

CRITERIA FOR AND DETERMINANTS OF
TRANSPORTATION SELECTION DECISIONS IN EXPORTS:
A CASE STUDY OF FIVE INDUSTRIES IN TURKEY

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TRANSPORTATION SELECTION DECISIONS IN EXPORTS:
A CASE STUDY OF FIVE INDUSTRIES IN TURKEY

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DECLARATION OF ORIGINALITY

I, Tatsiana Hlekava, certify that

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ABSTRACT

Criteria for and Determinants of Transportation Selection Decisions in Exports:

A Case Study of Five Industries in Turkey

In modern economy, decisions regarding what is to be produced correlates with the availability of a proper transportation network and the ability to supply these products to the market at lower cost. The most important question in world distribution is how the goods will be shipped from the origin to the destination. Regular mode selection depends on several dimensions. Among these dimensions are size, durability and value of the product which are issues related to the nature of the product. These may lead to the elimination of some modes from consideration as these modes cannot physically, legally or safely handle the goods. Weight, density and shape of a product can also greatly influence this decision.

There were three major aims of the present research. The first one was to identify the major criteria and factors that might influence the selection mode process. The second was to implement those factors in five different Turkish export-oriented companies from various industries. Taking into account the diversity and complexity of the study, the participants were chosen according to their direct role in decision-making. Among them are CEOs, heads of export departments, and directors. The third aim was to conduct a case study aiming to compare proposed hypotheses and real-life situations. A decision-making flowchart that accounts for internal as well as important external factors was proposed.

ÖZET

İhracatta Ulaştırma Seçimi Kriterleri ve Belirleyicileri:

Türkiye’de Beş Sektörde Vaka Çalışması

Günümüz ekonomisinde hangi ürünlerin üretileceği kararı, uygun bir taşıma ağının mevcudiyeti ve ürünlerin pazara düşük maliyetle arz edilebilmesiyle ilintilidir.

Global dağıtımda en önemli soru ürünün çıkış noktasından varış noktasına nasıl sevk edileceğidir. Taşımacılıkta mod seçimi birkaç boyuta bağlıdır. Bu boyutların arasında ürünün temel doğasına ilişkin olan ürün ebatı, dayanıklılık ve ürünün değeri vardır. Bazı taşıma modları, fiziksel, yasal veya güvenlik boyutları dikkate alındığında doğrudan elenmektedir. Ürünün ağırlığı, yoğunluğu ve şekli de taşımacılıkta mod seçimi kararını büyük ölçüde etkileyebilir.

Mevcut araştırmanın üç ana amacı bulunmaktadır. Bu amaçlardan ilki taşıma modu seçim sürecini etkileyebilecek önemli kriter ve faktörleri belirlemektir. İkinci amaç ise farklı sektörlerde faaliyet gösteren beş Türk ihracatçı şirkete bu kriterleri uygulamaktır. Çalışmanın çeşitliliğine uygun olarak, katılımcılar karar verme sürecindeki rollerine göre seçilmiştir. Aralarında CEO'lar, ihracat departmanı müdürleri ve bölüm yöneticileri vardır. Üçüncü amaç ise, önerilen hipotezlerle piyasa uygulamalarını karşılaştırmak amacıyla vaka çalışması yapmaktır. Bu doğrultuda önemli iç ve dış faktörleri dikkate alan bir karar verme akış şeması önerilmiştir.

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TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION	1
CHAPTER 2: THEORETICAL FRAMEWORK	3
2.1 Broad meaning of transportation	3
2.2 Concept of logistics	3
2.3 The role of logistics in economy and government	5
2.4 Types of transportation mode	6
2.5 Transportation mode selection	23
CHAPTER 3: CONTEXT OF THE STUDY	27
3.1 Modern world trends	27
3.2 Transportation in Turkey	30
3.3 Definition of the selected industries	38
CHAPTER 4: THE RESEARCH METHODOLOGY	41
4.1 Methodology, data collection method and survey design	41
4.2 Description of the selected companies	44
4.3 Purpose of the study	47
4.4 Hypothesis of the research	49
CHAPTER 5: HYPOTHESIS TESTING AND FINDINGS	51
5.1 Case study: Company A	51
5.2 Case study: Company B	53
5.3 Case study: Company C	54
5.4 Case study: Company D	57
5.5 Case study: Company E	58
CHAPTER 6: APPLICATION OF THE FINDINGS	60

CHAPTER 7: CONCLUSION	66
APPENDIX A: QUESTIONNAIRE	68
APPENDIX B: SUMMARY OF FINDINGS	72
REFERENCES	74

LIST OF TABLES

Table 1. Main Characteristics of Various Transportation Modes.....	8
Table 2. Comparative Advantages and Disadvantages of Transportation Modes.....	9
Table 3. Share of Selected Industries in Total Turkish Exports.....	40
Table 4. Parameters of Economic Performance for Interviewed Companies.....	47
Table 5. Hypothesized Range of Factors Importance within Given Industries.....	50

LIST OF FIGURES

Figure 1. Correlation of distance and transportation modes.....	10
Figure 2. World rail freight in billion tonne-kilometers and annual percent change..	28
Figure 3. World road freight in billion tonne-kilometers and annual percent change....	29
Figure 4. World seaborne trade.....	29
Figure 5. Turkey GDP.....	31
Figure 6. Foreign trade development.....	32
Figure 7. Turkey's major foreign trade partners in 2014.....	32
Figure 8. Road network in Turkey.....	33
Figure 9. Rail network in Turkey.....	35
Figure 10. Main ports of Turkey.....	36
Figure 11. Types of freight handled in ports of Turkey in 2012.....	37
Figure 12. The process of conducting the study research.....	43
Figure 13. Transportation mode decision-making flow chart.....	62

CHAPTER 1

INTRODUCTION

In the modern world, international trade plays an essential role in every country's prosperity, with transportation being the main tool to make the process of movement of goods in trade possible.

Transportation decisions encompass transportation-mode selection, size of the shipment, and scheduling, which in turn determines the location of warehouses, customers, and production facilities.

Four main modes of transportation for freight exist, each having their own advantages and disadvantages. These modes are rail, road (motor), water (sea), and air. Each of the modes has its special characteristics, and depending on the distance, location, value, and type of shipment, one of these the options can be considered the best choice under certain conditions.

When making the mode selection decision, all the advantages and disadvantages should be weighted and taken into account. In some cases, the appropriate choice of a transportation mode might seem to be obvious among the options, but proper comparison and analysis of additional criteria may be required.

The main criteria influencing the transportation mode selection are the product type, volume and value of freight, and the distance to be covered. Other criteria that often affect the selection process include the speed, availability, reliability, and security of the mode. Thus, a number of possible alternatives to choose from regularly exist and the manager making the final decision should properly evaluate all the possible options.

The purpose of the current research is to identify the factors that influence exporters' decision about transportation mode. For this purpose, case studies of five companies in various industries were conducted. All these companies operate in Turkey and export their goods worldwide.

The flow of the study as follows: In Chapters 2 and 3, the theoretical framework and context of the study are presented. Chapter 4 introduces the research methodology. In Chapter 5 the five cases are discussed. Finally, Chapter 6 discusses the application of the findings, followed by the conclusion in Chapter 7.

CHAPTER 2

THEORETICAL FRAMEWORK

2.1 Broad meaning of transportation

In very broad terms, transportation means the movement of goods within specified confines (Stroh, 2006). In a more detailed view, transportation is defined as a facility or service creating time and place utility through the physical transfer of people and goods from one location to another, proceeding production by bringing in raw materials and supplies, and following the production through the distribution of the finished or semi-finished goods (Mossman & Morton, 1957).

The major role of transportation is to satisfy the needs of society. Goods are being produced for actual use, for reserve storage or to be traded for other goods and services. The availability of goods and services satisfies people's needs and desires. And availability itself relies on transportation services (Mossman & Morton, 1957). Two concepts essential to the understanding of transportation are accessibility and mobility. The first means the number of options available within a geographical distance or time. Mobility is associated with the ability to move between different sites (for example, between city districts or regions) (Hanson & Giuliano, 2004).

2.2 Concept of logistics

When going deeper into the research about the nature of transportation, especially on an international basis, the transportation concept inevitably becomes part of "logistics." The term logistics itself takes its roots from the military, where it is applied to the process of supplying an operation of war with troops, equipment and supplies. During World War II, the key factor of the success of armed forces was

admitted to be the ability to efficiently and effectively transport and store supplies (Lambert et al., 1998). Later industries took these terms and used it in the discipline known as “business logistics.”

The first attention to logistics as a part of economic science arose in the 1950 and 1960s. According to Peter (1962), at that time, logistics remained the last frontier chance for organizations desiring to ensure their corporate efficiency. As a result, in 1963, the Council of Logistics Management was established, aiming to develop logistics theory and promote the understanding of the process.

Great deregulation of the transportation industry in the 1970s and the beginning of the 1980s allowed organizations and firms more opportunities and thus promoted competition within transportation modes (Lambert et al., 1998).

From the 1990s, accelerated globalization brought firms to higher competition and promoted market growth. This all created needs in raw materials, labor, component parts, and so on. Hence, logistics became a further solution for firms aiming to compete in the global arena (Lambert et al., 1993).

Thus, following the need for transportation development, the term logistics is defined by Christopher (2005) as follows:

Logistics is the process of strategically managing the procurement, movement and storage of materials, parts and finished inventory (and the related information flows) through the organization and its marketing channels in such a way that current and future profitability are maximized through the cost-effective fulfillment of orders (p.4).

According to Hesse & Rodrigue (2004), logistics involves a wide set of activities dedicated to the transformation and distribution of goods, from raw material sourcing to final market distribution as well as the related information flows.

Some authors do not distinguish between the terms logistics and transportation (distribution). For example, Stroh (2006) equalizes these two concepts,

but refers more to logistics when analyzing international scope. According to Lambert et al. (1998), some name logistics as:

- distribution
- physical distribution
- material management
- channel management
- industrial logistics
- supply chain management
- logistical management
- business logistics

However, to compare distribution and logistics, the former consists of goods handling and movement, transportation, warehousing and retail — in short, the distribution of end products; the latter adds legal services and cycles to coordinate the process, as well as production planning and customer service (Stroh, 2002).

2.3 The role of logistics in economy and government

For many centuries transportation has promoted and intensified mass consumption of resources and finished goods. Globalization of resources and commodities even enlarged this role (Janelle & Beuthe, 1997).

It is known that for a country to produce goods, it has to have a competitive advantage over and trade with other nations for goods and services. A positive balance of trade will promote the economy; that is why the main interest is concentrated on export and the protection of local producers (Wood et al., 2002).

According to Radalet & Sachs (1998), economic growth and foreign trade performance are related to the extent that export is essential in earning currencies which will be used to import commodities and goods promoting the growth. After the 1970s, when energy costs and interest rates were rising, logistics was considered mostly as a cost driver. Furthermore, due to industry globalization, logistics continued to receive more attention from organizations. First, domestic companies who wished to still compete in the conditions of rising globalization had to refer to logistics as a logical way to provide reliable service to local markets rather than overseas competitors. Second, the organizations involved in international trade needed perfectly organized logistics to deal with increasing costs and the complexity of the supply chain (Lambert et al., 1998).

Transportation can increase the value of a commodity. As a rule, a product has no value until it is produced and transported to a demanding customer. And due to economies of scale, sometimes it is more economically logical to carry goods in big volumes over long distances with transportation costs lower than domestic production of the goods. This is how, through increased transportation demand, the cost of transportation itself decreases.

2.4 Types of transportation modes

Transportation is a social concept which is broadly and deeply interdependent with daily life all around the world (Keeling & Blomley, 2007). The modes of transportation are the means by which the goods are transported. They represent an important component of transport systems because they are the means by which mobility is supported. Nowadays there is a wide range of modes that may be grouped

into three broad categories: land, water and air. Each mode has its own advantages and disadvantages, requirements and features, and serves the specific demands of freight traffic.

The basic five transportation modes are the following:

- road transportation
- railway transportation
- sea transportation (maritime transportation)
- airway transportation
- pipeline transportation

When considering the selection criteria, it is necessary to take into account four main criteria:

- the speed
- the reliability to fulfill service requirements
- the flexibility of the mode
- comparative unit costs

The first two criteria are the main influencing drivers to meet the demand and supply in time.

It is also essential to mention additional factors that have their effects:

- delivery time
- shipment size
- cost of transport service
- transit time
- item type
- possibility of damage
- number of transshipment points (Bowersox et al., 2002).

As seen in Table 1, characteristics vary from mode to mode and meet criteria at different degree. The mode decision should be carefully considered in order to match all the requirements.

Table 1. Main Characteristics of Various Transportation Modes

Mode Criteria	Road	Rail	Sea	Air
Relative Speed	Moderate	Moderate	Slow	Very high
Reliability	Good	Good	Limited	Very good
Cost per ton	Medium	Low/medium	Low/very low	High
Flexibility	High	Low	Low	Medium
Other factors	Extensive network; Short and medium distances	Limited and fixed infrastructure; Large consignments	Restricted network; Large quantities; Less urgent shipment	Limited network; Emergency shipment Expensive goods

Adapted from Lambert et al., 1998

Most goods are capable of being moved by different modes, unless some special characteristics require a specific choice. It is also suggested to create a matrix ranking the factors that influence the choice.

