INTERNATIONAL AND INTERMODAL TRANSPORTATION PROBLEMS BETWEEN EUROPE AND TURKEY: EVIDENCE FROM THE LOGISTICS COMPANIES IN TURKEY

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June, 2016

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ABSTRACT

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This thesis analyzes the problems faced on the behalf of intermodal transportation between Europe and Turkey in the name of different logistics companies exemplified by each one. Intermodal Transportation becomes increasingly important, as global supply chains tend to spread their activities globally in diversified countries. In the present study intermodal transportation between Europe and Turkey, relations and problems were analyzed. There has been few research on the problems occured regarding intermodal transportation between Turkey and Europe.. Therefore, based on literature research, intermodal transportation problems were investigated by semi-structured interviews with logistics companies that are involved in international transportation and intermodal operations. Moreover, secondary data research was conducted through the examination of logistics news in order to find support for the mentioned problems.

This study presents a novel approach by linking the international relations and logistics.

Keywords: Intermodal Transportation, Europe, Turkey, logistics companies, problems

ÖZET

AVRUPA VE TÜRKIYE ARASINDAKI ULUSLARARASI VE ÇOK TÜRLÜ TAŞIMACILIĞA İLIŞKIN SORUNLAR: TÜRKIYEDEKI LOJISTIK FIRMALARIYLA BULGULANDIRILMASI

UYGUÇ, Balca Berfin

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Bu tez intermodal taşımacılıkta Avrupa ve Türkiye arasında yaşanan problemlerin lojistik şirketleriyle yapılan ropörtajlarla birlikte desteklenerek incelenmesi üzerine yazılmıştır. Intermodal taşımacılık diğer bir ismiyle çok türlü taşımacılık günümüzde global tedarik zincirinin gelişmesiyle birlikte bütün ülkelere yayılmıştır. Bu çalışmada Avrupa ve Türkiye arasındaki ilişkiler ve problemler analiz edilmiştir. Literatürde Türkiye ve Avrupa arasında yaşanan problemler adına yapılmış çok az ropörtaj bulunmaktadır. Bu yüzden, literatür taramasını baz alarak, intermodal taşımacılık ve operasyonları yarı yapılandırılmış ropörtajlar ve veri toplamasıyla birlikte incelenmiştir. Bunun yanı sıra ikinci el veri araştırması bahsedilen problemleri desteklemek amacıyla lojistik haberlerinin analiziyle yürütülmüştür.

Bu çalışmada uluslararası ilişkiler ve lojistik yönetiminin bağlanması açısından yeni yaklaşımla anlatılmıştır.

Anahtar Kelimeler: Intermodal Taşımacılık, Avrupa, Türkiye, lojistik şirketleri, problemler,

To my Grandmother

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LIST OF ABBREVIATIONS

AETR International Road Transport

AGC European Agreement on Main International Rail Lines

AGR European Agreement on Main International Traffic Arteries

AGTC International Combined Transport Lines and Related Installations

ATS Air Traffic Service

BALO Big Anatolian Logistics Organization

BOT Build-Operate-Transport

CMT Central Marketin Transport

CREAM Customer-driven Rail-freight services on an European mega-corridor based on Advanced business and operating Models

EC European Commission

ECE European Community of Economy

ECMT/UBAK European Conference of Ministers of Transport

EIA European Intermodal Association

EU European Commission

EU European Union

EUROCONTROL The European Organisation for the Safety of Air Navigation

GHG Greenhouse Gas

HAP Hazardous Air Pollution

IATA International Air Transport Association

IMT Intermodal Transportation

IPC International Promotion Service

IRU International Road Transportation Unit

ISO International Organization for Standardization

JAA Joint Aviation Authorities

JIT Just in Time

PACT Pilot Actions for Combined Transport

R&D Research and Development

RODER Combined Transporters Assosication

Ro-La ROllende LAndstrasse

Ro-Ro Roll-on Roll-off

SSS Short Sea Shipping

TCDD Turkish State Railways

TEN Trans- European Network

TEN-T Trans- European Transportation Network

TEU Twenty-foot Equivalent Unit

THY Turkish Airlines

TOBB The Union Of Chambers and Commodity Exchanges of Turkey

TOFC Trailer on Flatcar Approach

UIC International Union of Railways

UN United Nations

UN/ECE United Nations Economic Commission for Europe

UND International Transporters Assosication

UTIKAD International Transportation and Logistics Service Providers Association

CHAPTER-1

INTRODUCTION

1.1. Introduction of the Main Concept and General Aims of the Study

An intermodal freight transport is characterized by the transportaiton of freight by using different modes for moving goods from the consignor to the consignee. Intermodal transportation involves different actors, activities and utilization of different resources. Also, implementation of different technologies are important as well as formal systems management which has no regulated system in Europe (Woxenius & Barthel, 2008). Furthermore, basically intermodal transportation defined as the movement of goods in one and the same loading unit or road vehicle while using two or more modes of transport without handling the goods in changing modes (ECMT/UN Definition, 1997). On the other hand, as an other definiton intermodal transportation is defined as the transportation of goods or people by using at least two modes using one mode to the next as the ending and lasting hub is intermodal terminal (Crainic amd Hwan Kim, 2007)

Transportation services and facilities have grown rapidly in the United States as well as in Europe due to increase in demand by multinational corporations and their suppliers and distributors for logistics services. Globalization in economy requires firms to produce and deliver goods faster to customers all around the world. In order to fulfill demands, companies must manage their supply chains and integrate their logistics systems more effectively (Rondinelli and Berry, 2000). The growth in freight and intermodal transportion gave rise to the emergence of standard load concept. On the other hand, globalization in business and development in technology progress have questioned new demands on transport. What's more, several benefits have been from using intermodal transportation. However, many problems have also been cropped out in intermodal transport chains. These are generally related with the organisational interfaces and technical incompatibilities between the various companies and systems involved in transport operations. Cargo handling technologies, communication links and various coordination measures are features that can fill the gaps in the intermodal transportation (Bask, Juga and Laine, 2001).

Secondly, according to Study On Infrastructure Capacity Reserves For Combined Transport Report intermodal transportation occurs as a bridge in logistics business. The intermodal transport is a concentrated business which is mainly carried out on a few selected corridors. 10% of all services cover 80% of the total transported volume and 16 percent of the services cover 90% of the total volume (UIC, 2004).

Finally, Turkey has made a commitment to intermodality and combined transport as one of the key factors for achieving economic growth and using the country's geo-strategic location as a world-class logistics platform. Turkey must develop a comprehensive strategy for the development of intermodal transport by establishing policies/reforms in order to create an integrated multimodal transport system that improves access to the national and international markets for products and to public services for individuals as well, guaranteeing of the country's competitive position (TCTSER, 2013). Due to its' geopolitical importance there are several problems occured between Europe and Turkey. As Turkey is an important intersection point of intercontinents, this also increases its strategic importance in intermodal transportation.

This study aims to provide an overview for intermodal transportation and risks and problems between Europe and Turkey. The empirical data was collected to investigate the operational differences between Turkey and Europe through the examination of EU transport regulations.

1.2. Significance of the Study

Even though there are many economic impact focused studies that analyzes different intermodal transportation types in Europe and in Turkey, there are no prior studies which have quantified the problems and risks of intermodal transportation between Turkey and Europe. The purpose of this project is to address this gap in the literature and to find and analyze problems for generating more detailed insight. Moreover, the examination of EU regulations presents another distinguishing attribute. Futhermore, Europe and country specific findings would provide practical implications for the industry.

1.3. Research Questions

This research, respectively, seeks to examine the EU- Turkey based intermodal problems faced and the possible risks of incongruence. Therefore, the following research questions (RQ) will be answered:

- RQ1: What are the problems between Europe- Turkey intermodal transportation and reasons of the problems?
- RQ2: What are the reasons of these problems?
- RQ3: Are there any country specific problems faced by Turkish logistics companies?
- RQ4: What are the risks originated from the incongruence in regulations and practice by companies?
- RQ5: Are there any mode specific problems in intermodal transportation?
- RQ6: What are the advantages and disadvantages of intermodalism?
- RQ7: What are the laws and regulations obliged to Turkey for environmental friendly transportation system?

1.4. Structure of the thesis

Firstly, the structure of the thesis clarified as intermodal transportation is identified by explaining the types, advantages and disadvantages, and the development of intermodal transportation in Turkey. Then, units of intermodal transportation are stated as the main loading units such as containers, swapbodies, and semi-trailers. Moreover, the importance for intermodal freight transportation is also discussed in this chapter.

In Chapter 3, policies of European Union for intermodal transportation are presented and discussed. Besides, White Paper for transportation section are encapsulated to figure out the development of intermodal transportation. The next section presents a literature review on laws and transportation documents. Besides, development of intermodal freight transportation in Turkey is also given based on the review of literature.

In Chapter 4, methodology of the thesis is explained and the data collection and analysis procedures are provided.

In Chapter 5, the results of the coding process are given regarding to the classifications generated from the semi-structured interviews.

The final section draw conclusions based on problems between Europe and Turkey iintermodal transportation.

CHAPTER- 2

INTERMODAL OVERVIEW

Intermodal transportation, with the options of integrating multiple modes, provides a flexible response to the changing supply chain management requirements in global markets and distribution systems (Dewitt and Clinger, 2000). A supply chain is a system of interrelated organizations, information, activities, and resources including people that are involved in the process of moving a product or service from one point to another (Nagurney, 2006). Within this process, natural resources, raw materials and other components are transformed and worked up to a finished product or service and eventually delivered to the end consumer/customer. In the case of global supply chains, this chain and its activities are extended around the world (Nagurney, 2006). Researchers have described traditional supply chains as a process in few main steps: a supplier produces the semi-final product, then the manufacturer does the assembling and finalizes the product. Eventually, it is sold to the final customer (Beamon, 1999). However, nowadays process of a value chain is much more complex and intransparent due to globalization and dissappeared trade barriers. Lambert et. al. (1999) extended this view and included more possible suppliers and information flow as crucial elements. Further, recent years show us that global supply chains develop in correlation with different modes of transportation. Furthermore, globalization leads customers to attach importance to different factors such as cost and lead time. Therefore, these difference in demand gave rise to the development of utilization of different type of modes in transportation (Yersel, 2010). As the transportation of goods developed intermodal freight transportation developed correspondingly. An integrated intermodal transport system is a significant and critical factor in the successful execution of supply chains, both domestically and internationally (Dewitt and Clinger, 2000). Consequently, intermodal transportation is not only transport of goods but also bridges between countries and business forwarders.

In the following, the terminology of intermodal transpotation, units, documents and background of both views of Europe and Turkey are defined. Furthermore, relations between those aspects will be investigated.

2.1 Intermodal Transportation

2.1.1 Definition of Intermodal Transportation

The term “intermodal” is used to include passenger transportation and the containerization of freight. In general, the term is used as “multimodal,” because of a lack of efficient connectivity for both freight and information among and between several modes on shipments under a single freight bill (Dewitt and Clinger, 2000**)**. The term “intermodal” was first mentioned in the Concise Oxford English Dictionary in the year 1980. Intermodalism was far from a new concept even at that time. In 1993 terminology was changed to “a vehicle/container system, etc. employing, suitable for, or able to adapt or be conveyed by two or more modes of transport”. In 1999 edition of definition of intermodalism was clarified by “involving two or more different modes of transport” (Jaržemskienė, 2007), coordinated door-to-door delivery of freight using two or more modes of transportation (Chatterjee and Lakshmanan, 2008). In other words, Intermodal transportation (IMT) utilizes two or more different transportation modes (road, rail, sea, or air) in one transportation chain for moving goods in order to minimize the total cost. If goods are of concern, IMT implies that the packaging type of the freight does not change when the mode of transportation changes (Atalay et. al , 2010).

An intermodal movement of infrastructure, goods movement and transfer, and information drivers under a single freight bill. In addition to this, intermodal transport can be defined as carrying goods by two or more transport lined with rows of different transport modes linked to carry loads up to reach the destination point (Çekerol, 2007). Moreover, intermodal transportation is defined by the European Conference of Ministers of Transport (ECMT) as the carriage of goods by at least two different transportation modes in the same loading unit without stuffing or stripping operations when changing modes (Rondinelli, 2000). According to Beken (2005), and Bask et. al. (2001) intermodal transportation refers to the movement of freight in one and standardized loading unit using successively several modes of transport while actual goods are not handled during transfer.

The goods shall be transported in unbroken unit loads from sending point to receiving point; ISO containers, swap bodies, semi-trailers and specially designed freight containers of corresponding size are regarded as load units. The unit loads must change between transport modes at least once between sending point and receiving point; and the shipper shall only need one contract between the consignor and the consignee. (Woxenius, 1998). As the main idea of intermodal transportation is to intensify loads for efficient long-haul transportation (e.g., by rail or waterway), container-based transportation has an important role. Freight intermodal transportation is often equated to moving containers over long distances through multimodal chains. For instance, the transportation of express and regular mail is intermodal, involving air and land long-haul transportation by rail or truck, as well as local pick up and delivery operations by truck (Bektas and Crainic, 2007). Several criteria call for the priorities in intermodal transportation. For instance, if lead time or speed is important, air link in intermodal transportation is the suitable mode of chain especially in long distances Furthermore, if cost is the priority and lead time comes next than sea or rail transportation chain can be preffered. Volume freight is the other issue for the usage of sea or railway transportation modes. Consequently, the fundamental aim is to choose the best possible and suitable transportation chain in order to satisfy the demand (Yersel, 2010).

Another example for intermodal transportation might be the transport by ship to a port, from which the containers, loaded directly on the wagons or transported by truck to the rail terminal. Containers are transported to the nearest hub by rail and are then transported to the final destination. In general, the major part of the European journey is by rail, inland waterways or by sea and any initial and/or final legs are carried out by trucks. [1]

[1]Rail Transport,<http://www.htshipping.com/uploads/file/1582014162326949-intermodal-file-.pdf>, 3 March 2016

2.1.2 The Differences Among the Concepts of Multimodal, Intermodal and Combined Transportation

Transportation activities specified in two categories as unimodal transportation and integrated transportation. Unimodal transportation is the transfer mode which uses only one type of transportation mode. "Intermodal transportation", "combined transportation", "multimodal transportation" modes are included as integrated transportation systems which provide door-to-door transportation (Yorulmaz and Deniz, 2010). In addition, integrated transportation which involves intermodal transportation and refers to constitution of several type of transportation modes including also multimodal and combined transportation (Yersel, 2010). “Multimodal transportation”, “intermodal transportation” and “combined transportation” have close definitions but each transportation mode have differences (TUSİAD, 2012). UN (United Nations) and ECMT (Eurpoen Conferance of Minister of Transportation) defined these three concepts according to their functions. In literature these three concepts used in order to specify transportation modes.

