

Development of Airline Transportation, Comparison with Transportation Modes and its Future in Logistic Sector

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Abstract: This article consists of three main parts. It dwells on some concepts that are related to airline transportation and airline logistic. In general, it examines development and future of airline transportation and compares airline transportation with other transportation types by considering the historical flow and developments about logistics. To begin; in the first part of this article, some information about the history of logistics are given. In the second part, it outlines the transportation modes, comparisons and air cargo. Lastly, the third part of the article informs about futuristic developments in airline transportation. Literature review method is used in this article to understand the current situation of futuristic developments and transportation modes. The focus and the aim of this article is examining the historical background and also the future of airline transportation, in addition to remarking the deficient and missing points of this sector for the other studies about this topic.

Keywords: Airline Transportation, Logistics, Transportation Modes, Futuristic Developments

1. Introduction

1.1 Definition of Logistics and Its Basic Activities

It is not possible to reach a single definition when the periods in relation to the definition of logistics are taken into account. Alongside with the concept of logistics having a very large content and area of effect, technological advancements have made it possible for defining this concept in many different ways.

First of all, logistics is a product of geography; it is not independent of geography. This geography determines the possibility of logistics. Logistics has been started to be used as a concept in military field for the first time. Alongside with the improvement of technology, the concept of logistics that was gradually understood to be important through the transportation of army materials and personnel has become an accepted part of our lives as trade logistics and modern logistic. In accordance to the Turkish Language Society, logistics means “to plan and carry out the transportation of all kinds of products, service and

information flow for compensating the needs of people effectively and productively”. Another definition in relation to the concept of logistics is “the part of military knowledge that gathers the works that pursues the goals of keeping the army in the most efficient condition for providing food and drink, health and communication services, road conditions etc. during a war or a military march”. And the definition for logistics in production sector is “the processes that plans, carries out and controls the transportation of information about storing and processing the raw material and acquiring the completed product for meeting the needs of customers from the point of the source to the point of choice”.

The definition done by The Council of Supply Chain Management Professionals: CSCMP, which is the international organization of logistics sector, becomes prominent when the definition of logistics in administration area is taken into account. In accordance to this definition logistics is defined as the planning, application and controlling period carried out for transporting, raw material the inventory within the period, final product or related information in the most efficient and cheapest way for the purpose of satisfying the consumer needs from the point of origin to the final consumption point. (DURMUŞ & ÖZTÜRK, 2014)

The most used definition of logistics by the logisticians is the transportation of the right product to right place in the right amount at the right time in the right cost at the highest flexibility without any damage. These aspects area also called the seven rights of logistics.

Logistics is a support function for production and sale functions. Logistics consists of the main activities of transportation and storing, complementary activities of packaging, value added services, customs, order management, stock management, insurance, examination and observation. Logistics is the coordination of every material movement between the point of origin and destination. Activities of logistics in relation to the product flow are Transportation, Storage, Packaging and Value Added Services and activities of logistics in relation to the service flow are Customs Clearance, Insurance, Examination / Expertise / Observation, Stock Management and Order Management/ Customer Services.

1.2 Improvement of Logistics and Provision Management Chain

History of the logistical activities dates back to the history of humanity. Before advancing to the permanent settlement, conserving and carrying the hunted animals and gathered foods can be accepted as the beginning of the logistical activities. Transportation, protection and storage of produced foods and supplies in various methods became a necessity after the advancement of permanent settlement. Raw material production and distribution with ships and caravans between countries and continents started in medieval age.

The producers produced more than what is necessary for legal markets with the spreading of mass production through the industrial revolution. This situation has pushed the producers to expand to more distant markets. The necessity of transporting the products to more distant markets caused transportation activities to get more important with each passing day. (ÜRGÜN, 2015)

With the competition environment which increased in international and domestic trade, the companies that wanted to increase their activities and profits resorted to various methods for a profitable growth by decreasing their costs. Logistics, as a factor resorted by the companies while exhibiting these attitudes, became a field that gained increasingly more importance. Factors such as international developments, political collaborations and economic associations, increase in trade volume, developments in transportation services, spreading of electronic trade has brought the concept of logistics, which was being used in the military field since 18th century, into prominence with its cost reductive structure. Usage of the logistics concept within the economic structure for businesses is a rather new case. Logistics concept, which has a very old history as a military term, has started to spread rapidly. New understandings of service have appeared in a way with advanced activity, extent and subject for providing the services necessitated by our age. Logistics gained a crucial place in the present business world as much as the military. Logistics is one of the limited areas that affect the life standards of a society in an important level. Almost every area in relation to the human activities is being affected by logistics directly or indirectly.

Construction of pyramids is deemed to be the oldest project within the scope of using logistics in public field. Carthagian General Anibal transporting his army of 30 thousand people from French to Italy over the Alps with horses and elephants is an important milestone in the history of military transportation. Aside from that, logistics had no major importance at the start of 20th century and was not applied to the area of business until the World War 2.

Progressively increasing interest towards logistics sector can be related to the factors such as unstable increase in traditional transportation costs and prices of petrol, increase in productivity, changes in stock structure, obligation to compensate the increasing customer expectations in time, fast and important innovations in computer and communication technologies, increase in national and international companies that operates in the sector and their scales. As a result, the importance generally gained by logistics sector now, forces companies to improve their logistical productivity and acquire competition advantage.