Table 2 provides a comparison of advantages and disadvantages of different transportation modes. Rail transportation, for example, is suitable for transporting bulky goods over long distances, while air carriers provide a speed advantage but at a higher price.

Table 2. Comparative Advantages and Disadvantages of Transportation Modes

Mode	Advantages	Disadvantages	Primary role
Road	Flexible in route and time; Direct delivery Flexible Customer service	Relatively short distance; Limited capacity; High cost	Move smaller shipments in local, national and neighbor markets
Rail	Transporting bulky goods; Long distances; Minimal time and cost; High capacity	High investment; Low accessibility; Damage rates	Move large shipments mostly within local markets and neighboring regions
Sea	Very low cost; Transport bulky products; High capacity International transportation;	Slow; Weather affected;	Moves large domestic shipments via rivers and international shipments by sea and ocean
Air	Available to and from most countries; carry high value items; Fast speed; Freight protection	Very expensive Low capacity	Move urgent shipments of domestic freight and smaller shipments of international freight

Adapted from Coyle et al., 2011

As can be seen in Figure 1, road transportation appears to have the lowest cost when going short distances. But the more the distance increases the more logical it is to use railway or maritime transportation to cut the costs. Air transportation will probably be chosen to send small volumes of goods with a very high value.

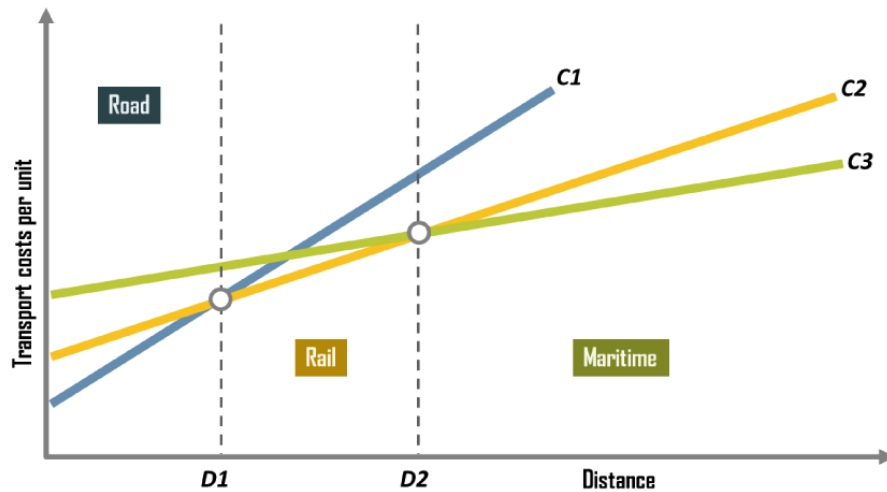


Fig. 1 Correlation of distance and transportation modes. Source: Rodrigue et al., 2013

2.4.1 Road transportation

Nowadays road transportation is without doubt the most widespread mode.

Compared to other modes it has more advantages, and companies prefer it for obvious reasons. The top benefit of road transportation is flexibility and accessibility to most locations.

Road transportation started to grow rapidly after the end of World War II. Speed and ability to operate door-to-door encouraged the spread (Bowersox et al., 2002). At that time, the high demand and growth of economies, especially in the USA and Europe, created a new market and a need for fast transportation solutions due to trade between nations. Seaport and airport systems had been ruined, so priority was taken by road transportation (Bowersox et al., 2002).

Nowadays one of the biggest advantages of roads is the network. It is always possible to find alternative ways to one destination. In addition, roads are divided according to functional hierarchy, depending on their role. The main role goes to highways, roads with limited access which do not intersect.

If the roads have traffic lights at the points of intersections they are called arterials. The main aim of the arterials is to connect special activities, such as shops, production facilities, and residences. Thanks to such a hierarchy, roads provide point-to-point service, the biggest advantage roads have over other modes. Due to governmental regulations and technical limits, road transportation modes are limited in achieving economy of scale. To promote safety, many trucks have set restrictions in weight and length (Rodrigue et al., 2013).

The most important advantages of motor travel over other modes are:

- The capital cost of vehicles is low, and providing new users to enter the business. This promotes high competition in the industry. It also makes easier access for new technologies and innovations inside the industry.
- Second main advantage is high relative speed of vehicles, which is only restricted by governmental regulations (Rodrigue et al., 2013).

Depending on what product should be shipped and whether it has specific characteristics to be taken into account, there are several main types of trucks used for road transportation, including semi-trailer, jumbo-trucks and refrigerated trucks.

The road transportation industry has its own problems. Trucks require constant maintenance, equipment replacement, and proper storage. Still, truck carriers are labor-intensive, where high wages remain a major concern. To deal with the trend, carriers pay more attention nowadays to ensuring scheduling, computerized billing systems and intermodal transportation (Bowersox et al., 2002).

2.4.2 Railway transportation

Railway transportation is associated with goods movement on guideways, with the most known among them to be rails. But in recent years, development in technology

and know-how has provided monorails and levitation trains. First, basic trains appeared in seventeenth century used to transport materials in quarries and mines, but only in nineteenth century real railway transportation came into existence. In regions such as Western Europe, North America and Japan, fast development of railroad systems played an important role in their economic development (Rodrigue et al., 2013). Historically in these regions, railroads covered the largest amount of ton-miles (freight activity that measures weight and distance) over continents.

Due to fast development of a rail network which connected most cities and towns, railroads were the dominating system in freight tonnage until after World War II (Bowersox et al., 2002). It obviously brought positive changes to freight distribution. At that time, maritime transportation was capable of moving heavy bulky loads, but railroads made it more economical with better and more frequent service and time schedules.

Railroads were first among all transportation modes in number of miles covered. However, the extensive development of roads after World War II brought serious competition from motor carriers and this caused a decline in the railroads' share of revenues (Bowersox et al., 2002).

Nowadays railroads continue to handle a large amount of through-city tonnage due to the ability to carry large tonnage over long distances. Railroad transportation costs are relatively low compared to road transportation, where high costs are related to expensive equipment, terminals and fixing costs. As a result of deregulation and development, railroad transportation moved from distributing a different range of commodities to specific goods. The main demand comes from raw material, extractive industries situated far from waterways, and proper automobiles, farm equipment, and machinery (Bowersox et al., 2002).

Rail transportation is highly controlled by government and big operating networks because most rail companies are in situation of monopoly or oligopoly. More than that, rail transportation is the most constrained by the geography, which is seen in:

- Vehicles. The technology of train motion consists of steam, diesel and electric. Depending on the purpose of transportation, rail transportation can provide a wide range of trains to fill any need. For bulk cargoes use mainly open wagons, also called hopper cars. Boxcars serve general and refrigerated goods; liquid goods are best suited for tanks. In recent years wagons were mainly organized and specialized according to orders delivered, for example hopper wagons for grain, potash and fertilizers, triple hopper wagons for sand, gravel and coal and flat wagons for manufactured goods, wood and agricultural equipment (Rodrigue et al., 2013).
- Space. Rail transportation lines do not consume lots of space, but operation costs increase with maintenance of its terminals, which is especially costly in urban areas. Nevertheless, these terminals are generally accessible and logically located.
- Gauge. For many political and historical reasons, different nations have adopted different gauges. For example, in North America and Western Europe the standard gauge of 1.435 meters is being used, which covers around 60 % of all railways. But in regions like Russia and Eastern Europe, the broad gauge of 1,520 meters covers around 17 % of all the railways. This difference makes the integration process harder, particularly the change from one railway system to another.
- Gradient and turns. Rail transport is very sensitive to the dissimilarity of the

geography, which is reflected in gradient and track alignment. The acceptable gradient rail transportation can handle is 4%, which is about 40 meters per kilometer, but the real gradient freight trains can tolerate does not exceed 1 percent. In practice, it means that a train needs 50 kilometers to climb just 500 meters. Gradients will also be the reason of more energy consumption, especially when trains travel long distances (Rodrigue et al., 2013).

The railroads own and organize their own rolling stock. The features of the cars used nowadays have changed accordingly, to satisfy the requirements of customers. Modern vehicles are specialized and designed to meet shippers' needs (Coyle et al., 2011).

In order to give better service to shippers, railroads concentrated on the development of advanced equipment, for example, unit trains, enclosed tri-level automobile cars, cushioned appliance railcars, double stack container flatcars. All the measures taken to reduce weight increase the productive capacity (Coyle et al., 2011).

It is also a common practice to combine rail and road transportation, in the form of so-called "piggy back," or simply, carrying trailers. This collaboration combines the advantages of truck transportation and railroad potential. The most commonly used is the RO-RO (Roll On – Roll-Off) method, when tractor and trailer are placed on a platform.

Historically, rail transportation was created to help in scales of national economies, but globalization had a serious impact on the system as well. The impact is seen in the following dimensions:

- Macro scale: land bridges, connecting all territories of North America, as well as Europe and Asia are being developed, serving as a good alternative

for long destination shipments, underlining the efficiency of rail along long distances.

- Meso scale: here the correlation is seen in terms of energy consumption.

While many countries still rely on other international fuel suppliers, others build their own fuel transport arteries. In recent years the integration of maritime transportation and railways is observed. Rail transportation at some points became the extension of maritime logistics.

- Micro scale: due to the specialization of rail traffic and the transfer of some types of commodities from rail systems to road ones. Railways in ports tend to increase and concentrate container movements. This allows the establishment of door-to-door services (Rodrigue et al., 2013).

2.4.3 Maritime transportation

Water is the oldest mode of transportation. For centuries, rivers, lakes and oceans have been a very important link in freight distribution. Waterways are a natural highway and currents and winds can additionally serve as a natural moving power (Coyle et al., 2011). The historically original sailing vessels of the 1800s were later replaced by diesel boats in the 1920s. In the present time, water transportation, thanks to modern technologies and governmental support, has changed dramatically, which has led to a significant increase in many countries' economic development (Bowersox et al., 2002).

When speaking about water transportation, the main distinction is between deep water (sea, ocean) and navigable inland water transport (rivers, land) (Bowersox et al., 2002).

According to Rodrigue et al., (2013) maritime transportation, similar to inland transportation, is associated with geographical, strategic and commercial usage. The idea of maritime transportation relies on the existence of maritime routes, which are corridors of a few kilometers in width avoiding the discontinuities of inland transportation through ports, which are the main features of land and water interface. Maritime routes are obligatory to pass, and consist of physical (winds, coasts, currents, reefs, ice) and political borders.

Population growth, increasing standards of living, industrialization, globalization, lack of local resources, elimination of trade barriers, have all contributed to the continuing growth of maritime transportation. In countries such as Greece, Indonesia, Norway, Japan, Philippines and the USA, with long shorelines and rivers, or countries consisting of large number of islands, water transportation is an important key in domestic transportation (Bookbinder, 2013). But not all regions are open to the sea or the ocean, and they may have difficulties participating in maritime trade. In this case they represent what is called maritime enclaves (landlocked countries) and require agreements with neighbors to gain access to ports through railways, roads or rivers (Rodrigue et al., 2013).

Maritime transportation is focused on freight because there is no other proper alternative to transport large amounts of freight long distances. The means of water transportation is ships or vessels, which in terms of this research basically mean equal units.

Ships exist in a variety of sizes. The size is determined by their capacity to carry weight and volume carrying capacity (Barnhart & Laporte, 2007). The weight carrying capacity in metric tons is called deadweight and consists of cargo weight,

weight of fuel, oils, all supplies, and additional goods on the ship. The gross tonnage of a ship is the volume of enclosed space of a ship (Barnhart & Laporte, 2007).

Maritime freight is divided into two main categories:

- Bulk cargo—dry freight which is not packed (minerals and grains). Usually such cargo has one origin, one destination and one client, and enjoys the economy of scale.
- Break – bulk cargo – general types of cargo which has been packed into boxes, bags, drums or containers (Rodrigue et al., 2013). Containerization provides efficient loading and unloading, which in turn saves time and money. Most common shipping containers exist in 2 lengths: 20 feet (able to carry around 28 tons) and 40 feet (capacity around 50 tons) (Barnhart & Laporte, 2007).

General types of ships: (Barnhart & Laporte, 2007).

- Tankers – used to carry liquids in bulk. Usually crude oil is transported in large tankers while other liquids like oil products, chemicals and other products are carried in small ones.
- Bulk carriers – designed to transport dry bulk commodities, for example iron ore, coal and other minerals.
- Liquefied gas carriers – transport refrigerated gas under high pressure.
- Container ships – transport packed goods in standardized metal containers.
- Refrigerated vessels – carry goods that require special temperature conditions, such as fruits, meet, and fish.
- Roll–On Roll–Off vessels –have special adjustments for cars and trucks to drive in and drive off the vessel.