Multimodal transportation is the transportation of freight via at least two modes through one agreement or only single transportation minument (Yorulmaz and Deniz, 2010) and happen under single responsible manager (Deveci and Çavuşoğlu, 2013). On the other hand, intermodal transportation can be seen as a sustainable transportation mode by using same transportation wagon or vehicle and when switching each mode there is no need for freight handling. As it means, the biggest part of the transportation actualized by railway, roadway, waterway in order to achieve cost minimization (Saygılı, 2014). Also, intermodal transportation has another difference from other definitions based on laws. There are differences with other transportation types because multimodal transportation can occur at least in two different countries with single operator. Intermodal transportation declays that freight should not be handled anew in the process. Intermodal transportation also underlies the combined transportation (Saygılı, 2014). Consequently, “multimodal transportation” can be defined as carrying any goods at least by two different modes. By this way, intermodal transportation can be defined as a private concept of multimodal transportation (Çekerol, 2007). On the other hand, a portion of total freight and passenger travel is, called

"multimodal," reflecting the natural advantages of various modes in terms of cost and time to the shipper or traveler. However, poorly coordinated interchanges and connections between modes often erode the advantages of multimodal trips (Lockwood, 2003). The multimodal transport of goods, consists of the use of two or more transport systems, with the issue of a single transport document by the combined transport operator, valid for the whole journey from door to door, which does not prevent or exclude the right of the transporter of each modality to also issue their own Bill of lading (European Commission, 2013). At first it is described as "intermodal transportation" later with the help of ECE (Europe Council of Economics) combined transportation is mainly divided into two as spending energy and not spending energy while in transporting of any goods. Ro-Ro ships which are loading into trucks also trucks which are loaded into trains are example for the situation (Çekerol, 2007). On the othar hand, CMT defines combined transport is the journey of rail, inland, waterway or sea and initial or final leg is by road. Combined transport is kind of intermodal transportation. Both forms provide an alternative for long distance road haul (Beken, 2005). For a better understanding of the difference, it can be summarized as "multimodal transportation" represents a more general term compared to intermodal transportation whereas "intermodal transportation" is a term which includes "combined transportation". The other difference is that combined transportation emphasizes that the usage of roadway should be minimized on the other hand "intermodal transportation" mainly stands on handling of transportation units rather than goods (Deveci and Çavuşoğlu, 2013).

2.1.3 History and Development of Intermodal Transportation

The 21st century will see a renewed focus on intermodal freight transportation driven by the changing requirements of global supply chains. Each of the transportation modes (air, inland water, ocean, pipeline, rail, and road) has gone through technological evolution and has functioned separately under a modally based regulatory structure for most of the 20th century (Dewitt and Clinger, 2000). While individual transport modes have been transformed by technological innovations (e.g. the jet engine), much of the recent reduction in transport costs (including costs measured in terms of time) has come through measures to reduce the barriers traditionally separating different modes (i.e. road, rail, sea, air). The basic revolution occurred in containerization which containers are transported among ocean, rail or road transportation systems (Carpineri et. al., 2006). Intermodal freight operations are become distinct in the 1980s and 1990s, intermodalism in general has become an important policy issue. The need for an intermodal transport policy has been strongly advocated because of environmental concerns, reasons of overall efficiency and the benefits of co-ordination of modes to cope with growing transport flows. (Bontekoning et. al., 2003). In the later half of the 20th Century, patterns of production and distribution became more geographically dispersed on a regional, national and even global basis leading to longer supply chains and distribution networks and emphasizing the role of transportation. Within the private freight industry, intermodalism is a key part of the competitive drive for increased service and reduced costs. In both freight and passenger sectors, the strategies are to achieve seamless, dock-to-dock (or door-to-door) integration, which is achieved by physical, operational, integration of information technology (documents, tracking information access) integration (Rondinelli, 2000). With the development of containerization in the mid-1900s, and a new focus on logistics and global supply chain requirements, the stage is set for continued intermodal transportation growth (Dewitt and Clinger, 2000). The pallet can be considered as the first successful intermodal unit. For instance, by the early 1930s, about three days were required to unload a rail boxcar containing 13,000 cases of unpalletized canned goods. With pallets and forklifts, the lead time could be diminish in about four hours (Rodrigue and Notteboom, 2008). World War II clarified the benefits of time and labor saving of using pallets which

was an important step for the emerging trucking industry. The main idea about integrating rail and trucking become the form of simply loading trucks on rail cars. This trailer-on-flatcar (TOFC) approach, which began in the 1950s, provided a good source of income for rail companies so that they could able to attract a new market segment (De Boer, 1992). The “intermodal” approach was initiated in the mid-1950s by a freight service provider (SeaLand) with the combined provision of containers on multiple modes. During the 1980s, double-stack container trains, and containers on steamers, barges and trucks began to exile distinct changes in land, air, and sealand shipping. While the term “intermodal” is closely associated with the use of transferable containers, it also refers to bulk freight transfer and air/truck package delivery express. During the 1970s and 1980s deregulation of rates and entry fostered total reorganization of the carrier industry (Rondinelli, 2000).

2.1.4 The Reasons for The Development of Intermodal

Five primary functions are performed in intermodal facilities: transfer of cargo between modes of transportation, freight assembly in preparation of transfer, freight storage, logistical control and distribution of product flows (Sulbaran and Sardar, 2002). Further, the use of intermodal permitted the development of faster, reliable, pricesly timed logistics strategies in which information technologies are central (Capineri et. al., 2006).There are several reasons for the development of intermodal transportation in the global arena. Firstly, intermodal transportation minimizes exhaust gas in such directs the ones who cares about sustainability of natural resources to prefer intermodal transportation (Yersel, 2010) and measuring, understanding, and responding to the role of intermodalism in the changing customer requirements (Dewitt and Clinger, 2000).

More recently, increased global competitiveness has introduced just-in-time logistics (JIT) associated with manufacturing and supply-chain management, to reduce the cost of delivering goods to national and global markets. These changes in the conditions of demand improvements in the efficiency of supply, the technology innovations such as containers, double-stack rail service, mega-containerships, computer and satellite-based cargo and vehicle tracking systems supported intermodal transportation (Lockwood, 2003). The use of IT has also enabled firms to more closely track and control the flow of goods so that the time embodied in a production process in not merely sped up but is also more carefully managed. The best-known illustration of this approach to logistics is just-in-time (JIT) production which reduces inventory stocks enhances quality control by making defective work more immediately apparent, and accelerates time to market (Capineri et. al., 2006).

As a result of the above factors, overall freight operations have expanded and improved across all modes (Lockwood, 2003). As transportation systems expand, their impacts (air, water, and land resources) will become more complex due to the need of reliable and flexible response to changing customer requirements with seamless and integrated coordination of freight and equipment flows through various modes (Dewitt and Clinger, 2000). The freight shipments of all four major transportation modes which are air, water, rail, and motorways

have increased over the past decade, and moreover, forecasts indicate continued growth in the future (Rondinelli, 2000).

Besides, the basic factor for the development of intermodal transportation is the railway usage. Also airway freight is another entegrated mode of intermodal transpotation which is used for to carry high valued freights (Saygılı, 2014). Further, intermodalism is regarded as a particularly important cure for land transport congestion but has contributed to that same problem in some areas. While the expansion of global economic activity has been predicated upon the earlier discussed advances in long-haul transportation, most trips, both for people and for goods, are relatively short-haul. One result has been worsening congestion on highways in densely populated conurbations. Intermodalism offers a partial solution by shifting a portion of interurban trips to rail (Capineri et.al., 2006).

The other significant and major reasons of development of intermodalism are economic globalization, speed-to market product delivery, agile manufacturing and business practices, integrated supply chain management (Rondinelli, 2000). Development of intermodal transportation includes several reasons which are; knowledge of current and future intermodal operational options and alternatives, as well as the potential for improved information and communications technology and the challenges associated with their application (Dewitt and Clinger, 2000), transportation cost should be minimized according to demand supply, faster transportation of goods because of international competetion and educing traffic congestion on roads due to environmental awareness (Deveci and Çavuşoğlu, 2013). Intermodal transportation shipping becoming increasingly due to equipment innovations, partnerships between rail and truck carriers, improved services by all providers (Barnhart and Ratliff, 1993).

2.1.5 Types of Intermodal Transportation

There are several ways used for intermodal transportation. The basis of intermodal transportation resides in the development of systems that integrate or combine the various elements of the five modes of transportation i.e. motor, railroad, water, pipeline and air transport (Back et. al. , 2001). The most popular common service of intermodal transportation is the transportation of goods by railway-roadway mode. It can be defined as transporting goods to places where there is no sea in other words hinterland. (Çekerol, 2007). The intermodal transport chain consists in general five links: initial haul-transhipment-rail or inland waterway haul-transhipment-final haul (Yorulmaz and Bayram, 2010). There are several types of intermodal transportation for instance: sea-rail-road, sea-inland-waterway-road chain, road-rail-road chain and sea-rail-sea chain. The first three chains are much used in Europe for the intermodal transportation (Beken, 2005). The basic movement for rail/truck combination is that a truck picks shipment from its origin and carriers to it initial rail terminal and than a train carriers the shipment from the initial rail terminal to its final rail terminal. Afterwards, a truck carries freight from the final rail terminal to its destination. This is often called as *drayage* (Barnhart, Ratliff, 1993). Rail-road transportation chain has several advantages compared to other chains due to its flexibility of trucks. The most popular road-rail intermodal transportation offers shippers a lower cost option compared to motor carrier movements, while the truck part offers the flexibility of door to door service. Intermodal rates are typically 15 to 20 percent below motor carrier rates for comparable moves, but transit times may be 2 or 3 days longer and more variable, depending on the length of haul (Ozment, 2001).

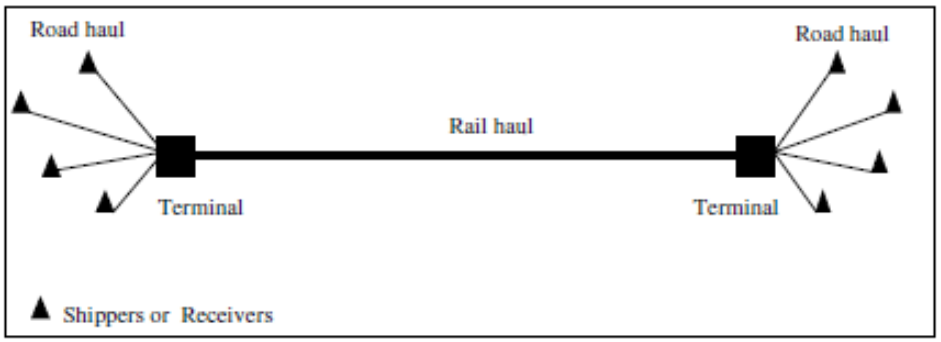


Figure 2.1: Rail-road Intermodal Transportation (Macharis and Bontekoning, 2004)

Figure 2.1. provides a sample of road–rail intermodal freight transport. A shipment that needs to be transported from a shipper to a receiver is first transported by truck to a terminal. Then, truck is transhipped from truck to its second mode, as in the figure this mode can be railways for terminal to terminal transport. At the other end of the transport chain the shipment is transhipped from train to truck and delivered by truck to the receiver. The motorways part of the transport chain is called drayage, pre- and endhaulage or pick-up and delivery. The transport between two terminals is called the long haul transportation (Macharis and Bontekoning, 2004)

Intermodal transportation has four basic railway transportation technologies which are; piggyback, biomodal, Ro-La and Rail-ferry modal. The first three of them are the combinations of railway- roadway and the fourth one is for railway- waterway usage (Deveci and Çavuşoğlu, 2013).

- **Piggyback**: The present invention relates to an improved type of piggyback" train for transporting highway trailers without requiring removal of the bogie or wheel assembly from the trailer. (Macomber, 1971). This service, which came to be known as “piggyback” service, increased slowly but steadily until the 1950s when it began to grow more rapidly (Rickett, 2013). In this technology trailers, containers, swapbodies and other intermodal transportation units are transported by “pocket wagons”. Intermodal volume of loading and unloading by crane or mobile handling performed at train stations (Deveci and Çavuşoğlu, 2013). Piggyback system has a private lifting equipment in it’s bottom

and also has special applications in implementation (Evren and Öğüt, 2006). Piggy-back truck/trailer transportation can be abbreviated as TOFC (Truck on Flat-car) which can define as carrying containers on wagons by rail transportation (Yorulmaz and Bayram, 2010).

- **Bimodal:** Private two mode semi-trailers can be transported by trucks and also by railway. For this aim, special tools are equipped to be fixed to the trailer, also with a special latch. By this way, special trailers can be transported to terminals. In addition, cran is not needed and also the process is carried out by the driver (Deveci and Çavuşoğlu, 2013). In this mean, trailers have also been percieved as wagons (Evren and Öğüt, 2006).
- **Rail-Ferry:** In this mode of transportation two modes are used which are railway and waterway. In addition to rail, ferry service plays an important role, along with road traffic for truck access to rail, and port–marine links between essential access points on the rail network (Zhang et. al, 2008). Railway unit loaded into ferry so that it provides several benefits to unite seas and lakes (Deveci and Çavuşoğlu, 2013).
- **Rollende Landstrasse (Ro-La):** The most well-known Intermodal transportation modal type for freight transportation is the Rolling Highway (Ro-La), which is a special train system that carries highway vehicles on railway cars. Ro-La is short for Rollende LandstraQe, in other words, rolling highway (Donovan, 2000). Ro-La introduced in Europe in order to eliminate traffic in roadway, reducing unsafety in transportation, preventing air pollution and serum effect, carbon emission, transporting trucks by railway and also to decrease cost. (Evren and Öğüt, 2006). The goal of Ro-La transportation is to transfer heavy traffic from highway to railroad and to gain benefit from the economical, environmental, and operational advantages of railroad and highway transportation by combining these two modes. Ro-La transportation also exploits the use of containers for freight, which blocks the need to repackage for different transportation modes. The use of containers increases the efficiency of operations at the intermodal terminals (Mckenzie et. al., 1989). Tractor and trailers loaded through ramp to its' private wagon called "horizontal loading" which has an advantage of this system by giving opportunity for the driver to rest while travelling by rail. Also, freight can be loaded as well as unloaded as soon as

possible and no need for special equipment for loading and unloading. A “walking path” train, as a type of transportation techniques, is particularly suitable for rapid transport and enables fast unloading quickly. There is no need for any special equipment for carriers. However, wagons equipped for the Ro-La are special for its own modal type (Çekerol, 2007).

On the other hand, there are several disadvantages of this system. It is more expensive compared to Piggyback. For instance, Ro-La is used mostly in Austria and Sweden because of traffic pollution (Evren and Öğüt, 2006) and geopolitical difficulty, and its share in Europe combined transport market is %22 (Deveci and Çavuşoğlu, 2013).

For more understanding, the combination of transportation chains are discussed below for intermodal transportation including all; air, road, rail and sea.

- **Roadway-Railway-Roadway (Drayage):** The organization of road-rail-road chain can be described as; swapbodies or traiers are transported by truck over short distance to a terminal where the loading unit is tranferred into a rail wagon and then transported by rail and freight is transhipped by truck to the destination point (Beken, 2005). The definition of drayage used by Harrison et al (2008) as truck container pickup from or delivery to a seaport terminal with both the trip origin and destination in the same urban area. Drayage activities have been conducted for several centuries in order to link modes and to make short trips from a transportation terminal to a customer. Historically, they spread from marine ports to canals and rail terminals, and the truck which replaced the horse. In general, drayage occurs at links in the supply chain where intermodal moves are being made, including those from the producer and to the final customer (Harrison et al., 2009). Freight is loaded by trucks and transported together with containers and / or RO-LA, load is transported to wagons at integrated facilities. The long distance is transported by railway and lasting point of transportation held through roadway. But the roadway transportation can not exceed 300 km (Çekerol, 2007).If ending and starting point of the transportation chain, distribution and collection of the freight held by roadway than it is called “Drayage” (Figure 2.2). Drayage operations involve the provision of an empty

trailer or container to the shipper and the subsequent transportation of a full trailer or container to the terminal. The empty container may be picked up either at the terminal, at an empty depot or at a receiver. Delivery operations involve the distribution of a full container or trailer from the terminal to a receiver, followed by the collection of the empty container/trailer and its transportation to the terminal, an empty depot, or a shipper (Macharis and Bontekoning, 2004).