Supplying means, to procure a necessary product in the right way and amount in the right price from the right place at the right time. The supplier must supply its own materials in the same way in order to produce the procured product itself. By doing so, a supply chain reaches to the first material. (TANYAŞ, 2015)

Just like the concept of logistics, there are many different definitions that were accepted for the concept of supply chain. The common ground of every definition done for the concept of supply chain is to include every activity carried out before production, during production and after production. Supply chain management is to increase the satisfaction level of the customer throughout the supply chain and manage materials, money, employees and information for acquiring superiority against competitors. In other words it is the integrated method of material, information and money flow that provides the right product to reach to the customer at the right price in the right place at the right time for the lowest cost possible for every supply chain. According to the Council of Supply Chain Management Professionals – CSCMP, Supply Chain Management is the systematic and strategic coordination of the supply chain and every company contained in this chain in a manner which the management functions and plans of the companies include every company in the chain. (TANYAŞ, 2015)

Supply chain management is to provide the coordination of every activity in the supply chain by providing a connection between suppliers, transporters, intra-business departments and businesses. (KÖGMEN, 2014)

Concept of supply chain management was started to be used at the beginning of 1980's for the first time. Companies that can combine their strategies and goals with supply chain can create product, process or service advantages. The businesses focused to supply chain as a result of some important changes. The first of them is the businesses distributing new and different tools to its suppliers and distribution channels for reducing their costs and improving the processes. The second one is the trade, which globalizes and grows accessing to the new markets that are hard to reach and appearing of new models. Another reason is the current market conditions forcing the businesses to adopt the supply chain for accomplishing the customer requests as soon as possible. Lastly, developments in relation to the technology of internet and information have caused the businesses to see the supply chain as a resource for gaining advantage against competitors.

Supply chain management is a process that contains the locations of materials, the phase transitions from the starting points of raw materials to the end of their useful lives. The main reason of this process is to gain a maintainable competition advantage and create a strategic force to improve it by reducing the costs without decreasing the satisfaction levels of

customers. Competition power of a company is related to the quality of the good or service provided with remaining price in the conditions of global economy conditions with almost equal costs. Global competition conditions force the companies to produce the goods or services in accordance to the demand and in the right amount (for preventing the stock costs) and to provide them to the customers in the right place at the right time. At this point, when we consider the developing technology and competition conditions, the supply chain and the concept of logistics become prominent. (KAĀNICIOĀLU, 2007)

1.3 Logistics and Transportation

Transportation is to change the place of a person or an object for a certain purpose with a transportation vehicle in healthy and undamaged situation. In other words, transportation is to change the place of people or objects for a benefit in an appropriate and economic way. Transportation is benefited from for almost every situation that requires the change of place. Request of transportation substructure required in accordance to the magnitude of the activity, area of effect and urgency of transportation, vehicle and speed of transportation can change. Properties of time saving and place benefits of transportation must be taken into consideration. Value of the transportation raises in relation to the measure, which makes time saving, sufficient and economic change of place possible.

Concept of transportation has changed greatly with the development of technology, inventions and other similar factors that made the human life easier. While the humans in first age carried their burdens with their hands, on their backs and over their heads, this situation has progressively modernized and became the transportation methods of the present. Invention of steamships and other vehicles that work with steam has occurred after the industrial revolution, especially the producers that adopted the mass production and expanded to the international market after getting satisfied from the local market has affected the transportation. (BATUR, 2008, s. 7,8).

Transportation is one of the main tools that meet the requirements of the civilized life of the people. The necessity of transportation arises from any reason that necessitates the change of place for a person to sustain its life and constantly increases in relation to the population, economic, trade, social and politic movement, it also arises from the necessity of transporting both people and goods and services required for people with different vehicles on different surfaces (land, air, water) from one place to another in high quantities and rapidly. Transportation also helps in establishing the time and place relation between geographic points. Activities that necessitate the transportation are encountered in every point and every moment of life such as production, consumption, trade, defense, social life and services.

Transportation service is the most important factor that connects every logistical activity to each other. Transporting the product to the consumption point for the potential consumer determines affects the value of the product. Transportation service is extremely important within the scope of providing this connection. Transportation is a sector in relation to transporting both humans and products that was produced by humans from one point to another. Humans both try to transfer the products to different points and benefit from transportation for personal necessities such as travelling, touring and similar necessities for thousands of years. (BATUR, 2008) There are factors that affect transportation sector within the national and international context. These are deregulation, development of full-time delivery, effects of customer services in high levels and globalization. (BATUR, 2008)

