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Conference Paper

The Analysis of Turkey's Freight Transport in Terms of Transport Modes

53rd Congress of the European Regional Science Association: "Regional Integration: Europe, the Mediterranean and the World Economy", 27-31 August 2013, Palermo, Italy

Provided in Cooperation with:

European Regional Science Association (ERSA)

Suggested Citation: Oguztimur, Senay; Colak, Kenan (2013) : The Analysis of Turkey's Freight Transport in Terms of Transport Modes, 53rd Congress of the European Regional Science Association: "Regional Integration: Europe, the Mediterranean and the World Economy", 27-31 August 2013, Palermo, Italy, European Regional Science Association (ERSA), Louvain-la-Neuve

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THE ANALYSIS OF TURKEY'S FREIGHT TRANSPORT IN TERMS OF TRANSPORT MODES

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Abstract

Turkey enjoys a strategic location, with the potential to play a pivotal role in regional and global integration. The important energy, trade and transport networks which connect west to east and north to south are keys to unleashing this potential. Recent economic and political developments throughout neighbouring regions -the Balkans, the Black Sea, the Mediterranean Basin, the Caucasus, Central Asia and the Middle East- have further emphasized Turkey's role.

A dynamic transport sector, combined with a large international road vehicle fleet, underscores Turkey's potential to become one of the most significant logistics hubs and transit countries in the region. Yet, some 96 % of passengers and 92 % of freight are transported by road in Turkey. This dependence on road transport creates imbalance in favour of road transport. Indications such as congestion, environmental downsides, border-crossing problems, road taxation, restrictions on road traffic, permit shortages and customs constraints are some examples. In order to overcome this vulnerability and become more sustainable, Turkey needs to develop intermodal transport solutions that can rapidly yield results without losing the advantages of its competitive road transport system. On the other hand, Turkey has significant potential, and several projects are underway to develop intermodal transport. The aim of this paper is to focus on the developments and challenges which Turkey have to face in order to enrich its operating capability of transport modes, in its international transport activities.¹

Keywords: transport, networks, Turkey

¹ **Acknowledgments:** The authors would like to convey gratitude to Yıldız Technical University Scientific Research Project Coordinator for their support.

INTRODUCTION

It is necessary to understand the socio-economic context of the international and national environment in order to assess the future of the Turkish transport sector and its role in international exchange development, especially between the EU and Asia. Throughout history Turkey has been at the crossroads of major international routes from the West to the East and from the North to the South: between Europe and Asia, the Middle East, the Black Sea and the Eastern Mediterranean as well as providing connections towards India and South East Asian countries.

This context should be analyzed from an internal and external point of view, showing how the Turkish transport sector can facilitate trade between countries while contributing to national cohesion and expansion. Therefore, appraisal of the future must not disassociate the performance of the transport sector within the large Turkish territory from the performance of Turkish international transport.

The development of major infrastructure corridors across Turkey will complement the improvement of transport services along these corridors, whether they are provided by Turkish or foreign operators. Geographic realities demand intermodal transport solutions; combinations of land, sea and air transport modes are required in order to provide more efficient transport chains.

Good transportation infrastructure and services are important preconditions for increasing trade, and achieving economic development. As the situation of a country's transport sector determines the transport costs and the degree of access to domestic and foreign markets, all of which impact the country's development prospects. Smooth, cost-effective and safe transport of exports and imports is a priority for Turkey.

1. THE SOCIO-ECONOMIC AND TRANSPORT CONTEXT

Turkey remains a country of contrast: from densely populated areas, to remote regions which face significant emigration rates, to coastal regions which face the challenge of the competition for land by tourism and industrial activity, to large internal mountainous regions which struggle with connection problems. On a national scale, the contrast is observed between the more developed western parts of the country and less developed eastern parts.

There are many factors currently at play which could contribute to sustained economic growth. Since Turkey is a country with a young population, the first factor is demographic. Turkish population growth rates are much higher than EU population growth rates. Although the population is growing annually at a high rate, this rate is expected to decrease progressively to 2% over the next twenty years. Decreasing population growth rates, as observed in many emerging countries, are due to decreases in fertility rates. Fertility rates drop as the percentage of the population living in urban areas increases and as income levels per household rise.

Since 1950's, Turkey has faced significant migration from rural to urban areas, and from the east to the west, in particular to İstanbul and the Marmara industrial region. Large Mediterranean coastal cities as well as other large and port cities such as İzmir, Mersin, Antalya and the capital city Ankara, have also been affected by migration.

A second very important factor is the achievement of macro-economic stabilization policy. Inflation and successive financial crises hindered Turkish economic growth and made it difficult to implement a solid banking system which could respond to financial needs. During this volatile period Turkey failed to attract international investment funds, and as a result such funds maintained a low level of business volume within the country. This situation is changing rapidly and Turkey is becoming an attractive country for investment in industrial activities and services. This will have an influence on investment in the transport sector as soon as the relevant regulatory frameworks are implemented.

A third factor is Turkey's size. Benefits due to size could be improved and supported by both national and international markets, as is the case with other large emerging countries of the world. Over the last five years, Turkey's GDP grew on average by almost 7%, much higher than the EU average GDP growth of 2.5%. In many economic studies, the GDP growth of Turkey ranks high among Mediterranean countries; it is also very close to the GDP growth of Asian emerging countries.

Diversified International Trade: A Strong Asset for Future Turkish Development

a) Geographic: a large diversification of economic partners

When looking at the structure of Turkey's international trade, the importance of relations with the EU is clearly revealed by a long history of economic cooperation, trade, and customs agreements. In terms of transport, Turkey has been a member of the European Conference of Ministers of Transport (ECMT – now transformed into the International Transport Forum (ITF)) since its foundation, and has always participated actively in the multilateral work of the United Nations (UN).

Trade has also developed with most Mediterranean countries and many former communist bloc countries currently undergoing transition. The rapid expansion of trade is due mainly to Turkey's central geographic position. In this context, Turkish transport operators and in particular Turkish road hauliers have always been particularly dynamic. Historical and cultural relations and the ability to communicate in various languages have facilitated trade relations; Turkish operators have been able to take advantage of the opening markets in the long run, both nationally and internationally.

b) Economic: weaknesses and strengths in world competition

Although the diversification of Turkish trade is an important asset, there are structural weaknesses in its international transport network that have to be overcome in order to face world competition.

Strengths and weaknesses:

- Dependency on energy products; petroleum, in particular. This dependency has been limited in part by hydraulic energy production; but this level of production is not sufficient to meet the demands of the transport industry. All types of transport is always remain very dependent upon petroleum.

However, Turkey's geographic proximity with oil producing regions - the Arabian Gulf and the Caspian Sea – translates into indirect benefits from these resources through trade with neighbouring countries in need of imports of industrial products and services.