Although the rail network is comparatively sparse, it can provide less costly long-distance transport. Drayage operations perform the collection and distribution of containers and trailers and connect the shippers and consignees, located on the highway network, with intermodal terminals on the railroad network. For a load to be delivered by truck, a drayage order is created that specifies the pickup and delivery location, as well as the intermediate stops along the way (Rickett, 2013). Once a decision regarding routes has been made, that trailer is loaded on a railcar, and the car is placed on a train. This train might then take it directly to the destination terminal, as some intermodal trains operate essentially non-stop to the final terminal, or the intermodal train may stop at intermediate terminals to drop off and pick up cars, and sometimes these are transferred to other trains to complete the trailer's journey (Nozick and Morlok, 1997). A flexible order is another type of pickup and delivery request that has either a specified origin or destination, but not both. A "drop-and-hook" stop occurs when a driver drops off their load and hooks up to another one at the customer's location. A "live" stop occurs when a drayage truck must wait while its contents are unloaded and loaded (or vice versa). Inbound movements occur when the drayage truck travels from the intermodal terminal to the customer. A common inbound movement is for the draymen to pick up a load from the terminal and then perform a drop-and-hook stop, picking up another load at the customer's location. Another possible inbound movement is to pick up a load from the terminal and then perform a live stop at a customer's facility. (Rickett, 2013) The general problem of drayage operations is its cost effectiveness. Despite the relatively short distance of the truck movement compared to the rail or barge haul, drayage accounts for a large percentage (between 25% and 40%) of origin to destination expenses. High drayage costs seriously affect the profitability of an intermodal service, and also limit the markets in which it can compete with road

transport. Consequently, alternative, less costly operations need to be designed. (Macharis and Bontekoning, 2004). Usually there is a single preferred routing to each destination, given the sparsity of the rail network, but there will be time-of-departure options for all but the highest class of service. For example, the entire trip may require four days, but the delivery deadline may be six days, therefore a total delay of up to two days anywhere along the trip is acceptable. This timing flexibility is the reason why lower service level cargo is generally charged at a lower price (Nozick and Morlok, 1997).

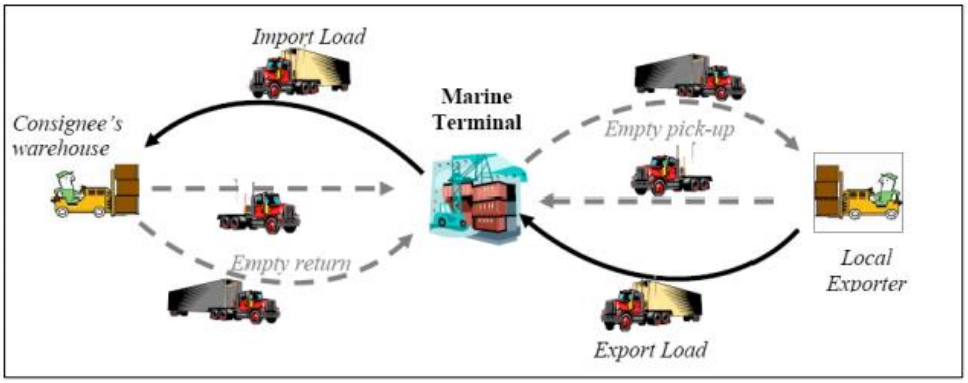


Figure 2.2: Cycle of a Drayage System (Harrison, 2009).

- **Sea-Rail-Road Intermodal Transportation:** The sea-rail chain organised as follows; maritime containers arrive in a port and transshipped into rail wagons and then transported by rail from country A to counry B. Then, in country B, the containers are again transhipped and transported by truck to their ultimate destination (Beken, 2005). In short, sea transportation is also important for the intermodal transportation. First, railway-roadway mode of transportation production place should have railway network and also waterway connection has production place or ports also have loading plant also in railway-roadway-waterway chain, the transportation ports have integration or loading plants because of this reason the freight should be determined whether it is transported by railway or roadway according to their tonage and distance; transfer of modes also obtained by integration plants. (Çekerol, 2007). On the other hand, in international transportation waterway is preferred because it is more secure and it is not complex as the other modes are. Waterway is preferred because in long

freight transportation waterway has an advantage by provides low cost. (Saygılı, 2014).

- **Air Intermodal Transportation:** Increasing urban expansion and air traffic connectivity between airports and other modes of transportation remain substantial. In this field, connectiviy between water, air and rail shipping has greatly become progressed (Vespermann and Wald, 2011). Ail-rail agreements occured because of the expansion of railway cooperations with air intermodal chain in fact it involves competetion with other mode of chains. Three factors collocated as the rebirth of the rail industry, the difficult trading environment for airlines, development of airports (Chiambaretto and Decker, 2012). The past twenty years are the biggest rise in the development of rail and air transportation services in Europe countries for the sustainable improvements between rail and air services for different routes (European Commission DG, 2006). Several air-rail intermodal agreements have been signed in Europe over the last 15 years and all of the agreements involve a rail (Chiambaretto and Decker, 2012).

2.1.6 Advantages and Disadvantages of Intermodal

Advantages of Intermodal

Intermodal transportation provides several benefits. However, many problems have also been encountered in intermodal transport chains which are often related with the organisational interfaces and technical incompatibilities between the various companies and systems involved in transport operations. Cargo handling technologies, communication links and various coordination measures are among the tools that can be employed for bridging the gaps in intermodal transport (Bask et. al., 2001). According to scholars and some other perspectives advantages and disadvantages are investigated in the following both sides.

To summarize, intermodal facilities provide a number of advantages to companies. In such, terminals facilitate the transfer of standardized shipping units between modes of transportation. Furthermore, these facilities allow operators to select the most efficient method of shipment for each freight container. Increased efficiency implies that less time is wasted on non-value adding activities. Reduced time means money saved while goods are in transit. In addition, having a shared intermodal facility allows for less capital expenditure on infrastructure, allowing companies to move more freight with fewer assets (Sulbaran and Sarder, 2013). Further, in order to make door-to-door transportation the basic need is speed and flexibility. On the other hand, cost of energy, infrastructure investment needs, increase in accident rate and environmental pollution are all counted as disadvantages of this transportation type. Maintaining cost advantage among the competitors, speed, on time delivery, transportation safety and environmental gainings serve as the benefits of intermodal transportation (Şakar, 2010; Saygılı, 2014).

- **Technological Impact:** The advantages of intermodalism for technological development, in both freight and passenger transportation, can be reinforced by focusing on improved physical connections, operational coordination and integration, and enhanced information and communication systems (Lockwood, 2003). Customers will also have more information awareness through the use of information communications and this development leads suppliers to gain more performance and higher expectations **(**Dewitt and

Clinger, 2000). Hence, as transportation becomes a high tech business with information and communication capabilities playing an even bigger role than the physical movement of goods. In the future, efficient transport chains will be based on coordination mechanisms that enhance network connectivity, using enabling technologies as a supportive element (Bask et. al., 2001).

- **Economic Impacts*:*** The economic impact of intermodal transportation is reducing cost of infrastructure and reducing roadway traffic, direct saving, less stuff cost (night shift, driver, driving time), less wear on material, long semi-trailer usage, smaller fleet, tax exemptions/ rebates / refunds, less highway fee, less damage of freight in transportation (Çekerol, 2007). Besides, lowering the costs and improving the service offered for freight by using the best combination of modes, reducing the burden on infrastructure and increasing total efficiency by shifting to modes that have higher capacity, and reducing time and inconvenience currently associated with intermodal interchange, increased economic productivity and efficiency, improving competitiveness at enterprise, regional, and national scales are all benefits (Lockwood, 2003).

On the other hand, intermodal transportation help to combine manufacturers, retailers, suppliers and consumers. Intermodalism serves for rational cargo handling, safe storage, fast ships and railroad, cargo trucks, in addition to shortening the duration of the freight transportation and eliminating the risk of freight theft. Also, by shortening the cost of transportation it helps global trade (Lowe, 2008).

Speed—or total transit time through the supply chain—will continue to be a necessary factor for intermodal transport in which customers will demand better execution of the supply chains, represented by quality and reliability (Dewitt and Clinger, 2000). For instance, air transportation is the best solution for time such as in conditions where geographical difficulties are significant. Besides, railway is preferred rather than roadway in places where there are special weather conditions such as snow, mist and icing (Yersel, 2010). The other economic impact is the reduction of transportation cost in integrated transportation systems. For instance, by eliminating vehicles, number of transhipment possibilities increase linearly.

This provides customers to choose several components (Trip and Bontekoning, 2002).

In addition, a major economic attribute of intermodal transportation is that they can increase the velocity at which high volumes of freight move through a given terminal or facility. If freight moves quickly through the transfer process, there is a potential for higher annual capacity. In the case of seaports nearly half of the space in most container berths is devoted to consolidation and storage above and beyond the immediate needs of vessels loading and unloading (Slack, 1990). The current waste in capacity is due, to the capacity constraints placed on ports by truck access limitations. Access at major port terminals has become problematic due to congestion and, in many cases, capacity expansion to accommodate truck traffic to service additional volumes is not an easy option. In addition to the accessibility problems of many ports, current law mandates that trucks are able to haul loads up to 80,000 lbs on most highways and interstates. These two limiting factors can have serious implications on the time for freight to move through the supply chain. Relocating freight from the area of port operations to inland facilities reduces the operational bottlenecks resulting from the overlap of high freight import and export volumes. Additionally, highway development costs are less expensive near hinterland facilities. In many cases, port expansion is very difficult because existing ports are congested, over capacitated, and adjacent land is very expensive. Conversely, capacity expansion and building infrastructure is less costly near inland intermodal facilities (Sulbaran and Sarder, 2013).

- **Social Impacts:** In addition to the benefits that shippers realize directly, intermodal transportation is beneficial to society as a whole. These benefits include increased energy efficiency, improved air quality, reduced highway congestion, and fewer accidents, all of which arise as a result of fewer trucks on the highways (Ozment, 2001). In the current operating environment, freight is received in a central location, a port or large intermodal rail terminal, and then widely distributed via truck. As aresult, in large freight volumes moving in congested urban areas in all directions from large terminals resulting in significant congestion on routes radiating from the ports and terminals. This is important

when one considers that heavy trucks cause a greater degree of congestion than passenger cars (Sulbaran and Sarder, 2013). Driver fatigue is often cited as one of the primary reasons for large truck accidents, and by using rail for the long haul portion of a shipment, truck drivers are used for shorter, regional moves which reduces the probability of an accident (Ozment, 2001). In addition, transportation companies pursue their services in competetion with others. As it means, companies which provide advanced services has the competetion advantage. The company which provides different solutions for demands gains logistics advantage. For example, intermodal transportation satisfies special demands of different customers by its flexibility and information of all types of transportation modes. Further, providing qualified service leads logistics companies to use intermodal transportation (Wan, Lim and Sim, 2008).

Several benefits of intermodal transportation can be specified as eliminating social spendings, more security (especially in railways, private goods), reducing air and sound pollution, less energy consumption, helping consumer interest, more driver comfort (for example in railway), usage of exact capacity (Lockwood, 2003; Çekerol, 2007).

- **Environmental Impacts**: Intermodal transport, the combination and integration of several traffic modes with the use of loading units, has often been said to be more environmentally friendly than unimodal road transport for the carriage of goods (Kreutzberge et. al., 2003). Intermodal transport and green supply chain has several beneficial connections. Green supply chain management recognizes the environmental impact of supply chain processes. Intermodal transportation systems maintains a wide choice of transportation mode and several alternative ways, for better movement of freight and flows. Here in, in this study the transportation modes taken into account in our study are road, air, water and rail. Environmental issues concerning freight become more important nowadays since it is well known that the transport industry is the major sources of noise and numerous air pollutants (Sawadogo and Anciaux, 2010). Especially European Union countries enhance the awareness of environmental protection by compel countries for to transport freight by roadway intermodal chain in order to reduce emission production by using developed technologies. In such Europe countries,

there are several sanctions in order to develop intermodal transportation primarily attached importance to railway transportation. In such development, carbon emission oscillation and less oil consumption targeted rationally (Wan, Lim and Sim, 2008). In such European countries, there are several sanctions in order to develop intermodal transportation.

Primary importance is given to railway transportation. Rail intermodal service on average uses less than half as much fuel as highway transport to move the same shipment the same distance, and moving a ton of freight by rail instead of truck results in less than one-third the emissions into the air (Ozment, 2011). For the reduction of environmental diseases air-rail intermodal agreements have the potential to reduce polluting emmissions and congestion by improving the efficiency by the integration of several modes. (Chiambaretto and Decker, 2012). Environmental gains with a modal shift toward rail may be significant and the aviation sector is responsible for an estimated of %10 transportation carbon emission. Also %2 of the total carbon gas emission in Europe is environmentally friendly in air-rail transportation chain compared to single aircraft system (OECD, 2007). In addition, potentially congestion can be reduced by modifying the supply chain to ship freight from the port and ship containers to an inland port facility via rail. Movement by rail removes many trucks from highways and interstates thereby reducing the amount of roadway congestion (Sulbaran and Sarder, 2013).

Disadvantages of Intermodal

Although there are several advantages of intermodal transportation, there are also some disadvantages and no attention is being paid for those (Allen, 2016).

Although intermodalism offers benefits of low costs compared to other modes, it obtains less speed so that any cargo is transferred slower and in longer times. For an example, a rail has its' direct route and as it slows down it can not travel like a truck. So for the efficiency, it should also reduce the amount of waiting in depots for a new cargo to be unloaded. As another disadvantage, "lack of reliability" can be given. As one mode is planned as railway, than lack of equipment or any equipment base failure can be problematic. For this reason, as well as concerns

over speed, shippers that require reliable, high-speed transportation are less likely to consider intermodal systems.

Besides, another disadvantage may be “damage”. Although is is carried in unit loads, shippers risk the possibility of damage as the freight is transferred from one method of transportation to another. This added weight and expense counteracts the advantages intermodal transportation in terms of energy efficiency and cost.

Finally, “high infrastructure costs” is the another disadvantage for some reason. Containerization has lowered the cost and difficulty of transporting goods by standardizing their form; thus, shippers can easily move the same container from a ship to a train or a truck. Handling these containers, however, requires that shippers have the heavy cranes and equipment necessary to manipulate large containers; this infrastructure may not exist in all places, especially in developing countries.[2]

Besides, there are negative impacts of intermodal transportation for environment on the other part of the mirror. The increasing importance of multimodal infrastructure and intermodal services will intensify the environmental impacts of transportation activities in the future. Identifying major transportation activities with impacts on natural resources can be the first step in effective environmental management. Three sets of activities associated with transportation — vehicle operations, equipment maintenance, and facilities operations — can have negative impacts on the environment. In addition, natural resources are under threat because as multimodal transportation and intermodal logistics developed transportation activities generate soil, ground water much more. The major sources are petroleum product disposal, sulfuric acid from battery leaks and disposal, organic hazardous air pollution (HAP) emissions, water and soil pollution from waste solvents, cleaning and de-icing fluids, fuel spillage, degreasers, coolant releases, and solid and liquid wastes from terminal operations (Rondinelli and Berry, 2000).

[2] Robert,Allen, The Disadvantages of Intermodal Transport, <http://www.ehow.com/info_8420695_disadvantages-intermodal_transportation.html> 10 March 2016

2.2 Units of Intermodal Transportation

In this section the aim is to provide an overview of the various types of equipments used in intermodal transport. The list is not ceased but the most common equipment will be identified and described briefly.