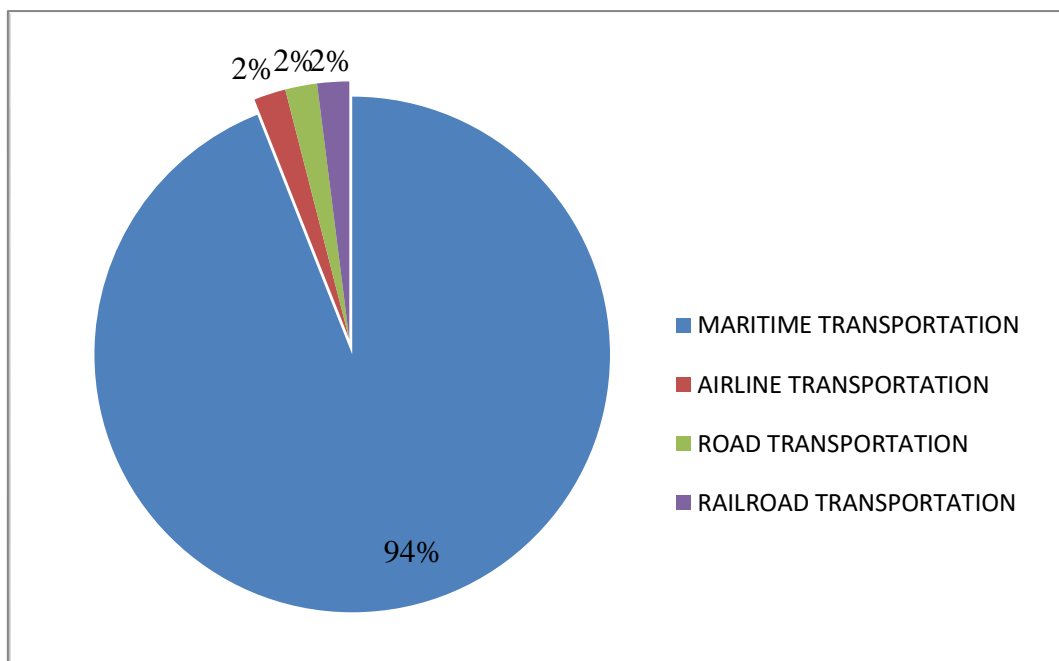


Image 1. Transportation Rates in Turkey (ÜRGÜN, 2015)

Logistics essentially includes the movements of economic goods from the point of origin to point of final consumption. Transportation is the most important component of transportation activities because it provides the movement of products. Transportation is also important in other sectors. A country's success and potential in transportation allows that country to develop and have a voice worldwide. (ÜRGÜN, 2015, s. 27) Countries are producing goods only for themselves and markets the goods they produce to other countries through exportation, and this is one of the most important factors that affect the economic development of countries. Countries must have established the necessary transportation

substructure for exporting the products that they produced. Transportation sector has an important place for region and country economy aside from its investor with its direct and indirect contributions to the national economy. (BATUR, 2008, s. 13,14)

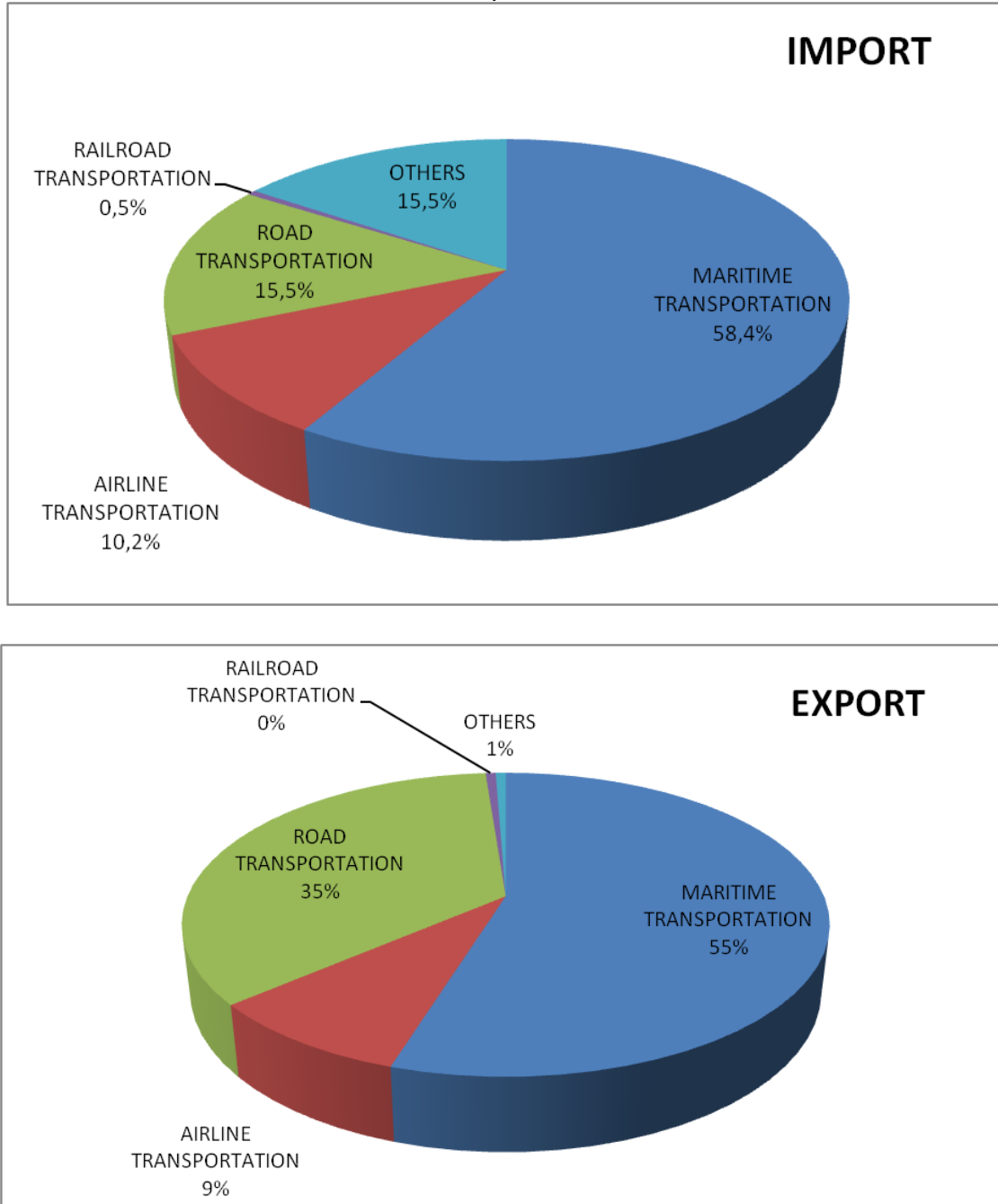


Image 2. Distribution of our total imports and exports in relation to the carried out transportation modes (TOBB, 2014)

2. Transportation Modes

2.1 Introduction to Transportation Modes

- 1) Road Transportation
- 2) Railroad Transportation
- 3) Maritime–Waterway (river) Transportation
- 4) Airline Transportation
- 5) Pipeline Transportation

Transportation modes consist of five main titles as road, airline, maritime–waterway, railroad and pipeline. Each transportation mode has its advantages and disadvantages. Features such as reliability, speed, frequency, elasticity, capacity and economic productivity are used in the comparison of transportation modes.

