkey, investments in transportation systems should be made by foreseeing the future, not by analytical methods and day-saving policies.

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