Intermodal transport has developed towards a commercial backbone of European rail transport. The two main drivers of this growth had been the increase of world trade, and standardisation allowing to achieve economics of scale and reduction of costs. Standardisation of intermodal transport units has been important for two economic factors: the box must be able to move in as many modes and countries as possible, and it must match competition of conventional transport (Siedelmenn, 2013).

European freight rail operation has to serve two distinct markets: The hinterland transport of sea-borne containers between sea ports and production or consumption areas inland representing 7 million tons of cargo or 63 % of the intermodal rail transport market, The long distance transport of cargo within Europe by road-rail-road operation representing 3,9 million tons or 37 % of the market. The intra-European intermodal transport competes with international long-distance road transport and is faced with the fact that road transport fixes the logistic requirements in this market.In other words: Intermodal road/rail operation must offer the same quality, a similar load carriage device, the same degree of flexibility and service as international road transport. If road transport changes its dimensions, intermodal transport has to follow, or they will loose the market. When this type of traffic started in the 1980s, the actors had been faced by a wide set of different rules for truck weight and dimensions.Things became much easier when the European Commission created a common regulation for sizes and weights of road vehicles for all the member states of the European Union (Directive 96/53/EC). This has been basis of European standards for loading units, mass production and mass operation, the basis for competitive economics of the system. Another advantageous pattern had been the stability: Such a regulation needs a compromise between very many actors with very differing interests, and this is difficult to achieve. So the actors assumed that the road vehicle dimensions that have been fixed Europewide in 1996 would not change and this was true until the current days (Seidelmann, 2013).

Intermodal transportation defines as transportation of freight by transferring from mode to mode with standardized loading units to transport cargo namely containers, swapbodies and trailers (Zeybek and Kaynak, 2007). Containers are generally used in the intermodal sea-rail and sea-inland navigation chains. Swap bodies and trailers are common loading units in intermodal road- rail transport. With these various loading units different forms of intermodal transport can be organized Rolling road transport; intermodal container transport, intermodal container transport, intermodal swap body transport and intermodal trailer transport. (Lowe, 2008). In other words, intermodal transport makes use of standardized loading units to transport cargo namely; containers, swapbodies and trailers. Containers are generally used on sea-rail and sea,inland navigation chains. Swapbodies and semitrailers are common in road-rail transport (Beken, 2005). Besides, intermodal transportation should have some transportation units in order to transport goods (containers, swapbodies, trailers etc.) and handling equipments to handle these units (gantry crane, transtainer, straddle carrier, forklift, reach staker etc.) and transportation vehicles (trains, roadway vehicles, ships etc.) and also ports, terminals and logistic centers and forwarders that help to coordinate operations. In addition to this, suitable technology, organizational functions, government support should be actualized (Deveci, 2010). Standardized freight units are generally used for different transportation systems. For instance, containers are commonly used in air, sea, rail, road transportation but lighten is used in sea and inland transportation. Also, trailers are used in road transportation whereas pallets are used both in rail and road transportation since containers are used as a stawing feature of maritime transportation. All in all, trailers and swapbodies are also used for road transportation hence in long distances trailers are loaded on wagons due to economic benefits (Yorulmaz and Bayram, 2010).

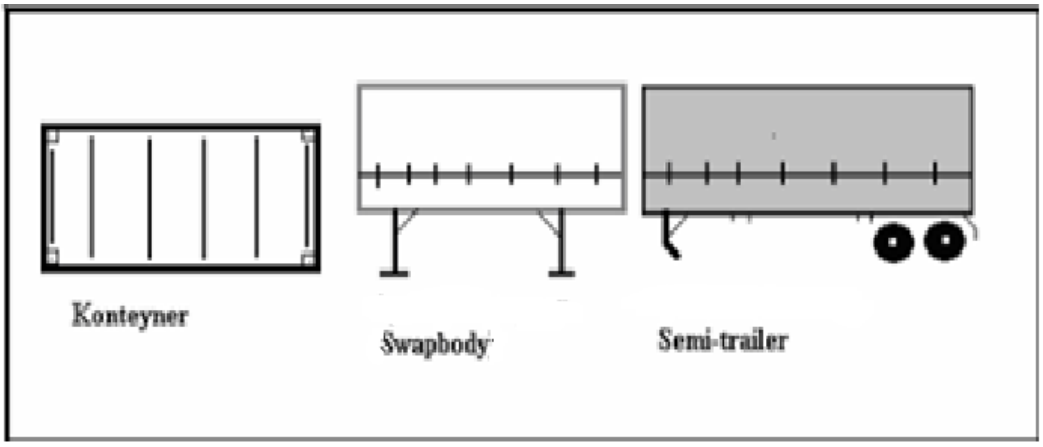


Figure 2.3 Intermodal Transportation Units (Containers, Swapbodies and Semi-trailer) Source: (Kasapoğlu and Cerit, 2011)

2.2.1. Containers

A container, as defined by the European Conference of Ministers of Transport (2001), is a general term for a box to carry freight, strong enough for repeated use, usually stackable and fitted with devices for transfer between transportation modes (Bektas and Crainic, 2007) whereas ISO containers are the modern standardized box units that able to handle freight of rail, road and water freight (Evren and Öğüt, 2006). Container transport services are seen rather standardized services or even routine ones due to first of all the use of standard unit (container). In basic container transport service use is made of standard containers and the services/chains do not include special arrangements or planning during the transportation process (Bask et al., 2000).

There are several types of containers that help to transport freight. Containers are carried on flat wagons, ISO deep sea containers unrestricted, other container types if coded to combined traffic rules. Container types may have different properties, such as different internal and external width, height and length, as container types include flat rack, open top and fold away containers. The use of the modern metal shipping container started in the middle of 1950's (Alemdağ and Aydın, 2015). It is remarkable that the container transportation has the largest impact on intermodal transportation. The launching of the first containership (Ideal X) in 1956, can be considered as the beginning of the container era and in the early years, containerization was seen as the simple application of temporary portable storage facilities, loaded with cargo, enabled

mobility as a unit for intermodal unified transport (Rath, 1973). According to Levinson, in April 1956 an oil tanker traveled between Newark and Houston with 58 crude "shipping containers," (refitted aluminum truck bodies) seen as a modern revolution in moving goods around the world. On the other hand, an unexpected result also eventually transpired: shipping containers became attractive as a building material (Alemdağ and Aydın, 2015).

In the mid 1960s, the adoption of standard container sizes, particularly the now ubiquitous 20 and 40 footers, and of standard latching systems marked a significant revolution and its associated surge in containerized traffic. In 1990's the most common size of container available are 20 feet, 30 feet, 40 feet and 45 feet in lenght. The height and width dimensions are the same for all lenghts 8 feet wide by 8 feet 6 inches (2.5908 meters) high and these are the most commonly used dimensions according to ISO (International Standards Organisation). (Rushton, Oxley and Croucher, 2000). Consequently, the latest container size length reached up to 53 feet and 45 feet in the recent years especially in United States (Yorulmaz and Bayram, 2010).

On the other hand, containerization refers to the increasing and generalized use of the containers as a support for freight transportation and involves processes where the intermodal container is increasingly used due to enabling[3] the transportation of cargo with easy interchange between modes by eliminating the re-handling of its contents. Special lifting equipment safely and efficiently transfers containers from one mode of transport to another (Rickett, 2013).

Further, containerization is the first rule of intermodal transportation since containers help handling unit of loads by consolating several freights and easening transfer of freights between different types of transportation modes and in addition, lead time saving in loading and unloading of freights and providing maximum protection advantage during transfer of freight (Hayuth, 1987). Malcolm MacLean, founder of intermodal transportation system, made a revolution by spreading containerazation in 1960's (Slack, 2001). In addition, container usage provides speed and cost saving of loading freight and proive labour force. For instance, containers are important especially in maritime

[3] Dr. Jean-Paul Rodrigue & Dr. Brian Slack, Intermodal Transportation and Containerization,https://people.hofstra.edu/geotrans/eng/ch3en/conc3en/ch3c6en.html, Access Date: 03.04.2016

transportation system in example, for unloading 40.000 tonne freight by traditional methods 24.000 men labour force is necessary on the other hand by using containers same amount of container shipment unloaded with 750 men labour force before ships were dropped anchor for 25 days by using containers period of time is diminished to less than 2 days (Zeybek and Kaynak, 2007). What's more, there are several advantages of containerization can be listed as; reducing damage and loss, to its type of structure transfer operations at terminals are fast and performed in minimal amount of effort, reduces cargo handling, flexible enough to enable the transport of products of various types and dimensions, enables a better management of transportation of goods. Due to these reasons, it totally reduces maximum transport costs (Bektas and Crainic, 2007), protects the contents from damage and theft (Rickett, 2013), provides doot-to-door transportation (Yorulmaz and Bayram, 2010).

Container Types	Definition	Use
General Containers	a freight container, enclosed and weatherproof, rigid roof, rigid side walls, and floor, having at least one of its end walls with doors and suitable for the transport of a variety of cargoes.	-types of "dry" goods, including those packed in boxes, cartons, cases, bags, bales, pallets, drums etc... used for certain types of bulk cargo dry and liquid)
Reefer Containers	thermal container with an electrical appliance (mechanical compressor) for the purposes of cooling or heating the air within the container.	-transport of perishable goods in a temperature-controlled environment. such as fruits and vegetables
Open Top Containers	A container except that it has no rigid roof but have a flexible and movable or removable tarpaulin cover normally supported on movable or removable roof bows.	-used to carry heavy and or bulky finished products, handling and loading performed with a crane or a rolling bridge
Flat-Rack Containers	Flat-rack containers have no side walls and are available either with fixed or collapsible end-walls.	-dedicated for items which are heavy, bulky and those which are over height and/or over width. -their base is often designed to transport heavy material. Some 40' flats are suitable to carry as much as 45 metric tons of cargo.
High Cube Palletwide Containers	40'/45' High Cube Pallet Wide units were specifically designed with the 1.2 m "Europallet". The equipment, with its 2.45 m internal width, ensures optimum utilization of space.	-shippers benefit by being able to load more Europallets than they would in a standard ISO container.
Tank Containers	A freight container which includes two basic elements, the tank and the framework.	-used to carry hazardous or non-hazardous liquids (foodstuff). -equipped with accessories to facilitate filling and emptying and has safety devices.

Table 1. Type of containers used in intermodal transportation

2.2.2 Swapbody

Swap bodies are most commonly used in Continental Europe which transportation done by truck-trailer combination chain and carried on railways generally on flat wagons and can be parked standing on retractable legs as they are primarily similar to general road swap bodies with grab pockets added to bottom lift. This handling technology introduced by Freightliner in 1966 allows constructed units without rigid top frame, thus they are not to be stacked[4] .

Swap body is a type of container used generally on bimodal intermodal transportation which utilizes the rail and road modes of transport. The swap-body is a self-supporting body that has supporting legs that may be folded away when not required. (Rushton et. al., 2000).

The development of combined transport starts with first avoidance of excessive dispersal of efforts. IRU/UIC (International Road Transportation Union)suggested that swapbodies, like containers, should be preffered both by loaders and transport operators in order to gain technical progress and to take full advantage like horizontal transfer of containers. Swapbodies (from road to rail) eliminate the need for gantry cranes and lifting equipments (Lowe, 2007). Swapbodies first introduced in Europe, are the units that reflect the importance of rail-road combination and single-market policies of European Union (Çekerol, 2007). Europe has established CEN TC 119 Swap bodies for intermodal transport, and standards committee followed the European legislation. The width for road vehicles had been increased to 2550 mm, and the new standard fixed the width for swap bodies. The European legislation had fixed 18300 mm for road train length; this allows for 2 transport units (truck + trailer) of 7450 mm each or 2780 mm with a sophisticated short coupling system. So, European standard set a length system of class C swap bodies 71500 mm for traditional swap bodies and 7450 mm for a pair of swap bodies on standard road trains 7820 mm for a pair of swap bodies on short-coupled road trains (Seidelmann, 2013).

[4] Intermodal Freight Operations, Matthias Bett < http://www.railway-technical.com/intermo.shtml> 3 January 2016

Besides, swap-bodies conform to different international standards. There are three standard lenghts: 7.15 m., 7.45 m. and 7,82 m. These lenghts are used because the swap-body will be carried by road transport as a part of its journey and must conform the strict requirements pertaining to vehicle dimensions inside the EU (Rushton, Oxley and Croucher, 2000). Furthermore, swap-bodies are predominantly used in intra-continental freight transport between the European member states carried on road or rail. Therefore, they are adjusted to road transport restrictions and the transport of standardized euro pallets (Klingender and Jursch, 2011). A further version of the swapbody is called the *caisse mobile*. There are 12 meetres or 13.6 metres long which conform to European Union dimensions for semi-trailer lenghts. Caisse mobiles do not usually have self-supporting legs but very often are able to top-lifted in the same way as ISO containers. Unlike ISO containers, swap bodies cannot be stacked (Rushton, Oxley and Croucher, 2000). Swap-bodies are removable from the chassis but more lightly constructed than containers, so that most of them cannot be stacked or top-handled. The increasing use of curtain-sided and volume-optimized swap-bodies meets the loaders requirements for wide openings on both sides and a maximized cargo area. These commonly used curtain-sided swap-bodies but only resist low horizontal forces in short sea shipping. In general swap-bodies are not suitable for intermodal transport including all modes road, rail and waterborne. While European standards in terms of dimensions and general requirements securing of cargo and the coding, identification and marking of swap-bodies have been published in the last 15 years, still differences in dimensions, fitting and lifting points and other properties concerning the loading and transhipment operations (Klingender and Jursch, 2011).

2.2.3 Semi-Trailers

Semi-trailers are accepted as a way for road operators for spreading intermodal freight transportation. It is most commonly used in United States when compared to EU. For example semi-trailers are loaded easily onto flat-cars. Europe's private railway cars (rail car) are developed in order to limit the amount of exceed freight. A standard semi-trailer used for its large internal and strength volume, air suspension in roadway transportation, freight security (Çekerol,

2007). The types of semitrailers can be speficied as *accompanied road-railer and unaccompanied semi-trailers*. Road-Railer is the brand name for a method of effectively converting a road-going articulated semi-trailer into a rail-going railwagon which is achieved by placing a railway bogie under the specially designed road semi-trailer. This system does not require specially adapted railwagons and allows for a more rapid transfer of vehicles from road to rail. It does require that the road vehicles are specially designed for the purpose. Unaccompanied road semi-trailers may be used to send goods by roll-on roll-off sea ferry (RORO) (Rushton, Oxley and Croucher, 2000).

Semi-trailers in European intermodal transport is the backkbone of the transportation. Intermodal transport of semi-trailers is a fast growing market in Europe. A European semi-trailer is allowed for a height of 4000 mm. This height road vehicle loaded on pocket railcar ends up in a total combined height of rail and road rolling stock that exceeds the rail gauge of some major south European railway networks so that cannot these railway undertaking cannot serve to market. Of course, it can be used, as well, for the carriage of ISO containers, but this would incur some capacity loss. (Seidelmann, 2013).