Airline transportation has a high cost in logistical system, but it has lesser risks than other transportation activities. For this reason transportation of extremely valued products is carried out through this method. Maritime transportation is a transportation method with low cost, speed and risk and it is used for transporting goods that have big volume and relatively low on value. Road transportation has a cost between maritime and airline transportation and it is the most common transportation method. Railroad transportation has lower costs than road transportation and higher cost than maritime transportation and it is an environment friendly and low risk transportation method. (ORHAN, 2003)

2.1.2 Road Transportation

It is the most used transportation method. This highly common transportation method is preferred more for its short–term transportations and ability of carrying out loading and unloading easily, carrying out scheduled loading frequently and providing service from door–to–door. Aside from that, its negative sides are having high costs, easily getting affected from bad weather conditions, traffic and environment factors. It became the most used transportation method especially after World War 2 and took place in every logistic process. It is a transportation method with the most competition. Its intense usage started especially in the end of 1950's in Turkey and started to grow rapidly. Length of road network of our country has increased 4,79 times from 1950's to 2001. This data shows the care given to the land transportation. (Navlun Blog, 2018) Road transportation is the most preferred and common transportation mode in relation to the increase of its transit ways in the whole world compared to the other transportation modes and having a wide transportation network. On the other hand, it provides uneven areas and fields to integrate with the production centers of the country and makes them contribute to the production and

economy of the country because of its applicability to all kinds of areas. The most preferred transportation mode is the road transportation because it is safe, it is commonly used and it can provide transportation for heavier loads. From house moving to factory moving, road transportation can be used in every mode of transportation. Road transportation, which is more attractive within the scope of both convenience and price, is the most common transportation method in this sector. Road transportation competes with airline transportation in small loads and competes with maritime and railroad transportation large loads. However, its elasticity and versatility provide an important advantage. In other words, transportation can be carried out door-to-door without requiring the contribution of other transportation systems. (TERCAN)

2.1.3 Railroad Transportation

Railroad Transportation is a transportation method carried out for low value heavy and bulky loads without caring for high costs. It is usually used by governments because of its high investment costs and maintenance. It provides high amounts of advantage in long distance land transportation. It is one of the most important tools when taken into account as integrated transportation. Because it necessitates a substructure work for improvement, a successful result cannot be achieved in Turkey even though regulations that encourage railroads are carried out. However, as a result of both transporters and producers getting informed, contribution and point of view towards railroad changes rapidly. (Navlun Blog, 2018) Railroad transportation is one of the most appropriate systems for bulky and long distance transportations. Transportation of underground resources such as coal and iron and agricultural and forest products to recipient centers can be carried out by railroad transportation. Within the scope of cost, this transportation method, which is environment friendly, provides great advantage in especially long distance transportation of low value and bulky loads. Even though terminal expenses are higher in railroad transportation, its activity expenses are lower. Railroad transportation is a system that possesses the features of less elasticity, more experienced handling, less resistance to the friction power during movement and more carrying capacity compared to land vehicles. Reaching the saturation point in road transportation and increase of sensitivity towards environment around the world caused railroad transportation to get more importance in the last 20 years. Railroad is a sector that has the most high growth and technology intensity after the aeronautics and space sector. For this reason, importance that given to the railroad sector increases. Because, the only transportation method that contains the alternative solutions for basic problems such as mobility, traffic intensity, traffic accidents and environment is railroad. Besides, its contribute for sustainable economic growth is unignorablely important. (T.C Kalkınma Bakanlığı, 2014, s. 9) Basic substructure components of the railroad transportation are rail systems and hardware products, locomotive and wagons, transfer stations and terminals.

2.1.4 Maritime–Waterway (river) Transportation

It is the most used transportation method within the international scope. It is the safest and low price one among the transportation modes. Products in very high amounts and products that can be put inside of a container are transported through waterway. It is the most preferred transportation method because it has 7 times lesser cost than road, 22 times less cost than airline, 3,5 times less cost than railroad. Maritime transportation shoulders 92% of the world's preference. Its load amount carried between continents and countries is 7 million tons. Even though Turkey is in a very appropriate location for maritime transportation because of its geopolitical and geographic structure, it cannot use this advantage due to wrong investments. Although there were regulations for maritime trade in the recent years, it is still insufficient. 90% of the foreign trade of Turkey within the year of 2000 is carried out through maritime transportation. River transportation is a type of waterway transportation and it is also called inland waterway transportation. Its most important difference is the transportation being limited within the areas that the river flows. Special transportation tools are necessary and vehicle capacities usually change in accordance to the depth of water. This transportation method has a wide usage area in Europe and it increases the trade in this area because the rivers are long and they pass through many countries. (Çancı & Erdal, 2003) Even though it is used very frequently and widely in Europe, it is still in start-up phase in Turkey. Its productive use is rarely possible because of geographic reasons and the flow rates of rivers in Turkey are high. (Navlun Blog, 2018)

2.1.5 Airline Transportation

Because the vehicles in airline transportation are extremely fast, transportation is carried out within the shortest time. Also, the airline transportation is the method that carries out transportation per unit weight for the highest costs. Its main preference reason is the speed factor. Aside from that, its costs for unit transportation is very high compared to the other transportation methods. It is useful for distances longer than 500 kilometers. However, the advantage of speed provided by the airline transportation can be deemed as a factor that decreases the storage expenses at the same time. Airline transportation is a transportation system suitable for transporting valuable products in small sizes and in a packaged state.