Maritime shipping is still dominated by bulk cargo, which covers around 65% of ton-miles. But break-bulk cargo percentage steadily grows, mostly due to containerization. Two main disadvantages of maritime transportation are slow speed, around 17 knots, and delays, caused by long procedures of loading and unloading on limited place (Rodrigue et al., 2013).

Despite the mentioned disadvantages, maritime traffic has grown dramatically, mostly due to the increase in trade between Asia and Europe. Here the advantage of maritime transport is its capacity and services. Railways and trucks are simply not capable of carrying such traffic at geographical scale (Rodrigue et al., 2013).

Maritime shipment has several notable improvements aiming to increase performance of vessels or their port accessibility. They go as follows:

- Size – in the last century the average size as well as the number of ships grew. Doubled size of a ship increases its capacity three times. The minimum cost-effective ship size is 1000 deadweight tons, but the economy of scale ensured much bigger ship sizes to meet the transportation demand.
- Speed – usual a ship can travel at a speed of 15 knots (28 km per hour), but modern ships can increase it up to 30 knots, but normally due to energy requirements they reach 25 knots. All the improvements were afforded by the energy technology improvements, from sailing steam to diesel, gas and even nuclear.
- Ships specialization – Over time, ships have been modified to improve carrying performance and meet the economy of scale.
- Ship designed – Huge improvements, starting from wood hulls up to aluminum and composite materials hulls.

- Automation – Computer technologies helped to create self-unloading ships, computer navigation, global positioning systems, which decreases the crew requirements (Rodrigue et al., 2013).

Water transportation remains the second most efficient mode of transportation, especially in terms of energy cost per output. Still, rail transportation ranks the first in this competition, with 6 percent of its energy inputs as a percentage of output, while maritime transportation has 9% (Coyle et al., 2001).

Water transport will remain to be a useful and important transportation option in future transportation systems. The slow transit time of water transport provides a form of product storage in transit that can benefit integrated logistics system design.

2.4.4 Air transportation

The newest but least utilized transportation mode is air transportation. The most notable advantage of air carriage is the speed at which the goods can be shipped. Long coast-to-coast transportation with aircraft requires only a few hours compared to other modes of transportation. Even though it is the most expensive solution, the advantage allows other aspects such as warehousing and inventory reduction (Bowersox et al., 2002).

Only in the twentieth century has the development of aviation become possible. The first attempt to use an airplane to carry not passengers but materials happened in 1911 when 6500 letters were carried within India for a distance of 10 kilometers (Wood et al., 2002). But the most serious impact on aviation, mostly in terms of cargo aviation, was made during World War II. Military training brought many pilots who could operate during the night and in bad flying conditions. During the war, 90 percent of the load of aviation was observed. But after the war ended,

many surplus aircrafts and skilled pilots were left without work. So the post-war period became the period of new categories of airlines to come into existence, including all-cargo carriers (Wood et al., 2002).

Most airlines combine their freight and passenger services in one system. Passengers tend to travel in the daytime and consume relatively small space, which includes only their physical seats and baggage. Freight shipment requirements favor nighttime service and do not stick to specific routes and schedules. When passengers and freight services are combined, it is possible to share costs and find optimal pricing to satisfy both sides (Bookbinder, 2003).

Airfreight service providers are operators that offer different type of services and level of logistics. It is logical to distinguish three different categories of freight carriers: line haul operators, express (or integrated) carriers and niche (specialist) carriers.

- Line haul operators ship goods from one airport to another and use help of freight forwarders or consolidators to work directly with customers. Line haul operators are:
 - a. All-cargo operators – (scheduled and non-scheduled/charter), which move only freight in assigned freighter/cargo aircrafts. Such operators are usually highly reliable and move high volumes over long distances.
 - b. Combined passengers and cargo operators, using scheduled aircraft and free belly-holds to move freight. Most modern airlines are passenger carriers who sell free belly space to cargo shippers and forwarders. But passenger load has an impact on cargo shippers. During peak seasons, holidays and so on the priority is

given to people movement over cargo, so freight shipments would be left behind (Wood et al., 2002).

- Integrated/express/courier/parcel carriers deliver goods from door-to-door, with defined time delivery. Good examples of this type of service are DHL, FedEx and UPS. These operators combine air transportation with ground services to satisfy customer demand. This often requires nighttime operations. That is why in such business, reliable aircrafts with low utilization are used. Such service first aimed at high-priority documents, but soon expanded and now includes package cargo. As an example, big premium-delivery companies use overnight delivery from centralized centers, which makes it very attractive to firms with expensive products or those who are restricted in time (Bowersox et al., 2002).
- Niche operators – use specialized equipment or expertise to fulfill unusual extraordinary requirements. Such operators are very flexible when choosing airports, work hours, load/unload factors and other characteristics. (Barnhart & Laportel., 2007).

Nowadays most air cargo is carried in containers, because this remains the only way to load and unload aircrafts. Air cargo containers are called unit-loaded devices (ULD) and vary in shape and design in order to fit the aircraft. It is possible most of the time to interchange containers between airplanes. The biggest air container is 8x8x20 feet and is similar to truck and water containers, with the difference of less empty space inside it. There are also bottom corner containers to fit the main deck space. Containers are usually loaded directly in airports or special properties. Some shippers, for example, load containers with several cargoes and send already loaded container to the side of aircraft (Wood et al., 2002).

There is no special commodity that takes a higher share in airfreight transportation. The explanation here is that goods are shipped on a high-priority basis. Cargo with biggest potential for regular air transportation are those that have high value or very perishable (Wood et al., 2002). Goods which are usually moved by air carriers are mail, clothes, fresh flowers, expensive cars, jewelry, industrial machines, photography equipment, racehorses and similar commodities. Basic raw materials are transported by this means very rarely, only if this appears to be urgent need. The old proverb “Time is money!” is very suitable here (Coyle et al., 2011).

As mentioned above, most airlines combine passenger and cargo transportation in one craft. In such a situation a big variety of planes is used. But speaking of all-cargo crafts, the following models are mainly available:

- Boeing 747 -800F – overall length approximately 77 meters. Carrying capacity 448,000 kg with over 8,000 km distance range (Wood et al., 2002).
- Antonov AN-225 – with overall length more than 84 meters and carrying capacity 300,000 kg. The plane was originally built for military use in the USSR. Antonov’s loading and cargo-carrying dimensions are higher than those of Boeing 747. The plane is capable of carrying freight that no other airplane can. The door of the nose section opens almost twice as wide.
- Airbus A330- 200F – new cargo aircraft that includes an impressive range of innovations, which makes it the most economical and ecological plane nowadays. Overall dimension in length is 59 meters and carrying capacity 227,000 kg.

Compared to rail and water transportation, air transportation fixed costs are relatively low. Only road highways can compete for low fixed costs. Most of the time airports are under government regulation. Fixed costs include craft purchases

and special cargo containers. But opposite fixed costs, variable cost is very high because of fuel, maintenance, and labor (Wood et al., 2002).

2.5 Transportation mode selection

In modern economies, the decision about what is to be produced correlates with the availability of proper transportation networks and supplying these products to the market at lower cost. The cost includes all the decisions about raw materials, suppliers and finished goods. Production locations such as plants, warehouses, stores require transportation consideration. Overall, end users, providers and the government are all involved and at some point interact with each other and all aspects of the society should be taken into account (Coyle et al., 2011).

The most important question in world distribution is to answer how the goods will be shipped from the origin to the destination. The decision has to be made either by the exporter or the importer. According to various research studies conducted over the years, the mode option selection requires consideration of many criteria, among which are transit time, reliability, capacity, and accessibility and of course one of the most critical one – cost (Coyle et al., 2011).

Simon (1955) proposed that the selection can best be named as a "step function" rather than a linear, continuous process, which means that there is a point below which criteria would not be accepted and above which it would be.

Cunningham (1982) combined views of researchers on models of transportation modal choice and categorized them as the traditional approach, where cost is the criteria of the competing modes of transportation; the revealed preference approach, which concentrates on traffic within modes; the behavioral model, which analyzes the perception of decision-making person concerning modal efficiency; the

inventory-theoretic mode, which tries to predict modal choice based on cost of transportation to both the consignor and consignee from production point to the destination.

Bagchi (1989) was the one who concentrated on the time when the just-in-time management system was introduced to producers. As part of the research, shippers were asked to weight and rate factors driving their selection determinants from available rate, customer service, problem handling and equipment availability. It was revealed that companies using a just-in-time concept that largely emphasized all factors.

Bardi et al. (1989) conducted a similar investigation with the same criteria, but comparing two periods: before and after the important Carrier Act of 1980, where it was summarized that the most significant changes were related to rate carrier selection, and less important to service factor.

McGinnis (1990) also analyzed conditions before and after the deregulation changes and revealed the six most influential factors: freight cost, reliability, damage and loss issues, shipper market and carrier reputation. Surprisingly service factors were found to be more significant than freight cost; however, rates were still named as an important variable.

According to Foster & Strasser (1990) shippers really cared about the price, even though that said that service is more valued. Long-time relationships were also identified as important, although managers responsible for decisions were not rewarded for such relationship development. The authors concluded that both carriers and shippers should do well to improve performance to achieve firm goals.

The purpose of Lambert et al.'s (1993) research was to identify the factors shippers use when choosing a transporter and to evaluate the relative importance of

those criteria. One hundred sixty-six selection attributes were identified, most of which related to transportation and logistics, rather than to price and promotion. According to the conclusion made by the author, great importance was placed on factors such as customer service, while shippers mostly were not concerned about getting lower prices. This study was the first to combine such a detailed summary of all the possible attributes.

A similar question was raised by Crum & Allen (1997). Carrier selection criteria were investigated through a survey that contained 22 criteria that helped identify the most important factors. Among the most important were transportation rate, quality of personnel and reliability. Reliability is the consistency of the transit time provided by a transportation mode. International prospect was included in the investigation, so international challenges were addressed as well.

Even though the factors mentioned above are taken into account when choosing a carrier, many researchers concentrated on a cost-based approach of the selection process. Some of them designed a cost-based system to support mode and carrier selection. Sheffi et al. (1988) adopted a simple form of cost in the mode choice but addressed and discussed more the problem of equipment capacity. Kuo & Soflarsky (2003) used a similar approach, introducing a decision support system that works with a database in searching for the lowest-rate carrier at a given location. Some scholars address different preferences for a shipper, depending on a particular industry or activity (Maier & Bergman, 2002), while others give more importance to consistency (Bolis & Maggi, 2002).

In some works it was found that transit time is the most important criterion in collaboration with a carrier. More important, transit time reliability, determined as variation from delivery time in comparison to promised (Saleh & Das, 1974) was

considered the most important factor (Matear & Gray, 1993). Baker (1984) identified reliability as “transit time” while Collison (1984) associated it with the term “schedule.” It was advised that a slower but more reliable carrier should be preferred to fast but erratic.

On the other hand, it is the opinion made by some researchers that service criteria stand above all. This includes proper shipper–carrier relations, fast problem solving, ability to satisfy customer requirements, and willingness to conduct urgent requests (Matear & Gray, 1993). Whyte (1993) concurs with this approach and adds that traditional selection criteria stand behind if the carrier is willing to help and understand a problem on a fast notice. The relationship between carrier and shipper managers was also addressed by Brooks (1990).

The general rule for modal selection focuses on determining which mode better responds to the requirements of the international buyer. This selection decision requires consideration of the best fit and balance between modal capabilities, product characteristics, speed and service, and of course, transportation cost (Coyle et al., 2011).

CHAPTER 3

CONTEXT OF THE STUDY

3.1 Modern world trends

The transportation industry is closely related to global economies, where any peaks and busts influence statistics. When world trade is healthy and growing, trade rates increase accordingly – while recessions create the opposite problems and issues. For example, in stagnation years, liner and charter providers face unused capacity (Coyle et al., 2011).

Geographically, world trade is concentrated in three main regions: North America, Europe and Pacific Asia. Trade volume is not always related to trade being a part of GDP. Hence, export countries such as China and Canada are more dependent on international trade. Countries whose trade share is more than GDP are usually export national resources (Rodrigue et al., 2013).

All around the world, all types of transportation are used for international trade. According to Coyle et al., (2011), 98% of intercontinental containerized trade volume and 60% of trade value is shipped via ocean, while intracontinental freight moves mostly by truck.

The 2012 global statistics showed a decline in rail freight tonne-km volume, which was due to the 2009 economic crisis. The growth slowed down to 0.4 percent. For example, after the first shock, rail transportation shrank by 18%, but in 2011 rail freight volume increased by 7%, while in 2012 growth represented only 1%. In the USA, rail freight volume in 2010 and 2011 grew 8% and 1%, respectively. India and the Russian Federation continue to enjoy yearly growth, where rail freight volume

statistics are 5% and 4%, respectively. China, after several years of impressive growth, represents a 1% decline in freight tonne-km. The above-mentioned countries constitute nearly 80 percent of global rail freight (OECD, 2013). Figure 2 shows the dynamics of world rail trade within given periods.