- Emerging countries can now compete in traditional sectors, such as textile, clothing and shoe production with lower production costs and prices, which creates a challenge in the market. Turkey's objective is to maintain a strong position within these traditional sectors.
- In agricultural production, Turkey has obtained a strong position by pursuing new developments for the food industry. The effects of large investments made in the South Eastern region, help strengthen the position of Turkey in the agricultural industry, especially for exports towards the Middle East and "Maghreb" countries.
- For basic industries, such as steel and basic chemicals, production within Turkey does not appear greatly diversified. Turkish international trade is an example of the "old economy" trade with significant exports of basic and intermediate products.
- The production and export of "white" goods for household equipment has developed rapidly. This development is occurring in parallel to the support of the internal market, which plays a significant role.
- The rapid development of the automotive industry with the support of key foreign investments concerns exports primarily and the internal market secondarily. Turkey is a country of almost 70 million inhabitants, where the rate of motorization is fairly low compared to the average income per inhabitant. Recent success in the automotive industry, a sector which demands highly qualified personnel and logistic performance, confirms the fast pace at which Turkey is adapting to the new type of industrial production.
- Finally, sectors of high technology markets, such as information and office equipment, are also developing in Turkey.

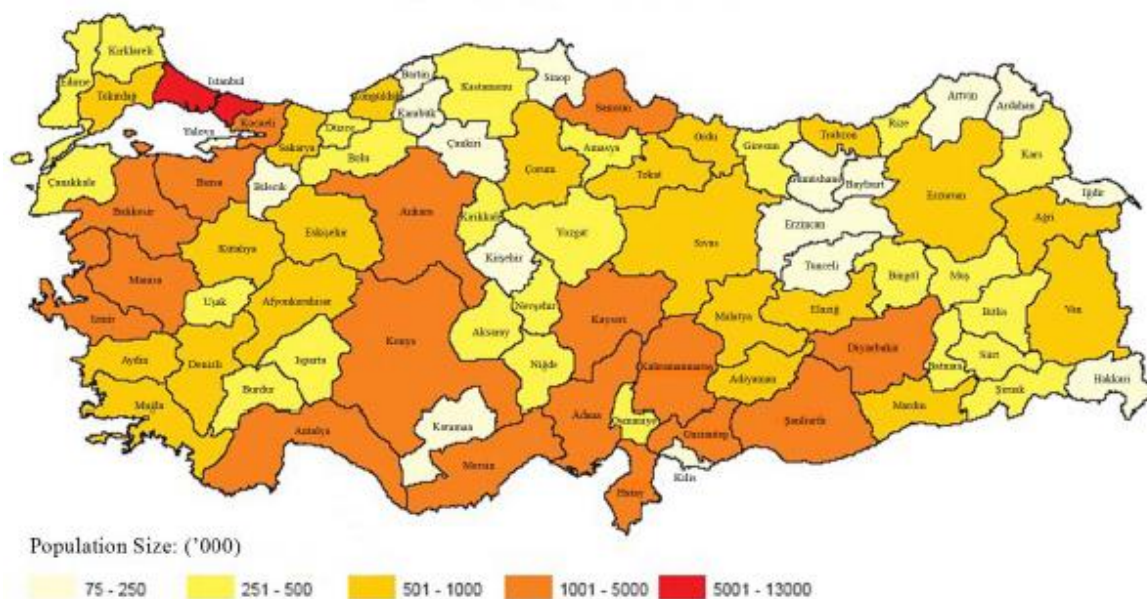
In conclusion, Turkey's industrial structure could show vulnerability in some traditional sectors of production such as textile, steel, clothing, in a globally competitive market. Recently, however, new high technology production has been developing successfully, and new modern industrial plants have been introduced. Furthermore the Turkish internal market is very promising and this alone could be an important basis for international competitiveness, but only if the proper transport and industrial policy framework is provided.

The Spatial Development of Turkey

The problem of spatial development within Turkey is reflected in the locations of activities and in the population movements mentioned earlier. These have a direct influence on the development of networks across Turkey. For the development of Turkish and transit trade, it is essential to respond to the needs of the concentrated population in the western part of the country, and also to provide proper connections between regions, from the east to the west, and from the north to the south, as well as connections with neighbouring countries.

The first major problem to overcome is the concentration of population, along the İstanbul Strait, Marmara Sea, Mediterranean coast and the western part of the Black Sea coast.

Figure 1. The problem of spatial development and cohesion of Turkey



Source: TUIK, 2013.

Crossing the Bosphorus is known to be fairly difficult; therefore the ongoing construction of a new tunnel for rail “Marmaray” will certainly improve the capacity for connections between the European and Asian sides of Turkey. The Project of Marmaray is also of vital importance for radically solving the urban transport problem of İstanbul as a world city.

However congestion around the Marmara Sea is not due simply to the difficulties associated with crossing the Bosphorus. İstanbul is a megapolis of almost 13 million inhabitants which expands far beyond the İstanbul Strait and around the Marmara Sea, a zone which contains a large number of highly populated industrial cities. Therefore, in addition to improvements made to ease crossing the Bosphorus, alternative routes should be found to connect cities across the Marmara Sea.

Furthermore, the ports of the Marmara Sea have become important gateways for maritime foreign trade; an increasing number of private ports have responded to the growing demand that the public ports could not satisfy.

But in the long run, the saturation of the entire Marmara Sea, including access to the various ports, remains a risk. Thus the problems of entry to and exit from Turkish territory should be tackled on a large scale. Factors to consider can be categorized as “East-West connections” which refers to the connections between Turkey and the EU, the EU and Asia, and other entry ports along the Aegean coast or the South Mediterranean coast (İzmir, Mersin); and “North-South connection” which involves alternative routes to the İstanbul Strait that could include a bridge link between the Mediterranean and the Black Sea, connecting for example, Mersin and Samsun. Other dimensions of this situation are discussed below:

The Western part of the Anatolia

The density of population of the Anatolia is much lower than the density of population along the coasts. However, the Anatolian plateau contains a network of interconnected large cities with important historical and administrative roles. Ankara is in the centre of this network in relation to Konya, Afyon, Eskişehir, Kayseri, and Sivas, which are the

main regional cities. Connections between the Anatolian plateau and coastal regions are sometimes difficult, and the number of routes through the mountains is limited by topographic constraints. This is the case for connections to Antalya and Adana along the southeast Mediterranean coast as well as connections to some North-Western regions of the Black Sea where major ports should develop.

The Eastern Regions

The Eastern regions of Turkey have less developed ports and high rates of emigration to foreign countries. The rate of demographic growth is not always related to economic growth and it differs from one region to the other; the fast growing population in the South-Eastern regions is due mainly to the high fertility rate and the decreasing population in the mountainous North-Eastern region is due in part to the high rate of emigration.

In the Eastern part of Turkey, a differentiation should be noted:

- In spite of the rail corridor towards Iran across the Van Lake, it remains difficult to cross the high mountainous areas in the South-Eastern region of Turkey towards Iraq, Syria and the connections to the North and to Iran.
- The Central Eastern regions of Turkey, between the Black Sea coast and the South-Eastern regions are connected to the Anatolian plateau through the East-West axis from Kars to Sivas.
- North-Eastern Black Sea regions, connected through ports to other Black Sea countries (Bulgaria, Romania, Ukraine, Russia, Georgia) are also East-West transit regions for road transport towards Georgia, Azerbaijan, and the Caspian Sea, as part of the “Silk Road”.