Its cost is higher when compared to other transportation systems. However, it is seen as a system that has a decreasing effect on storing expenses, thanks to its speed advantage. (BAKİ, 2004, s. 51) Also, concepts of speed and time have also gained importance alongside with expense for global companies. For this reason the importance of airline transportation within the integrated transportation raises with each passing day. After the airline transportation was carried out under the monopoly of the government for long years, the way of regional transportation has been cleared with regulations carried out in the year of

2003. Great increases in regional passenger transportation were observed after these regulations. Besides, entry of new companies to the sector was accelerated. (Navlun Blog, 2018) Existence of modern airports, state of the art airplanes, enhanced capacities and advanced storing systems has popularized the airline transportation. Airline transportation is a trustworthy and flexible transportation where loading and unloading can be carried out frequently.

2.1.6 Pipeline Transportation

The first investment cost is high in this transportation mode similarly to the railroad transportation and it is predicted for constant transportation in long-term plans. It is a transportation method that can be used for both short and long distances. It is divided into two as underground or above-ground pipeline transportation. It is commonly used for the transportation of liquid and gas materials such as petrol and natural gas. It provides possibility of high capacity. It is extremely economic when compared to the other transportation methods. It is safe; however its flexibility is extremely low. Pipeline is one of the sub-transportation systems with an important place in international transportation, which increases gradually. Pipeline transportation has faster, safer and more economic qualities when compared to road, railroad and maritime transportation. Pipelines are the most productive and valid transportation method used for transporting the energy, which is the resource of almost everything and became one of the irreplaceable factors of development, to the requested centers. By this way, the pipelines that crosses and to be crossed under Turkey, which is a geographic bridge between Asia and Europe, have an international importance. For this reason, this situation that provides benefit for Turkey became a national policy. It is the transportation method with the most expensive substructure costs and the cheapest unit transportation cost. These types of lines are put to the nearest harbor or consumption point in accordance to the most appropriate consumer group for the liquid transportation located in the hinterlands. (DURUSU, 2011, s. 32)

SHARE OF TRANSPORTATION TON/KM (DOMESTIC LOAD)	2014 (%)	2023 TARGET
ROAD	80,63%	60%
RAILROAD	4,76%	15%
AIRLINE	0,44%	1%
MARITIME	2,66%	10%
PIPELINE	11,51%	14%
SHARE OF TRANSPORTATION PAX/KM (DOMESTIC PAX)	2014 (%)	2023 TARGET
ROAD	89,59%	72%
RAILROAD	2,22%	10%
AIRLINE	7,82%	14%
MARITIME	0,37%	4%

**Chart 1. Turkey's Current Situation With Regards To Transportation Rates and Goal of 2023
(T.R. Ministry of Development, 2014)**

2.2 Comparison of Transportation Modes

2.2.1 Superiorities and Inferiorities of Road Transportation

Superiorities;

- The most important advantage of the road transportation is making flexible and fast transportation of small amounts of products to short and medium distances possible.
- Waiting periods to be occurred in harbors are eliminated and delivery of the products to the storages of the customers directly can be provided with road transportations.
- Necessity of terminal is generally low.
- It is the most useful method for connecting every production and consumption center, in other words door-to-door transportation.
- Its transportation network is almost limitless under the appropriate geographic conditions.
- It provides fast service possibility.
- It can carry out the processes of loading, unloading and departing for 7 days and 24 hours and it provides conveniences in loading and unloading processes.
- It has the convenience of planning and finding vehicles and feature of departing frequently.
- Relatively low handling costs and damage risk.
- It is more productive and economic in short distance.
- It can transport in various volumes.
- Transportation vehicle is under the control of sender / transporter considerably.
- Possibility of increasing and decreasing the transportation speed.
- Ability of easily adjusting the starting and arriving times.

Inferiorities;

- The most important disadvantage of the road transportation is having more expensive transportation costs compared to the other transportation modes.
- The weight amount in a single transportation is low.
- Weight limitations.
- Getting affected from bad weather conditions.
- Being sensitive towards the balance of departure and arrival load.
- Insufficient equipment for high volume departures.

- Having a high risk of accident.
- It causes environmental pollution, traffic intensity and usage of more land pieces and it requires substructure.
- Price uncertainties in market fluctuations.

2.2.2 Superiorities and Inferiorities of Railroad Transportation

Superiorities;

- It is an environment sensitive transportation type.
- It is safer compared to the other transportation methods.
- It lessens the burden of road traffic.
- It usually has a long-term stable price guarantee in contrast to the other transportation alternatives.
- While there are passage limitations in international passages for roads, it has a right of way because it is a transportation method preferred by transit countries.
- Even though their transit times are longer than road transportation, their trip duration is stable.
- It is a very suitable transportation method for heavy tonnage and bulky loads.
- It gets affected from weather conditions and traffic limitations at minimum rate.
- Its operating costs are low.