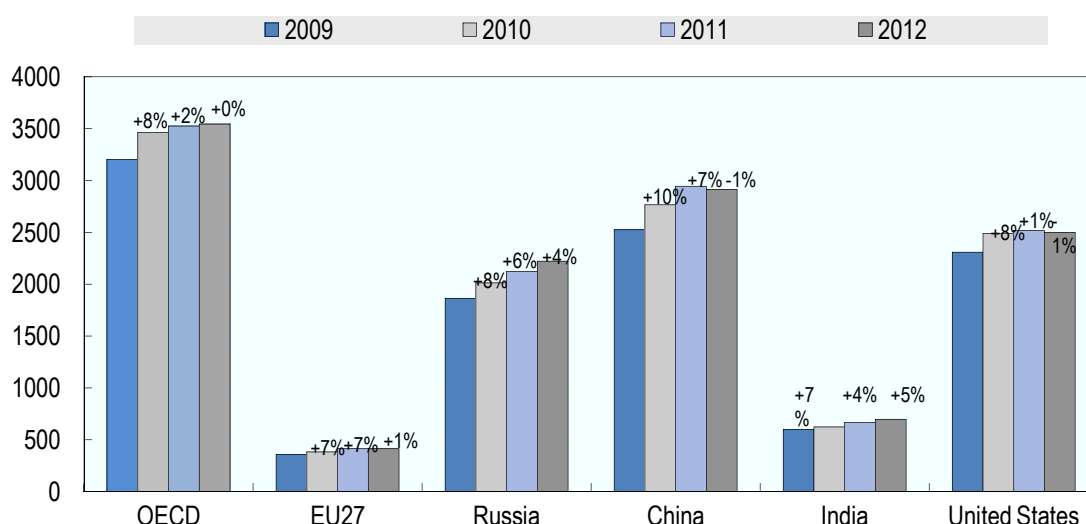


Fig.2 World rail freight in billion-tonne kilometers and annual percent change

Source: OECD/ITF, 2015

Affected by the global 2009 crisis as well, road freight volume grew 2% from 2010 to 2012. Despite the growth, tonne-km volume was still 9% less than the 2012 pre-crisis level. The EU in 2009 showed an initial drop of 10%, 3% growth in 2010 but 1% decline in 2011. The 2012 year showed a 5% negative growth. The EU covers approximately 75% of all world ton-km.

Road freight transportation in China and India continue to expand over the mentioned period. Tonne-km growth represents 17% and 18% in these countries, with a freight volume increase of 11% in 2010, 7% in 2012 and 4% in 2012 (OECD, 2015). Figure 3 shows the dynamics of world rail freight from 2009 till 2012.

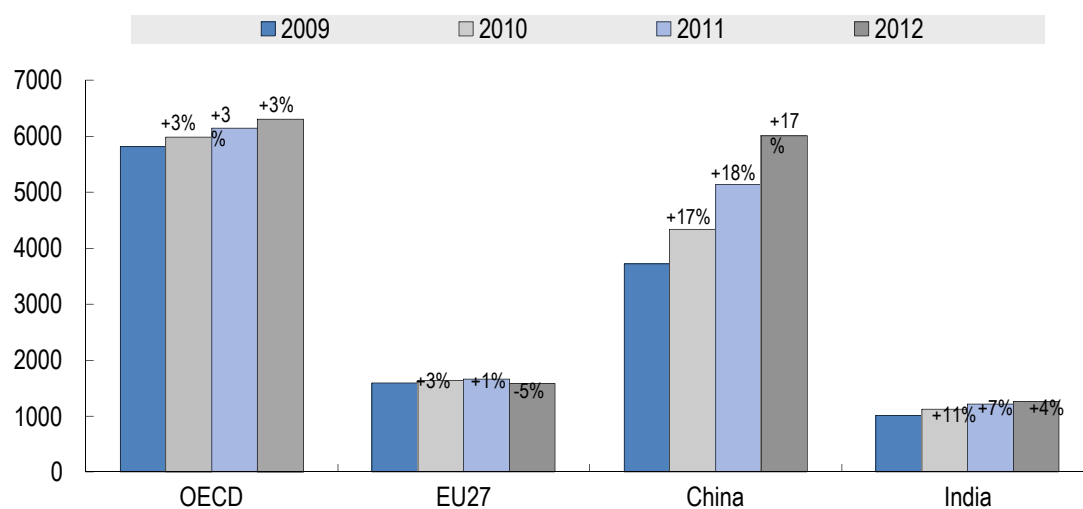


Fig. 3 World road freight in billion tonne-kilometers and annual percent change

Source: OECD/ITF, 2015

Global seaborne trade in 2012 showed better results than the world economy, with a 4.3% growth and basically remained at the level of 2011. Approximately 9.2 billion tons of freight were loaded in ports over all nations. The total world seaborne trade is shown in Figure 4 (UNCTAD, 2013).

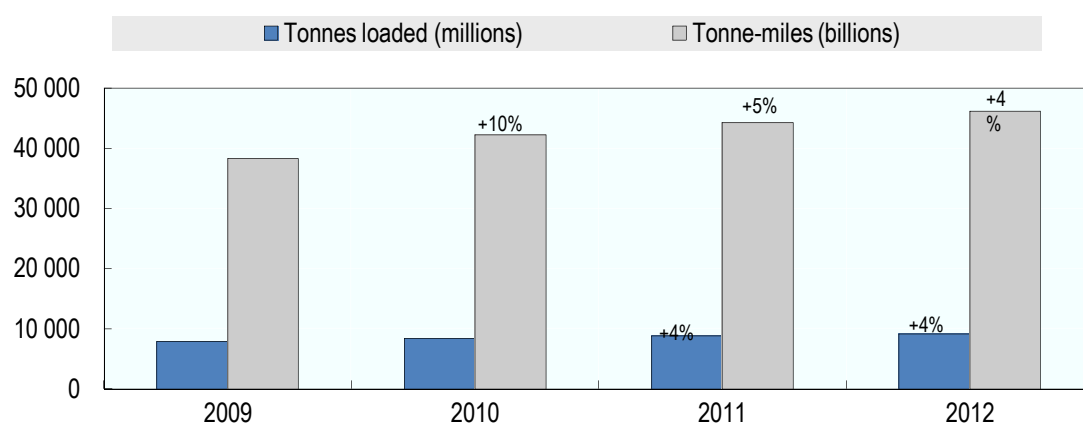


Fig. 4 World seaborne trade. Source: UNCTAD Review of Maritime Transport 2013

The 2012 maritime tonne-miles growth constituted 4.2%. Approximately three quarters of the total tonne-miles was presented by bulk commodities such as coal, iron, grain, and so on (UNCTAD, 2013).

During the period 2011–2013, world air traffic was in stagnation. The period of growth followed by decline was again explained by world economic crisis in 2008 and 2009. However, in 2013 air traffic started to grow slowly, with a 0.9% surplus compared to 2012 (Boeing, 2013).

International air cargo consists of three major service sectors: scheduled freight, charter freight, and mail. Scheduled takes the lion share, with 88% of all world air cargo traffic. Scheduled freight is a combination of general and express freight. Scheduled freight growth accounted for 0.5% in 2013 compared to 2012. Charter airfreight was 8% of world air cargo traffic. This sector represents traffic of urgent or special handling requirements. The charter traffic grew by 2.9% in 2013 over 2012 (Boeing, 2013).

3.2 Transportation in Turkey

Transportation is an essential part of any country's economic strength and prosperity. A good transportation network and services directly influence increase in both domestic and international trade, as well as economic development, determining the ease of access to world markets.

It is obvious that Turkey has very strategic position vis-à-vis Europe and Asia and is a point of international intersection. The trade from Asia to Europe and vice-versa increases yearly, with both sides expanding the trade corridors. In 2013 Turkey ranked as the eighteens largest economy in the world and seventh in Europe (World Bank, 2014).

After making big steps in macroeconomic development, the economy of Turkey showed stable growth dynamics. Compared to BRIC countries, Turkey steadily occupies a position among the faster growing economies of the world (Iskan & Klaus, 2013).

Since 2002, Turkey's GDP has almost tripled and accounted for 820 billion USD in 2013. The dynamics are presented in Figure 5.

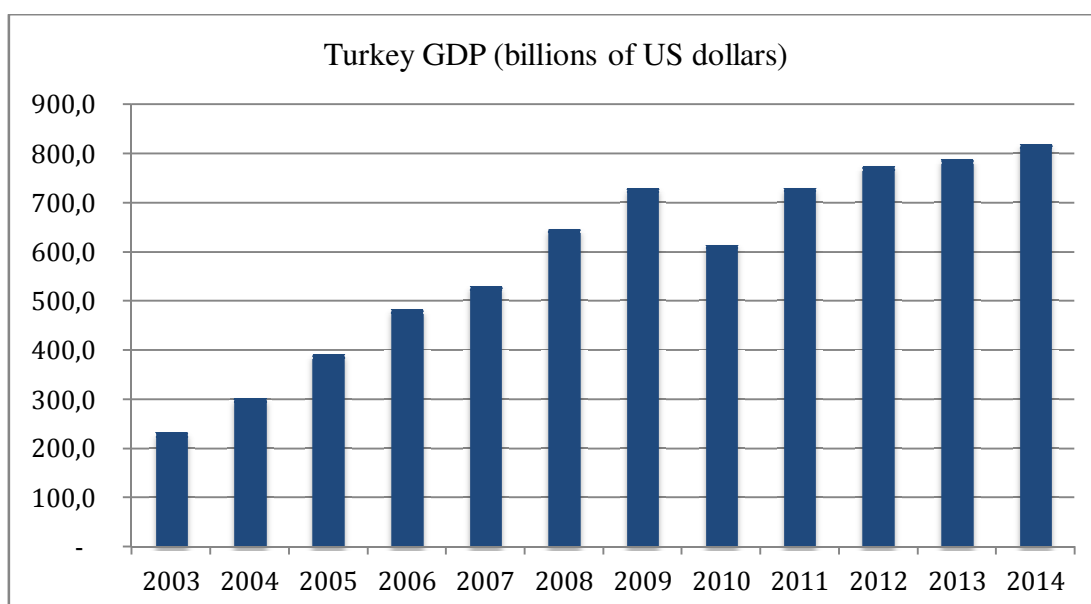


Fig. 5 Turkey GDP. Adapted from TurkStat 2015

The increase in foreign trade during the same period appears impressive as well. In 2013, foreign trade reached 402 billion USD with the share of export in it around 36% (Iskan & Klaus, 2013). The dynamics of foreign trade development of Turkey is presented in Figure 6.

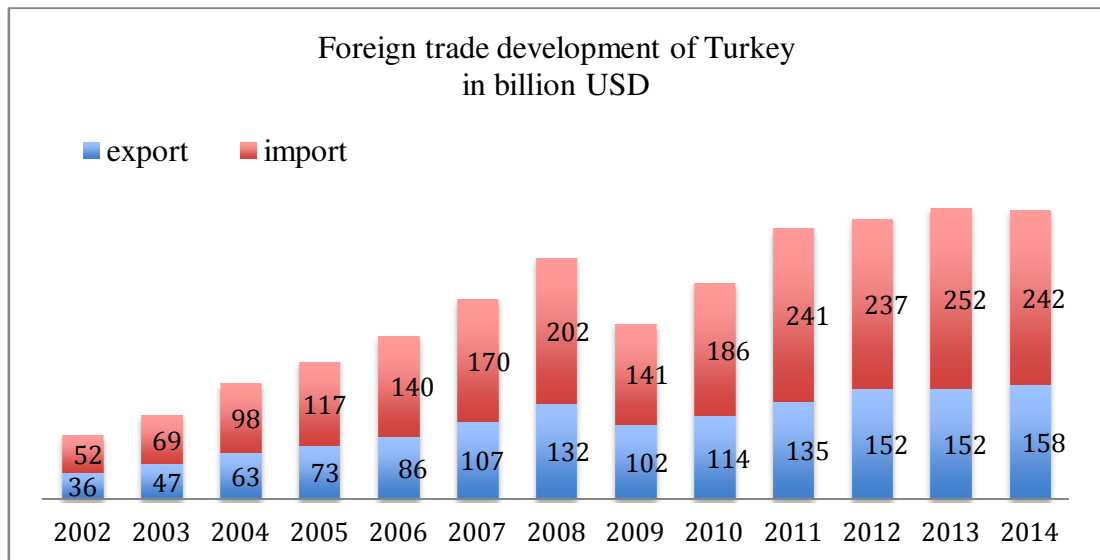


Fig. 6 Foreign trade development. Adapted from TurkStat

As seen in Figure 7, the main trade partners of Turkey remain to be countries of the EU with a share of around 36% in imports and 38% of all exports. Iraq and Russia occupy the second position, mostly due to gas and oil trade. Asian countries also have influential position in trade accounts.