In addition to this, growth in container volumes in sea ports will lead to increased market share of railways. Railways offer clear economies of scale, i. e. more productivity and more competitive pricing if the volume on a given itinerary grows. In Europe, a new trend in intermodal road/rail transport has started: semi-trailers become the fastest growing part of intermodal loadings. These semi-trailers are built for lifting by crane or by rubber tired special equipment and carried in pocket wagons. The transportation industry buys large quantities of such semi-trailers, so that their volume in intermodal services will increase in the future (Seidelmann, 2013). However, rail-transport of semi-trailers is difficult because of its technique in the UK but is is commonly used in Benelux, Sweden and Germany in such almost all wagons operated by the largest Swedish intermodal operater which can carry all semi-trailers (Woxenius and Bergqvist, 2011).

A sharp increase in the demand side is similarly expected: Intermodal transport road/rail shows better energy efficiency that road transport, and the CO_2

emission values are much more favourable. Specifically the consumer goods industry and the retail industry will use this argument to show their engagement for a better tomorrow. As long as intermodal transport is rather competitive in price and quality compared to road transport, the industry will decide to organise its logistics with preference for intermodal transport (Siedelmann, 2013).

Semi-trailer transport on pocket railcar is currently limited to the rail networks in Central and East Europe that provide a rather generous tunnel gauge. The networks in France, South and Central Italy, Spain and Portugal cannot accommodate the combination of full height semi-trailers on pocket railcars. There is a need to look either for techniques that grant a lower platform height with railcars (and not absorb all efficiency of rail operation), or for possibilities to enlarge some tunnels on most important trunk lines to offer a better gauge (Seidelmann, 2013).

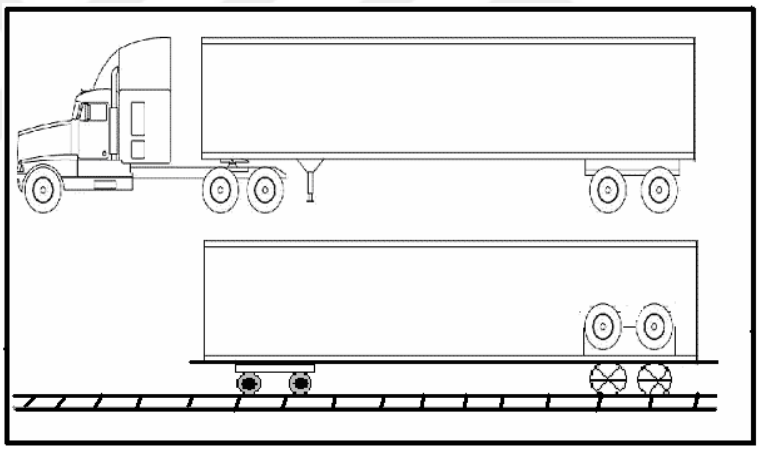


Figure 2.4. Semi-trailer transportation by railway

Moreover, semitrailers are dominantly used in road transport. Compared to containers and swap-bodies they prove to be more flexible especially in regard to the use of their cargo area. In road haulage semitrailers are preferred because of their flexibility not only in terms of manoeuvrability but also concerning the coupling and uncoupling process. Within the last few years greater sized semitrailers, called “Mega-Trailer” or “Jumbo”, are used in intermodal transportation commonly. Because of their length and internal height (about 3m)

the maximized cargo area is associated with important economic advantages leading to more profitable transportation. (Klingender and Jursch, 2011).

Skeletal trailers are the semi-trailers that is designed to carry ISO containers and allow the carriage of different sizes of containers (Rushton, Oxley and Croucher, 2000). However, semitrailers are only less applicable in intermodal transport chains because they are not stackable and require special equipment for handling compared to containers and swap-bodies. In general, only less than 3% of semitrailers are permitted in intermodal transport (Klingender and Jursch, 2011). The several differences between containers and semi-trailers are summarized in the Table 2 (Woxenius and Bergqvist, 2011).

	Container	**Semi-trailer**
Geographic transport market	Trans ocean/ deep sea/ short sea	Intra-European / short sea
Modal competetion	Air for deep sea leg/ Rail and road for feeder leg	Rail and road+fixed connection
Business priority	Utilising economies of scale	Providing customer convinience
Port geography	Few large hub ports+feeder ports	Many ports-partly bridge substitute
Hinterland depth	Deep	Shallow
Transport time/speed	Fast	Fast
Precision	Day	Hour
Order time	Week	Day/minute
Frequency	Weekly	Daily/hourly
Transport service coordinater	Shipping line, line agent, sea forwarder	Shipper, road haulier, general forwarder
Cargo dwell time in port	Days	Accompanied-minutes or none/ Unaccompanied-hours
Empty unit dwell time	Days/weeks	Hours/days
Port work content	Substantial	Limited
Rail technology	Very simple-flat wagon/twist locks	Complicated-pocket wagon/ king pin box
Road technology	Awkward at end points	Simple and accesible
Road-rail transhipment technology	Fairly simple-automation possible	Dimension factor in weight and handling

Table 2. Comparison between the container and semi-trailer shipping

2.2.4. Important Points of Intermodal

Several components are active in the intermodal transportation chain. The freight haulage shipper to receiver is performed by various transporters, the transhipment of the cargo from one mode to the other is the work of terminal operators and the way in which the chain is organized are in charge of intermodal operators (Lowe, 2008). Intermodal transportation, including several type of modes is complex when compared to unimodal transportation chain. There are several components that help to combine these special transportation units which are; roads, terminals, vehicles, operation rules, control and bill of lading (Evren and Öğüt, 2006). In addition, fundamental components of intermodal transportation can be specified in the following as; terminals, information technologies and process, instruments and labour force (Yersel, 2010).

- **Instruments:** Intermodal transportation performed by rail, air, sea and road mode. Truck and haul are preffered because of convenience of arriving each point rather than other transportation modes. Each module provides flexibility for the transportation organizators. For instance, trains are popular in intermodal transportation because of its cost benefits by providing energy consumption, production of carbon emission and volume of freight. If the selection of criteria is speed than air transportation is preffered even it costs more than other chains in which capacity of airplanes and high volume freight is transported by seaway (Yersel, 2010). In addition, transportation instruments should be standardized and convenient for operation. Otherwise, freight will be unloaded from containers and there should be extra handling of freight for integration in such cost benefit will be diminished and there might be freight damage risk in process of handling (Dölek, 2004).
- **Terminals:** Terminals are the important arrival and departure points for the intermodal transportation system rather than unimodal transportation chain because of having transition of the systems (Zeybek and Kaynak, 2007). In other words, terminals help storing of freight (Trip and Bontekoning, 2002), transhipment of freight and help operators to provide healthy operating system by preventing any anticipation and any delay (Hall, 2001). Further, terminals and transfer centers are the important parts of intermodal transportation for successful

transportation. Transfer centers should have adequate infrastructure in order to supply tranportation mode needs (Yersel, 2010), by providing coordination, transfer centers can enable the flow of freight without any interruption (Çekerol, 2007). For instance, railway intermodal transportation should be integrated with ports in order to be defined as intermodal terminal (Tümiş, 2008).

In addition the growth of "freight villages" has become a new from of intermodalism especially in Europe. These are intermodal terminals located inland from the port where the container traffic is unloaded and repackaged away from congested areas. These terminals usually involve motor carrier and rail access, often through dedicated highway infrastructure. In addition they are equipped with sophisticated information and technology software that allows tracking and tracing of goods. An example of this occurs in both Bologna and Verona in the north of Italy, in Dresden (Germany) or in Sogaris (France) (Capineri et. al., 2006).

- **Information Technologies and Process:** Information Technologies in intermodal transportation can be divided into two as for providing physical process and information-document flow (Çetin and List, 2006). For instance, information systems provide location of vehicles, operation of documents in customs, traffic control, security on road, automatization of store management and especially minimizing cost and risk of flow (Mun, 2008). Further, by eliminating technological handicap cost reduction will also decreased correspondingly (Çekerol, 2007).
- **Labour Force:** Qualified labour force is the one of the key points of the logistics sector especially in integrated transportation system. Handling of freight, supply and distribution, storing and customer services are the other departmants oft he logistics management. Indeed, university education and certificates are the other sources of education (Chikan, 2001). Qualified intermediate staff should be educated in logistics business high school and graduate schools are play role in order to bringing up high and low class managers (Yersel, 2010).

2.3. Intermodal Transportation Overview in Turkey

Turkey plays an important role in international trade market as well as in freight and passenger transportation. Ports are the biggest investment factor for logistics industry in both for rail and road transportation in Turkey (Güngörürler, 2004) since Turkey is a bridge between Asia and Europe, has dynamic demographic structure and potential of being transfer center (TUSİAD, 2012) due to geographical location and being in the center of two continent (Bakırcı, 2012). On the other hand, as the development of intermolism increase all over the world Turkey get nowhere fast due to it's infrastructure and lack of good management of rail transportation system hence intermodal transportation in Turkey still can not reach it's deserved place (Vitoşoğlu and Evren, 2008). Further, even though Turkey wants to become a regional power in integration process with European Union still lack of intermodal transportation in global world. The vulnerability of Turkish intermodal transportation system is terminals which are the center of transfer of freight in transportation chains (Zeybek and Kaynak, 2007).

In addition, in 80's and 90's Turkey has developed its' integrated infrastructure for road, rail, sea and air and continued to improve its development until 1990's. In addition, logistics is not a common term to Turkish logistics until 2000's. Especially in last 20 years as industry and trade developed storing, information and document management, cooperation among national and international companies, introducing new offices in abroad, improving quality (Çekerol, 2007) have become acquaintanced. In addition, several logistics companies are constituted. Further, unimodal transportation converted to multimodal transportation in logistics companies (Yersel, 2010).

Furthermore, in Turkey there are five different intermodal transportation types which are transportation of containers by rail, transportation of containers by water, Ro-Ro transportation, transportation by ferry and Ro-La transportation (Evren and Öğüt, 2006). Each transportation mode includes transportation chains of air, road, rail and sea. For better understanding each mode should be analyzed historically since intermodal transportation is combination of these chains.

2.3.1. Transportation Types in Turkey

For better understanding, Turkish logistics industry includes road, air, sea, rail and pipeline, inland transportation system (Yersel, 2010).

2.3.1.1 Road Transportation:

First, investments for transportation infrastructure is generally based on road transportation since Turkish roadways reached up to 63.383 km and it's 1.892 km is counted as highway (Kaya, 2008). Turkish transportation policy is based on road transportation system in such %92 of freight transportation and %95 passenger transportation hold on due to statistics. Increasing day by day, there are several applicants and encouragement policies applied for other transportation policies however still road transportation system is preffered since it has the advantage of door to door transportation, less volume of freight transportation, less investment cots. On the other hand, in Turkey until 1950 rail and water transportation policies were supported afterwards supplying of road transportation policies caused road transportation policies shaped in present position (Yersel, 2010).

2.3.1.2 Air Transportation:

Air transportation is the fastest industry that show an alteration in recent years due to large, fuel-saving and technologically developed aircrafts, developed air transportation services, privatization in industry and consumer based policies (Kaya, 2008).

Further, Turkish air transportation is shaped according to world air transportation system since the first aviation studies started in 1912 in Sefaköy, near by Ataturk Airport (Bakırcı, 2012). In 1954 Civil Aviation Authority was established in order to keep face with world civil industry, harmonize with international civil aviation regulations, control and regulate Turkish aviation operations (Ministry of Communication, 2009). By the end of the year 1950 due to investments and developments of civil aviation it became complicated to carry out airports and transportation operators under single organisation. In consequence of, transportation business assigned to Turkish Aeronautical Association in 1955 and airport business assigned to State Airports Administration in 1956 (DHMİ, 2009). All in all, aviation developments constitute a base for increase in air transportation

usage and increase in airplanes and passenger. In this sense first flight materalized in 1933 in İstanbul-Eskişehir-Ankara chain. In 1937 number of airline chain increased to 3 with İzmir-İstanbul, İstanbul – Ankara ve Ankara- Adana and in 1939 İzmir-Ankara flight started. Also, in 1943 Ankara-Van flight materialized for the first time for Eastern Anatolia (Taşlıgil, 1997). On the other hand, the first international flight actualized in 1947 by Ankara-İstanbul-Atina air line. (THY, 2011). Consequently, by the end of the year 2010 international flight point reached up to 157 whereas it was only 4 by the year 1957 (Bakırcı, 2012).

Further, in this sense, first airport established in 1912 in Yeşilköy which is a base for Atatürk Airport (THY, 2011). After 1930's number of airports steeply increased since after İstanbul and Ankara airports, İzmir ve Adana (1937), Afyon, Elazığ, Van (1943), later Sivas, Erzurum, Diyarbakır, Konya, Kayseri, Malatya Antalya, Gaziantep, İskenderun, Urfa (1944), Samsun (1945) ve Bursa (1946) airports were constructed hance by the end of year 1947 number of airports reached up to 19 (Taşlıgil 1997). Further, between 1990–2010 period construction of airports boomed in Turkey. In 1991 with the initial process started by Denizli Çardak airport construction since with the Çanakkale Gökçeada Airport opened to use in 2010 number of active airports reached up to 29 (Bakırcı, 2012). First, Turkey as having 52 airports and 370 airplane fleets in order to carry both passengers and freights increase its importance in transportation chain (Kögmen, 2014) and 34 airports with different magnitute (Kaya, 2008). In Turkey, air transportation (air cargo transportation) industry has been developed correspondingly by the imrpovement in air industry in recent years (Yersel, 2010) due to it's benefits air cargo become more efficient both internally and externally (Bakırcı, 2012).

Table 3: Distribution of Number of Airplanes in Turkey and Capacity of Cargo by years

Years	2004	2005	2006	2007	2008	2009
Number of Airplanes	202	240	259	250	270	284
Capacity of Cargo (tonnage)	471,374	549,562	873,539	962,539	1.093,096	1.133,621

Furthermore, Turkish air freight transportation drop back one step behind compared to other modes. The basic reason of the customers were not satisfied with the service quality in the past years and verge to other mode of transportation. Further, air cargo transportation implies to close the gap (Yapraklı, 2006). After 2000's still there have been fluctuations in the number o fair companies by the end of the 2002 there were 14 companies that serve for freight transportation but end of 2009 number of air transportation companies dropped back to 17 (Bakırcı, 2012). Further, there are limited number of the cargo running business in Turkey. Hence, in general other than businesses transportation of freight held through cargo section of passenger aircraft. Consequently, development of logistics in Turkey due to investments of global freight markets increase directly the importance of the transportation. On the other hand, road transportation preffered in terms of level development due to expensive costs of the transportation. (Yersel, 2010).

2.3.1.3 Rail Transportation:

Turkey has to become the main connection point between Europe and Asia, putting in value Turkish geostrategic position (European Commission, 2013). Before extablishment of republic rail transportation was in the hands of foreign companies and provides several benefits by regulations. Whereafter, with the proclamation of the republic national interests were observed and national economy was aimed in order to use resources for rail transportation (TCDD, 2010). In addition, as Turkish railway line is investigated there are not specific

raise of spurt in rail network after establishment of Turkish Republic. After 1950's the transportation policy have been formed on road transportation since rail transportation became as deficient of technological development and it's volume became less in transportation system (Kaya, 2008). Further, between 1977 and 2012 rail network growth reached up to only %18 since the largest part of the growth is because of high speed trains (Kögmen, 2014).

At the present time despite rail transportation has economic benefits and less accident, less environmental pollution (TUBİTAK, 1996), cheap and secure transportation (Kaynak, 2002) still not getting what it deserved in overall transportation sector. Rail transportation by its existing structure can not be defined as competetive and can not supply demand. On the contrary there are several rail transportation projects aimed especially high speed train projects are considered as new developing projects (Yersel, 2010).

