

# International Transportation Projects and Türkiye from the Perspective of Transportation Economics

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Ulaştırma Ekonomisi Perspektifinden Uluslararası Ulaştırma Projeleri ve Türkiye

Öz

Günümüzde ulaştırma sektörü, küresel etkileri olan, sosyal, ekonomik ve toplumsal açıdan değerlendirilmesi gereken ve ulusal ekonomiler üzerinde önemli etkileri olan bir hizmettir. Bu konulara derinlemesine odaklanan çalışma, ulaştırma ekonomisi sistemleri politika ve stratejilerine kavramsal bir bakış sunmaktadır. Çalışma, uluslararası taşımacılık projelerinin Türkiye ve daha geniş bir bölge üzerindeki ekonomik etkilerini, bir ulaştırma ekonomisi çerçevesi kullanarak analiz etmektedir. Çalışma aynı zamanda Türkiye'nin ulaştırma politika ve stratejilerini ve bunların sürdürülebilir ekonomik büyüme ve kalkınmayı teşvik etme potansiyellerini değerlendirmeyi amaçlamaktadır. Ayrıca Bakü-Tiflis-Kars Demiryolu Projesi, Kuşak ve Yol Projesi, Tahıl Koridoru Girişimi, TÜRSAT Haberleşme Uydu Projeleri ve akıllı ulaşım gibi benzer projelerin potansiyel genel ulusal ekonomi üzerindeki etkilerini analiz ederek literatüre katkıda bulunmaktadır.

**Anahtar Kelimeler:** Ulaştırma Ekonomisi, Kuşak ve Yol Projesi, Tahıl Koridoru Girişimi, Haberleşme Uyduları, Demiryolu Projeleri

**Makale Türü:** Araştırma Makalesi

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Abstract

Today, the transportation industry is a service with global implications, one that must be assessed from a social, economic, and societal perspective, and one that has a significant impact on national economies. The study, which focuses on these issues in-depth, offers a conceptual overview of transportation economics systems policies and strategies. It analyzes the economic impacts of international transportation projects on Türkiye and the broader region, using a transportation economics framework. The study could also aim to evaluate Türkiye's transportation policies and strategies and their potential to promote sustainable economic growth and development. It also adds to the literature by analyzing the impacts of similar projects like the Baku-Tbilisi-Kars Railway Project, the Belt and Road Project, the Black Sea Grain Initiative, the TÜRSAT Communication Satellite Projects, and smart transportation on the potential overall national economy.

**Keywords:** Transportation Economics, The Belt and Road Initiative (BRI), The Black Sea Grain Initiative, Communication Satellites, Railway Projects

**Paper Type:** Research Article

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## 1. Introduction

From local to global, the development of transportation systems (modes) is influenced by various factors such as the scale and context in which they are formed in environmental, historical, technological, and economic terms<sup>3</sup>. This situation ensures that the transportation sector, which defines the whole of transportation systems and activities, covers different areas of influence and relationships with its multidisciplinary structure with multiple stakeholders and factors.

Transportation-related concerns have been crucial to the global economy for centuries. Transportation, which plays a crucial role in economic and social development, is a service with direct macroeconomic effects through the addition of increases in infrastructure capital investment and indirect macroeconomic effects through the contribution of improved transportation services to productivity. In addition, within the framework of cost-benefit analysis, the emergence of attempts to provide cheaper and more reliable transportation services in the context of the effect of some infrastructure improvements on traffic congestion and thus travel times, points to the microeconomic effects of transportation (Lakshmanan and Anderson, 2002: 39-43).

International trade activities, which have intensified with increasing globalization since the late twentieth century, have been significantly affected by new technologies and policies. By the beginning of the twenty-first century, it was possible to see the reflections of the impact of technological developments on transportation, as in all sectors, in all sub-components and activities of this sector. The smooth operation of transportation systems and processes has been made possible by the interoperability of transportation policies, particularly in the logistics industry and the delivery of commodities. Technology advancements like containerization, Global Positioning System (GPS), and Electronic Data Interchange (EDI) have significantly improved the effectiveness and interoperability of transportation policy.

Transportation has adverse effects on the environment due to the emission of greenhouse gases and noise pollution, particularly from the consumption of fossil fuels. Therefore, countries across the globe aim to decrease the environmental impact of transportation by advocating the adoption of low-carbon transportation modes, allocating funds toward energy resources, and enhancing energy efficiency. Thus, ensuring the sustainability of transportation will contribute to the national economy.

Transportation activities contribute significantly to the development of countries, particularly in economic, social, and cultural aspects, resulting in a positive domino effect throughout these sectors. The transportation sector is a complex, multidimensional structure comprising land, sea, rail, air, and pipeline categories, as well as the field of communication. Activities and projects within each of these sub-industries have significant implications for the national economy, and their integration into international transportation projects is an essential consideration. Therefore, determining the position of these factors and their impact on the country's economy is a crucial issue for policymakers.

The purpose of this study is to examine how international transportation projects might affect the Turkish economy. In this setting, the study initially investigates the conceptual, theoretical, and political framework of transportation and transportation economics before summarizing regional and global plans and policies. Subsequently, the historical development, importance, scope, and objectives

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<sup>3</sup> Environmental factors: Transportation systems should be developed to minimize their negative impacts on the environment, including air and water pollution, habitat destruction and climate change.

Historical factors: The development of transport systems is often shaped by historical events and decisions, such as the construction of roads and railways, the growth of cities and the development of trade routes.

Technological factors: Advances in technology have played an important role in the development of transportation systems, from the invention of the wheel to the development of electric and autonomous vehicles.

Economic factors: The transportation sector is closely linked to economic activity, as transport systems are essential for the movement of goods and people. The development of transport systems is often driven by economic considerations, such as the need to reduce transportation costs and increase efficiency.

Stakeholder factors: Transport systems involve a wide range of stakeholders, including governments, businesses, and individuals. The interests of these stakeholders can influence the development of transport systems in different ways.

of international transportation projects and their evaluation in the context of Türkiye's geopolitical, economic, and transportation role are analyzed. Finally, the economic impact of Türkiye's transportation and communication investments is analyzed.

## **2. Transportation: Conceptual, Theoretical, and Policy Framework**

The history of humanity is closely related to the development of transportation and the transportation economy and includes intertwined processes. Transportation has been a key factor in shaping the economic, military, political, and socio-cultural structures of societies, from the earliest times when people started to transport goods, news, and energy from one place to another, to modern times when the transportation sector plays a very important role in trade, tourism and communication (Saatçioğlu, 2016: 11). By its very nature, transportation is one of the most fundamental elements that contribute to the formation of international cooperation by crossing national borders in economic, cultural and political terms in an environment where national independence is maintained to a certain extent (Linden, 1961: 171-172).

Transportation is the activity of moving people, goods, information, and services in an economical, fast, and safe way to provide a benefit, and it is an activity that covers all the services created by all the vehicles needed for this activity. Transportation necessitates the development of new markets via an effective network structure, as well as the mass distribution of goods both inside and beyond national borders (Perreault et al., 2015: 299). According to this concept, the transportation sector is a service activity that is required by several sectors (Ayaz and Bakan, 2022: 23). The presence of transportation activity is proportional to the amount of demand for it. As a result, the rise of other economic variables has also fostered and led to transportation development. In other words, transportation demand is a derivative demand (Saatçioğlu, 2016: 10).