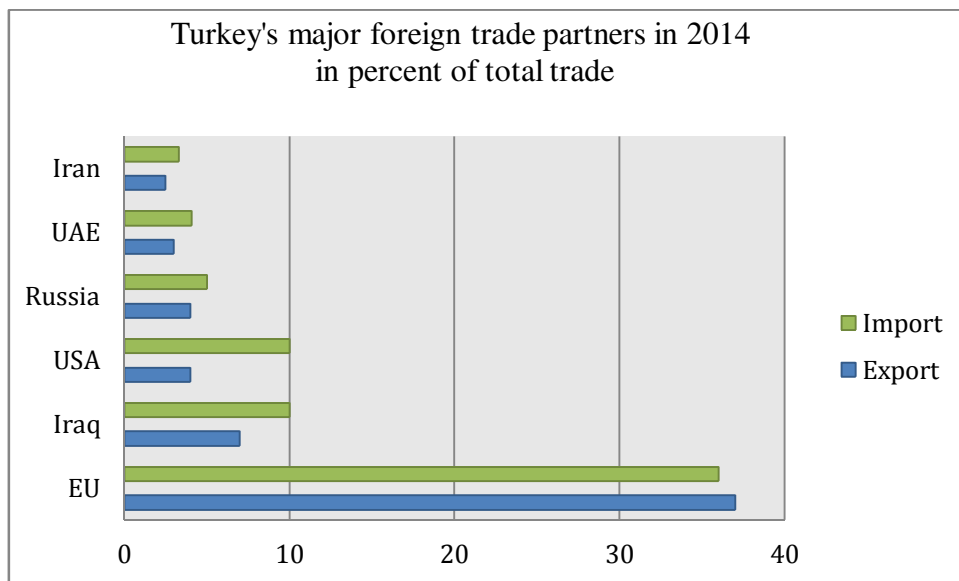


Fig. 7 Turkey's major foreign trade partners in 2014. Adapted from TurkStat

3.2.1 Road transportation

As from the 1950s, the road transportation of Turkey has been in constant development and adjustments and ranks as number one within transportation modes. Still, road transportation is easiest and most accessible in terms of door-to-door transportation, mainly because of the time issue regarding railway and maritime transportation. The percentage of road freight represents more than 89%. Roads are being used even for bulky and heavy freight, but major attempts are being made nowadays to switch attention to alternative modes.

According to the Ministry of Transportation of Turkey, in 2013 the total road network had over 65,000 km, where more than 31,300 km are of state roads, 2,100 km are motorways and the rest are provincial roads. The density of roads is about 48km/100Km², while in Europe the average density is around 110 km/100km² (OECD, 2009). Figure 8 illustrates the main road network of Turkey.



Fig. 8 Road network in Turkey. Source: Ministry of Transportation of Turkey

As mentioned above, roads play a dominant role in all modes of transport, which brings need for ensuring and improving the design standards and physical state of road networks. By 2012, according to international standards, the divided roads in Turkey accounts for 21,228 km (Ministry of Transportation and Communication of Turkey, 2011).

3.2.2 Railway transportation

Nowadays the Turkish railway system is state-owned under the responsibility of Ministry of Transport and Communication, with the supervision of Turkish State Railway (TCDD).

The first railways in Turkey was built in 1856, connecting Izmir and Aydın, while in 1888 Turkey was already connected to Europe with Istanbul-Edirne and Kırklareli-Alpullu lines (TCDD, 2014).

Up to 2012, the total Turkish rail network represented 11,400 km, of which 22% were electrified, 28% signalized, and 5% were double lines. Cargo trains can stretch up to 550 m and carry a maximum of 650 tons at once (TCDD 2013). Within domestic territory, freight can be moved at a speed of 65 km per hour. The total annual capacity is around 35 million tons (TCDD 2013). Cross-border transportation is carried by the following lines: Bulgaria (Kapıkule–Svilengrad), Greece (Uzunköprü–Pythio), Syria (Nusaybin–Qamishli, Islahiye–Meydan Ekbaz and Çobanbey), Iran (Kapıköy–Razi) and Armenia (Doğukapı–Ahuryan) (TCDD 2013). The Turkish rail network map is shown in Figure 9.

3.2.3 Maritime transportation

Turkey is at the crossroads of Europe and Asia and is surrounded by the Mediterranean, the Aegean, and the Black Sea, which gives it a big advantage in global trade. Total coast borders run up to 8,400 kilometers. Cargos for transit come from Europe, the Americas, and Asia and remain for domestic consumption or pass transit to CIS countries, the Balkans, Iran and Iraq. As shown in Figure 10, the main strategic ports are Istanbul-Ambarlı, Istanbul – Haydarpaşa, Izmit, Izmir, Mersin and Samsun. Among these, Ambarlı port carries 40% of all annual container traffic, Izmit carries 25% of all car traffic and Samsun is responsible for the traffic of oil and derivatives (Oguztimur & Colak, 2013).



Fig. 10 Main ports of Turkey. Source: Turkish Undersecretaries for Maritime Affairs, 2013

Ideally, sea transport is the most convenient method of transportation for Turkish exports and imports, representing 46% and 59% share, respectively. Eight-five percent of Turkish foreign trade is carried by sea. The cargo amount (import, export, cabotage and transit) passed through ports in 2004 was 183.86 million tonnes, while

in 2012 it already accounted for 388 million tonnes, with a 71% growth (Bloem et al., 2013).

The amount of container (including import, export, cabotage and transit) handled at Turkish ports was 1.95 million twenty-foot equivalent unit in 2002, whereas it reached 7.2 million twenty-foot equivalent unit in 2012 with an increase of more than 360 per cent (Bloem et al., 2013).

The majority of cargo handled was liquid bulk cargo with more than 132 million tonnes in 2012, followed by bulk cargo in excess of 107 million tonnes, during the same period (Deloitte, 2013). Figure 11 shows types of freight handled in ports of Turkey in 2012.

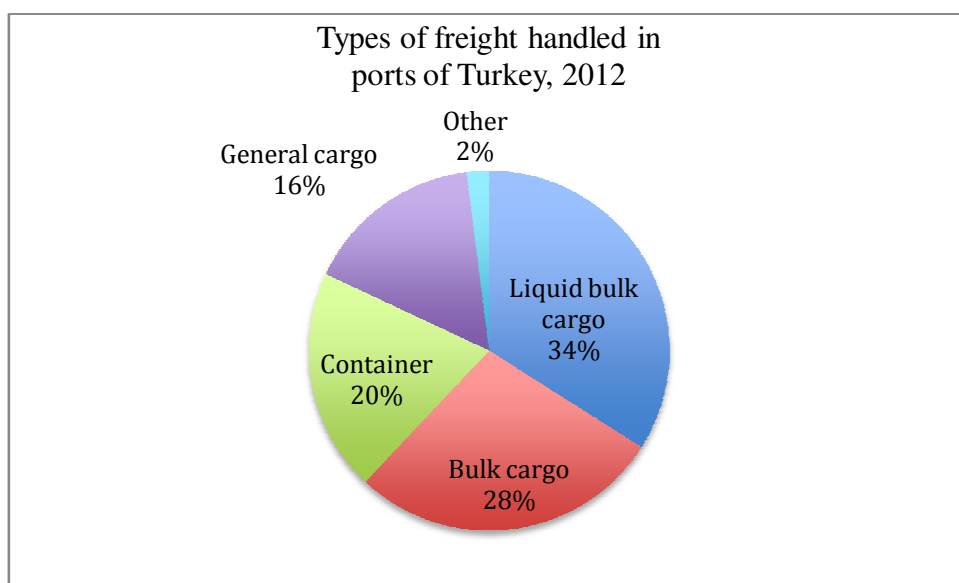


Fig. 11 Types of freight handled in ports of Turkey, 2012. Adapted from Deloitte, 2013

Turkey has more than 300 shore facilities for ports, wharves, marinas, and 175 of these serve international transportation. Among main maritime trade partners are Russia, Egypt, Italy, Ukraine, the USA and other countries (TurkStat).

3.2.4 Air transportation

Turkey has become more and more involved in the global economy and international trade, which reflects in the country's rapid air cargo growth as well. The main international airports are situated in Istanbul, Ankara, Izmir and Antalya. Among all country's airports, 16 are able to host international crews. At the same time, Istanbul Ataturk airport is one of the most important Europe airports (Oguztimur & Colak, 2013).

Seven percent of the Turkish monetary value export and 10% of imports are moved by air. The total air shipment approached 2.3 million tons in 2012 (Iskan & Klaus, 2013). In total, the monetary air market size reached 8.8 billion USD. The biggest share of the freight transported comes from international lines. These account for around 72% of the total freight carried in 2012 (Deloitte, 2013). More than half of the total airfreight in 2012 came through Istanbul Ataturk airport, the total amount of freight surpassed 1.2 million tonnes in 2012, literally a 15% increase from 2011. Turkish Airlines carries more than 50 percent of total cargo (Turkish Airlines, 2014), but private air carriers also growing very rapidly.

3.3 Definition of selected industries

In general, the food industry includes all variety of smaller industries involved in any process of food production. It involves raw food materials processing, packaging, and distribution. Anything that people consume as food, excluding pharmaceuticals, is related to the industry. The scale of the industry is considerable, characterized by diversification according to the origin or raw materials.

According to the Turkish Statistics Institute, the food industry includes, for example, fish, meat and meat products, dairy products and eggs, fruits and

vegetables, cereals and its preparation, coffee, tea, spices, and so on. In this research, we will be focusing on the dairy industry. In 2015 the export market of the industry in Turkey was around 545 million US dollars and approved to be the biggest industry in the region. The share of total export value is presented in Table 3.

The textile industry is a group of light industries involved processing plants (cotton, flax, hemp, jute, ramie), animals (wool, silk), and artificial and synthetic fibers into yarn, thread, and cloth (Turkish Clothing Manufacturers Association, 2013). Without exception, every person in the world is related to the textile industry, simply because of our daily need to wear something in order to protect our bodies or keep them warm. This feature makes the industry one of the biggest in the world. Due to weather and geographical requirements for the production of specific fabrics, some regions are in a leading position within the global industry. Turkey is one of them, recognized worldwide as a main producer. The Turkish Statistics Institute estimates the total export of the textile industry to be worth around 25 billion US dollars.

The chemical industry includes industries which produce raw materials from organic and non-organic minerals, hydrocarbons, by means of chemical processing. Subsectors of the industry usually produce basic chemicals such as plastics, different types of dyes and pigments, and perfume; agricultural chemicals, used in food production; consumer product chemicals, basically soaps, detergents, cleaners, cosmetics. The biggest role of the chemical industry is not only producing end products, but also supplying raw materials to essentially all other industries. Nowadays Turkey's ambition is to reach a 1 percent share of the global chemical market by 2023 (Deloitte, 2014). In 2015, the export value reached 9 billion US dollars.

The distinctive feature of the rubber industry is the use of natural rubber, coming from rubber trees in terms of latex, and synthetic rubber, produced from a base of petroleum to manufacture final goods. Around 60% of world rubber usage is for tire production. Other products include latex gloves, toys, and balloons. The end products are quite specific and have strict orientation (Brentin, 2011).

In 2015 Turkish rubber manufacturing contributed around 2 billion US dollars to the total export turnover (TurkStat, 2015). The metal industry includes manufactures that produce metal products, metal ore or scrap metal. Subindustries use pure ore or combination of several metals to get end products, which later will be used by other industries. Metals are usually extracted by means of mining. Basically the industry is divided into ferrous and non-ferrous containing (Deloitte, 2013). Among the above-mentioned is the steel industry, which will be the core or interest within this work.

According to the Turkish Statistics Institute, the iron and steel industry accounted for almost 8 billion US dollars in the year 2015. Table 3 indicates the impact of selected industries on total export turnover of Turkey in 2015.

Table 3. Share of Selected Industries in Total Turkish Exports

Industry	US dollars (thousands)	% of Turkey's total export
Food	14 343 683	9.96
Textile	11 171 618	7.76
Chemical	9 146 516	6.36
Rubber	36806	0.025
Metal	7 891 620	5.48

Adapted from TurkStat

CHAPTER 4

THE RESEARCH METHODOLOGY

4.1 Methodology, data collection method and survey design

The methodology selected for this research is the case study. A case study is described by Dual and Hak (2008) as follows:

A study in which a) one case (single case study) or a small number of cases (comparative case study) in their real life context are selected, and b) scores obtained from these cases are analyzed in a qualitative manner (p.4).

The main difference between a case study and a survey is the amount of data collected for the purpose of the research. The case study lends itself to qualitative analysis while surveys are quantity-oriented.

Case study research cannot be called a sampling research, an idea which is supported by most researchers, including Yin (1994), Stake (1995), and Feagin et al. (1991). However, the process of selecting the proper cases must be to maximize what can be investigated and learned during the research.

There is no precise opinion on the number of different cases to be involved. This is usually for researcher to decide (Romano, 1989). There are different views supporting this question. Some suggest a minimum of two, but the common view is that four to six groups are enough for a serious project (Hedges, 1985). According to Eisenhardt (1989), the best option would be between four and ten cases. A multiple or collective case study enables analysis within each setting and across settings (Baxter & Jack, 2008).