In last 50 years Turkish rail freight transportation has decreased by %50. Almost %90 of the freight transportation actualized by road transportation (Çekerol, 2007). The reason is that rail, sea and air transportation systems are lack of infrastructure (Kaya, 2008). Unfortunately, compared to Europe, Turkey appeared as one step behind in price competetion according to its disadvantage of expensive transportation costs (Yersel, 2010).

Consequently, Turkish transportation policy constituted as the biggest European fleet but this can not converted into advantage. The biggest problem occured in international transportation system is the transit document problem. Significant countries assigned transit document for Turkish road transporters expired earlier than it is meant to be and freight is waited in the boarder gates in order to gain additional money. In addition, Turkey as a dependent country for petrol, spend its expenditure for road transportation with %72 of the budget compared to rail transportation with %7 prevents competetion among logistics companies due to lack of investments (Çekerol, 2007).

2.3.1.4 Sea Transportation

Sea transportation in Turkey is a developed chain with its 8 km coastal strip and 174 ports and piers since 6 of them are operated by Turkish Marine Operators and 4 of them are managed by TCDD. On the other hand, Turkey transports %88 of goods by sea transportation. In this sense, Turkey has increased it's percentage of passenger and freight transportation due to it's cost benefits but still there are some problems with the growth (Kögmen, 2014).

Although the sea transportation in Turkey is the cheapest transportation system, it is still can not receive what it deserves with it's 8.333 maritime border and surrounded on three sides by sea (Kaya, 2008). Ro-ro transportation is the best sea transportation system in Turkey when it is compared to other type of transportation modes (Yeşilbağ, 1999). The sea transportation which is the best way to carry the freight in big volumes is carried out by international regulations rather than national ones because the cost of transportation per unit is the cheapest among the others. Although, the age of the fleets in Turkey is evaluated negatively by the sea freight operators, recently sea trade fleets are being renewed in such Turkish vessel construction area plays a big role in fleet regeneration. Turkey by having coast to Aegean Sea, Black Sea, Mediterreanean Sea and Marmara Sea, having wide hinterland, advantage of transit transition perpetrate its chance for to be a high potential logistics exponent (Çancı and Erdal, 2009).

2.3.1.4 Pipeline Transportation

Pipeline transportation underdeveloped in Turkey compared to sea, rail, air and road transportation modes. Further, in recent years there are several regional transportation projects (Yersel, 2010). For instance, Russia- Turkey Natural Gas Pipeline Project, Bakü-Tiflis-Ceyhan Pipeline NABUCCO projects are play an important role in East-West transportation chain especially assist Caspian petrol to open up to the world. In other words, by pipeline projects Ceyhan will be one of the important petrol center in near future (Akpınar, 2005).

2.3.1.5 Inland Transportation

Turkey inland transportation is not opted compared to other mode of transportation systems since river streams are not sufficient and due to seasonal flow differences. Further, education level factor is the one of the important factor for the stagnation. On the contrary, Black Sea Region has limited capacity for inland transportation but has no contribution for national economic development (Yersel, 2010). Before, downstream of Sakarya River is thought to be developed since progress was taken a further step in 1976 but there were not enough freight to be transported and the project was cancelled. In the recent years, the project was expanded to Sakarya, Kocaeli, Bolu, Bilecik and Eskişehir since it has been taken progress in this field (East Marmara Agency, 2011).

2.3.2 Intermodal Transportation in Turkey

Turkey has a privileged geo-strategic location, which is an extraordinary comparative advantage. This physical configuration situates the country as a platform for economic, social and cultural exchange between Europe and Asia. These investments seek to contribute to the development of the combined transport network in Turkey along the east-west and north-south axes (European Commission, 2013). Turkish logistics industry by consedering its geographical advantage has the capacity of improvement. As the physical conditions of Turkey involves suitable base for road, rail, sea and air transportation system provides opportunity for integrated transportation especially for intermodal transportation to be applied. Hence, supporting programs applied by government for air and sea transportation also for rail transportation open a space for intermodal transportation sytem. In turkey there are several intermodal transportation projects which are planned by government such as Kars-Tiflis Project, Marmaray Project, Mersin Container Port Project and Çandarlı, Filyos Project (OECD, 2009). Internationally the assumption is that a transport system that depends exclusively on road transport is unsustainable in the medium term owing to growing congestion, negative external factors and the impossibility of guaranteeing the levels of safety and efficiencyrequired by the growing volume of traffic (European Commission, 2013). In addition, transportation of freight fast and economical by several transportation modes grow in Turkey day by day. For instance, companies

which converts unimodal transportation system into intermodal transportation has the advantage of becoming a worldwide company. Further, global alliances will be increased, strong integrated intermodal transportation systems will be developed in worldwide sphere (Yersel, 2010).

The purpose of this Strategic Plan for Combined Transport in Turkey is to define and start up an integral transport system balancing the different modes of transport, which requires investment, legislation and improvements to operations in railways, shipping and logistics (European Commission, 2013). Furthermore, White Paper documents which defines transportation policies of European Union declares that integrated transportation system should be supported in order to balance transportation modes. Consequently, government policies are shaped in recent years from European Union perspective which also support Turkish logistics industry to groom on intermodal transportation (Yersel, 2010). According to Strategic Plan Turkey has several problems since not market-driven but policy-driven, lack of equipment and efficient nodes (terminals). No master plan or regulation governing intermodality, lack of multilateral and bilateral agreements on the development of intermodal transport, long loading/ unloading times for vessels and trains, Joint Controls at Customs (lengthy procedures), permit requirement from the vehicles using Ro-Ro line, financial support measures, lack of harmonisation (TCTSER, 2013).

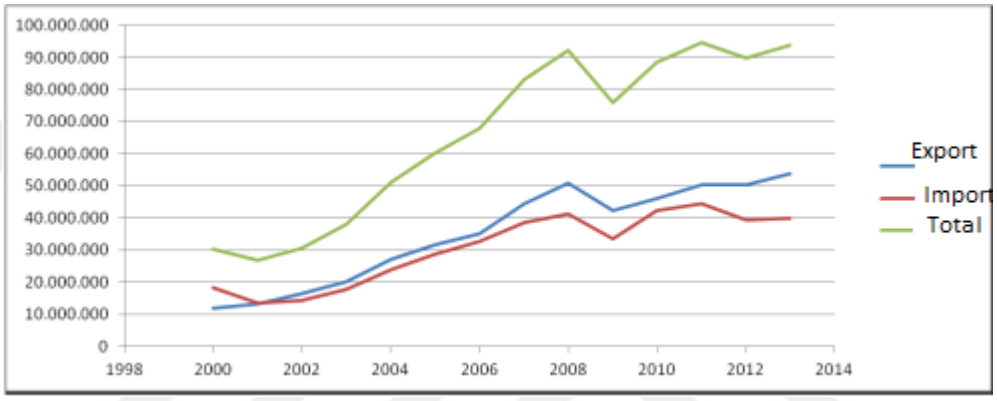
For more better understanding despite analyzing only infrastructure of intermodal transportation in Turkey each mode of transportation should be discussed in the framework of evaluating intermodal transportation in Turkey.

2.3.2.1 Turkish Road Transportation in Intermodal Transportation

Turkish road transporters have been transporting goods in intermodal transportation system by through long years in such trailers are standardized units that are suitable for integrated transportation system (Yersel, 2010). The changing transportation system provides fleet extension and spark off Ro-Ro lines between Turkish and European ports which includes road, sea, Ro-Ro and Ro-La transportation system (OECD, 2009). This infrastructure encompasses intermodal transport, which is to play a fundamental role in this unprecedented economic

expansion. Given the large capacity of the transport sector, the country must abandon its overwhelming dependence on road transport, which has a market share in the movement of goods and passengers exceeding 90% of the total (European Commission, 2013).

Several popular logistics companies have been transporting goods by intermodal transportation. On the other hand, several road transportation companies have warehouses and transfer centers in such each warehouse is selected according to its location of closeness to sea or rail (Yersel, 2010).



Şekil 2.4. Export and Import Volume of Road Transportation of Turkey (1000 $)

In addition, Turkish foreign trade has two routes while transporting of freights to European Union countries which are kapıkule border and intermodal transportation through Italy by Ro-Ro ship transportation. Especially, intermodal rail transportation is obliged since transportation through kapıkule customs gate has road limitations and limited transition time problem (i.e Austria) (Çancı and Erdal, 2009).

Furthermore, in Turkey %96 of passenger transportation and %92 of freight transportation is done by road transportation system. The dependency of rooad transportation causes several problems such as traffic pollution, environmental problems, transit documents, lack of earrant, road taxation, customs restrictions (OECD, 2009). In addition, the most common problem faced during road transportation is that quotas which are applied by different countries in order to protect their operators. Especially, it is obvious to see that transportation between European Union and Turkey has several problems such as

limited transition documents, highway payments, long anticipation hours and it decreases competetion. Further, acording to World Bank EU-Turkey Customs Union Evaluation Report it is reported that Turkey is requisited to pass from Greece and Bulgaria in order to pass freight by road transportation inn such there are several problems occured because of transition documents. In Greece, each year Turkish 35.000 transition permission is evolved and 100 € permission fee is paid for each going/arrival. There are limited number of transition permission in Bulgaria since Turkish road trnasportation operators buy 250.000 transition permission per year and 86 € is paid for each going/arrival (Kögmen, 2014).

Further, in Austria, Turkey should use Ro-La transportation chain due to applications of Austria government in order to protect environment. Turkish road operators are seriously faced with problems because of Austria's transportation regulation since they can only get 15.000 transition permission indeed the official number is 130.000 to reach Germany as a final destination point. Hence, rest of the transition held by RO-LA and for each truck 250 € hidden cost is paid. In addition, RO-LA is waited 4 or 5 days due to delay of transition documents. Further, in normal circumstances the transportation of goods reach to its destination point in 4 days but by RO-LA transportation system it is doubled which is a danger for perishable goods. Turkish operators get 24.000 free permission transition permission and 16.400 paid vacation (500 € for each going/ arrival) (İKV, 2010).

Furthermore, Italy quota system is limited which allows only 100.000 truck for to pass through borders for each year by transition permission. Hence, Turkish trucks which are transported by Ro-Ro reaches to Trieste Port and than continues to North (i.e. Germany) reast easily where there are several problems faced in West due to transition permit. Turkish road transporters can only get 6.000 transition permit and additional permission is not allowed.If permission is not allowed Italy would not allow trucks to pass through in east-west line. All in all, Italy as well as Turkey obliged operators for permission paper for empty trucks. Further, due to time lag Turkish transporters pay 250 € for each truck. In such, some countries allow trucks to pass complimentary if the delay time is under 36 hours. Neverthless, in some European Union countries permission quotas are extinct and trade is virtually ceased (Kögmen, 2014).

2.3.2.2 Turkish Air Transportation in Intermodal Transportation

Air transportation is not substantial in intermodal transportation services due to cargo transportation. New regulations and strategies should be developed for high priced freight, express transportation, perishable goods. Logistics services should be developed for high demand of air industry (OECD, 2009). Turkish air transportation operators are operationg freight operation by passenger airplanes where special cargo divisions are seperated. Further, special cargo loading units are not suitable with other transportation modes since handling of freight obliged in intermodal transportation system (Yersel, 2010).

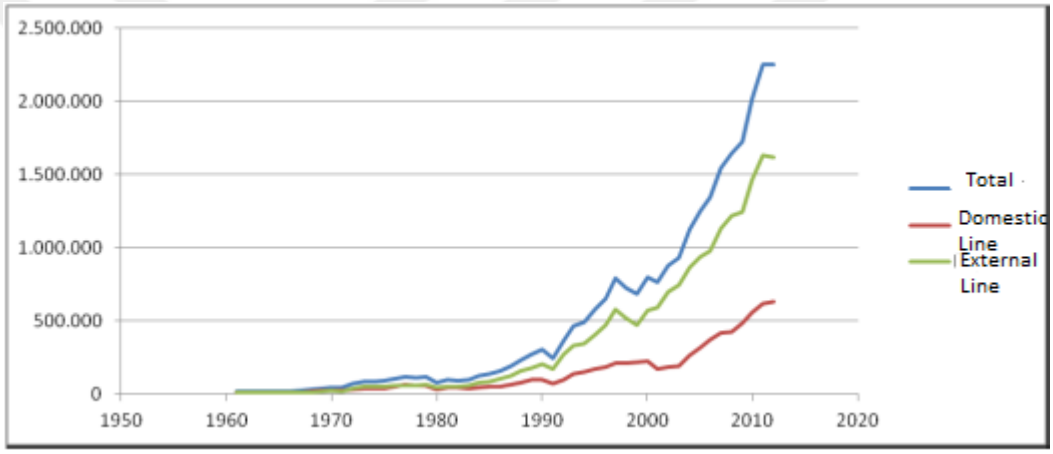


Figure 2.5. Volume Freight of Air Transportation in Turkey (Tone) (TÜİK)

Furthermore, another important matter is that projects for adaption of European Union bill of lading have accelarated in recent years and flight security, psasenger rights, environment and slot systems are enhanced (Kögmen, 2014). Still, air transportation industry has pilot and qualified staff problem due to it's extraordinary development (Kaya, 2008). Several studies show that infrastruce of air transportation system is healed in order to eliminate problems through customs and serious bureaucratic process.

2.3.2.3 . Turkish Sea Transportation in Intermodal Transportation

Ports are linked with countries' economic situation directly in fact it is the important structure for integration of all markets since they are directly affect sea transportation (Kaya, 2008). Directly linked both with port infrastructures and fleet is the amount and percentages of cargo handled in the Turkish ports. In addition, 44 % of the total corresponds to solid cargo; 39 % to liquid bulk; and 17 % to cargo in containers (European Commission, 2013). Furthermore, frequent and regular Ro-Ro ferry transportation implemented in Turkey which combines industrialized North region and Asia in Marmara Sea. In such, by reduction of consumption tax of ship fuel traffic congestion increased hence RO-RO transportation is the suitable transportation type for the region (OECD, 2009). Regarding Turkey maritime transport, both domestic and international, has a paramount importance due to the fact that four of the most important industrial and agricultural areas are close to the sea. These areas are Istanbul, Izmir, Bursa and Adana (European Commission, 2013).

Turkey, as having several advantages due to it's geopolitical advantages for ports still not see value (Kaya, 2008). Further, there are few number of problems in turkey for container transportation by sea intermodal transportation. Further, operational problems are not occured since bulk cargo are not suitable to carry by intermodal transportation. Indeed, hinterland of ports should be designed for intermodal transportation since there are several new privatization applications for ports which increase utilization of sea transportation (Yersel, 2010).