To conclude, in addition to the East-West connections between the regions of Turkey, there are also major East-West international transit corridors towards the Middle East, Iran and Caucasian countries. North-South connections across the mountains of the Eastern Anatolian plateau face difficulties because of the topography. These difficulties pose significant constraints for Turkish land networks and for the development of transit corridors

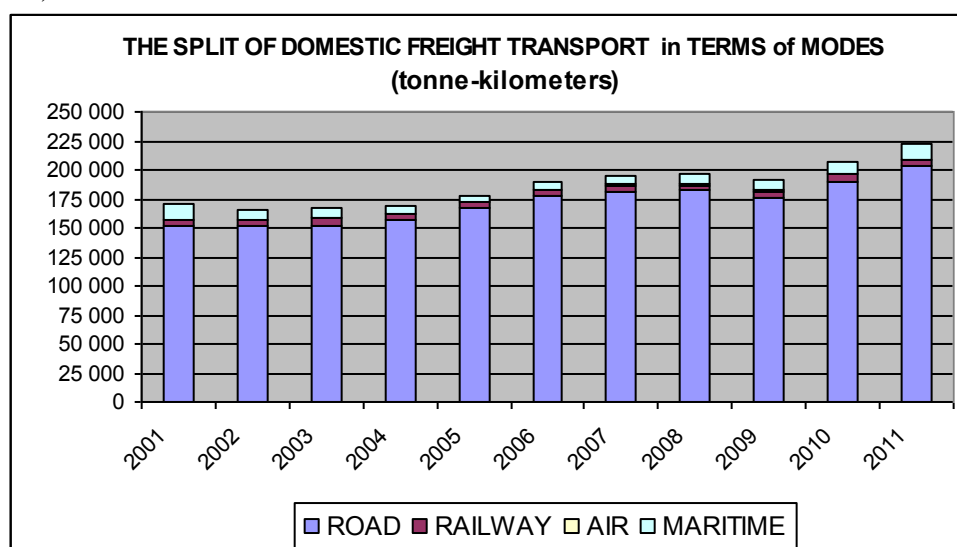
2. OVERVIEW OF TRANSPORT SECTOR IN TURKEY

2.1. Road Transport

As of 2010, having 89,4 percent of freight transport, road transport constitutes a great share among the transportation modes in Turkey by means of international freight. As of the year 2010, share of road transport for freight are 85 percent and 44.3 percent respectively for EU-25 (Ministry of Transportation and Communication, 2011).

Beginning from the 1950's, road transport has experienced a significant development process and now, it is considered as the dominant transport mode of Turkey. Demand (*measured in passenger-kilometres and tonne-kilometres*) has grown at an annual rate of nearly 8% since 1950. Due mainly to long-time neglecting of railway and maritime physical infrastructure, road transport as being the most appropriate mode for door-to-door transportation have given rise to concentration of freight and passenger transport on road network in Turkey. Even for heavy and industrial freights, road is used. But by last decades, Turkey has promised to give attention to other modes as well. Railways gained more budgets and more investment than roadways. By the year 2011, the share of public investment budget separated in terms of transportation modes are below.

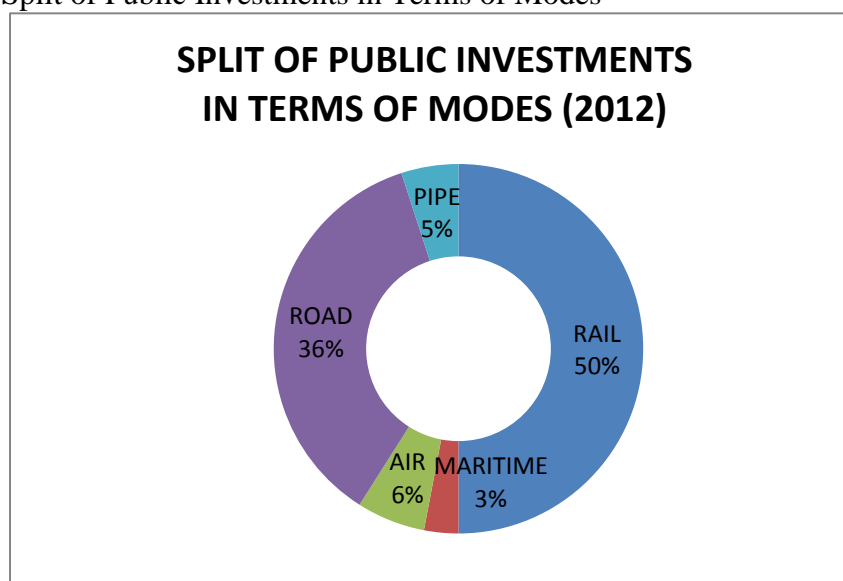
Graphic 1. The Split Of Domestic Freight Transport in Terms of Modes (tonne-kilometers)



Source: TUIK, 2013

Turkey is in the network of international corporations which constraints Turkey's transport policies. Table 1 show the road Networks in Turkey. E-Roads, ECO and TEM are the longest corporations passing across Turkey. Below Figure 1 show the international road Networks. In brief, it is clear that; the international roadways across Turkey in East-West axis in two basic way: from Northern Coastline and from central Anatolia. And in North-South axis, Generally from Capital city Ankara to important port city: Mersin.

Graphic 2. Split of Public Investments in Terms of Modes



Source: General Directorate of Motorways, (2011).

http://www.kgm.gov.tr/SiteCollectionDocuments/KGMdocuments/Kurumsal/StratejikPlan/sp12_16.pdf

In parallel with the growth experienced in world trade volume in 1990s, Turkish road transport sector witnessed a dramatic increase in the role of private sector. Currently there are 1634 licensed firms in the international goods transport and 151 licensed firms in

international passenger transport. Also there are 172.945 licensed firms in national goods transport and 359 licensed firms in national passenger transport.

Table 1. International Road Network in Turkey

International Road Network In Turkey	Length (Km)
Trans European Motorway (TEM)	6 896
Agreement on Main International Traffic Arteries (AGR) E – ROADS	8 878
Black Sea Economic Cooperation – BSEC	4 472
Economic Cooperation Organisation – ECO	7 982
UN - ESCAP	5 247
TRACECA	1 500
Euro - Asian Linkages	3 020
Pan – European Corridors (Corridor IV)	261

Source: Turkish General Directorate of Highways, 2011

In terms of utilization of the intercity highways network, vehicle-km values increased to 10 percent, road freight (in tones-km) to 7,88 percent and passenger transport to 6,80 percent from 2009 till 2010. Because of its dominant role in all modes of transport, improving the physical and design standards of road network has become a necessity in recent years. In terms of design standards, the divided road network in Turkey currently reaches to 21.227 km including motorways as of September 2011.

In general meaning, transport demand in Turkey has been growing. However, freight transport, which is being realized 89,4 percent by highways, increases heavy commercial vehicle traffic as well as creates unsafe situation on the roads. Turkish total road network is over 60.049 km, of which more than 31,372 km are state roads, 31,558 km are provincial roads and 2119 km are motorways. The density of the Turkish road network, excluding urban roads, is approximately 47 km/100km². In the European Union (EU 25), the average density of the overall road network is 110 km/ 100km² (OECD, 2009).

One of the major issues in road transport is traffic accidents which have become a significant issue in the world. As traffic accidents leave casualties and injuries, and causes significant economic losses, development of physical and geometric standards aimed at increasing traffic safety, especially in highway transportation is given special emphasis in many countries. A total of 1.104.388 road accidents have taken place in Turkey on urban and intercity roads, with total casualties of 4045, a total number of injured reaching 211.496 in 2010. Fatalities per 100 million vehicle-km resulting from traffic accidents are decreasing dramatically. By the construction of divided roads and developing traffic safety, the ratio is decreasing every passing year. But anyway, in Turkey, unfortunately number of injury accident, accident per vehicle, accident per passenger is still far more than EU average.