The actions of constructing, organizing, developing, and implementing road, railway, marine, airline, and communication systems in compliance with technical, legal, organizational, economic, and social criteria are referred to as transportation systems. Transportation systems may be beneficial or detrimental to one another. Costs such as the transportation cost borne by the carrier, time from start to delivery, i.e. speed, reliability such as consistency of delivery, capabilities such as the number of different types of products that can be transported, capacity, which is the amount of cargo that can be transported at a time, and flexibility are used to determine whether a transportation system is advantageous or disadvantageous (Saatçioğlu and Çelikok, 2019: 516-517). Furthermore, investments may be made through the adoption and dissemination of new technologies such as electric, connected, and autonomous cars, as well as intelligent transportation networks. Intelligent parking systems, vehicle-to-vehicle communication, and real-time traffic management are examples of such programs. By improving traffic flow and reducing delays, ITS may reduce emissions and energy consumption. In general, the adoption and dissemination of these cutting-edge technologies have the potential to transform the transportation industry by promoting safer, more efficient, and environmentally friendly travel.

There is no hoarding or stockpiling of the service for later use because the manufacturing of the products of the transportation sector and their distribution to the market are contemporaneous. In the transportation industry, a large portion of total costs are fixed costs. However, because the transportation industry influences how the economy, society, and politics of the nation are organized, it is not enough to focus just on profit or loss considerations during the review and development phases (Erdoğan, 2016: 193-194).

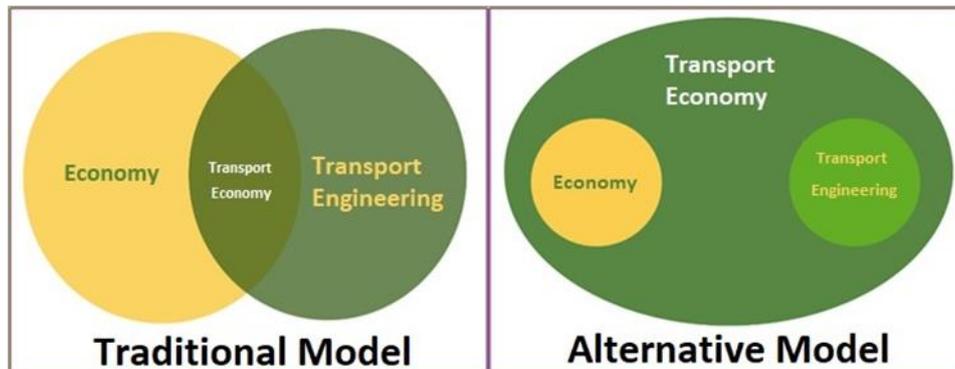
The provision of transportation services has a supervisory and, in particular, a foreign trade regulatory impact. The opening of the transportation sector to private enterprises is a concept that impacts both the private sector and the public sector because it requires massive infrastructure expenditures under increasing competitive circumstances. Economic analyses of infrastructure investments for the public and societal benefit are critical in estimating the economic impact of transportation improvements (Saatçioğlu, 2016: 30-32).

### 2.1. Transportation Economics

Transportation is critical for stimulating economic growth, improving citizen welfare, and increasing a country's competitiveness. Investing in transportation infrastructure and communication may promote economic growth, welfare levels, and competitiveness in rising economies trying to accelerate their development processes (Bakkaloğlu and İncekara, 2017: 70-71).

The transportation industry differs from other sectors in that it considers public and social benefits, rather than only profit and loss factors. However, for a successful economy, manufacturers, service providers, and supply chain variables must be prioritized, just as they are in other industries (Hibbs, 2004: 178). Adequate use of transportation, communication, and information technology in production and consumption activities will have a substantial impact on countries' social and economic advancement.

The main focus of transportation economics, a division of economics that examines the resources assigned to the transportation industry, is the study of the movement of people and goods in space and time. Furthermore, in the context of traditional microeconomics, the phrase "transportation economics" only applies to situations in which goods are converted into money at a certain location and time. Transportation economics often deals with issues like privatization, nationalization, regulation, pricing, economic incentives, finance, funding, expenditures, demand, production, and externalities (WIKIBOOKS, n.d.).



**Figure 1.** The traditional and alternative economic model

Source: [https://en.wikibooks.org/wiki/Transportation\\_Economics/Introduction#What\\_is\\_Transportation\\_Economics](https://en.wikibooks.org/wiki/Transportation_Economics/Introduction#What_is_Transportation_Economics)

A well-developed and well-functioning transport system can facilitate the movement of people and goods, reduce transportation costs and connect businesses to markets. It can also facilitate access to education, health, and other basic services. In addition, the linear effect of the transportation sector being closely related to many other sectors such as insurance, customs clearance, packaging, procurement, and logistics will be an increase in employment rates, which will contribute to economic growth (Oral and Kipkip, 2019). Furthermore, transportation is critical in international trade, allowing countries to export goods and import necessary items and raw resources. While promoting economic activity, these conditions can benefit residents' overall well-being by providing new employment possibilities and increasing countries' competitiveness in global marketplaces.

The reduction of time losses resulting from gaps in time and geography between producers and consumers is one of the economic purposes of transportation, to sum them up. The total cost is increased by transportation expenses, one of the production process's complementary components, and is decreased by the necessary improvements to the transportation infrastructure. Last but not least, as products and services are a by-product of production, they serve as a feedback mechanism for many businesses (Erdoğan, 2016: 189-191).

The transport system requires physical and human capital, as its development is socioeconomically driven, but also requires diverse operations and service-oriented activities. Due to its extensive usage of infrastructure, the transportation sector is a significant part of the economy and a popular

instrument for development. The extent of economic development and the amount and quality of transportation infrastructure are related.

The transportation sector plays a supporting role in terms of ensuring market equilibrium in the economy and is a sector that creates employment by regulating the circulation and continuity of commercial goods in the macroeconomic framework. Greater availability of a wider range of goods and services in a competitive market is made possible by a successful and efficient transportation sector (Ayaz and Bakan, 2022: 23-24). Improved market access, more job opportunities, and additional investments are all positive multipliers of investments in transportation infrastructure and services that provide economic and social potential. An efficient transportation system created by these multiplier effects contributes to the development of transportation and all other related sectors and production in the long run. When transportation systems are inadequate in terms of qualitative (reliability, accessibility, comfort, etc.) and quantitative (speed, frequency of scheduled shipments, capacity, price, etc.), disruptions will negatively affect the quality of life (Stoilova, 2020: 2-3).

Each mode of transportation has distinct characteristics that provide significant operational and financial advantages. However, the development of integrated transportation systems that allow for flexibility in the usage of each mode has altered the demands of modern society. As a result, modal competition takes on various forms and manifests itself to diverse degrees. In terms of price, speed, accessibility, frequency, safety, comfort, etc., modes may compete or work in unison. A gateway is necessary for some modes to complement one another, particularly intermodal transport, which covers domestic and international transportation at various sizes and offers complementarity and connection of regional markets through intermodal transshipment. Two modes delivering different levels of service will typically complement one another with specialized services for a similar market and accessibility. Road transportation is the most advantageous and preferred transportation system in terms of the number of locations served due to its door-to-door delivery. However, it tends to be more costly than other transport systems other than air transport as it requires high energy consumption. Air transport, line transportation, and auxiliary services emerged later than other transportation systems and started to operate commercially after the 1950s. Although these transport systems are advantageous in terms of high transport speed and centralized transport load for both passenger and freight transport, they are expensive due to their high cost. The railway transportation system, whose development is emphasized especially in developed countries, has significant advantages in national and international public transportation, including urban transportation. However, due to the energy it consumes, it is more expensive than maritime transportation, which is more disadvantageous in terms of transportation capability. Maritime transport is a cheaper mode of transportation compared to air and land. For this reason, it is generally used for long-distance transportation of large volumes of low-value goods and passengers between production and consumption centers. With its capacity to transport large quantities of cargo over long distances in a single trip, maritime transportation offers significant cost advantages with economies of scale (Rodrigue, 2020: 151-181). At this point, intermodal transportation, which encourages complementarity rather than competition between these factors, brings an integrated perspective to transportation systems. The vehicle used in one transportation system is used in another transportation system.