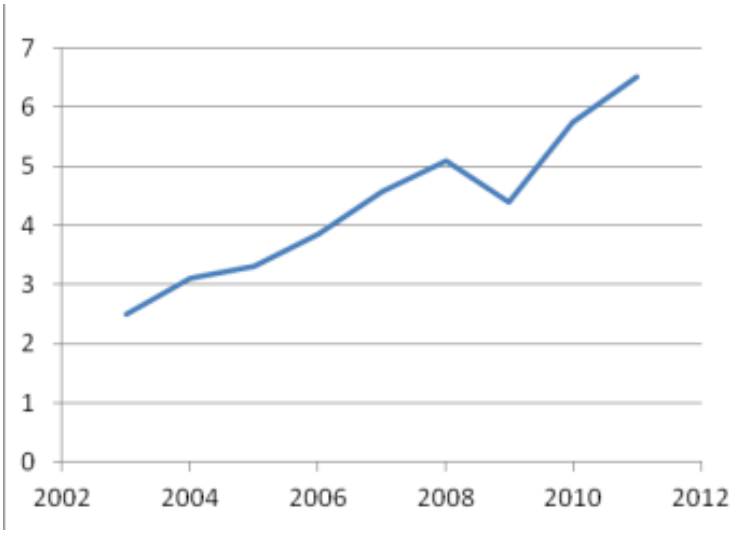


Figure 2.6. Number of Container Transported by Sea Transportation in Turkey (Milyon-TEU) (TÜİK)

Further, one limitation is that some Turkish ports have design faults that prevent the potential expansion of their operational areas or even a possible railway connection, despite the fact that the topography of most of the new infrastructure being considered is not an obstacle to turning the port locations into combined transport nodes (European Comission, 2013). On the other hand, Turkish sea fleets have technical problems and fleets are so old that new regulations are organized in order to eliminate actual port time. Further, even Turkey is sorrounded on three sides by sea still sea intermodal transportation is unadvanced. Consequently, economic, ne wand big ships and Ro-ro transportation ships are located in Turkish sea transportation since containers are transferred by Ro-Ro easily between sea, rail, road transportation modes. Especially, ferry rail wagons that are transferred by rail increase sea intermodal transportation in functional way (Erdal and Saygılı, 2009). Furthermore, Turkey has over a barrel position with European Union countries which have coastal border with Mediterrenean Sea since Turkish ports are less productive and rudimentary.This may cause port services to be unjoined (Yersel, 2010) since in Turkey still logistics centers and distiparks are not constructed. However, there is not value-added port since Turkish foreign trade is carried by maritime transportation. Also, lack of land cause avoid of logistics centers and distriparks in ports (Zeybek, 2007).

2.3.2.4 Turkish Rail Transportation in Intermodal Transportation

Turkey has 10,984 km of railways, operated by the General Directorate of Turkish State Railways (TCDD). Since most of the railways have been in use for quite a long time, the Turkish government is aiming to modernize the system through various projects (European Commission, 2013). In recent years, Turkish rail transportation questioned in the name of trade and infrastructure dimensions and rail transportation process instance started by government. As a result, rail transportation accelarated in Turkey as high speed trains are put into practice (Alataş and Somunkıran, 2004), investments are maintained in order to enhance intermodal transportation (TOBB, 2012), TCDD's incentive applications for allowance of third party wagon and container service (Rota, 2011). In addition, government policies are concentrated on block train transportation to Europe due to problems occured limitations of transit documents (Yersel, 2010).

There are four regulated block train include swapbodies operate between Germany and Turkey each week. Besides, there is a private market which carries autos by rail wagons. Since 2006 block train is applied between Romania and Turkey for to carry autos in two weeks period. For instance, another international rail-ferry network passes through is Van lake which combines Iran and Europe. Further, block train system between Europe and Middle Asia are handled by TCDD. All in all, in national transportation, containers, swap-bodies and semi-trailers are not suitable for rail transportation. In short, centers of Turkey have long distances among each other (500-600 km) compared to West European countries each carry freight by intermodal transportation (OECD, 2009).

Several studies indicated that Turkey has several benefits of intermodal rail transportation due to some reasons such as; has opportunity of transit transportation due to geographical condition, being in the center of East- West energy, trade and transportation network (Deveci and Çavuşoğlu, 2013) , has dynamic logistics sector, raise in investments based on intermodal rail chain, usage of container increase in all over the world either in Turkey, development in Trans-Europe Asia Network and being in the center of new railway routes (TOBB, 2012), incentive projects of TCDD for the intermodal railway transportation system by providing private container and wagon investments

(Rota, 2011), projects such as BALO, CREAM intermodal projects (Deveci, 2013).

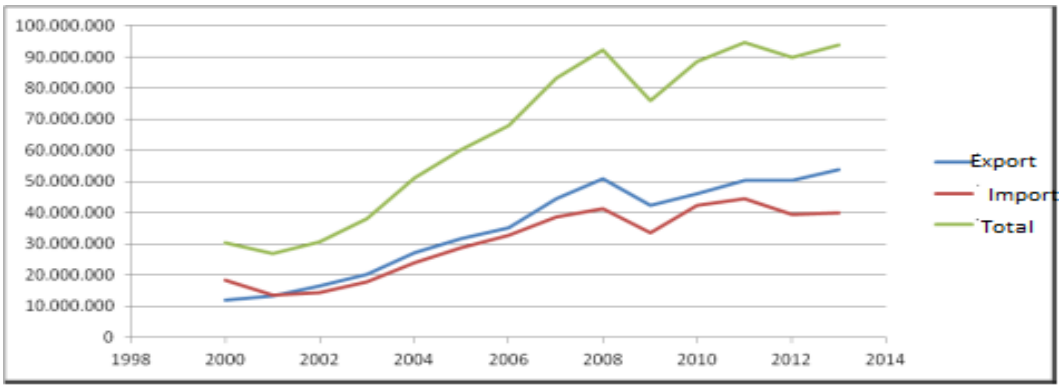


Figure 2.7. Volume of Freight Transportation in Turkey by Rail Transportation (TÜİK)

Turkish rail intermodal transportation is based on transportation of goods by containers. The two mode of transportation systems are; block containers and Ro-La transportation. Container block trains are governed by TCDD between Europe and Middle Asia corridors (Deveci, 2013). Rollande Landstrasse, walking road in Turkish is a type of transportation system which road vehicles are transferred by wagons. Hence, being a widespread transportation type in England, Austria, France, Germany and Hungary it is also environmental friendly and cost beneficially (Çancı and Türkay, 2007). The important transportation type is Ro-La transportation between Turkey- Europe corridor which foresees three routes which are; Halkalı / Bulgaria/ Romania/ Austria (87 hours), Halkalı/Bulgaria/Serbia/ Crotia/ Slovenia/ Austria (72 hours), Halkalı/ Bulgaria / Serbia / Hungary/ Austria (70 hours) (Deveci and Çavuşoğlu, 2013). Unfortunately, Ro-La transportation between corridors are not so successful due to long distances, cost of drivers, Bulgaria's unexpected increase in Ro-La cost (Onur, 2006). In such, Marmara Project will provide uniterrupted freight transportation (Deveci, 2013) and also Trececa Project which connects Europe-Caspian-Asia transportation network project will provide Turkey to be in the center of trade corridor (Yersel, 2010).

From the point of view of the development of railway infrastructures for the combined transport Turkey shows the following specific characteristics: A great geographical extension, with long distances between certain points and the border gates and A very rugged topography: only the 46% of Turkish soil can be considered flat, and certain areas have slope rates of 30/1000 (European Commission, 2013). Furthermore, Turkish rail transportation has the existing capacity of rail transportation infrastructure. However, especially for train stations special sanctions should be applied in order to develop operational settlement. Especially loading and unloading spaces and opportunities should be enlarged, transfer terminals should be constructed, rail- sea- road transportation chain should be enhanced, infrastructure of rail intermodal transportation should be developed due to low costs (Yersel, 2010). However the main problem is that most of the existing railway network was constructed long ago, curve radius is very low and it is not adapted for the use of modern technology (European Commission, 2013). Turkey rail intermodal transportation is not suitable due to lack of information and distribution system either sea transportation is not developed because of lack of infrastructure of ports and expensive cost of port transportation. Further, Turkish freight transportation have been conducted on road transportation system which ruled out rail transportation caused cost problems and operation problems (Çekerol, 2007). Especially, integrated transportation by road/ rail chain has template problem of rail lines. In this sense, nonconcurrence of tunnels is the basic problem since intermodal transportation should be investigated according to gabarite problem. For instance, Halkalı-Europe rail transportation face with several problems due to tunnel template (Evren and Öğüt, 2006). Hence, Turkish rail transportation chain has several threats such as Turkish rail line is not so interminable enough to reach all regions of Turkey cause interrupted transportation between Turkey and Russia (Deveci and Çavuşoğlu, 2013), exporters and importers are hard to find enough wagons and locomotives (TUSİAD, 2012), weakness of ports and railway networks (Deveci, 2013), lack of infrastructure of transition of modes (TOBB, 2012), old infrastructure and equipments are used in railways, strong position of road transporters (Deveci, 2013), lack of information technologies in intermodal rail

transportation (TOBB, 2012), opportunities and funds are rebounded due to extension of European Union membership (TOBB, 2012).

CHAPTER 3

EUROPEAN POLICIES OF INTERMODAL TRANSPORTATION

3.1. Transportation Policy of European Union

European Union is the second resource of the global trade area. European Union tries to find ways to compete with its' regional opponents which are US, Japan and China. EU also manages transportation policies, laws, projects and investments and aim to improve supply chain management operations (Orhan, 2003). The successful promotion of intermodal transport is the most important action in order to maintain sustainable transport which is one of the detent transport policy objectives in the European Union (European Commission, 2001). For that reason, the European Commission, through research projects and financial instruments, supports policies, projects and the development of intermodal transport. This effort can contributes to the modal shift from road to other transport modes that assemble the ''Intermodal Transport'', such as rail, inland waterways and maritime transport (Tsamboulas et. al. 2007). Today with the effect of increasing transactions, the European Union's transportation policy prioritizes railways and short sea shipping (SSS) as complements to road transport that high external costs, both in environmental terms and through traffic congestion, noise, accidents, and so forth (Navarro, 2014).

Furthermore, the European Union Commission recognizes the importance of European Union intermodal transportation in the 1990's since European countries specifically concerns on rail transport and competetive transport modes (Konings, 2008). For instance, world petrol crisis which occured in 1970's started Europe countries to question benefits of railways connecting ports to railways and railways to roadways. In this framework, in 1991 European Union policies which maintain liberalized rail transportation network projects were founded (Yavuz, 2012).

Several research projects funded by the European Commission have addressed the intermodal transport suggesting initiatives for the promotion of its usage in freight transport (Tsamboulas et.al., 2007). European Union countries and new delegates confected new regulations and long term projects in order to

create integrated transportation network. All of these projects such as AGR (European Agreement on Main International Traffic Arteries), AGC (European Agreement on Main International Railway Lines) which are led by UN/ECE (United Nations European Commission of Economy) aimed to transfer viscious traffic of road/rail intermodal transportation chain to railway mode of transportation (Evren and Öğüt, 2006). AGTC Agreement effectuated in April 1991 which declays renewing of railway network of Europe in order to develop East-West intermodal combination (Evren and Tekin, 1997). LOGIQ identified the actors in the decision-making process and contraints of the intermodal transport (LOGIQ, 2000). PROMOTIQ, another funded project that identifies the opportunities and barriers for the actors for door-to-door transport services (PROMOTIQ, 2000), IQ suggested to that intermodal transportation's market share can be increased by supplying information (IQ, 1997), RECORDIT maintained to improve competetetiveness of intermodal transport in Europe by cost reduction because price barriers seem to form an obstacle for its development (RECORDIT, 2001).

European Commission issued "White Paper" in 1985 in order to fasten the liberalization and harmonization of transportation modes followed by Maastricht Agreement which was signed in 1992 for improving political and economical base for Trans-Europe Transportation Network (Çekerol, 2007) for European Union's integrated market and it's competetive environment (Çelik, 2007).

In June 1995 *"Common Transportation Policy: Action Plan for 1995-2000"* accepted by Europe Commission followed by Green Paper based on "fair and efficient pricing in transport" and also a notification emitted in 1998 later in 2000 (Çekerol, 2007).

In May 1997, EC issued *"Intermodal Freight Transport in the EU"* document which was a step for the development of intermodal transportation which refines the Trans-European network and nodes, realise a single transport market, remove obstacles to intermodality and friction costs and also emphasizes the cooperation between transport modes which favours competetion between transport operators (Lowe, 2007)

Most notably publication in 2001 *White Papers: European Transport Policy for 2010: Time to Decide* declared for international rail-freight services across the EU as called *Railway Directive of 1991* which focuses on integrated market for rail-freight services (Lowe, 2007). EU Policy based on *White Paper: Tasks for the Decades to come 2011 Transport White Paper* aims of shifting 30% of long-distance road to rail by 2030 and 50% by 2050, reducing the oil dependency of economies through modal shift, significant reduction of GHG emissions of transport, fulfilling the European Commission's vision would require the tripling of rail freight's prevailing market by 2050 (Burkhardt, 2011).

In White Paper on the European Transport Policy, published in March 2011 the European Commission, amongst other goals, aims at optimising the performance of multimodal logistic chains, including by more use of more energy-efficient modes (European Commission, 2011). Also,"balancing policy" should be striked between economic development and request of the society for quality and security in order to establish modern and sustainable transportation system and also commission has several aims for the development of intermodal freight transportation (Çekerol, 2007). Furthermore, Directive which was adopted in 12th of September 2011 aims to charge road transport with costs due to its negative impacts on other sectors and society itself (e.g. costs for air pollution, traffic jams, noise) (EIA Annual Report, 2013).

European Union transportation policy has four basic programs. These are given below;

- Trans-Europe Transportation Network
- Southeast Europe Transportation and Energy Infrastructure
- Marco Polo Program and Sixth Program: Civitas II ve Concerto Program (Çekerol, 2007).

In order to reduce imbalances in transportation and to provide network connection and also to reduce environmental problems, the most attention seeking projects are TEN-T and Marco Polo Project (European Commission, 2005). Also in order to develop sustainable transportation network, there are 30 projects in the name of TEN-T. These projects can be generalized as road,

water, rail, fast rail, intermodal, Motorways of the Sea-MOS and airport projects (Çevik and Gülcan, 2011). These supporting programs of European Union are clarified in the following chapter.

3.1.1. Supporting programs of European Union for Intermodalism

European Union transportation policies reflects European Union standards in transportation system. European Union standards are important in terms of protecting social freedom and rights of citizens in public sphere as well as protect economic competetion in European Union for sustainable and balanced development. European Union policy was formed in order to contribute and ensure the single market and intensify economic and social integration (Çevik and Gülcan, 2011).

Furthermore, European Union fundamental principals of development and social adaptation program endure Roma Treaty which was signed in 1957 as establishment of European Economy Community. Hence, treaty involves articles which is related with transportation policies (Çelik, 2007). In 1993, fundamental matters of Trans-European Transport Networks (TEN-T, TEN) Project were defined by Maastricht Treaty and legal basis were formed. In addition, the aim of project is to eliminate barriers of deficient interregional networks of socio-economic integration within the scope of developing single market (European Commission, 2010). In White Papers which were published in 1985, 1992, 1995, 2001, one of the fundamental aim is to change the balance of transportation modes by reducing congestions in laws. Further, in White Papers problems deriving from the liberalization of transportation markets discussed. In this sense, renewing of road transportation, strenghtening railway transportation, reducing problems in air transportation, gearing up sea and inland transportation, providing sea-inland-rail integration, incentive applications for intermodal transportation, security and cost of transportation are regulated (Commission Of The European Communities, 2001). In this several regional projects were constituted and new financial funds were spared.

3.1.1.1 Trans – European Network Project

European Commission defined Trans European Networks (TEN) in 1996 which covers ports, airports, roads in order to form rail transportation network. According to TEN Project, 14 projects have been funded in the first run. Hence, projects based on high speed trains are the begining of Europe High Speed Train Network (Orhan, 2002). These principals include road, rail, inland, sea and air transportation systems which combine European countries economically. Trans-Europe Network investments are only %10 of the investments. European Commission funds are spent mostly for infrastructures, single market target economic and social adaptation. The Project was initially foresighted to be finished by 2010 but due to financial difficulties there is an extension (European Commission, 2010).