Figure 2. International Network of Road Transport in Turkey



Source: Turkish General Directorate of Highways.

2.2. Rail Transport

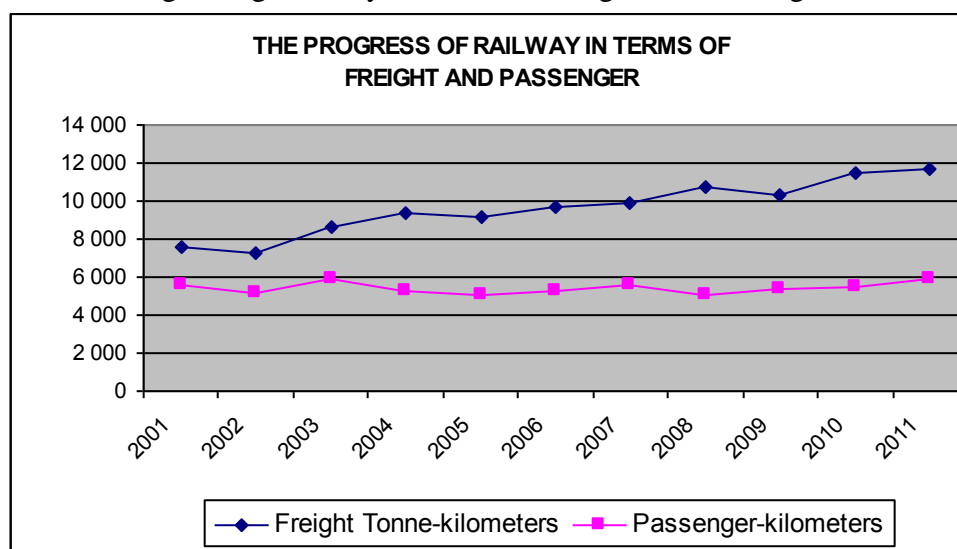
The length of the rail network in Turkey is 9.642 km, of which 7.355 km are main lines, 2.287 km are branch lines. The network is predominantly single-tracked (95%) and is characterised by mountainous terrain, tight curves and steep gradients. The existing railway network is concentrated on a few major routes. Thus the railway network is available only in certain areas and between certain cities. 2.336 km of the railways which correspond to 21% of the network, are electrified; 3.111 km of the railways, corresponding to 28% of the existing network, are composed of signalled lines. The permitted axle load is 20 tonnes on about 61% and 22.5 tonnes on about 37% of the network. The Turkish rail system is both jointed and welded, with concrete sleepers used on around 60% of the network (OECD, 2009).

4.136 km of railway network of Turkish Railways was inherited from Ottoman Empire and remained in the national borders. As a result of the construction works of new railways started in 1924 after the Republic, approximately 5.506 km of new lines were constructed and put into operation. After 1950, a transport policy which focused mostly on road transportation was adopted. In the first years of the Republic, approximately 134 km of railway line was built per year; however after 1950, average length of railway lines constructed per year decreased to 16 km. In last two decades, Turkey witnessed the disadvantages of the transport costs and time, then has started to pay special attention and priority to railways among other transport modes, which has resulted in allocation of large amount of investment and new rail transport policy both in passenger and freight transportation. Approximately 10 billion US Dollars (40% of all budget) investment was allocated to railway infrastructure (see graphic 2). Share of railways in freight transportation throughout Turkey is 5.3 percent and its share in passenger transportation is 1.6 percent.

After 2000's, TCDD has changed its freight transportation strategy and shifted to Block Train Operations from piece-by-piece transportation. 24.2 million tonne freight was carried in 2010 and when it is compared with the transportation in 2002 freight transport amount was increased by 67 percent. Also, the freight transport income was increased by 206 percent. But in general meaning; it is still almost 3% of all freight transported. From a different view; it is clear that ports connection with railways is so weak. For example, the biggest container port Ambarlı-İstanbul does not have rail connection. Other important ports İzmir and Mersin ports already have railway connection. But unfortunately the ratio to link the hinterland by rail is around 2-3 percent of all. The rest is all to be transported via roadways.

In terms of type of goods carried; ore, coal, container and international transportation account for the 78 percent of total transportation. Moreover, transportation of goods such as automobile, construction materials, food products etc. are now being transported by block trains. With regard to international transportation, block trains are operated reciprocally from Turkey to Germany, Hungary, Austria, Bulgaria, Romania and Slovenia in west and to Iran, Pakistan, Syria, Iraq in east, and to Turkmenistan, and Kazakhstan in Central Asia.

Graphic 3. The Progress of Railway in Terms of Freight and Passenger.



Source: TUIK, 2013.

Turkey has a state-owned railway system under the responsibility of Ministry of Transport and Communications which carries out supervision of Turkish State Railways (General Directorate of State Railways Administration- TCDD). TCDD is a state-owned enterprise, founded for producing monopoly products, basic products, services and marketing them, and focuses on the public service aspect. There is no separation of accounts between infrastructure management and train operations. Liability of the Enterprise is stipulated in its Articles of Association to construct new conventional, fast and high speed railway lines, operate, expand, renew the Railways, Ports, Wharfs and Docks and perform complementary activities related to them.

Fares and investments are generally regulated by the State and some operating losses are compensated by the State, as well. Current efforts are concentrated on opening up the sector for competition, separating infrastructure management from train operations and establishing the necessary bodies in accordance with the EU Acquis.

Rail Infrastructure Developments

In 2013 programme, Turkey intends to construct Ankara-Istanbul, Ankara-Konya, Ankara-Izmir and Istanbul-Bulgaria high-speed lines. It also aims to complete the Marmaray Project in 2013. Priority is given to new railway construction projects as indicated below:

Kars-Tbilisi-Baku Rail Link: The rail line will link the eastern Turkish city Kars with the Azerbaijani capital, Baku. With this project the construction of a new line between Kars-Akhalkalaki (Georgia) and rehabilitation of the present line between Akhalkalaki and Tbilisi (Georgia) will be carried out. Creating this new route will be the only way to re-establish the Silk Road railway line between Istanbul and Baku. With the completion of this project, a new line to connect Europe to the Caucasus and Middle Asian Countries will be ensured.

Figure 3. Railway Map in Turkey



Source: TCDD, 2013

Ankara-Sivas Railway Project: This project is a part of “Sivas–Erzincan-Erzurum-Kars” Railway Projects. It involves the construction of a new 466 km stretch of railway and the upgrading of the existing Ankara-Kırıkkale line. Currently trains between Ankara and Sivas run via Kayseri, a detour of over 300 km. This project will shorten the most important link between the east and west, the Ankara-Sivas line, by double tracks and electrified and signalled railways.

Halkalı (İstanbul)-Kapıkule (Edirne) Project: A high standard railway, as a continuation of the Ankara–İstanbul Speed Railway Project, is planned for implementation. (250 km/h, two tracks; electrified and signalled).

Sivas-Erzincan-Erzurum-Kars-Railway Project: This line forms the most important section of the east-west corridor, this project aims to increase passenger and freight transportation capacity by reducing 131 km of length and raising its standards. It also aims to provide high standard railway routes between Europe-Caucasus- Central Asia via Turkey in the east-west axis, by integration with the Kars-Tbilisi Railway Project.