However, some researchers underline other important features as well. Robert Stake (1995) underlines the objects of study to be crucial to the research, not the ways in which the data is collected.

Case study methodology is applicable in business and economics, enabling investigation of a particular region, industry or company. Anderson (1998) highlights that a case study concentrates on how and why events happened, observing and investigating the realities and comparing what was planned and what occurred in fact. Studying a number of organizations improves the accuracy and reliability by means of reflecting the holistic essence of the subject studied. A case study does not require an investigation of the entire organization, but usually focuses on a specific issue or several units of analysis.

Yin (2003) and Stake (1995) mention several terms to classify all the variety of case studies. Among them are descriptive, aiming to describe what happened to an object and what was the presupposition of that; explanatory, mostly useful to describe processes in a company; and exploratory, as a basis for hypothesis testing.

Yin (1994) describes six main sources of evidence for case study research: documentation, archival records, interviews, direct observation, participant observation and physical artifacts. Interviews are one of the major sources of gathering information for case studies and can be conducted in several forms: open-ended, focused, or structured (Tellis, 1997).

In the present research the method used is a combination of exploratory and explanatory case studies, which allows an understanding of the complex real-life decisions supported by sources of evidence obtained. The process of conducting a case study research is presented in Figure 12.

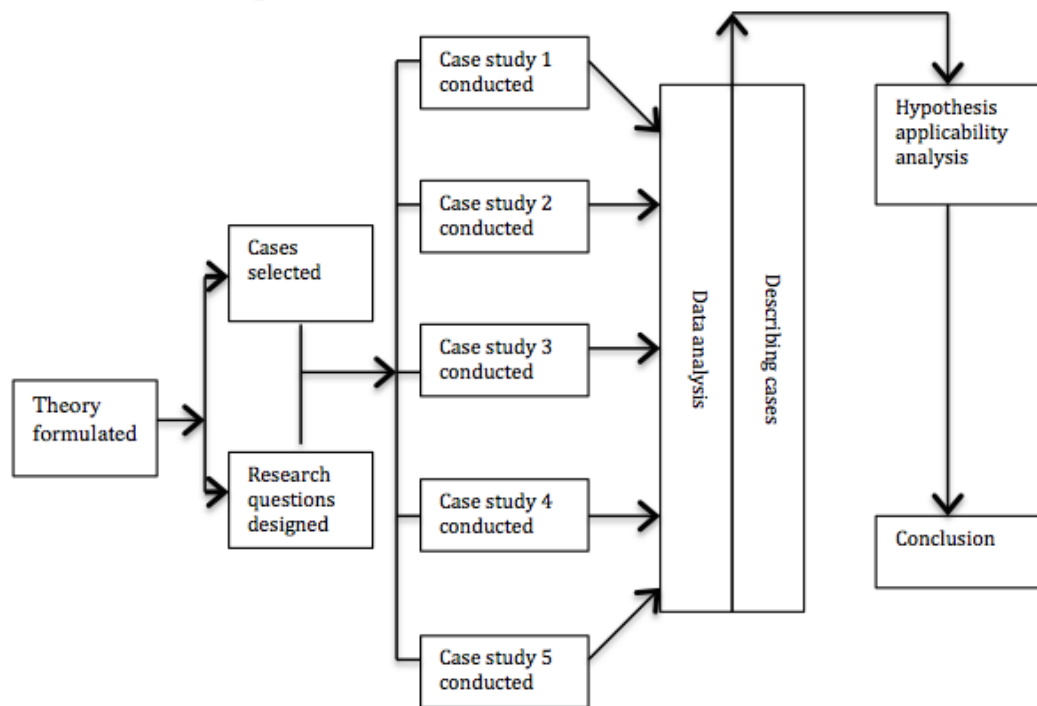


Fig. 12 The process of conducting the study research

The very first step of the research was to conduct a literature review, studying both online and printed sources of information. Using the knowledge gained, the basis theory was constructed and the framework for this research was designed. Following this, related industries were selected and relevant questions assigned. After that, meetings with company representatives were set and interviews were conducted. Each interview consisted of two parts. In the first part, basic information about the firm was obtained and respondents were asked to describe the characteristics of the typical export shipments. In the second part, they were asked to answer questions related to factors influencing the transportation mode selection.

This was followed by the formulation of a theoretical framework that formed a structure for the study. Data obtained from interviews was analyzed and the hypothesis was tested. The final step was to compose the conclusion and researcher's commentary.

Five industries were chosen as the focus of the study. The selected respondents had a professional perspective on the whole supply chain in the selected industry. The sectors researched were the food, chemical, rubber, textile and steel industries.

The survey was completed through personal interviews and a questionnaire to experts who work with logistics and who are responsible for transportation decisions and operations. The questionnaire consists of qualitative and quantitative criteria, aiming to better identify transportation mode selection.

The main purpose of the study is to identify and prioritize weight to criteria regarding transportation mode selection relative to exports from Turkey to trading partners.

4.2 Description of the selected companies

4.2.1 Company A

Company A operates in the food industry and is one of the leading players within the whole sector, combining around 60 companies within its holding. The company is local, with headquarters in Istanbul. Around 20,000 people are employed. Regarding the particular product related to our investigation, 130 personnel are responsible for export operations. The percentage of total export volume in the company's overall trade is 10%, accounting for 500 million USD. The main trading partner is Germany, buying more than 80 million USD worth of products annually. The goods to be shipped are classified as highly perishable and require special temperature conditions of not higher than 4°C when transported. The company sends products in 40' HR containers, each weighing 25 tons. The average value of the freight is 85,000 USD.

4.2.2 Company B

Company B belongs to chemical industry and produces fragrances for cosmetics and household products; the headquarters are in Istanbul. The number of employees is 180, and total annual sales account for 70 million USD. Export decisions in the company are under the responsibility of a separate export department. The total export volume is 7 million USD, which represents 10% of all sales. The main trade partners of the Company B are the UAE and the USA. The transported goods are characterized as liquid raw materials that need to be dispatched in special steel drums on pallets. The average shipment size is 14 tons and is valued at 80,000 USD. No special transportation associated with the freight is required.

4.2.3 Company C

Company C is a part of specific rubber industry, which is not very advanced in Turkey. The company is situated in Izmir and produces latex balloons, widely used in advertising. Eighty five people work at production. Total year sales are around 2.5 million dollars, 1 million of which derives from export trade. The main trading partner nowadays is Russia, with 5-6 annual dispatches. The product is packed in pallets and does not require any specific transportation conditions. The average shipment weight is 20 tons and is valued at 180,000 USD.

4.2.4 Company D

Company D produces textile products. This is an international company, with its headquarters in the UK and only production held in Turkey. But all dispatches are conducted directly from production facilities in Istanbul. In total 40 people are employed in company D with annual sales of 10 million dollars. Export part in the

whole company operations in some years exceeds 90%. Main trade partner of the company are the UK, Ireland and the USA. The product is very light, with unlimited usable lifetime and only packed in cardboard boxes when shipped. 20' and 40' HR containers are used by the shipper.

4.2.5 Company E

Company E is another international company established in London, with the headquarters in Turkey, Istanbul. The good traded is steel, so company D belongs to the metal industry. This is not a mining or producing company, but a commodity trader. So the export share is 100%. The number of people employed is 6 and annual sales are 35 million USD. Steel raw materials require shipping in 40' HR containers, with products placed on a wooden pallet. The usable life time of the freight is up to 2 years. Normally the transportation does not require special conditions, except when transported by sea, because water can cause some damage in terms of corrosion. The average shipment size is 500 metric tons is valued at 20-35,000 USD. The main trade partners of the company are France, Germany and Turkey.

4.2.6 Summary of company export characteristics

The most important company parameters used in this research are summarized in Table 4.

Table 4. Parameters of Economic Performance for Interviewed Companies

	A	B	C	D	E
Annual sales (USD)	440 m	50 m	2.5 m	10 m	35 m
Export %	10	10	30	90	100
Product's special transportation requirements	Temperature	Steel drums	None	None	None
Product price (USD/kg)	3.4	5.7	1	2	0.07

4.3 Purpose of the study

The purpose of the current study is to identify factors that influence exporters' transportation mode selection. Considering the diversity and complexity of the study, the respondents were chosen according to their direct connection with decision-making. Among respondents were CEOs, heads of export departments, and directors.

Respondents were first asked to describe the nature of the business and main features of the goods to be exported. Later they were asked to weight the criterion based on the importance in the selection process. The rating ranged from 1 to 5, where 1 was to very important, 2 was important, 3 neither important nor important, 4 unimportant and 5 very unimportant. The criteria selection assumed the importance of features of price, speed, security, reliability and service with related subcategories.

Previous research shows that most of the time the main factor that affects the transportation mode selection is the product. (Rushton et al., 2001). However, product characteristics are not always the only determining factor. Industry-specific practices, market and customer expectations, high season peaks, production and

delivery schedules are also very common issues that can change the selection situation. In the selection process all the advantages and disadvantages associated with the concerned mode have to be analyzed and taken into account (Tuzkaya & Onut, 2008).

Thus, one of the main aims of this study is to compare the planned mode choice in real-life cases. The survey is organized in the form of a case study, because in this researcher's opinion, it will give a better de-facto picture of the process.

In the supply chain, logistics costs represent a sufficient share of the total cost structure. Sea freight is definitely the slowest but the cheapest mode of transportation and covers long-freight destinations. This mode of transportation best responds to the needs of inter-continental shipment, mainly due to considerable product size and large equipment delivery and better facilities for bulky products and raw materials (Coyle et al., 2011).

For long-distance destinations, assuming the goods structure of the network, rail transportation is also known to be an economical option that is faster than the sea choice. But the availability of proper rail connections is rarely observed, which means that for short distances this mode of transportation is rarely used. In these cases, motor services are preferable. And most of the time, road transportation remains to be the most-used alternative for deliveries over one continent, although of course at a higher price. Overall, air freight is always the fastest but most expensive mode and is preferred for urgent deliveries of good that are not bulky, for example, spare parts (Bowersox, 2002).

4.4 Hypotheses of the research

Hypotheses:

1. Products with a high value/weight ratio and those with short product life cycles, which creates high price erosion, will require fast transportation modes such as truck and air.
 - A high value/weight ratio justifies speed, because relative transport costs remain small even when more expensive transportation modes are recruited. Thus, high value/weight industries will opt for speed over cost in transportation mode selection.
 - Fast transportation of perishable products is essential even when volumes are low.
2. In industries where the value/weight ratio is low (heavy machinery, metal) the most important factor in selecting the transportation mode is price.
3. Sea freight is used only in product groups with a lower price or intercontinental shipments.

In sum, the estimated criteria importance which will influence transportation mode selection according to the chosen industries' points of view are presented in Table 5.

Table 5. Hypothesized Range of Factors Importance in Given Industries

	Food	Chemicals	Rubber	Textile	Metal
Criterion 1	Speed	Security	Price	Price	Price
Criterion 2	Security	Price	Service	Speed	Reliability
Criterion 3	Price	Speed	Speed	Reliability	Speed
Criterion 4	Reliability	Reliability	Security	Service	Security
Criterion 5	Service	Service	Reliability	Security	Service

CHAPTER 5

HYPOTHESIS TESTING AND FINDINGS

Summary of questionnaire results are presented in Appendix B.

5.1 Case study: Company A

In company A, which operates in the food industry, the product to be shipped is cheese. The product is characterized as highly perishable with a medium value/weight ratio. The special feature of the case is that it requires special temperature conditions of max + 4 °C, which should be maintained throughout the supply chain. So according to our hypothesis, the criterion to take into most consideration is speed and we would suggest using the air transportation option.

Producer's (shipper's) response indicates speed as the main factor as well. Reliability was given the second highest rate, which contradicts our prediction at this point. The price issue ranked as 3rd and does not play a critical decision role. A security criterion of fleet size, however, was identified as highly influential and the service factor was the least important. In this case, the most suitable transportation mode, according to our estimation, would be air transportation. The evaluation of the real case situation is presented below.

The product's final destination is Munich, Germany, which is approximately 1,900 km from the loading point in Istanbul. Sea transportation was eliminated at the very beginning due to its slow movement and the lack of open access to a port.

Two options remain most logically applicable to the case – air carrier and motor services. The decision of the shipper was road transportation, which is explained as follows.

The goods are always shipped at big loads in 40' HR containers. In order not to lose temperature balance, the loading process should be minimized in time as much as possible. Here, the biggest disadvantage of airfreight is seen: the impossibility of door-to-door loading and unloading. It means that in order to place the product on a plane, an additional refrigerated truck should be recruited to deliver goods to the airport and from the airport to the point of destination. An initial usage of truck service eliminates this inconvenience associated with temperature requirements. Additionally, from the perspective of air cargo, a 40 HR container is considered as a giant shipment, and even though the price was ranked as not the primary factor, shipping by air will still increase the transportation price up to 7 times, which would make the product very expensive.