Since the turn of the twenty-first century, there has been a dramatic rise in international trade. Positive developments in transportation policies, which is a very important pillar of globalization, are directly related to the increase in international trade. By the beginning of the twenty-first century, in the modern transportation understanding that emerged, the main mode of transportation for the transportation of freight is the maritime and classical railway. For this reason, it is necessary to talk about different transportation structures according to distance. Accordingly, it can be stated that passenger transportation in the modern transportation system is based on airlines, high-speed railways, and highway modes according to distance. In long-distance transportation, the airline has

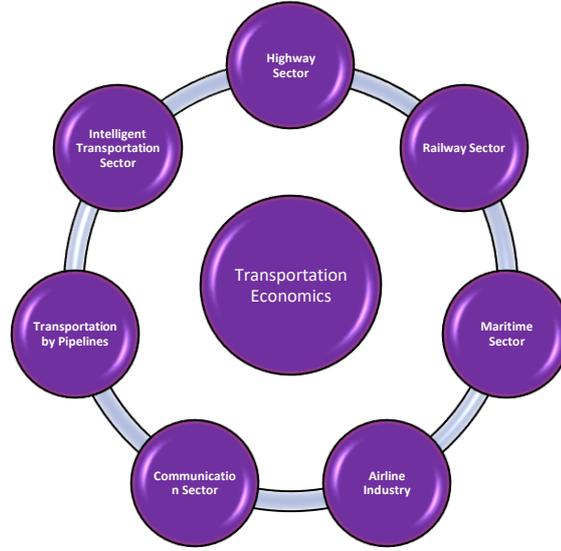
gained significant weight with its costs that have become more economical with the advancement of technology (Tutulmaz, 2013: 96-97).

While the size of the sector increased in the twentieth century with the tremendous growth in the use of transportation services, this was followed in the twenty-first century by changes in the ranking of the importance of different modes of transportation and significant technological developments affecting almost all modes of transportation. In addition, urbanization and mobility differences resulting from changing human needs have also accelerated change and transformation.

Most modes of transportation sought solutions for change, transformation, and development in the aftermath of the First and even the Second World Wars. In particular, the size and efficiency of airplanes increased significantly, while electric and diesel traction technologies in railways and the diversification and updating of motor vehicles attracted attention. The second important feature of the change was that it involved striking developments, particularly regarding the preferences of transportation users. Accordingly, travel preferences have generally shifted towards individual vehicle use.

The following categories best describe the economic effects of transportation, and increases in any one or more of these areas will raise a region or nation's competitiveness (Rodrigue and Notteboom, 2022):

- **Capacity (basic):** Investing in infrastructure is a crucial tactic to promote economic prospects by developing intermodal and modal capacity.
- **Costs (fundamental):** As the transportation industry develops, unit transportation costs frequently decline, making mobility cheaper. Alternatively, more volumes can be transported at a comparable price. Overall, the proportion of transportation expenses in the price of final goods is declining.
- **Time (Operational):** Time improvements provide numerous financial advantages. First, traveling will be quicker for people and goods, which is practical and beneficial economically. Second, time gains result in improved inventory management and greater utilization of transportation resources (infrastructure, terminals, cars, containers, etc.).
- **Reliability (Operational):** Generally speaking, it refers to a passenger or shipment of cargo arriving at its destination within a certain amount of time without loss, deterioration, or damage (for cargo). Economic systems can better synchronize their operations and utilize transportation resources thanks to reliability.
- **Accessibility (Geographic):** Access to a larger market is a common economic benefit for businesses. Raw materials, components, energy, and labor become easily accessible inputs, while finished goods have access to a wider market base. For travelers, easier access to regional and international marketplaces has economic effects on commerce and tourism.
- **Location (Geographical):** The placement of economic activity is one of transportation's significant effects. ones that are close to modal or intermodal infrastructure are more likely to produce better value than ones that are more difficult to access. The clustering effect is a common name for this. As a result, decisions about where to locate manufacturing, residential, or commercial activity alter the economic landscape.



**Figure 2.** Elements of the Transportation Economy

The changes and developments in the transportation sector and its sub-fields over the last two hundred years have demonstrated the role and importance of the transportation economy in the development of countries. Transportation economics is at the heart of all modes of transportation and even the smart transportation sector, which is one of the best solutions to many transportation problems of the twenty-first century, as shown in Figure 2.

Economic policies for sustainable transport are essential for accomplishing objectives for both economic growth and sustainable development. To sustain a reliable and effective transportation system, a transportation infrastructure that balances various modes of transportation is required. The future global economy will continue to be significantly shaped by the transportation economy sector (Saatçioğlu, 2016: 12).

## 2.2. Global and Regional Strategies

Transportation is one of the most important parts of globalization. Facilitating the mobility of goods and people is an important activity in this context. Solutions such as the creation of competitive, responsive, well-organized efficient, cost-effective transport networks, streamlined customs procedures, and harmonization of regulations and standards facilitate trade. National and international trade and mobility lead to increased transportation between countries. The significance of international transportation policies is growing every day as a result. National transportation policies are influenced by all worldwide trends and strategies. Along with the benefits that the global division of labor has on welfare, states collaborate internationally and adopt policies that promote international mobility because people want to travel in safety, comfort, and freedom. However, there are social and environmental effects of globalization and international transportation regulations. The need for sustainable transportation laws and practices is a result of the fact that increased transportation can result in pollution, congestion, and other undesirable externalities.

In addition to promoting economic growth, supporting international trade and tourism, enhancing social and cultural exchange, and building a seamless and integrated transportation system, the goal of transportation policies is to promote the cross-border movement of people and goods in a safe, efficient, and sustainable manner. Additionally, by encouraging the adoption of environmentally friendly transportation methods that can lessen the impact of transportation on the environment, such as rail and maritime/inland waterways, road, and air transportation modes.

**Table 1.** Social Objectives of Transportation Policy

<b>Social Benefits of the Transportation Sector in the Context of General Objectives</b>				
Freedom	Security	Justice	Prosperity	Environmental Protection
<b>Example classification of transportation policy objectives</b>				
Providing or increasing mobility; time-saving personal freedom and flexibility through the use of private vehicles such as personal cars and motorcycles; affordable freedom to travel by public transport such as buses, trains, and subways	Improving transport safety; reducing traffic accidents and fatalities by improving road safety through the implementation of measures such as speed limits, traffic calming, and safety campaigns	Ensure that everyone has access to reliable, cheap, and safe transportation services, regardless of location or mobility needs, including vulnerable road users such as people with disabilities, older people, and disadvantaged people such as people with low incomes, including by improving access to public transport, cycling and pedestrian infrastructure and other transport modes	Efficiency and growth through competition benefit both consumers and the wider economy, leading to increased productivity and growth; stimulating innovation by encouraging transport providers to develop new products, services, and business models	Reducing certain emissions; promoting sustainable transportation methods and adopting environmentally friendly practices

Transportation policies, as shown in Table 1, necessitate logical decision-making and rational choice due to their excellent classification of social advantages in terms of freedom, security, justice, welfare, and environmental protection. Making rational choices and decisions entails taking into account all pertinent information, balancing the potential advantages and disadvantages of several possibilities, and selecting the one that is most likely to provide the intended results. In the context of transportation policy, rational choice and decision-making can involve several steps. First, policymakers need to identify the problem they are trying to solve, such as reducing congestion or improving air quality. To identify the causes of the problem and potential solutions, they must next collect pertinent data and information. Next, policymakers need to consider the different options available to address the problem, such as building new infrastructure, promoting alternative modes of transportation, or introducing pricing schemes. They need to evaluate each option in terms of its potential effectiveness, feasibility, and cost-effectiveness. Finally, policymakers should choose the option that is most likely to achieve the desired outcome and implement it effectively. This involves considering factors such as stakeholder interests, political considerations, and public opinion. Rational choice and decision-making are important in transport policy because they help to ensure that resources are allocated effectively and efficiently. By making informed decisions based on evidence and analysis, policymakers can minimize costs and unintended consequences while maximizing the benefits of transport policies (Wieland, 2007: 389).