Ankara- İzmir Railway Project: The largest of the four projects involves the creation of a new high speed line between the Turkish capital, Ankara and the main Aegean port, İzmir. This Project involves the construction of 554 km of new rail line linking Polatlı with Afyon. Few trains currently run between Ankara and İzmir, as the journey takes more than 15 hours. Once completed, travel time between Ankara and İzmir will be reduced to 3 hours and 20 minutes. The line will allow for the easy transit of freight between the port facilities of Turkish Railways (TCDD) at İzmir, Afyon, and Ankara.

Ankara-İstanbul High Speed Train Project: The Ankara-İstanbul High Speed Train Project aims to decrease the travel time between Ankara and İstanbul by 3 hours (Travel time by conventional express trains is 6 hours and 30 minutes, by road 5 hours and 30 minutes and approximately 50 minutes by air).create a fast, safe and comfortable means of transportation, and increase the share of railways in transportation. The hope is to increase the railway share in passenger transportation between Ankara and İstanbul from 10% to 78%. The existing railway line between Ankara and İstanbul is 562 km in length, 198 km of which is double-line and 364 km of which is single-lines.

Marmaray Project: The most challenging infrastructure project in Turkey is the Marmaray Rail Tube Tunnel Project. The Marmaray Project is the upgrading of approximately 76 kilometres of commuter rail from Halkalı to Gebze. The project will provide an upgrading of the commuter rail system in İstanbul, connecting Halkalı on the European side with Gebze on the Asian side with an uninterrupted, modern, high-capacity commuter rail system (See Figure 5).

Figure 4. Map of Rail Projects



Source: TCDD, 2013

Railway tracks on both sides of the İstanbul Strait will be connected by a railway tunnel connection under the Bosphorus. The red line on the map shows the parts of the railway that are above ground; the white line shows the new railway system that will be constructed in tunnels under the Bosphorus.

Figure 5. Marmaray Project



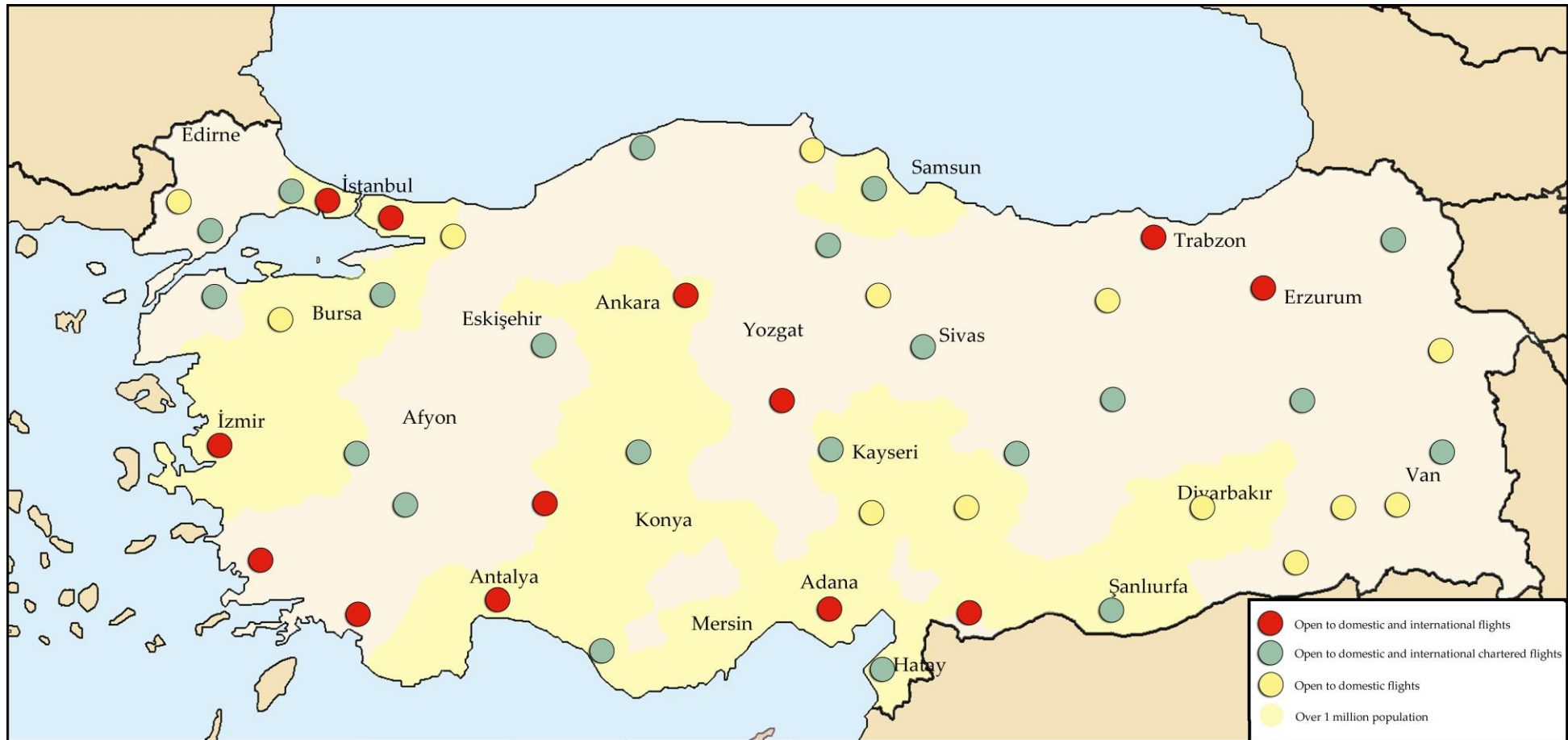
Source: www.marmaray.com

2.3. Air Transport

Turkey has many modern airports that are open to international and domestic flights. The major international airports are in İstanbul, Antalya, Ankara and İzmir. The increased volume in international aircraft and passenger traffic through Turkish international airports, especially İstanbul/Atatürk and Antalya airports, have placed them among the most important airports of Europe. There are 45 airports, 16 of which serve for international flights. In addition to the 45 airports in Turkey, new airports in Bingöl, Iğdır, Hakkari Yüksekova, Şırnak, Kütahya-Afyon- Uşak, İstanbul, Çukurova and Diyarbakır are projected or on the way of project (Deloitte, 2010).

In terms of intermodal transport, air transport does not have an important share in cargo transport volume (see graphic1). İstanbul Airport is the most important airport for cargo transport, even though it is not at competitive levels compared to other important European airports. Nevertheless, the freight terminal at the Atatürk International Airport is currently undergoing a face-lift to prepare for additional freight volumes. Turkish Airlines Cargo will begin to operate four full-freighters to play a greater role in transporting freight to/from its home base in the future.