Additionally, it is easier to find stable and reliable transporters for sustainable shipments among truck service providers. Company A is the biggest producer of the selected goods on the local market and has stable dispatches every two weeks, which are carefully planned. In order to provide container availability, every year the company announces a tender for supplier selection, the main criteria of which are to select the carrier who can secure the availability of required containers. As noticed by Company A, normally the price difference between transporters varies within 400 Euro, which is not as crucial as the need for fast loading into the container with refrigerator. So after the transporter company is chosen, both parties sign a year contract with a hedged price and the amount to be shipped.

As we can see here, our hypothesis for company A is confirmed in favor of motor transportation.

5.2 Case study: Company B

Company B operates in the chemical industry. Exported goods include liquid raw fragrances for cosmetic and household products. Among all the chosen products, this has the highest value/weight ratio of 5.7. The transportation of such goods requires using special steel drums which are hermetic sealed. As the drums are already durable, they do not require additional packing; only pallets are occasionally used to provide extra stability. The goods are classified as not hazardous, but when the liquid contains an alcohol addictive, more control on loading and transport is needed. Summing up the factors given, our hypotheses would claim that the factor in selecting the transporter would be security, followed by price and speed. As the usable lifetime of the product is claimed to be 1 year, the product can be easily stocked in advance. If the supply chain is properly arranged, it helps to eliminate the speed factor as the determiner and allows the cheaper transportation mode to be used. Depending on the destination, our suggestion would be to choose sea freight or rail transportation.

Company B's interview analysis revealed the following. The two most important international customers are situated in New Jersey, USA and Abu Dhabi, UAE. The distances are approximately 8,100 km and 4,100 km respectively. In the case of USA shipments, two possible options are sea and air transportation. For the UAE case, the most suitable choice seems to be sea or truck transportation.

Respondent ranked the importance factors as following: price, security, time, reliability and service.

The steel drums have no problems in loading and unloading process. They can easily be placed on any stable surface and do not require to be arranged inside containers. This makes the difference with the previous case in terms of shipment

size. One steel drum can easily be sent as ten or more. So our hypothesis seems to work by now, but only for the USA case. The USA customer has more planned dispatches of 4-5 shipments a year, approximately every two months with vessel arriving in a USA port in about 3 weeks. Because both ports of shipment and the destination are big, it is usually very easy to find a proper vessel. So security, price and speed importance sequence are maintained. Service, as was predicted, did not influence the decision-making.

A different situation was observed in the case of the UAE buyer. Our suggestion would be to send the goods by sea, if time does not matter, or by truck. The shipper's point of view does not contradict ours on this point, but the UAE buyer is not as sensitive to price issues as the USA buyer and specifically requests the shipment be done by air. The difference between sea and air dispatch is sufficient, but the UAE buyer's orders are not planned yearly and even sometimes have a particularly urgent status. In such conditions, the receiving party does not take into account the price difference and they select the faster mode. The importance order is as follows: speed, security, reliability, price, service. As we can see, our hypothesis for industry B is semi-supported.

5.3 Case study: Company C

Company C produces latex balloons and belongs to the rubber industry. The product is produced from natural latex, used for decoration purposes as well as for children's toys. The goods are durable to temperature changes and do not require any special transportation conditions. The balloons are packed into plastic bags and organized inside carton boxes for transportation. The value/weight ratio is an expected low at 1. The shelf life of the balloons is very long, so the product can be transported without

a time rush. Our hypothesis assumes that the most significant determining factor in selecting the transportation mode is the price. The transporter will be chosen according to how low his competitive proposal is. We also presume that service will play an important role, followed by speed, security and reliability. Our proposal here is to use the sea mode or railways, if possible.

The respondent from Company C, whose production is situated in Izmir, Turkey, revealed the following: the most important export customer is situated in Yekaterinburg, Russia. The distance is approximately 4,500 km. Prices, as we correctly estimated, is the most determining factor. Security and speed were ranked equally important, while reliability and service are not significant for them. The priority is given to the cheapest transportation option. The shipper uses a combined transportation method: by sea vessel until Saint-Petersburg port and then by rail. The railway network in Russia is one of the most advanced and makes it very easy and cheap for the goods to be delivered. So our estimation is verified. The whole shipment process takes up to 1 month and is planned in advance.

This transportation method was used impeccably for over three years of two companies' collaboration. And we might say that this case almost perfectly fits our hypothesis. But while conducting the research, one big factor changed. The political situation between the two trading countries worsened and one of the parties imposed hidden barriers to trade. It was therefore decided to re-interview the respondent to see if anything had changed in the decision-making.

This main barrier is reflected in customs clearance procedure time. While before the political events, customs clearance took just one week, but now the time had increased to three months, mostly because of bureaucratic requirements imposed on the Russian side. In these conditions, the goods arrive at the buyer's warehouse

four months after the order. As mentioned before, the orders are planned by the buyer and the schedule is according to season. So what happened on the real example is that balloons with a New Year theme was received by the customer in February, when the season was over. Of course, the goods were stocked for the future sales, but this leads to revenue loss due to the need to keep these balloons unused for the next ten months. The income is frozen for the same time.

The main decision-making lies on the customer side but the producer also gets affected. He received the payment for after-season shipment, but future orders were under question. Russia is the world's bigger balloons consumer yet has no production of such goods themselves. Turkish goods have a very favorable position in the Russian market, so in order not to lose customers, the two sides decided to reduce the political effect by changing the transportation mode. Truck services were selected. This solution allowed the cargo to arrive at customs very fast—within one week, but obviously affecting the transportation price. The entire financial burden in the situation was imposed on the buyer because the price difference was extracted from its revenue. Nowadays the situation is accepted to be like this, truck transportation is planned for future shipments and customs clearance time is taken into consideration. Here the proper work within all supply chain should be managed, with the orders to be placed according to the season, plus customs bureaucracy.

Additionally, the issue of reliability arose in this case. A new inland transporter had to be arranged, and company C had to find it and get the transportation provider adjusted to their services. The order of selection factors is now speed, reliability, price, security, service. This case appeared to complement to our hypothesis proposed but only until politics got involved.

5.4 Case study: Company D

Company D operates in the textile industry. The product chosen for the purpose of the case study is socks. The average price/kg ratio is 2 and relatively low. The shelf life of the goods is very long and no special packing is needed when transporting. Socks are packed into cardboard boxes and the boxes are arranged onto pallets. Depending on the season, goods are sent in big amounts in 20' and 40' HR containers or part loads. As the product does not demand special transportation, and shipments can be organized according to a proper schedule, we suggest that price would be the most important factor. The textile socks market is highly competitive, so the cheaper the product and higher the quality, the higher sales will be. Thus, one of the possible ways to cut the cost is to reduce transportation fees. We would also assume speed to be the second determining factor because the rest of the factors should not impose any obstacles to transportation of the particular goods. Our choice would be to dispatch by sea transport. A comparison of our hypothesis to the real answers of the interviewed export director gives us the next picture.

The goods are being produced in Istanbul, Turkey and shipped to London, United Kingdom, where the biggest distributor is situated. The respondent weighted price with score 1, making it the most significant criterion in the decision-making process. The speed, as we correctly assumed, is the second most important factor, but only compared to the rest — security, reliability and service factors, scoring 2 and 3, respectively.

The two trade companies have been in collaboration for over 20 years and have established a reliable production-delivery schedule. The seasonal aspect is carefully taken into consideration and is not affected by unrelated factors. The demand for the product is always relatively high so the production–transportation

process within the whole supply chain is established and stable. The transportation channel was determined at the initial point of collaboration and has rarely changed since then. The company from the D industry prefers to ship its goods by sea vessels. The current case totally supports with its example our hypothesis.

5.5 Case study: Company E

Company E represents the metal industry with steel as the product to be exported. The product is very bulky and its price/kg value is very low, at 0.07. Steel has several forms and characteristics, but the one in particular that we are investigating is in the form of coils placed on wooden pallets for transportation purposes. So the basic characteristic of the goods is that they are very heavy, cheap and shipped in enormous quantities. Shelf life is also long and does not require speedy transportation. Taking into consideration these facts, we would expect the price of transportation to be taken into consideration. We next presume reliability to be the second important factor due to the need for constantly available transportation on a regular basis, as the average weight of the shipment might exceed hundreds of tons. We finally give speed, security and service almost unrelated important scores. Mode to be selected, according to our assumption, is sea vessel.

This is what the CEO of the company revealed during our interview.

Company E is the only representative international company and its headquarters are situated in London, UK with several branches worldwide, including Istanbul, Turkey. The main trading partners are situated in Europe, the biggest one being in Germany. Only in this particular case study of the current research the product is being transported from China, but the decisions on mode selection are done from the Turkey branch. The respondent supported our hypothesis about sea transportation

choice. One order usually consists of a minimum of 5-10 dry containers filled with steel coils. There are some big orders as well that require full bulky transportation, meaning that the whole vessel will be occupied only by one transporter.

The priority scale estimated by the respondent looks price, security, reliability, speed, and service. What was not taken into account when making our assumption is that despite looking very durable, steel during transportation can face several safety issues. All steel products are susceptible to be damaged by rust. If the rust appears when the consignment is being loaded and water gets on its surface, the rust might enlarge in its scale by the time shipment arrives at its destination point. A product highly damaged by rust loses its initial value.

Another problem faced when loading the goods on board a ship is edge crimps occurring if the lifting equipment is improperly used. So, additional security measures should be taken, covering the edges with extra wrap as an option.

Steel is a product with constant turnover, so buyers need sustainable availability. The vessels are sent several times a week and reach the customer within one month. The supply chain in this case is properly adjusted and provides product availability. In this case, as there is no unpredictable delay, all the delivery process is properly organized and does not account for any emergency. To summarize the case, the hypothesis is proven with some small comments and adjustments.

CHAPTER 6

APPLICATION OF THE FINDINGS

Regular mode selection depends on several dimensions and “the nature of the product — size, durability, and value — may eliminate some modes from consideration such as they cannot physically, legally or safely handle the goods” (Coyle et al., 2013, p. 426). The weight, density and shape of a product can greatly influence the decision. Electronics, clothing and other light goods are suitable to be shipped by air and motor transportation, while heavy, bulky products usually require rail and water transportation. Another factor to take into consideration is the shape of the product. If a product surpasses certain dimensions, air and motor transportation are not the best option (Coyle et al., 2013).

According to Coyle et al., 2013, another key factor in transport mode selection is durability. For example, fragile products such as phones and glass are better shipped by modes with a high ride quality. Products requiring special temperature conditions (food, pharmaceuticals) must be shipped by modes that can provide consistent temperature capabilities. Fast transit time is essential for perishable products such as newspapers and flowers. High time-sensitivity products require air and motor carriage services with their superior speed and freight protection advantages.

Mode selection is also highly dependent on product value. Transportation tends to be a main cost for low-value products, for which water and rail transportation would be most suitable, but a minor cost for high-valued products, where truck and air services would be better applicable (Coyle et al., 2013).

Size, route and speed requirements, known as shipment characteristics, should not be ignored in the selection process. Modal capacities should fit the total weight and the dimensions of the dispatch. Speed, reliability and safety should match the modal capabilities mentioned before (Coyle et al, 2013).

Based on the discussion above, we propose the following flow chart regarding transportation mode selection. The flow chart takes into account not only the issues mentioned above but also special conditions and contingencies that might lead to deviation from the norm in terms of mode selection. Application of the flow chart to cases researched gives us the following picture, presented in Figure 13.

Company A's shipment is not associated with any non-product related special conditions, so the decision on mode selection is made by the producer. The value/weight ratio of the goods is relatively high compared to all other cases, and according to the value/weight part of the flow chart, air or motor transportation should be chosen. The product shipped is not bulky, so the size-related part of the flow chart leads us to select motor or air transportation. The matter of highest concern in the current case is the product-related special conditions, requiring a constant cold chain. This limitation sends us to the right part of the flow chart with motor and railways being the available choices. The summary of the whole flow chart application gives us the final mode decision, which is motor carrier. The same mode was chosen by the shipper, so our hypothesis was confirmed.