Inferiorities;

- Transit time can take longer than road and maritime transportation in some delivery areas.
- Delivery can take longer, especially in the section within Turkey.
- While there are rail connections to the interior of factories in most places of Europe for door-to-door delivery, this opportunity is very scarce in Turkey.
- Train can stop in the nearest station for most places in door-to-door deliveries, but truck transportation is additionally required for the delivery address. (MEB, 2011)
- Widespread and quality railroad substructure is necessary for rapid transportation.
- High amount of handling.
- High internal transportation expenses in places that railroad network cannot reach.
- Problem of incline in relation to track laying (8% incline cannot be passed over).

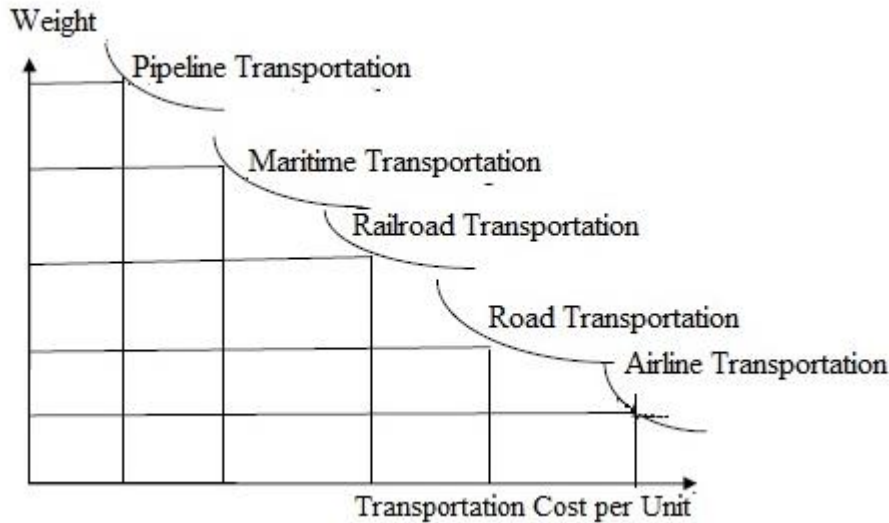


Image 3. Comparison of Transportation Types in Accordance to Transportation Cost per Unit (KESKİN)

2.2.3 Superiorities and Inferiorities of Maritime–Waterway Transportation

Superiorities;

- It is the cheapest transportation mode.
- There is no transit passage and customs process between departure–arrival harbors.
- It requires lesser investment compared to the other modes.

Inferiorities;

- Handling amount is high and it is under control of external sources.
- Risk of damage to the goods is high.
- It has very long transit time.
- It is extremely affected from weather conditions in relation to transit time and good safety.
- Flexibility of departure–arrival time is low.
- Destination provided with this service is limited to harbors and environments.
- It is very costly in door–to–door deliveries.

2.2.4 Superiorities and Inferiorities of Airline Transportation

Superiorities;

- Short delivery time thanks to its high speed transportation.
- It is affected from politic and bureaucratic negativities at minimum amount because the connection between the countries is provided directly.
- It is the most suitable transportation type for small amounts of objects.

- The existence of a widespread airline network across the world.
- High safety and security.
- Attention given to the handling and loading of cargo.
- Planned and scheduled cargo movement.
- Lower insurance premiums in comparison with other transportation types.

Inferiorities;

- Having a higher transportation cost in comparison with other transportation types because of weight and volume limitations of the planes that carry the cargo.
- Airline cargo transportation is not suitable for the transportation of every load.
- It is not possible to use airline for the transportation of loads in high amounts.
- It is obligatory to use the road transportation for delivering the load transported by airlines to the storage of recipient. (ÇELİK, 2015)

2.2.5 Superiorities and Inferiorities of Pipeline Transportation

Superiorities;

- Its first investment cost is as high as railroad transportation.
- It provides the opportunity of transporting products in very high amounts.

Inferiorities;

- Its flexibility is extremely low.

Transportation Mode	Cost	Velocity	Service Area	Frequency	Reliability
Road	High	Fast	Very Wide	High	High
Maritime	Very Low	Slow	Limited	Very Low	Medium
Airline	Very High	Very Fast	Wide	High	High
Railroad	Medium	Medium	Medium	Low	Very High
Waterway	Low	Slow	Limited	Low	Medium
Pipeline	Low	Slow	Very Limited	Medium	High

Chart 2. Comparison of Transportation Modes (Lojistik Sektör Raporu, 2015)

2.3 Factors That Affect the Selection of Transportation Modes

There are lots of factors that affect the selection of transportation modes. These are;

1. Speed (time elapsed during transportation)
2. Availability (being ready for service)
3. Reliability (departure and arrival on time, regularity)

4. Frequency (transfer number)
5. Capacity (possibility of meeting all kinds of transportation requirements)
6. Cost (TEK, 1997, s. 678)

Properties	Railroad	Road	Maritime	Airline	Pipeline
Velocity	3	2	4	1	5
Availability	2	1	4	3	5
Reliability	3	2	4	5	1
Capacity	2	3	1	4	5
Frequency	4	2	5	3	1
Cost	3	2	5	1	4

Chart 3. Operational Features of Transportation Modes (TEK, 1997)

As it is seen in the chart, road transportation is the most common and used transportation mode in both passenger transportation and load transportation. Road transportation, railroad transportation, maritime transportation and lastly pipeline transportation, which the human transportation is not possible, follows the airline transportation respectively. Maritime transportation is the most ideal method for transporting big and bulky goods and it is the cheapest and safest among transportation modes and it is the most suitable transportation method for loads with big volumes (petrol, coal, grain etc.). It is the most preferred transportation method because it has 7 times lesser cost than road, 22 times less cost than airline, 3, 5 times less cost than railroad. Railroad transportation has the most capacity after the maritime transportation. This transportation type is environment friendly and provides serious cost advantage in long distance transportations. Intensities arose from other transportation modes creates reductive benefits due to being suitable for mass transportation. (Çancı & Erdal, 2003)

When Turkey's foreign trade is examined in accordance to the transportation modes, maritime has the biggest share and it is followed by road and airline transportation.