Figure 6. Air Transportation Network

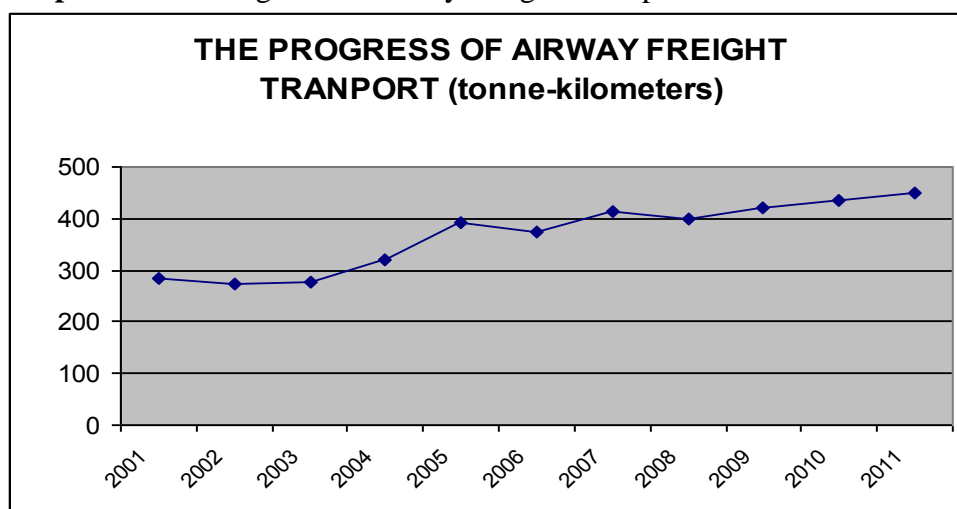


Source: Republic of Turkey Prime Ministry Investment Support and Promotion Agency, 2012

The total freight carried grew by 8.0% to 448 ton-kilometers in 2011. In 2000, there were 110 aircrafts in Turkish fleet compared to the 340 aircrafts in 2010. The growth rate in this period is 210 percent. In 2002, total numbers of transit flights, international flights and domestic flights were 155 thousand, 157 thousand and 218 thousand respectively. But in 2010, total number of transit flights was 304.540, international flights were 536.350 and domestic flights were 489.980. The growth rate between 2002-2010 is 150 percent. In 2000, near 285 tonne-kilometres of cargo were carried by air. In 2011 domestic cargo volumed 448 tonne-kilometers. The freight carried by domestic and international lines has continuously grown until 2008. However, freight volumes then declined in 2008 due to the effects of the global financial crisis. Although domestic airfreight volume is smaller than international airfreight, it is growing faster.

Turkey has had a tremendous development in the civil aviation sector during the last decade. In recent years, Turkey's civil aviation sector has grown ten times faster than the world average. Total air traffic growth expected for Turkey in the reports of international civil aviation organizations like European Organisation for the Safety of Air Navigation (EUROCONTROL) and International Air Transport Association (IATA) for 2015 had already been reached in 2005, i.e. 10 years before the anticipated year. Main causes of this development are liberalization of the sector and economic growth in Turkey.

Graphic 4. The Progress of Airway Freight Transport



Source: TUIK, 2013

Besides all the developments in civil air transportation; one of the basic issue is transit cargo to be mentioned. Transit cargo volume need to progressed more than it performed last decades. One of the restrictions is the facilities of airports. If Turkey want to become a hub in the global market, then have develop its transportation facilities as required. Turkey have to stop counting the number of airports but to do better service for future cargos (and passengers as well).

Turkish Airlines is still the leading carrier in Turkey. Being under the umbrella of Ministry of Transport and Communications, General Directorate of Civil Aviation (DGCA) supervises and monitors the air transport sector and General Directorate of State Airports Administration (DHMI) manages air navigation systems and most of the airports.

2.4. Maritime Transport

Turkey has a competitive advantage in maritime transport since it is surrounded by seas on three sides with the Mediterranean, the Aegean, and the Black Sea, together with the straits of the Dardanelles and the Bosphorus. The length of Turkey's coastal borders is 8,333 kilometres. Turkey is located at the crossroads between Europe and Asia. This geographical location enables Turkish ports to handle significant amount of cargo between the Western and the Eastern points. Cargo coming from Europe and Americas are handled in transit to CIS Republics, Iran, Iraq, and the Balkans and vice versa. Marine transport is mostly handled by Istanbul-Ambarlı, İstanbul Haydarpaşa, İzmit, Izmir, Mersin and Samsun ports. 10 harbours belong to different State owned organizations and 19 harbors belong to municipalities; there are also 34 private operators. Moreover, 14 yacht harbors belong to the Ministry of Tourism and the private sector, while 128 fishing shelters belong to co-operatives, municipalities and provincial administrations.

Ambarlı (İstanbul), İzmir and Mersin ports are the biggest ports of Turkey in terms of annual handling and traffic capacity. Haydarpaşa, Mersin, İskenderun, Samsun and Derince ports have been registered as international ports/ferry links and container terminals by the European Agreement on Main International Combined Transportation Lines and Related Facilities (AGTC). Recently in Turkey, as parallel to world, there are specialized ports regarding the handling of especially certain cargo groups. The most significant examples are Ambarlı port which meets approximately 40 percent of Turkey's annual container traffic, Pendik Ro-Ro Terminal which meets approximately 50 percent of ro-ro traffic and Autoport (Izmit) which is expected to meet 25-30 percent of total car handling. Moreover, Aliaga, Samsun and Ceyhan regions meet the traffic of oil and its derivatives; Kusadasi, Istanbul, Izmir and Marmaris ports meet the large portion of the cruise passenger traffic.

The ten major ports which belong to the State have a handling capacity of 250 million tonnes/year, of which more than 3 millions TEU is for container transport.

Turkey's approach to maritime transport is consistent with the broad European principles of free circulation of shipping, fair competition, enhanced maritime safety and pollution prevention. The maritime sector is one of the most liberalized sectors in Turkey, with a largely free market oriented economy. The shore facilities, including 29 main ports, are operated by various types of organizations.

Maritime transportation is the most preferred method of transportation both in Turkey's exports and imports, with respective shares of 46.0 percent and 59.1 percent in total. 85 percent of the volume of Turkey's foreign trade transportation has been carried by sea. The progress of Turkey's seaborne trade has been examined under two headings as maritime cabotage and international transportation in following parts.

Although an increase could have seen in the graphic, it does not have a stable display. One of the basic problem in Maritime transportation is slightly low ratio of transshipment cargos in whole. Turkey has to ensure the ratio higher in order to benefit its strategic location. The amount of container (including import, export, cabotage and transit) handled in Turkish ports was 1.95 million TEU in 2002, whereas it has reached 7,2 million TEU in 2012 with an increase of 270 percent.