The following aspects stand out when examining the evaluation of policy measures in light of the primary goals of the EU transport policy relating to the decarbonization of transport as well as economy and competitiveness (European Commission, 2022):

- Increasing the effectiveness of the overall transportation system: Analysis of the techno-economic effects of emerging technologies, including demand, costs, pollution, traffic, accessibility, and economic effects on transportation.
- Supporting the competitiveness of European industry: An analysis of how transportation, both as an industrial sector and as a fundamental component of economic activity (the movement of people and things), contributes to economic competitiveness.
- Future-focused transportation innovation includes activities such as techno-economic characterization, monitoring and forecasting of technology, and transport innovation.
- Analysis of technology and the decarbonization and greening of the transportation system.

Equity, climate and sustainability, transformation, and organizational excellence are among the strategic aims and objectives of the U.S. Department of Transportation's Strategic Plan for Fiscal Year 2022-2026 (U.S. Department of Transportation, n.d.). This document confirms that social welfare, climate change, and innovative transportation technologies are addressed and that transportation is a major contributor to economic recovery.

Japan has actively promoted global collaboration on transport-related issues, particularly in the Asia-Pacific area. The country has established several regional transportation initiatives, including the East Asia Summit (EAS) Transport Ministers' Meeting, which focuses on energy efficiency and e-mobility in transportation in the EAS Action Plan (2023-2027). Additionally, the ASEAN-Japan Transport Partnership (AJTP), works in the areas of quality and sustainable transportation, infrastructure development, and transportation facilitation (JAIF, n.d.).

When transportation policies in Türkiye's economic development are examined, a picture of tree-shaped railways, concessionaire railway companies, mileage guarantees, and Ottoman finances crushed under foreign debt remains from the Ottoman period, which was turned into an open market, to the Republican period. In the Republican period, while the tree-shaped railways were transformed into a network, industrial and population policies were tried to be integrated into transportation policies, and nationalizations were made. The period after the Second World War was a period of significant changes in terms of the world economic conjuncture, a period in which highways started to gain weight with the Marshall Plan, a period in which this process continues in today's transportation policies in domestic passenger and freight transportation, while maritime transportation maintains its weight in international freight transportation and airline transportation maintains its weight in international passenger transportation (Erdoğan, 2016: 211).

Each of the policy documents for Türkiye in Table 2 provides short-, medium-, and long-term objectives and activities that will benefit the country's economy and welfare. Within the framework of each plan, projections are also included in terms of possible investments and investment costs:

**Table 2.** Current Approach to Transportation Economics in Policy Documents in Türkiye

Preparing Organization	Document	Description
Presidency of the Republic of Türkiye	Eleventh Development Plan	Measures aimed at improving the current situation and introducing innovative approaches in all modes of transportation are included. Demand management will be adopted to ensure the sustainability of the transport system and efficiency of the existing infrastructure, and transport investments will be rationalized with a focus on efficiency. Integration among transportation modes will be strengthened and measures will be taken to remove barriers to entry into the sector.
Republic of Türkiye Ministry of Transport and Infrastructure	National Transportation Master Plan	The Plan's focus on production and productivity provides a critical perspective for enhancing Türkiye's international competitiveness and ensuring sustainable economic growth and development by creating high-added value. It includes recommendations on important issues for the transportation economy, such as pilot projects for existing,

planned, or planned logistics centers located on international rail corridors passing through Türkiye. When the project investment costs of the chosen scenario, the Green (Sustainable) Scenario, are taken into account, the total project investment costs come to 125 billion euros. These costs are as follows: 23 billion euros for the period 2019–2023; 58 billion euros for the period 2024–2029; 35 billion euros for the period 2030–2035; and 9 billion euros for the period 2036–2053. By 2053, it is aimed to increase the amount of freight carried by all modes of transportation from 1 Gigaton (Gt) in 2019 to over 2 Gt, and the number of passengers carried by all modes of transportation from 2 billion in 2019 to over 4 billion by 2053.

**2053  
Transport and  
Logistics  
Master Plan**

General transportation policies have been designed to ensure Türkiye's sustainable development, to expand transportation networks across the country, and to structure a transportation system that is holistic, efficient, economic, accessible, safe, responsive to the needs of the society, supportive of economic growth and prioritizing environmental issues.

**2019-2023  
Strategic Plan**

It has been updated with a broad and innovative perspective for all types of transportation and communication sectors. Since inadequate use of IT infrastructure in the preparation, monitoring, and evaluation of investment programs will lead to a decrease in the effectiveness of the resource allocation process and make it difficult to monitor and measure the impact of investments, information systems such as KaYa should be integrated with other public institution information systems and their use should be expanded.

**National ITS  
Strategy  
Document and  
Action Plan  
2020-2023**

Plans for countries with successful transportation economies will be impacted by the economic and social changes that autonomous and connected vehicles will bring about. Since the systems currently in operation that have already been deployed to the field will soon become obsolete and cease to function, it has been proposed as a road map for Intelligent Transportation Systems. Information and communication technology must be used in the transportation sector due to the growth of congestion caused by rising traffic density, rising fuel consumption, and rising carbon dioxide emissions. This condition makes ITS one of the greatest techniques to employ. This condition makes ITS one of the greatest techniques to employ. In our nation, all forms of transportation make extensive use of ITS applications such as electronic toll collection, passenger information systems, and traffic management and signaling systems. A large number of public institutions and organizations participate in the ITS ecosystem and carry out their operations successfully.

Through the implementation of measures like establishing traffic control centers, creating strategies for encouraging the development of domestic and national technologies that include infrastructure for traffic monitoring and analysis, the creation of passenger information systems, the establishment of national ITS architecture and standards, and the optimum use of information and communication technology, ITS will become more widely used. In the long term, it is aimed to ensure the integration of all modes of transportation by the ITS architecture developed and the standards set, to carry out preliminary work to prepare the current infrastructure for autonomous driving, to create completely autonomous cars, and to widely adopt them as transportation options, to expand accessibility practices in transportation modes and to facilitate transportation activities by integrating logistics centers with trigeneration modes. Thanks to

intelligent transportation systems, human errors are minimized. However, it has been stated that many negative situations such as traffic-related time loss, accidents with death and injury, material losses, air pollution, and many similar negative situations can be prevented.

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**Source:** Republic of Türkiye Presidency of Strategy and Budget (2019); Republic of Türkiye Ministry of Transport and Infrastructure (2022); Republic of Türkiye Ministry of Transport and Infrastructure. (2020).

### **3. International Transportation Projects and Türkiye**

#### **3.1. The Belt and Road Initiative (BRI)**

##### **3.1.1. Historical Development, Importance, Scope, and Objectives**

China chose a planned economic development after the Second World War despite originally being ignorant of the idea of the global economy. Since the last part of the 20th century, China has integrated into globalization in three stages: The first phase, which lasted from 1978 to 2000, was marked by China's progressive globalization and openness to the outer world. China submitted an application to join the General Agreement on Tariffs and Trade (GATT) in 1986, and as GATT discussions progressed, China significantly updated its domestic trade laws. China joined the World Trade Organization (WTO) in 2001, kicking off the second phase (2001–2008) and heralding the start of its involvement in global governance. The Chinese economy expanded enormously during this time, and China's absorption into globalization was completely thanks to the international trade system's openness. The current phase, which began after 2008 and is marked by China's complete globalization, is the third. China took the lead in the governance and recovery efforts after the beginning of the global financial crisis. China introduced the BRI in September 2013, bringing about a new age of international governance (Cheng, 2018: 23).