2.4 Development of Airline Cargo Transportation

Even though airline cargo transportation is newer than other transportation modes within the scope of historical development, it has become a transportation mode that increases in usage rates in the recent years. Objects that are relatively low in volume and weight, but high in value are mostly transported in the airline cargo transportation. Intensified competition due to the increase of product variety in the world trade and advantages the airplane has as a transportation vehicle with regards to accelerating business processes are the reasons for increasingly more preference of the airline cargo transportation.

Airline cargo transportation is a sector that is closely related to the state of global trade. Economic growth across the world is a result of economic regulations, free trade agreements and economic integrations. International trade changed in a striking way in 1990's and countries that struggle for only their national benefits started to get separated to big commercial blocks nowadays. Even though air cargo traffic has shown a good development, it has not yet reached the goal of being the most important source of income of airline companies, which was predicted between 1930's and 1940's. There are some basic reasons for income gained from air cargo transportation being lower than income gained from passenger transportation. The first reason is its higher price when compared to the other transportation system. And the second is the present day airplanes are not designed with the purpose of carrying special cargo. The third is it's not seen as a profitable investment among the managers. (ÇELİK, 2015) Even though mail transportation with airline is the first product of the air cargo, it creates approximately 7% of the cargo transport incomes gained by global airlines. These companies that carry out cargo transportation is a result of constant increase in numbers.

2.4 Basic Reasons for Preferring Airlines in Cargo Transportation

1. It provides the fast transportation of perishable cargo (fish, fruit, vegetables, flowers etc.) even in the longest distances. Transportation of these kinds of cargos remove the cooling expenses given for other transportation methods and prevents the losses to be occurred due to the damaged (rotting etc.) cargo.
2. Reduces the dangers that can occur during the transportation of live animals (horses, zoo animals etc.) by carrying out the transportation process rapidly.
3. It provides the timely delivery of the cargos that are deemed to have a trade value as long as they are up to date and possible to sell (newspaper, magazine, new photos and movie documents for TV etc.).
4. It makes the transportation of extremely valuable cargos (gold, platinum, money, valuable documents, artworks etc.) possible.
5. Decreases the expenses of packaging and transportation insurance. Because of the careful treatment carried out in the handling and loading processes of cargos, transportation risks decrease.
6. It is the fastest option for cargos (spare parts for machines, generators and other energy equipment etc.) that can cause heavy economic losses for businesses unless they are delivered within a short time.
7. It provides great protection in transportation of very fragile cargos such as measurement equipment, electronic and optical devices because, damages that can

occur due to the reasons like shaking or impact are at the lowest level in airline transportation.

It especially decreases the flow expenses of before and after transportation in cases of airports being located near big economic areas. (ÇELİK, 2015)

3. Futuristic Transportation Models

Insufficiency of substructure in many countries and cities across the world, city structure's inability of responding to the increasing population and increasing chaos has given birth to alternative pursuit to traditional transportation methods such as automobile, train and metro.

Many new transportation vehicles are being developed for short and long distances in both land and air. Even though most of their R&D processes takes more than expected, projects with strong capital power show faster development than expected. It is very hard to make certain predictions about the futurist transportation in our current state. However, travelling from Istanbul to Ankara can take 20 minutes or via a flight done outside of the atmosphere, travelling from New York to Sydney can be possible. (Gökmen, 2018) Although there are not many information and document in this field, drone transportation, traveling by rocket, autonomous mass transportation systems, autonomous vehicles and airplanes and flying taxis will be concepts that we got used to hearing.

Hyperloop is a technology that is dependent on a rail system established inside of tunnels. There are two versions of it that are still in development phase. Elon Musk is building Hyperloop system underground with his company The Boring Company. When it is completed, it will go underground with an escalator, which has 8 to 16 passenger capacity and travel with 200–240 km/h speed. The first line of The Boring Company will start from Los Angeles Airport and go through three stations. The purpose of the tunnels to be built under every corner of USA in the following years is to decrease the travel time between the neighboring cities under 45 minutes. And Hyperloop One tries to build the standard version of the idea suggested in 1970's. Hundreds of kilometers long Hyperloop tunnels to be established on 6 meters long columns are aimed to go faster thanks to the magnetic levitation technology. There are still long years to experience the Hyperloop technology that will decrease a 400 kilometer trip less than 25 minutes. Hyperloop One carries out agreements with many countries aside USA and needs big financial investments. (Gökmen, 2018)

Even though one of the positive sides of transporting people and goods within tubes that goes under or above ground is its high speed, its negative or deficient sides can be deemed as low flexibility, high cost and people's prejudice. For this reason, the most suitable transportation method for the near future is Maglev trains, which has magnetic levitation system. This technology is achieved by removing the traditional wheel-rail interaction. While electro magnets push the train from behind, they also pull it from the front at the same time. Even though its production cost is astronomic, Maglev trains come into prominence with their much higher speed and sustainability when compared to the diesel-fueled trains. The fastest Maglev train is the Shanghai Maglev that travels between Shanghai and Pudong International Airport and reaches up to 430 km/h speed.