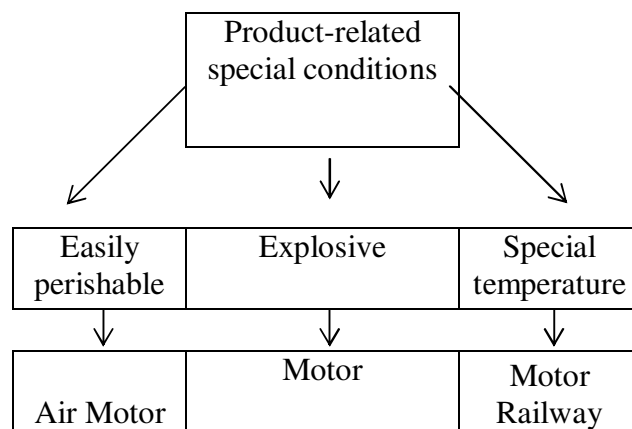
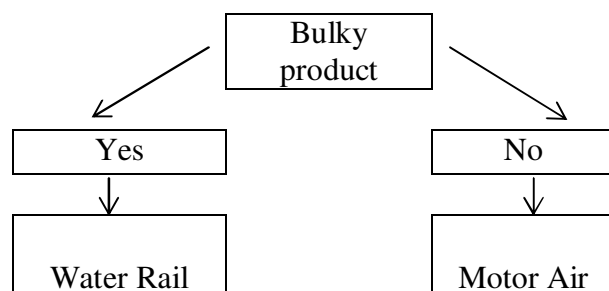
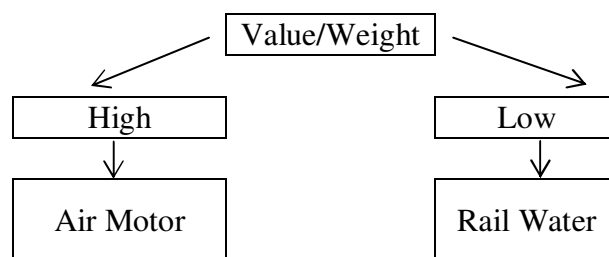
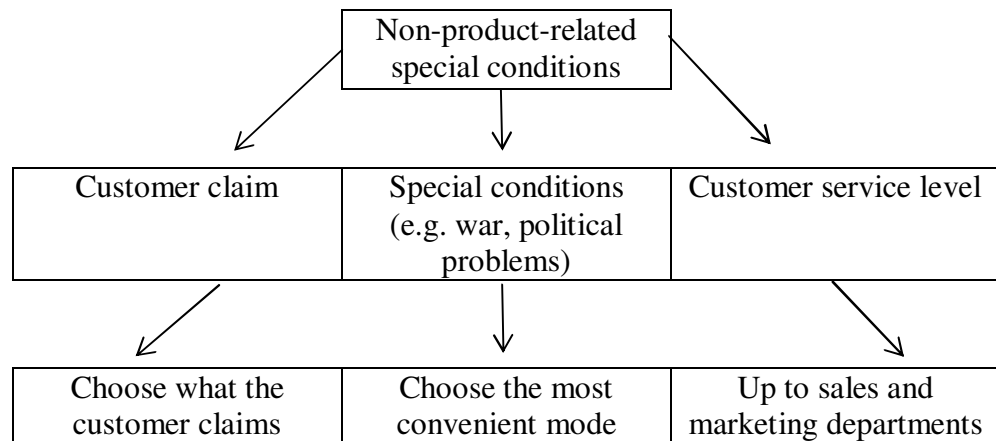


Fig.13 Transportation mode decision-making flow chart

Company B's product has the highest value/weight ratio, so according to the proposed flow chart, air or motor carrier should be selected. The size and parameters of the shipment are not categorized as bulky, so the related part of the flow chart leads us to the motor and air options. No special product-related conditions are applied in the case. From the options mentioned above, which are air and motor modes, taking into account other factors important, such as the distance and the cost of the shipment, the most logical option would be to choose the motor carrier. But the present case has a limiting condition, which is customer claim. The buyer dictates in this case to choose air transportation. In such situations, usually no further considerations of the mode selection are required because the customer is ready to cover all the expenses associated with the claim.

Company C's product to be exported is rubber balloons. As product-related special conditions do not apply here, we can directly proceed to the parts of the flowchart related to product characteristics. The application of the case limits us to water and motor options, as the volume/weight ratio is low and the product is not bulky. Taking into account that in this case the transportation cost represents a significant part of the total cost, the water mode option is the best fit for the current situation. But while conducting the current research, political problems intervened in the decision-making. The flow chart solution advises us to use the most convenient mode, which appears to be motor transportation. In this situation, time, which is mostly affected by the political problems, could be saved at a higher cost. It is necessary to mention that when the political problem is solved, the transportation mode will be again switched to the previously-used water option. So the situation has a temporary character.

When applying the proposed flow chart to the Company D case, we observe that neither non-product-related nor product-related special conditions affect the selection process. The value/weight part of the chart guides us to select rail or water transportation, while product size-related flow-chart gives us motor and air options. Basically speaking, the shipper should choose from three options. The choice is done in favor of water shipment due to geographical availability and the absence of time restrictions imposed by the buyer.

Company E's product to be dispatched is characterized as bulky with a low value/weight ratio. This information leads us to two equally possible options—rail and water transportation. Non-product-related special conditions are not associated with the present case, nor are there any product-related special conditions. The final decision was quite obvious due to the destination of the dispatch. Taking this into consideration, water was the preferred transportation mode, which also supports our hypothesis.

What was mentioned and taken into account by the researcher is that non-product-related special conditions might change the modal choice considerably. These factors might include customer claims, special conditions such as war and political problems, and customer service level requirements.

The usual practice is that exporter decides or advises which transportation mode better be used. This is related to experience in export frequency and better knowledge of the channels previously used. Especially it applies to new customers. The proposal will be based on better cost, speed and service combinations. But there are cases when the customer would like to take all the responsibility of decision-making on himself. Mostly he would request a faster transportation mode or special

service providers. Price in such cases plays the last role and is not a matter of a concern for the buyer.

Special conditions such as war or political problems are seen more and more in the modern world. In such cases, the change of the mode is mostly associated with the geographical accessibility of the region where the goods are to be shipped. If the problematic region is not the destination point but rather lies on the way of transportation route, alternative routes might be found at the cost of time. But if the political problems appear at the destination point, it can cause barriers of trade, affecting time, cost and security of the transportation.

The customer service level is applied to specially treated clients. It might be the customer who represents the highest sales for the producer, or the so-called premium customer. In such cases in order to keep high standards within the whole supply chain, sales and marketing departments propose to use the most effective in terms of possible quality characteristics mode of transportation.

CHAPTER 7

CONCLUSION

The process of selecting the most appropriate transportation mode is a very important decision and often might be made in an irrational way. A range of different criteria offered by transportation providers should be evaluated. Price, speed, reliability, and accuracy are usually the most important general factors. Product characteristics, durability, product value and route should also be taken into account. This paper presents the outcome of research in Turkish industries about the perception concerning transportation modes.

The research describes the basics of transportation and analyzes the selection criteria of transportation modes from five different industries' point of view. It also investigates the logic by which the industry decides on which mode of transportation to use and why. Several hypotheses were proposed and tested.

Combining many details through case study research and analyzing them to gain a better understanding of transportation mode selection is the main contribution of this work.

According to the findings, products with high value/weight or that are highly perishable typically require fast modes of transportation such as air or motor. This applies to, for example, company A from the food industry, where special temperature conditions influenced the selection of mode based on speed and ability to provide the required conditions. On the other hand, the products with low value/weight ratio opt for modes with the most affordable cost criteria. In such cases transportation costs represent a significant share of the total cost, so the best options appear to be water and rail transportation modes.

A selection flow chart was proposed and applied to real-life cases related to transportation decisions. Applying the chart to the selected company, which already has a chosen alternative mode, makes it possible to compare the hypothesized assumptions with the real preferences of the company.

Additionally, according to our knowledge, this study is the first industry-oriented study which takes into account non-product related special conditions, affecting the selection process. The research closes the gap, proposing to always take into consideration such factors as political imbalance, war actions in the region or special requirements of the customer. Based on our results, the above-mentioned factors completely changed the initially selected mode.

Based on the results, some future possible transportation issues were identified. One aim of the study was to help companies choose the exact transportation needed, reflecting the services needs as well as external factors that might not been taken into consideration initially.

As with all research, this study has its limitations. However, it should be noted that these limitations also offer us areas for further research.

Despite the fact that case studies generally have high internal reliability, they have low generalizability. Therefore, our findings are limited by the five case studies of the current research. Furthermore, the study was conducted in five industries in Turkey. Extending the research to other industries and countries might be another area for further research.

APPENDIX A
QUESTIONNAIRE

Dear Respondent,

This questionnaire aims to explore the logic and drivers of selection the proper mode of transportation when dispatching goods abroad. Thank you in advance for your time and contribution.

MA student Tatsiana Hlekava

Dr. Zeynep Ata

Section I. Please answer the following questions related to your company's export experience	
1. Name of the company	
2. Industry	
3. Size of the company: a) number of people employed and b) total annual sales	
4. Is the company local or international? Company's headquarters.	
5. Respondent's position	
6. Who in the company is responsible for logistics decisions?	
7. What is the % of export in overall company's trade	
8. The total export volume. Total turnover	
9. On average, how many dispatches a month the company has? What is the frequency of the dispatch?	
10. Who is the main and secondary trade partners of the company (country)	
11. Product characteristics:	
- what product is being exported	
- average shipment size (metric tons); the weight of the freight	
- features of the package of the freight	
- special transportation requirements associated with the freight (ex. highly perishable, frozen products)	
- usable life time of the freight	
- value of the transported freight	
12. To the destination selected which mode of transportation is mostly used by the company	
13. Incoterms relations (who pays for the shipment)	
14. The distance to the most important trading partner	
15. Does the selected product being dispatched to several destinations?	

Section II. Please indicate your opinion about the importance of the following aspects <i>on transportation mode selection</i> by circling the appropriate option.					
	Very Important	Important	Neither Important nor Unimportant	Unimportant	Very Unimportant
Price					
Cost of transshipping the freight from shipper to customer	1	2	3	4	5
Special offers/discounts	1	2	3	4	5
Low packaging charges	1	2	3	4	5
Speed					
Delivery time	1	2	3	4	5
Carriers punctuality	1	2	3	4	5
Arriving on scheduled time	1	2	3	4	5
Customs clearance time	1	2	3	4	5
The time consumed for loading, storing and unloading process	1	2	3	4	5
The transport time between the supply and demand points	1	2	3	4	5
Transit time	1	2	3	4	5
Security/ Control factors					
Low damage/loss frequency guaranteed	1	2	3	4	5
Control over delivery time	1	2	3	4	5
Ability to monitor goods on transit	1	2	3	4	5
Fleet size (power units, the maximum fit rate)	1	2	3	4	5
Average model of the vehicle (year)	1	2	3	4	5
Type of shipment (direct or consolidated)	1	2	3	4	5
Reliability					
Responding to complaints quickly	1	2	3	4	5
Delivering the cargo at promised time	1	2	3	4	5
Issuing accurate price quotation	1	2	3	4	5
Issuing accurate shipping documents	1	2	3	4	5
Refund if service is not provided as promised	1	2	3	4	5
Image of the company	1	2	3	4	5
Stable long-term relationships	1	2	3	4	5

Flexibility					
Changing the route if necessary	1	2	3	4	5
Giving arriving notes on time	1	2	3	4	5
Issuing documents on time	1	2	3	4	5
Informing any changes in schedule	1	2	3	4	5
Personal service					
Polite and respectful personnel	1	2	3	4	5
Informing about the conditions of cargo	1	2	3	4	5

Section III. DEMOGRAPHICS

1. Age: ☐ Below 30 ☐ 31-40 ☐ 41-50 ☐ 51-60 ☐ Over 60

2. Gender: ☐ Female ☐ Male

3. Education _____.

4. How many years are you in the company and on this position particularly?_____.

APPENDIX B

SUMMARY OF FINDINGS

	Company				
Criterion	A	B	C	D	E
Price					
Cost of transshipping the freight from shipper to customer	3	1	1	1	1
Special offers/discounts	4	1	1	1	1
Low packaging charges	4	2	1	1	1
Speed					
Delivery time	1	3	2	2	3
Carriers punctuality	1	3	2	3	3
Arriving on scheduled time	1	3	3	2	3
Customs clearance time	3	4	3	3	4
The time consumed for loading, storing and unloading process	1	4	2	3	3
The transport time between the supply and demand points	2	3	2	2	4
Transit time	2	3	3	2	3
Security/ Control factors					
Low damage/loss frequency guaranteed	3	2	2	3	2
Control over delivery time		3	2	4	3
Ability to monitor goods on transit	1	2	3	4	2
Fleet size (power units, the maximum fit rate)	1	3	3	3	2
Average model of the vehicle (year)	1	2	3	4	2
Type of shipment (direct or consolidated)	1	2	2	3	2
Reliability					
Responding to complaints quickly	3	4	3	4	3
Delivering the cargo at promised time	3	4	3	4	3
Issuing accurate price quotation	2	2	2	2	2
Issuing accurate shipping documents	2	4	3	4	3
Refund if service is not provided as promised	2	4	3	4	2
Image of the company	2	4	4	4	3
Stable long-term relationships	2	3	3	3	2

	Company				
Criterion	A	B	C	D	E
Flexibility					
Changing the route if necessary	4	3	4	5	5
Giving arriving notes on time	3	4	4	5	5
Issuing documents on time	5	4	4	4	5
Informing any changes in schedule	2	4	4	4	5
Personal service					
Polite and respectful personnel	5	5	5	5	4
Informing about the conditions of cargo	1	5	5	5	3

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