The BRI was created as a result of remarks made by Chinese President Xi Jinping to the Indonesian Parliament and during a conference in Kazakhstan in 2013. It was a land-based project that aimed to link China and Southeast Asia, in particular, with Western Europe. The Silk Road Economic Belt, on the other hand, aimed to improve communication and economic cooperation between China and Eurasian countries. The Silk Road Economic Belt and the project centered on maritime transportation that aims to connect China with ASEAN nations, South Asian nations, Africa, and Europe are referred to as the 21st Century Maritime Silk Road. The initiative intended to improve marine connection and cooperation between China and other countries along its routes.

The BRI is a long-term plan that embodies China's vision of its future role in the global economy and its strategic goals, both domestically and internationally. It is a new step in China's opening-up initiative and a strategic plan to enhance its worldwide influence and integrate into the world economy. BRI will also be able to create a unique international market in terms of scale and value, as it addresses some of China's, Asia's, and the world's current but fundamental problems and needs and, if completed, will involve more than four billion people (Mitrovic, 2018:17-18).

Figure 3's pathways provide a visual representation of how BRI has grown to include 147 countries on every continent as of March 2022 (Greenfdc, n.d.):

- 43 countries in Sub-Saharan Africa
- 35 BRI countries are in Europe and Central Asia (including 18 European Union (EU) countries that are part of the BRI)
- 25 BRI countries in East Asia and the Pacific
- 20 BRI countries in Latin America and the Caribbean
- 18 BRI countries are located in the Middle East and North Africa.



**Figure 3.** Routes of the BRI

Source: <https://www.economist.com/china/2017/05/04/china-faces-resistance-to-a-cherished-theme-of-its-foreign-policy>

The BRI, the trade route that will be established from China to London, is one of the significant investments and agreements made by China in the international arena, which has been successful with the economic reforms it has made after the Cold War period, on its path to becoming a global hegemonic state (Coskun, n.d.). By reviving the economic growth of the countries along its route and global economic development, the BRI, a plan put forth by the People's Republic of China to link Asia with Africa and Europe through land and maritime networks, will aid in the global economy's return to equilibrium and recovery growth. It will also support the peaceful creation of a wealthy world. The Project envisions the free flow of commodities, funds, talents, technologies, and information in the Asian, Asian-European, and Asian-African commercial markets and is by the trend of economic globalization. Its goal is to ensure the efficient distribution of resources. Additionally, the creation of a complex production network through the exchange of industrial capacity and collaboration between numerous countries will support economic growth, industry upgrades, and industrialization in the countries bordering the route (Liang and Zhang, 2019: 3). The BRI's structure is quite comprehensive and includes many different industries, such as transportation, energy, telecommunications, and logistics. Construction of pipelines, power plants, telephone networks, ports, railways, motorways, industrial parks, and economic zones are also included, as are actions aimed at promoting trade and investment.

International organizations are welcome to participate in the BRI, even though it encompasses the Silk Road routes. The main reason for this is to ensure that countries outside the Silk Road lines can also benefit. The project is based on a "win-win" relationship, where the Chinese government is committed to mutual benefit and gain through peace and cooperation. The state's party to the project is expected to create an environment of political trust and increase cultural exchange within a framework of friendship. For the project to be successful in the long term, the parties should act in line with mutual benefit and common security goals (Coskun, n.d.).

### 3.1.2. Financing Mechanism

The topic of how the BRI would be financed arises given that infrastructure investments can be financed through stock, bonds, banks, and/or development bank financing. A Silk Road Fund would be created to raise money from Chinese policy banks like the China Development Bank and The Export-Import Bank of China, as well as multilateral development banks like the Asian Development Bank, the World Bank, and the Asia Infrastructure Investment Bank, which is led by China. The Asian Infrastructure Investment Bank (AIIB) will give money to build infrastructure, improve regional integration, offer essential non-infrastructure services including banking, health, and education, and

boost operational capability. Additionally, funds will be set aside for several projects involving China and other countries, including the promotion of cultural exchanges and policy coordination between the Asian Infrastructure Investment Bank (AIIB) and other institutions (Hsu, 2017: 55).

The post-pandemic economic slowdown threatens the debt burden on many ASEAN countries and funds are not available to finance the rest of the project. This is where Chinese loans linked to the BRI come into focus (Chirathivat et al., 2022: 21).

Significant loans to SOEs and a rise in PPPs (Public-Private Partnerships) are part of the BRI's financing. Large infrastructure projects are frequently designed, financed, constructed, and operated via PPPs. The ability of governments to plan, procure, and carry out such projects, as well as the availability of suitable regulatory frameworks, are crucial for maximizing efficiency and minimizing the financial risks associated with significant expenditures (World Bank, 2019: 103).

### 3.1.3. Risk and Uncertainties

*Economic and Financial Risks and Uncertainties:* BRI involves large-scale investments in infrastructure and development projects that fail to deliver the expected return on investment. This can result in financial losses for investors and lenders, as well as for the countries receiving these investments. The BRI project has raised concerns about debt sustainability, with some countries borrowing heavily to finance infrastructure projects. A debt crisis where countries are unable to pay off their debts could result from this.

*Political Risk and Uncertainties:* The BRI is expected to be completed in 2049, the same year that the People's Republic of China celebrates its 100th anniversary of formation. Due to China's intentions to rule the globe, the West is alarmed by the Initiative, which aims to reduce China's dependency on the West and increase its global influence. Additionally, investments made as part of the Project will be made in countries with various political structures and levels of stability. This raises the possibility of political unrest, war, and regime change, all of which could hurt the Project's success.

*Environmental Risk and Uncertainties:* The BRI calls for extensive infrastructure work that could hurt the environment, including shifting land use patterns, deforestation, and higher greenhouse gas emissions.

### 3.2. Baku-Tbilisi-Kars Railway

The China-Europe Corridor Construction and Development Plan published by China's National Development and Reform Commission in 2016 includes four competing routes, including Türkiye. These routes are Kyrgyzstan-Uzbekistan-Turkmenistan-Iran-Türkiye; Mongolia-Russia-Belarus; Manchuria-Russia-Belarus; and Kazakhstan-Russia-Belarus (Kenderdine, 2017).

The outcomes of China's BRI and the Central Corridor initiative, which envisions a resurrected Silk Road, reinforce one another. Türkiye and China signed a "Memorandum of Understanding on the Harmonization of the BRI and the Middle Corridor Initiative" at the G-20 Leaders' Summit in November 2015. In keeping with the "win-win" philosophy, Türkiye is in favor of the BRI (Republic of Türkiye Ministry of Foreign Affairs, n.d.).

Türkiye's location at the crossroads of Asia and Europe makes it a key location for the project in terms of its geopolitical, economic, and transportation role. With Türkiye's presence in the Central Corridor, transportation to Europe will be even faster and easier. The fact that the Central Corridor is 2,000 km shorter than the Trans-Siberian Railway, the trade route between Asia and Europe, increases Türkiye's importance (Coskun, n.d.).