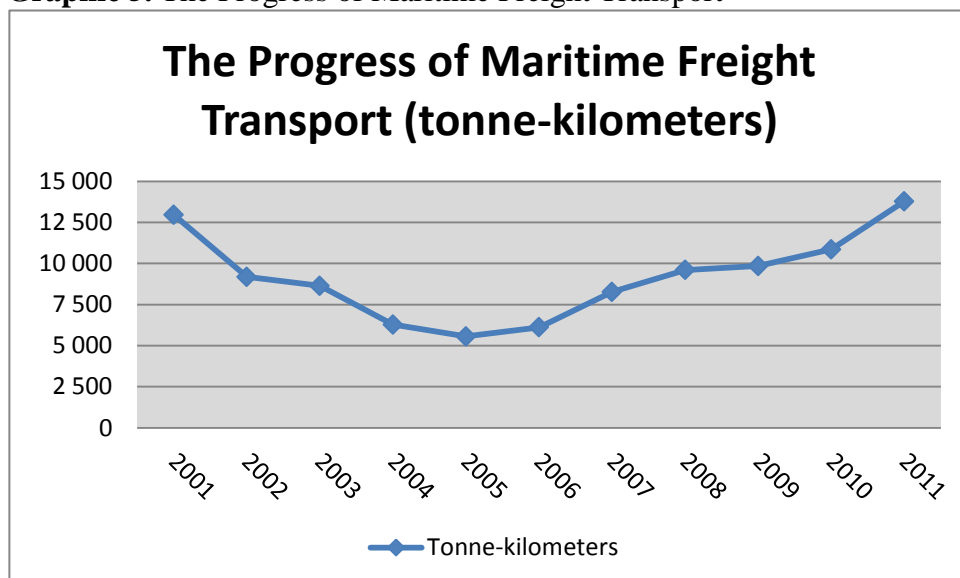
Figure 7. Ports in Turkey



Source: Turkish Undersecretaries for Maritime Affairs, 2013

The number of ships in the Turkish-owned shipping fleet (1000 GT and above) was 568 in 2002, whereas in 2010 it has become 1.239 by an increase of 118 percent. Total tonnage of Turkish-owned fleet (1000 GT and above) was 9.329.000 DWTs in 2002, whereas it has reached 18.671.000 DWT in 2010 by an increase of 100 percent. Turkish-owned Merchant ships of 1.000 GT and over ranked 17th in the world in 2002, whereas it has ranked 15th in 2011. World's Merchant fleet has grown by 62 percent whereas Turkish owned merchant fleet has grown by 111 percent between the years of 2002-2011.

Graphic 5. The Progress of Maritime Freight Transport



Source: TUIK, 2013

There have been important developments in the Turkish shipbuilding sector in recent years, and the sector has proved its ability in the international arena in many areas. Turkish shipbuilding industry has 37 shipyards in 2002, whereas the number of Turkish shipyard has become 70 in 2010 and has managed to become well known throughout the world, especially in the construction of chemical tankers and container ships. Turkish shipyards ranked 6th in the world in terms of the number of new ship orders as of 2010. Turkey is one of the five major ship recycling countries in the world. Ship recycling and dismantling takes place in İzmir Aliğa located in the Aegean Region in Turkey. In 2002, 83 ships and 190.648 LDT ships were dismantled in Turkey whereas 229 ships and 410.380 LDT were dismantled in 2010 with an increase by 275 percent.

Table 3: The Theoretical Capacity of Turkish Ports (2010)

CARGO TYPE	THEORICAL CAPASITY
Container	11.085.000 TEU
General Argo + Dry Bulk Cargo	276.851.862 Ton
Liquid Bulk Cargo	148.900.782 Ton
Wheeled Cargo	3.674.800 Units

Source: MoT

Ro-Ro Transport

The RoRo lines used by Turkish companies are Haydarpaşa (Istanbul)-Trieste (Italy), Ambarlı (Istanbul)- Trieste, Zonguldak-Ukraine, Samsun-Novorossisky (Russian Federation), Trabzon-Sochi (Russian Federation), Rize-Poti (Georgia), Çeşme-Bari/Brindisi/Ancona, Mersin-Magusa, Derince-Constanta and Taşucu-Girne. 330,100 trucks/cars were carried through RoRo and 18% of road traffic was handled by RoRo services in 2008.

Figure 8. Ro-Ro Lines



Source: UTIKAD

Port infrastructure developments

Turkey's major port projects concern Mersin, Çandarlı, Derince and Filyos ports. The aims of these projects are as follows

Filyos Port Project: This Project is intended to decrease the number of vessel passages through the Straits and to provide access for potential cargo among the Black Sea countries, where high cargo traffic is expected. The project will create a capacity of 9 million tonnes per year within the first 3 years of investment; this will increase to 25 million tonnes per year within 10 years. Connected to the railway, Filyos Port Project will create dynamic trade activity among Black Sea countries. Cargo traffic will find the shortest route via existing railway, motorway extending to Mersin Container Port to reach Mediterranean boundary, to North Aegean or İzmir Port to reach Aegean boundary or to connect directly Middle East markets.

Çandarlı Port Project (North Aegean sea port): This port is planned as an alternative new Hub Port of the west Anatolian hinterland and as a transshipment centre for traffic between Europe, the Middle East and the Black Sea countries. It will be operated generally as a container terminal with ensured dry and liquid bulk and break-bulk terminal facilities. The

feasibility study has been completed and the port is expected to operate with 2 million TEU capacities. It will be a gateway not only for the Black Sea countries, but also for Caucasian, landlocked Asian countries, and the NIC.

Mersin Container Port: The present capacity of existing port facilities on the Turkish Eastern Mediterranean coastline is insufficient to respond to future demands for marine bound traffic via Turkey. Thus the Mersin Container Port is planned to act as a gateway facility between Mediterranean container shipping lines and Central Asian landlocked countries.

Derince Container Terminal Project: Designed as a container terminal, this port is planned to serve transport to Kocaeli Bay and the Central Anatolia hinterland. It will also lighten the burden on Haydarpaşa Port. The importance of this port is also due to its road and railway connections which help decrease the traffic volume of the Bosphorus.

2.5. Pipelines

Turkey has an extensive network of approximately 10.000 km of pipelines in national level. Of this network, 3 373 km consist of crude oil pipelines and 8 467 km of natural gas pipelines.

Turkey's existing crude oil pipelines are as follows:

- Iraq-Turkey Crude Oil Pipeline
- Baku – Tbilisi – Ceyhan Crude Oil Pipeline

And also existing natural gas pipelines are as follows:

- Russian Federation-Turkey Natural Gas Main Transmission Line
- Eastern Anatolia Natural Gas Main Transmission Line
- Samsun-Ankara Natural Gas Transmission Line (Blue Stream)
- Azerbaijan Natural Gas Pipeline (Shah Deniz)
- Turkey-Greece Natural Gas Pipeline

Iraq-Turkey Crude Oil Pipeline: Iraqi crude oil produced mainly in the Kirkuk Region and other production fields in Iraq to the Ceyhan (Yumurtalık) Marine Terminal. The projects aiming at increasing the capacity of the pipeline system are as follows:

- The First Expansion Project: the construction was completed in 1984, which allowed increasing the initial annual transportation capacity.
- The Second Expansion Project: the construction of the second pipeline (parallel to the first line) was commissioned in 1987. This allowed an increase of annual capacity.

Baku-Tbilisi-Ceyhan Crude Oil Pipeline: Project is aimed at transporting crude oil produced in Azerbaijan via Georgia to a marine terminal in Ceyhan (in Turkey), with marine access to international markets. The maximum capacity of the Baku -Tbilisi - Ceyhan Crude Oil Pipeline, starting from the Sangachal Terminal near Baku, traversing Georgia and reaching the marine terminal built in Ceyhan on the Mediterranean shoreline of Turkey, is 50 million tonnes per year (1 million barrels per day). The total length of the pipeline will be 1 776 km while the Turkish Section will be approximately 1 076 km long.

Figure 9. International Pipeline Network of Turkey



Source: Turkish Ministry of Energy and Natural Resources.

Russian Federation-Turkey Natural Gas Main Transmission Line: As a consequence of studies to search for alternative energy sources, an Intergovernmental Agreement was signed in 1984 for transmission of natural gas between the Governments. The 845 km long Russian Federation-Turkey Natural Gas Main Transmission Line enters Turkey at Malkoçlar at the Bulgarian border then reach to Ankara.