Japan has succeeded in reaching 590 km/h speed with magnetic levitation technology in the trials it carried out in 2017. And China, world leader of this field with its 200.000 km long railroad network, has declared that it is developing a Maglev train to be used in 2020's, which can reach up to 600 km/h speed. In accordance to the Japanese authorities, security substructure necessary for travelling over this speed needs 10 more years. (Gökmen, 2018)

Ehang Company based in China is the leader of flying taxi field, which is a competition field for many big companies such as Airbus and Uber. EHang 184 brought the last model of drones that appeared for the first time two years ago and carried out more than thousand test flights until this day. Flying taxi that can levitate 300 meters above the ground vertically, has accomplished flying a 15 kilometer distance with 230 kg weight with 130 km/h speed. Maximum flight time of completely electrically operated EHang 184 is 23 minutes. The biggest rival of EHang 184 with R&D process still in progress in Dubai and USA is the Volocopter from Germany. There is one point that draws attention when we examine these propeller driven vehicles: they were developed as private flying automobiles. However, their high costs and production limitations will make these prototypes appear as taxi services of private companies or public in 2020's. (Gökmen, 2018)

Falcon Heavy is the biggest rocket of SpaceX and it flew through a firing that took place in the date of 6 February. Big Falcon Rocket (BFR) built for Elon Musk's Interplanetary Transportation System (ITS) is 106 meters long. It will contain 40 cabins in its body weighting 4400 tons. The rocket with 100 passenger capacity is not planned for transporting its passengers to the Moon or the Mars; it is planned for the Earth. In accordance to Musk's plan, BFR will be fired with 860 tons of liquid fuel and reach up to 27,000 km/h speed on low earth orbit by getting out of atmosphere. And this means travelling the distance between Hong Kong and Singapore in 22 minutes. This duration is 29 minutes for London and Dubai and 30 minutes for London and New York. BFR will be used for the first time for transporting

cargo to the International Space Station (ISS). Musk's next goal is to send people to Mars with BFR in 2024.

Jet fueled airplanes that are expected to transform until the year of 2050, will be replaced by its futuristic models that completely works with electricity or bio-fuel. The airplanes that are being used now have lifespans between 21 and 33 years. Lithium-ion batteries having high costs and airplane technology with solar panels being limited points out that we will use jet fueled modern airplanes for at least 15 to 20 more years. First examples of futuristic airplanes highly invested by NASA can be seen starting from the year of 2025. Purpose of NASA that works on new concepts with companies such as Boeing, Lockheed Martin and Northrop Grunman is to develop passenger and transportation airplanes that can reach up to 1000 km/h, fly 12.000 km continuously and carry 45 tons of loads.

4. Conclusion

Primary problems encountered in the management of costs in airline industry, arises from determining flight schedules and pricing the tickets. Guessing middle and long term tendencies correct, determining the routes with estimated high demand and planning a fleet that is compatible with these variables is necessary. Timing of airplane orders and their optimal financing also creates a hard time for companies. Even in the case of controlling every expense factor and planning with developed methods, sudden declines can occur in the profitability rates of the sector because of unforeseen events such as epidemics, war and terrorist actions.

Airline passenger and load transportation sector has potential of developing in the upcoming period because of Turkey is a wide corridor for important routes geographically, newly-built gigantic Istanbul Airport will become the central base by working in full capacity and its closeness to the areas that are expected to grow fast.

Important increases are observed in the numbers of private sector airline businesses, fleet capacities and share taken from the sector. Problems of management capital, disadvantage of operating with relatively old airplanes, insufficiency of maintenance-repair and other substructures and struggles encountered in the educated qualified personnel employment were the problems generally faced by private airline companies.

Necessary conveniences must be provided to national airline transporters by reorganizing the customs regulations in accordance to the dynamism of aeronautics. Cargo transportation

thought to provide important benefits in increasing exportation and neglected due to various reasons until now must be supported and developed.

In addition to that, cost, time and speed concepts have gained importance for global companies. For this reason, airline transportation's role within integrated transportation increases with each passing day. According to the statistics of the last ten years, only 2% of the total cargo carried in the world was carried out through airport transportation. On the other hand, total value of airline transportations in dollar kind has reached 33% share within the dollar value of total cargo. This data shows that airline transportation is tolerated even though its expenses are high. The sector with dependence to fuel and importation in plane fleet, tries to protect itself from exchange rate and fluctuations in petrol prices with advanced financial methods and will continue to get negatively affected from unforeseen changes that can be observed in exchange rate and petrol prices.

In case of an increase of demand for airline transportation, Turkey must have a substructure to correspond this demand. Especially there are deficiencies in subjects of the sufficiency of cargo facilities, cargo security and cargo handling. Besides, the number of establishments that provide education in the subject of civil aviation is low in our country. People expert in the civil aviation sector must be trained by creating the necessary education substructure for the aviation sector that currently meets its need of pilots from mostly military pilots retired from army and the need of other personnel from mostly other different sectors. Developments in airport transportation must be followed and related regulation must be reorganized correspondingly.

Lastly, aeronautics is one of the sectors to be reshaped with industry 4.0 in the future and establishments of ground services, airlines and logistic companies must follow technological developments closely, work on autonomous systems and make investments in these fields, so that it is not left behind in this industrial revolution. Therefore, employers must be selective in the employment of people with necessary vision, education and knowledge about the developments in the sector.

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