Türkiye is right in the middle of the Silk Road and is of great importance. Located right in the middle of the Silk Road's land route, Türkiye is therefore a politically and economically very active country. One of the Silk Road's most strategically significant countries is Türkiye, especially given the presence of the straits and its position as the link between Asia and Europe. With its unique position in terms of

energy resources, Türkiye has further reinforced its position on the Silk Road with its investments in Canal Istanbul, 3rd Bridge, and 3rd Airport (Çatal, 2019: 103).

### **3.2.1. Historical Development, Importance, Scope, and Objectives**

The first decisions on the Baku-Tbilisi-Kars (BTK) railway project were taken on 29.12.2004 in Tbilisi at the meeting of the Türkiye-Georgia-Azerbaijan Mixed Transport Commission. The content of this decision was to reinstate the railway line between Akhalkalaki and Tbilisi by building a new railway line of 73 km between Türkiye and Georgia and 29 km from the Turkish border to Akhalkalaki in Georgia (Üzümcü and Akdeniz, 2014: 190-191).

A railway project connecting Azerbaijan and Türkiye via Georgia was first proposed in July 1993 as a result of the closure of the Kars-Gyumri-Tbilisi railway through Armenia. On November 21, 2007, near Marabda (South Georgia), the Presidents of Azerbaijan, Georgia, and Türkiye formally opened the construction of a new railway after this project was unable to move further due to financial difficulties. The new railway will travel via Tbilisi from Kars to Baku. This new railway, which also seeks to diversify the kinds of goods that are moved through these three countries, will boost the South Caucasus' transportation capacity. The Baku-Tbilisi-Kars railway, also known as the Baku-Tbilisi-Akhalkalaki-Kars railway, was built following the completion of the Baku-Tbilisi-Ceyhan (BTC) oil pipeline and the Baku-Tbilisi-Erzurum (BTE) gas pipeline, has become a significant transit route between Europe and Asia, particularly through Azerbaijan, Georgia, and Türkiye (Lussac, 2008: 212-213).

The Baku-Tbilisi-Kars railway line should be considered on a global scale. This line is also a part of the New Silk Road Project put forward by the global powers who are trying to benefit from the rich underground and surface resources of the Turkic States that gained their independence in Asia after 1990 and to create a consumer market considering the population here. Therefore, countries that shape international politics and economies such as EU countries, the USA, Russia, and China closely follow the developments within this project and produce policies accordingly. On the other hand, even if the global powers take their place in this market, it is a fact that the countries in the region will also profit, especially in transit trade. Along with the economic dimension, the political influence of the countries along the Baku-Tbilisi-Kars railway line in the regional geography will increase, the influence of global powers such as the US and Russia on Georgia and Azerbaijan will be slightly reduced and these countries will be able to produce more independent policies.

China will enhance its commercial volume in the Caspian after the Baku-Tbilisi-Kars railway, which connects Azerbaijan to both Georgia and Türkiye by land, is finished. China's one-country, one-market trade policy strengthens its tremendous negotiating leverage and will accelerate a global trend away from multilateral, rules-based institutions and toward bilateral trade deals. The Caucasus and Central Asia are growing infrastructure as well, thanks to China's consumer markets.

### **3.2.2. Financing Mechanism**

The BTK Railway project has been hailed as a substantial effort to encourage regional integration and economic prosperity among the member countries. To assure the railroad's successful completion, the governments of Azerbaijan, Georgia, and Türkiye worked together with international financial institutions such as the European Bank for Reconstruction and Development (EBRD) and the Asian Development Bank (ADB) to develop a financing framework for the project.

The "South Caucasus Integration and Open Railroads Act of 2006" prohibited US assistance for the development or promotion of any rail link or rail-related connections that traverse or connect Baku, Azerbaijan, Tbilisi, Georgia, and Türkiye through Kars, specifically excluding cities in Armenia. It also emphasized that US policy toward the countries of the South Caucasus is intended to strengthen regional stability and enhanced cooperation (Congress, 2006).

### **3.2.3. The Role of Türkiye in Geopolitics, Economy and Transportation**

After the fall of the USSR, the CIS countries were connected to Europe via the Caucasus and the Black Sea through the TRACECA project. This allowed the EU countries to overtake Eastern Europe and the Balkans as the dominant powers in all of Asia while also fostering trade and transportation ties with the regional markets. The transportation routes between Europe and Asia that were created for this reason demonstrate that Türkiye is the most significant country that contributes significantly to the Central Asian and Caucasus strategy of European countries and the US. This is so because Türkiye, which borders both Europe and Asia as well as the Black Sea and the Mediterranean Sea in the north, has good transit connections throughout the whole region. It is also a country with a key role in the center of international transportation corridors with east-west and north-south axes (Üzümcü and Akdeniz, 2014: 183).

The Transport Corridor Europe Caucasus Asia (TRACECA) project, which the EU has implemented, aims to revive the historic Silk Road and re-establish ties with countries rich in energy resources, to provide member countries with easier access to European and global markets, to increase economic cooperation among member countries, and to ensure integration into the Trans-European Transport Network (TEN-T). The Initiative is based on building a safe transportation corridor of rail and road networks between Türkiye, Iran, the EU, and the CIS (Commonwealth of Independent States). Azerbaijan, Georgia, and Türkiye's commercial interests are brought together through the Baku-Tbilisi Kars (BTK) railway project. A multimodal transportation corridor between the Caucasus, Central Asian Republics, and Europe is what the TRACECA Project wants to build. The projects in which Türkiye is directly involved within the scope of the TRACECA Project (Üzümcü and Akdeniz, 2014: 190):

- Marmaray Bosphorus Tube Crossing Project,
- High-speed line projects with west-east axis,
- Kars-Tbilisi-Baku (BTK) Railway Project.

The Kars-Tbilisi-Baku International Railway Project, which has a length of 838 km, will reduce the distance of trade between the countries of the region and provide a logistical, commercial, political, and cultural rapprochement. The project, which was realized by isolating the Armenian line, is important in terms of contributing to regional wealth, connecting Europe to Asia, and strengthening Türkiye's position as a transit country. The Kars-Tbilisi-Baku International Railway Project will play an effective and efficient role in Türkiye's geopolitical and geographical context of carrying freight and passengers, reaching new markets, establishing closer and closer relations with neighboring countries, and developing relations. This project will also ensure Türkiye's position as a transit country (Gülay, 2018: 113).

For Türkiye, the Baku-Tbilisi-Kars railway is geopolitically, geostrategically, and geo-economically important. Türkiye is expected to increase its influence in the Caspian and Caucasus geographies shortly with the support of Georgia and Azerbaijan. With this line, Türkiye will gain global and regional prestige thanks to its reshaped geopolitical and geostrategic position. This line is also important in the relations between Türkiye and Armenia. Türkiye gave up the use of the Tbilisi-Gyumri-Kars line, a part of which is in Armenia, and closed the border trade. Baku-Tbilisi-Kars railway will be of great benefit for Türkiye and Azerbaijan in terms of Armenia's so-called genocide allegation, diaspora understanding, Karabakh problems and the steps to be taken in favor of Azerbaijan in Azerbaijan-Armenia relations. Thanks to this line, the countries will be involved in new market areas. Türkiye, which will benefit economically from this line in the long term, will be able to reach the markets in Central Asia easily, cheaply, and safely in passenger and freight transportation. Türkiye is also planning logistics centers to maintain its efficiency in transit transportation. Two of these centers are Kars, where the line passes through, and Erzurum, which is located in the close hinterland. In this sense, the Kars-Tbilisi-Baku International Railway Project as well as the Baku-Tbilisi-Erzurum projects will contribute more to the economic and social cooperation of these three countries, which have cultural

ties and historical past (Gülay, 2018: 112). These logistics villages should be completed, and road safety, customs, service training, and technology-related problems should be solved. Thus, Türkiye will make significant contributions to the national economy in the logistics sector after the tourism sector. The New Silk Road is not only economically but also culturally important for Türkiye. This railroad, which is located in the Turkic cultural geography, will make a great contribution to ensuring unity and integrity in the Turkic World extending from Türkiye to China and to creating a perception of common action. For this, Turkish should be accepted as the language of trade and transportation, and culture and investment projects should be implemented rapidly. In conclusion, the Baku-Tbilisi-Kars railway line has taken its place in the global and regional transportation network with its economic, political, and cultural dimensions.