Eastern Anatolia Natural Gas Main Transmission Line: The Eastern Anatolia Natural Gas Main Transmission Line is aimed at transporting natural gas produced mainly in Iran and other countries in the east of Turkey. Approximately 1.491km-long Eastern Anatolia Natural Gas Main Transmission Line starts from Doğubeyazıt and reaches to Ankara.

Samsun-Ankara Natural Gas Transmission Line (Blue Stream): Natural gas is transmitted from the Russian Federation to Turkey via Black Sea under the Natural Gas Sale.

Azerbaijan Natural Gas Pipeline Project (Shah Deniz Project): This Project is aimed at transporting the natural gas produced in Azerbaijan via Georgia to Turkey. The construction works of 225 km long pipeline section in Turkey between Georgia/Turkish border and Erzurum-Horasan were completed.

Turkey-Greece NG Pipeline Project: In the scope of the Southern Europe Gas Ring, which was developed in the frame of the INOGATE (Interstate Oil and Gas Transport to Europe) of the EU Commission, and with the aim of transporting natural gas to be supplied from sources located in the Caspian Basin, Russian Federation, the Middle East, Southern Mediterranean countries, and other international sources through Turkey and Greece.

Turkey's planned / on construction pipelines are as follows:

- ☐ ☐ Egypt-Turkey Natural Gas Pipeline Project
- ☐ ☐ Samsun – Ceyhan Crude Oil Pipeline Project
- ☐ ☐ Turkey-Greece-Italy Natural Gas Pipeline Project
- ☐ ☐ Turkey-Bulgaria-Romania-Hungary-Austria Natural Gas Pipeline Project (Nabucco)
- ☐ ☐ Iraq-Turkey Natural Gas Pipeline Project
- ☐ ☐ Trans-caspian Turkmenistan-Turkey-Europe Natural Gas Pipeline Project

3. CONCLUSION AND EVALUATION

As competition increased in parallel with the rapidly liberalizing world trade and as transportation distances became longer with the increasing role of global and regional scale organizations, the factor of speed became even more important. This situation has increased the importance of transportation of raw materials and processed products to buyers at low costs and on time and has led to widespread use of multi-modal transportation systems supported by logistic services. Turkey is growing fast, owing mainly to rapidly increasing trade. In order to facilitate this trade, efficient logistics and transport services are crucial. Yet Turkey is at an early stage in developing sophisticated and modern logistic services and at present is too dependent on road transport.

Due to the inability to adequately develop the physical infrastructure of railway and maritime transportation in line with the increasing transportation demand and the fact that road transportation is the most suitable way for door to door forwarding in Turkey, the freight and passenger transportation is concentrated more on the highway network in

Turkey. This situation has resulted in the emergence of an imbalanced and inefficient transportation system. As Turkey's role as a hub for Europe, Asia, and the Middle East and as a facilitator of global exchange will be enhanced with a strategy and measures to support a range of intermodal logistic and transport services.

Turkey adopted new policies and programs with a view to develop the transport sector both locally and internationally. The main aim in new transport strategy is securing a balance among all transport modes, as well as meeting modern technological and international standards. The investments in transport sector increased, new regulations introduced. While it is clear that Turkey is already operating intermodal transport, whether as road-rail, Ro-La, Ro-Ro and rail ferry services in its international transport and logistics activities, the country still needs a comprehensive intermodal strategy and framework. In other words, a roadmap is needed which would allow a more efficient and sustainable growth of intermodal operations.

Turkey has a great potential to build up intermodal solutions engaging maritime and railway resources with other modes of transport to increase its international freight volumes and viability. What remains to be done is to promote and maintain emerging intermodal demands through the provision of a legal framework and financial/regulatory incentives so as to foster intermodal transport. Development of the transport will continue to be an important objective for Turkey in future. For this purpose, while new investments and regulations will continue to meet the rising needs, international efforts will continue to strengthen the connectivity with the other countries through bilateral and multilateral cooperation. If the above-mentioned recommendations are acted upon, Turkey will greatly facilitate its own trade and will play a central role in providing access to Europe on Middle East, Asian and Caucasian markets. Progress in and promotion of intermodal transport will also contribute to Turkey's aim to achieve a sustainable and more balanced national and international transport system. Here is a summary SWOT analysis of transportation in Turkey:

The strengths:

- Having a strategic location with regards to transportation on Europe-Asia and Europe-Middle East axes
- Having two road bridge crossings between Asia and Europe and having a railway crossing being constructed
- Having a freight fleet with a high capacity capable of making international transport
- Increasing freight demand between the EU countries and Asia and the Middle East
- Having internationally institutionalized firms in road transport and a knowledge build up on the subject
- Having firms internationally experienced on transport infrastructure construction and the necessary human resources
- Having improvements on investments, operations and regulations through the adaptation process with the EU

The Weaknesses:

- Densities of the highway and railroad network are under EU averages
- There is no balance between the shares of transport modes
- There is no Transportation Master Plan that will enable the assessment of national transportation as a whole

- The railroads in the main corridors are quite old and they have single track; moreover, the lines between the major cities aren't suited to high-speed train operations.
- The share of transportation within the national budget has been decreasing in the last few years in spite of the fact that the need for new investments and maintenance is increasing.
- For infrastructure pricing, a system that takes the external costs into account and that can be applied to all transportation modes cannot be established.
- More than one public authority is responsible for transportation investments and the coordination between these institutions is very weak.
- More than one public authority is responsible for operations and the transportation system is operated inefficiently because of inadequate coordination between these authorities.
- Highway transportation develops rapidly that the others because all external costs cannot be internalized. The resulting accidents, environmental pollution and traffic bottlenecks cannot be solved.
- There are bureaucratic difficulties in the application of financing models that would canalize private sector funds to new investments.
- The railway infrastructure in the Southeast is inadequate for the developments in the near future.
- General education and professional education level of the transportation staff is generally inadequate.
- There are inadequacies in data collection. It is difficult to obtain data from private companies. Origins and destinations of most trips are not recorded.

The Opportunities:

- The present rail, highway, marine and inner waterway network is suitable for combined transport.
- The transportation infrastructure can be attractive for international transit traffic if it can be modernized with new technologies and if its capacity is increased.
- European Council of Ministers has planned to finish a high-speed railway network of 30,000 km until 2015. This network will be connected to Turkey over two corridors that are connected with Asia.
- It is possible to divert the freight and passenger traffic between Turkey and the Middle East, Central Asia to railroads.
- Turkey has many ports that can be among the most important in the Mediterranean, if they are improved. Among these, the port of Mersin will have a significant place because of the Baku-Tbilisi-Ceyhan oil pipeline that is being constructed.

The Threats:

- If the TRACECA corridor is connected from Romania and Bulgaria to Georgia and Central Asia over the Black Sea, transit transport over Turkey will significantly decrease.
- If the North-South corridor, which was started with Russia, Iran and India's consortium is realized, and if Turkey is left out of it, there will be decreases in transit traffic between Europe and Asia over Turkey.
- Transport to the Middle East countries can be interrupted because of conflicts.
- The public financing is inadequate. Some projects, which are not based on serious preliminary studies, are taken into program and funded.
- Because intercity highway transport is totally under the private sector's control, it increases rapidly and uncontrollably. This results in a decrease in safety, increase in congestion and pollution

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