- The BTK line is the most suitable transportation line for transporting the existing export products of the landlocked Central Asian countries to Türkiye and Europe via Türkiye in a short time and at a low cost.
- It is an important option to bring the existing export products of Central Asian and Caucasus countries to Mersin Port via the BTK line and transport them to continents other than Europe.
- Considering the problems experienced in road transportation, especially at border crossings, the BTK line offers predictability to businesses by eliminating the problem of late delivery of products transported between Türkiye and the countries in the region.
- The BTK line is the most suitable option for transports whose origin and destination points are China and Türkiye.
- Along with the northern corridor, the BTK line and the Marmaray crossing represent a unique possibility for blocking train traffic between China and Europe in terms of speed and cost.
- The BTK line contributes to a sustainable environment by reducing the demand for road transportation.

The Baku- Tbilisi- Kars Line has contributed USD 839.6 million in GDP, USD 1.8 billion in production, USD 168.2 million in exports, USD 39.6 million in tax revenues, and 2.3 thousand jobs per year to the Turkish economy. Investment Profile Information (Ministry of Transportation and Infrastructure, 2022):

- 808.1 million USD investment size
- 2008-2017 construction period
- Operating period cargo revenue 20.6 million USD
- 1.3 million tons of cargo transported

### **3.3. TÜRKSAT Communication Satellite Projects**

With the launch of TÜRKSAT 1B in 1994 and the subsequent TÜRKSAT 1C, 2A, 3A, 4A, 5A, and 5B satellites, services in this field were provided in Türkiye. These satellites, however, were bought from foreign firms. Utilizing the space expertise acquired through the earlier RASAT and GKTÜRK-2 projects, TÜBİTAK UZAY is developing the national communication satellite platform for the TÜRKSAT 6A project. This is the first communication satellite project to be developed domestically in Türkiye to advance our country's space capabilities. (Ministry of Transport and Infrastructure, 2022).

The project will improve connectivity throughout the region and assist end users in Europe, North Africa, the Middle East, and a sizable chunk of Asia. This might advance scientific research and discovery as well as societal connectivity and economic growth.

TAI is developing the national communication satellite platform together with ASELSAN and CTECH. Collaboration with project partners is an important aspect of the project as it allows for sharing of expertise and resources and can lead to further innovation and progress in the field of communications satellite technology.

TÜRKSAT 5A will provide television broadcasting and data communications services with a capacity of 1728 Megahertz, covering Europe, the Middle East, North Africa, Central West Africa, South Africa, the Mediterranean, the Aegean Sea, and the Black Sea. In addition, supporting communications satellites currently in service is an important aspect of the project, as it can help improve the overall reliability and efficiency of communications networks in the regions covered by the satellite.

Satellite technologies have advanced to the point where they are now widely used in a variety of industries, from transportation and communication to space sciences, defense, education, and health, among others. Increasing productivity, security, and convenience across a range of industries, particularly in the transportation industry, has become possible thanks to satellite technology.

TÜRKSAT 5A, 5B Satellites try to increase Türkiye's communication capacity, ensure the redundancy of existing satellites, and preserve our orbital rights, a contract was signed with Airbus D&S in November 2017 for the supply of TÜRKSAT 5A satellite to be operated in 31° East orbit and TÜRKSAT 5B satellite to be operated in 42° East orbit. The TÜRKSAT 5A satellite was successfully launched into orbit on January 8, 2021, by a Falcon 9 rocket, and it was put into service on June 28, 2021. On December 19, 2021 (TSI), the TÜRKSAT 5B satellite was successfully launched into orbit by a SpaceX Falcon 9 rocket. The satellite was launched into orbit, tested while in orbit, and put into service on June 14, 2022 (Ministry of Transport and Infrastructure, 2022).

The production and testing of Türkiye's first indigenous communication satellite, TÜRKSAT 6A, continues at the Space Systems Integration and Test (USET) Center established at TAI facilities. All integration and testing activities of the Engineering Model of the project were completed by August 2022. The experience gained from the Engineering Model is being transferred to the Flight Model studies, which are currently undergoing integration and testing activities. In the Flight Model, system-level integration activities have been largely completed and system-level tests are ongoing. The contract for the supply of launch services for TÜRKSAT 6A with Space X was signed and entered into force in July 2021, and the coordination related to the contract is being carried out by TÜRKSAT. The satellite, which will enable Türkiye to be among the 10 countries capable of producing communication satellites, is targeted to be launched into space in 2023 (TÜBİTAK, n.d.).

**Table 3.** TÜRKSAT 6A Communication Satellite Specifications

Feature	Description
Orbit	42° East
Payload	16 Ku-Band Transmitter
Service Life	> 15 years
Dry Mass	~1800 kg
Total Mass	~4200 kg
Power Generation	~7.5 kW (End of life)

Source: (TÜBİTAK, n.d.)

### 3.4. The Black Sea Grain Initiative

Russia saw Ukraine as a threat to its foreign policy and national security as a result of Ukraine's political initiatives to join NATO and its warming relations with the US and EU. As a result, on February 24, 2022, Russia launched a war against Ukraine, causing a security crisis around the world. However, for the first time likely since World War II, Europe felt the terrifying breath of "war" so near to itself. While the Covid-19 pandemic-related economic and social issues have not yet been fully addressed by international governments, the start of the Russia-Ukraine war means that these issues will continue to be on the global agenda for some time. The global rise in food prices following the pandemic is an economic and, indirectly, a social problem. The emerging war, on the other hand, has reinforced these problems, and Russia's military blockade of Ukrainian ports has prevented grain exports from Ukraine to third-world countries, especially North African countries. The problem of how to transport this grain from a leading grain producer and exporter country such as Ukraine to the countries of the world in a war environment has taken its place on the world agenda as an international legal and economic issue,

and the necessity to establish a corridor at sea starting from the Black Sea has emerged (Candan and Halhalı, 2022: 372-373; Yenginar, 2022: 103).

The "Document on Initiative for the Safe Shipment of Grain and Foodstuffs through Ukrainian Ports," also known as the "Grain Corridor Treaty," was signed on July 22, 2022, by Russia, Ukraine, Türkiye, and the UN to fulfill this requirement. Particularly successful in this regard was an initiative by Türkiye. The Black Sea Grain Initiative works to ensure the safe passage of food goods, particularly grain products, through the Black Sea to lower food prices and shortages around the world. The agreement's content can be summed up as "establishing safe routes along the drawn red line and ensuring food shipments by utilizing these safe corridors," and "fulfilling their commitments and responsibilities to ensure the success of the agreement" is a vital phrase for all parties involved (UN, 2022).

The initiative, in particular, permits the export of commercial food and fertilizer, including ammonia, from Ukraine's three main Black Sea ports (Odesa, Chornomorsk, and Yuzhny/Pivdennyi), while Ukrainian ships are diverted into the international waters of the Black Sea, avoiding mined areas; the ships then proceed along the established maritime humanitarian corridor to Istanbul. JCC teams made up of Russian, Turkish, Ukrainian, and UN inspectors inspect ships arriving at and departing from Ukrainian ports. Approximately 25 million tons of grain and other products were carried to 45 countries as a consequence of the project in the first two time periods, which helped to bring down food costs worldwide and stabilize markets (UN, n.d.).

It is significant to highlight that several variables, including transportation costs, import laws, and distribution routes, can affect how well the Black Sea Grain Initiative works to meet the nutritional needs of people in low-income countries. Here, the specific objectives of the initiative could be to improve the safety and efficiency of loading and unloading operations, reduce the risk of contamination or damage to products during transportation, improve the quality of packaging and handling of products, and ensure compliance with international standards on food safety and quality. While the agreement provides a safe and regular route for grain exports from Ukraine, it may take some time before shipments reach their final destinations and prices stabilize. However, the Initiative is expected to contribute to increasing global supplies of wheat and other grains, which could help alleviate food insecurity, especially in some countries that are heavily dependent on grain imports.

### **3.5. Impact of Transportation and Communication Investments in Türkiye**

The Turkish economy, including GDP, output, exports, taxes, and employment, has benefited significantly from the investments made in the country's transportation and communication infrastructure. These investments have promoted Türkiye's economic expansion and development and made it a significant player in the global transportation and communications sector.

Between 2003-2021, USD 183.7 billion was invested in transportation and communication infrastructure. These investments contributed USD 548.5 billion to the total GDP, USD 1,138.9 billion to production, USD 99 billion to exports, USD 27.9 billion to taxes, and 18.9 million jobs (an annual average of 995.1 thousand people). All public investments including public-private partnerships are included in this calculation (Ministry of Transportation and Infrastructure, 2022).



**Figure 4.** Investments between 2003 and 2021

Source: Ministry of Transport and Infrastructure, 2022:17

When the environmental benefits of the investments are evaluated, it was determined that 83,169 trees were saved in terms of paper savings, and 1,010,593,692 trees were saved in the examination of CO2 emissions (Ministry of Transport and Infrastructure, 2022).

**Table 4.** Economic Benefits of Investments

Time-Saving Billion \$	Decrease in Accidents Life Saved	Fuel Savings Billion \$	Vehicle Maintenance Savings Billion \$	Environmental Impact	
				Paper Savings Million \$	CO2 Emission Savings Million \$
19,4	13 Bin 109	1,7	1,3	14	92

Source: Ministry of Transport and Infrastructure, 2022:20

**Table 5.** Comparison of Activities between 2002-2022

Investment Act	2002 Year End	2022 November
Highway (km)	1.714	3.633
Total divided roads including highways (km)	6.101	28.816
Length of Bituminous Hot Mix (BSK) under the responsibility of the General Directorate of Highways (KGM) (km)	8.591	29.664
Number of Highway Tunnels	83	469
Highway Tunnel Length	50 km	663 km
Number of Highway Bridges and Viaducts	5.967	9.740
Highway Bridge and Viaduct Length	311 km	736 km
Railway Network	10.948	13.749
Number of Active Airports	26	57

Source: Ministry of Transport and Infrastructure, 2022:20

"As of the end of 2002, there were almost no "broadband subscribers" in our country, while the number of fast internet users reached 91.3 million subscribers as of October 2022. By the end of 2022, we aim to reach 92 million subscribers. While the "Fiber Line Length (km)" was 81,304 km at the end of 2002, 488,423 km of fiber infrastructure was put into service as of June 2022. By the end of 2022,

the total fiber infrastructure is expected to reach 500,000 km" (Ministry of Transport and Infrastructure, 2022). The importance of communication projects in the country's economy is evaluated in terms of the fact that they affect many sectors and business areas, as well as becoming an indispensable element of social life. For this reason, it is seen as a factor that plays an effective role in the success of projects related to horizontal and vertical sectors both on a national scale and in an international context. The Internet of Things (IoT), big data, and other cutting-edge technologies all have their roots in developments in the communications industry. Improvements in communication infrastructure are also important for today's transportation and smart transportation projects, where real-time data is becoming increasingly important.

Completed major transportation projects (Ministry of Transport and Infrastructure, 2022) are listed below, as well as ongoing major transportation and communication projects and economic impact analyses have been conducted for all projects:

- a. Istanbul-Izmir Motorway Project (Including Osmangazi Bridge)
- b. Menemen-Çıǧlı-İaliğā-Çandarlı Motorway Project
- c. Northern Marmara Motorway Project (Including Yavuz Sultan Selim Bridge) (Yid)
- d. Malkara-Çanakkale (including 1915 Çanakkale Bridge) Motorway
- e. Eurasia Tunnel
- f. Ankara-Nigde Motorway Project
- g. Ayvacık - Küçükkuyu Road Assos and Troy Tunnels
- h. Malatya-Hekimhan-16th Regional Border Road
- i. Diyarbakır Southwest Ring Road
- j. Ankara-Eskisehir-Istanbul Ht
- k. Marmaray
- l. Ankara-Konya Ht
- m. Kars-Tbilisi-Baku Silk Railway Project
- n. Sabiha Gökçen Airport Rail System Connection (Tavşantepe-Sabiha Gökçen Airport)
- o. Gaziray Project
- p. Istanbul Airport
- q. Amasya Merzifon Airport
- r. Rize-Artvin Airport
- s. Ordu-Giresun Airport
- t. Tokat Airport Project
- u. Filyos Port
- v. Karasu Port
- w. Communication Satellite Project (TÜRKSAT 5A and 5B)
- x. E-Government Gateway
- y. Camlica TV-Radio Tower Project
- z. Çanakkale TV-Radio Tower

#### **4. Conclusion**

For Türkiye to take advantage of its geographical location and have a say in the corridors, Türkiye must have a strong transportation infrastructure. This includes physical infrastructure such as roads, railways, ports, and airports, as well as legal frameworks and regulations that facilitate trade and transportation.

The transportation industry plays a significant role in the economy of Türkiye, which is situated at the intersection of trade between Asia and Europe and is bordered by seas on three sides. It is a proven truth that effective policymaking is essential to achieving the economic growth advantages of an investment in transportation infrastructure. Türkiye is one of the most active members of TRACECA with its transportation infrastructure. Türkiye is working to put its transportation potential at the service of the Eurasian transportation network, prioritizing the elimination of congestion in international traffic and border crossings and implementing many projects such as Marmaray, BTK railway, high-speed train projects, construction of dual carriageways, Black Sea Coastal Road, second tube crossing to Istanbul, Baku-Tbilisi-Kars railway, construction of Istanbul New Airport, which is preparing to be one of the largest airports in the world, and establishment of twelve logistics centers across the country.

The development of an information-based transportation system that is centered on the requirements of people and the environment has been the subject of extensive research and there are projects aimed at making this vision a reality. It is well established that both the public and private sectors engage in a variety of activities related to autonomous, linked, cooperative, and shared mobility, and that these activities have significant positive economic effects. Digital technologies have a positive impact on transportation projects and subsequently have a positive impact on the economy.

Türkiye has been investing heavily in transportation infrastructure in recent years. These projects aim to improve Türkiye's connections with neighboring regions and increase its role as a transit country. However, it is also important that these infrastructure projects are sustainable, environmentally friendly, and meet the needs of all stakeholders, including local communities and businesses.

Türkiye's economy will be able to maintain its growth trend at the level of development thanks to the funds provided by the European Union for the harmonization process, the share allotted from the state budget, the zeal of local and foreign investors, geographical advantage, and, most importantly, the continuity of political stability. These factors also include projects in the fields of transportation and communication and their sustainability.

#### **Ethical Approval**

The authors state that there is no need for an ethics committee report in this study.

#### **Contributions of the Authors**

The authors contributed equally to this study.

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#### **Conflicts of Interest**

The authors declare no conflicts of interest.

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