TEN-T Project targets developing infrastructure for transportation, building centers for transportation modes, and establishing single market transportation field in order to improve free movement of services, passengers and freight. [5] Furthermore, European Commission introduced a new project in order to reduce the density of transportation. In 2010, new regulations were held through in order to reform Trans-Europe Transportation Network. In this new report assigned in 2003, development of new sea transportation routes and projects, transfer of new funds, enlargement of Trans-Europe Transportation Network with new members until 2020 were discussed. Further, as primary objective of European Union enlarging the fund up to %30 rather than %10 then for increasing the competetion of European Union Research and Development investments was one the topics. Until 2020 with the new regulations integrated market will be freshened and European Union's competetive environment will be strenghetened. In this sense, Trans-Europe Network will contribute to European Union economic devleopment and integration (Kögmen, 2014). Consequently, consedering the development of new infrastructure projects for high speed trains and the transfer freight transportation from road to rail transportation TEN-T is a successful project with it's targets. All in all, European Single Market Road Map was published in 2011 in order to increase high speed trains by the end of 2030, finishing high speed

[5] Trans- Avrupa Ağları, http://www.ab.gov.tr/?p=86&l=1, <03,05.2016>

train network by the end of 2050 in order to shift passenger transportation to rail transportation and by the end of 2050 all networks should be integrated with air transportation system.[6]

3.1.1.2 Pilot Actions for Combined Transport

Furthermore, The PACT programme introduced in 1992 has led to great initiatives, with 167 projects launched between 1992 and 2000, despite the modest budget the European Commission aiming at the promotion of intermodal transport some financing instruments have been introduced in the form of Pilot Actions:

(i) PACT Pilot Actions for Combined Transport (1997–2001) which aims to increase the competitiveness of combined transport by promoting the use of advanced technology in the combined transport sector;

(ii) MARCO POLO programme which intends to assist the transport and logistics industry in achieving sustained modal shifts of road freight to short sea shipping, rail and inland shipping (Tsamboulas et.al. 2007).

In addition, European Commission by generating PACT (Pilot Action for Combined Transport) with 53 million Euro aims to improve environmental friendly combined transportation. Sliding freight transportation from road to rail, sea, inland will reduce traffic pollution and to create environmental friendly transportation system. For instance, PACT acts as a leader for Germany- Austria project by creating rail-sea combined transportation span decreased to 48 hours (Kaynak, 2002).

Furthermore, few successes of the PACT can be summarized as follows;

- new combined rail/sea link between Sweden and Italy, via Germany and Austria which takes some 500 000 tonnes a year off the busy roads and improves journey times significantly (by up to 48 hours),
- rail/air services between Schiphol (Amsterdam) and Milan airports have already taken the equivalent of 45 air freight pallets per week off the roads in their first year in operation,
- a shipping service in La Rochelle-Le Havre and Rotterdam has shifted 643 000 tonnes of cargo from road to sea in three years,

[6] Trans- Avrupa Ağları, http://www.ab.gov.tr/?p=86&l=1, < 03,05.2016>

- an information system for freight tracking, accessible via PC and the Internet, translates messages written in different languages into a single, common language (European Commission, 2010).

3.1.1.3 Cabotage in Europe

Any freight operator should obtain Cabotage in order to pass through one country to another without any barrier. Cabotage system was accepted in June 1st, 1990 due to protect competetive system of single market and with the help of improvement of institutions it was effectuated in 1998. Further, liberalization of cabotage was supported by adjustment of autoban taxation (Çelik, 2007).

In addition, international sea maritime should be liberalized. On the other hand due to several reasons Cabotage By Sea entered into force in June, 1993. For this reason, France, Italy, Greece, Portugal and Spain liberalized Mainland Cabotage and this entered into force in 1999. Cabotage came into force for reducing high pricies, obtaining standardization of shipping transportation in hazardous substance, and taking precaution for competetion policies. After 1996, three priorities were defined: security, continuity of open market, strenghtened competetion especially after tank accidents (explosion of Erika in 1999 and Prestige in 2000). In addition, environmental pollution of fuel truck, control of ports, dissalow of single hangar tanks, constitution of A Community Monitoring system, information and inspection system for maritime traffic, formation of European Maritime Safety Agency were taken as a step for precautions.Cabotage which was revived in 1993, eliminates route system which hinder operators to select best mode of transportation can be seen as a contribution for inland transportation (Çelik, 2007).

3.1.1.4 Marco Polo Programme

Another measure of considerable significance is the Marco Polo funding initiative designated as a community support programme for promoting intermodal transport (especially short sea shipping and inland waterway modes and the motorways of the sea) through providing financial assitance to improve the environmental performance (Lowe, 2007). In global era, road transportation limits economic improvement because of pollution, traffic and accidents. In order to reduce these grayness, due to special requirements were created for rail and sea transportation in Europe and Asia. For instance, in 1960 high speed trains, spread

through all over the Europe by the mid-1980's (Çevik and Gülcan, 2011). Hence, associated with Morco Polo programme environmentally-conscious policies, full freedom but continuos control, delay on customs, coasting, reducing taxes and less legal sanctions were aimed. In 2004 European Commission suggested Marco Polo II programme followed by Marco Polo programme. Marco Polo II (2007-2013) had a budget of 740 million Euro, was accepted by Europe Parliament in order to provide new regulating system for environmental issues (Çekerol, 2007). European Union tries to provide transportation security and enchance environmental protection (Çalık, 2008). In 2003-2009 in period, 125 projects involving more than 500 companies received funding from the Morco Polo programme which has the goal of stimulatig and supporting the development of intermodal transport (EIA Annual Report, 2013). In addition, new supporting program Marco Polo targeted at innovative initiatives to promote sea motorways in particular, will aim at making intermodality an economically viable reality (Konings, 2008).

3.1.2. Intermodal Transportation Applications in European Union Transportation Policies

Intermodal transportation in general meet %5 of Europe freight Intermodal overall transportation traffic. In order to increase incentive programs of intermodal transportation European Intermodal Association (EIA) and promotion services (IPC) (Savy, 2005). EIA investigated the ways o gain with higher (green *and* profitable) values in a global intermodal environment. For EIA it was a high level and far reaching opportunity to underline the intermodal interest of its members while using sustainable market best practices right in the heart of legislative policy making processes.

3.1.3. White Papers

The promotion of intermodal transport entails massive shifting of freight movement from road to more environmental friendly modes (rail, inland waterways, short sea shipping). In this respect, intermodal transport has been recognized as a priority in the European and National Transport Policies (Tsamboulas and Kapros, 2000). European Union suggests sustainable transportation policy which emphasizes the reduction of environmental pollution

involving road, rail, inland, energy consumption (Deveci and Çavuşoğlu, 2013). The White Paper is a part of the traditional transport-related European strategic documents. In 1992, the European Commission published White Paper on the common transport policy, which was dedicated to market opening, in line with the priorities of the time. Almost ten years later, the 2001 White Paper emphasized the need for managing transport growth by achieving a more balanced use of all transport modes (European Commission, 2001).

In 12 September 2001, European Commission suggested *White Paper—European Transport Policy for 2010: Time to Decide* which proposes transportation policies to reduce problems of transportation services. In this document eliminating environment and road pollution, reducing traffic density, protecting competetive structure. In this sense, alternative transportation modes were provided in order to encourage competetion environment and transportation policies (Çelik, 2007), sustainable transportation, usage of vehicle technologies, intermodal transportation and environmental policies are suggested (European Commission, 2001).

Within the European context, the Commission's 2011 white paper on transport policies, entitled "Roadmap to a Single European Transport Area—Towards a Competitive and Resource-Efficient Transport System," sets out guidelines for transport policy until the year 2050. It contains interesting details on the future of the freight transport sector, particularly with regard to forthcoming infrastructure and transportation policy priorities of European governments (Navarro, 2014). The *White Paper –European Transport Policy for 2011: Time to Decide 2011* emphasizes importance of transportation in economy and social life and future of Europe is discussed in the frame of global world. The actions suggested are related to the general transport policy and they address issues that include among others (European Commission, 2001), Environmental, Economic and Social integration of Europe. Therefore, an action has the following general objectives:

• **Transport objectives:** These aim to ensure the effective functioning of the Community's transport system and the protection of the environment. They also

aim at advancing the state-of-the-art of an intermodal transport system or creating a new one.

• **Sector objectives:** They refer to objectives which is for a single transport sector.

• **Area objectives:** They refer directly to the areas of major policy interest within each transport sector. They support a policy decision and they aim at implementing a new concept.

• **Application objectives:** These address the implementation of an action and they also aim at building a consensus among different actors of intermodal transport chains. (Tsamboulas et.al. 2007).

In new White Paper there are several principles adopted.These can be setates as reducing dependency on carbon based fuel, integrated transportation chains will be used in large volume of freight and large quantity of passengers, environment friendly transportation, tendency towards rail and sea transportation, less usage of road transportation, minimizing large quantities of energy consumptions (TEN corridors), reducing transportation barriers, new financial funds for infrastructures (TOBB, 2012).

Major challenges for European Transport have been investigated in White Paper documents. European Union seeks to help transport systems to meet the major challenges facing them. For better understanding White Paper principles and goals are investigated according to its purposes in the following.

In March 2011, the European Commission adopted a comprehensive strategy for year 2050 for a competitive transport system that will increase mobility, remove major barriers in key areas and fuel growth and employment. At the same time, the proposals will dramatically reduce Europe's dependence on imported oil and cut carbon emissions in transport by 60% by 2050 (European Commission, 2011). It consists of a roadmap to aim reduce Europe’s dependence on imported oil and cut carbon emissions in transport by %60 in 2050 since developing intermodal transport such as possible adaption of legislations on technologies and needs and better aerodynamic performance, reduction of overall energy consumption and emissions (EIA Annual Report, 2013). The document clearly states that the transportation system is unsustainable and needs to be changed, as it cannot continue to develop along its present lines. In the same vein as the previous white

paper, published in 2001, intermodal transportation is understood to be crucial, and the integration of different transport modes are seen as a way to ensure sustainable and efficient transport systems (Navarro, 2014).

Road- Lorries can now operate in countries other than their country of registration, reducing the number of empty return journeys. This new flexibility encourages competition, drives up the quality of both freight and passenger services, cuts costs and makes journeys more efficient, thereby reducing pollution. Uniform technical standards have also improved safety (European Comission, 2011). On the other hand, White Paper, supporting program of European Union declays that road transportation will increase between 1998-2010 by %50. Hence, it is suggested that sea, rail and inland transportation should be developed in order to reduce disadvantages of road transportation (Çekerol, 2007). The number of deaths on Europe's roads halved between 1992 and 2010 (falling from 70 000 to 31 000). Between 2010 and 2013, the figure fell by a further 17%. This means the EU is on track to achieve its strategic goal of halving road deaths again by 2020.
Freight shipments over short and medium distances (below some 300 km) to a considerable extent will remain on trucks. Therefore it is important, to encourage alternative transport solutions (rail, waterborne transport), for improving truck efficiency. In particular, the elimination of remaining restrictions on cabotage should be pursued (European Commission, 2011). In addition, EURO V vehicles will be exempted untill the date of application oft he EURO VI standards, untill 31 December 2013. Less polluting vehicles than EURO VI, namely hybrid and electrical heavy goods vehicles are exempted.

Air – Flying is becoming easier and cheaper, with new airlines, more routes and hundreds of services connecting large numbers of airports across Europe. The EU's Single European Sky will help that trend continue. "Open skies" agreements allow any EU airline to fly from any EU airport to a city in another country. These agreements also exist with the US, Canada, Israel, Balkan countries, Morocco, Jordan, Georgia and Moldova – and more are on the way. Check the status of aviation relations by country (European Commission, 2011).Unsafe airlines are banned in Europe. EU works with organizations like International Civil Aviation Organization and International Maritime Organization to promote safety and

security standards. Improving the efficiency of aircraft and traffic management operations has to be pursued in the air sector. It will secure a competitive advantage on top of reducing emissions; attention is needed however to avoid imposing excessive burdens on EU operations which could compromise the EU role as 'global aviation hub'.

Rail – Any licensed rail company can now offer its services anywhere in the EU. The high-speed rail network has expanded rapidly in recent years, saving passengers time and money. Further improvements are coming (European Comission, 2011). By 2050, complete a European high-speed rail network. Triple the length of the existing high-speed rail network by 2030 and maintain a dense railway network in all Member States.

Maritime – 75% of Europe's trade with other countries and 40% of freight within Europe is shipped by sea, and some 400 million passengers use European waterways every year. Opening up the maritime market has allowed shipping companies to operate and move freely in countries other than their country of origin. In 2014, the EU Council and the European Parliament agreed, by 2025, to promote the development of a core network of liquefied natural gas refuelling stations at the key maritime ports that make up the trans-European network, as well as a shore-side electricity supply (European Comission, 2011).

Environment- EU supports research and innovation and effective projects for new green transport technologies. For instance, new rules are requred to EU countries to promote clean technologies such as cars that run with electricity, bargesi gas powered trucks) (European Commission, 2011). The long-term goal is to apply user charges to all vehicles and on the whole network to reflect at least the maintenance cost of infrastructure, congestion, air and noise pollution. Under the current Directive vehicles complying with the most applicants emission standards will be exempted from the air pollution charge for four years after those standards have become applicable; that means that vehicles oft he EURO VI emission class will be exempted until 31 December 2007 (EIA Annual Report, 2013).EU Regulation No 443/2009 sets an average CO_2 emissions target for new

passenger cars of 130 grams per kilometre. The target is gradually being phased in between 2012 and 2015. A target of 95 grams per kilometre will apply from 2021. For light commercial vehicle, an emissions target of 175 g/km applies from 2017, and 147 g/km from 2020 (European Commission, 2014).

Congestion affects both road and air traffic. It costs Europe around 1% of annual GDP – and freight and passenger transport alike are set to growth.

Oil dependency – despite improvements in energy efficiency, transport still depends on oil for 96% of its energy needs. Oil will become scarcer in future, increasingly sourced from unstable parts of the world. By 2050, the price is projected to more than double compared to 2005 (European Commission, 2011).

Greenhouse gas emissions – by 2050, the EU must cut transport emissions by 60% compared with 1990 levels, if it is limited as global warming to an increase of just 2ºC (European Comission, 2011). Within the European Union, road transport is responsible for about 20% of all CO_2 emissions, with passenger cars and vans contributing about 15%.The target fixed at Kyoto Protocol was an 8% reduction of emissions in all sectors of the economy compared to 1990 levels by 2008–12. Relative CO_2 emissions from transport have risen rapidly in recent years, from 21% of the total in 1990 to 28% in 2004 but currently there are no standards for limits on CO_2 emissions from vehicles (European Commission, 2007).

Infrastructure quality is uneven across the EU. A sustainable alternative fuels strategy including also the appropriate infrastructure. Integrated transport management and information systems, facilitating smart mobility services, traffic management for improved use of infrastructure and vehicles, and real-time information systems to track and trace freight and to manage freight flows; passenger/travel information, booking and payment systems. Intelligent infrastructure (both land and space-based) to ensure maximum monitoring and inter-operability of the different forms of transport and communication between

infrastructure and vehicles. Innovations for sustainable urban mobility following up the CIVITAS programme and initiatives on urban road pricing and access restriction schemes (European Commission, 2011).

Competition – the EU's transport sector faces growing competition from fast-developing transport markets in other regions. Eu sets safety and security standards and only funds new structure projects that meet those standards (European Commission, 2011).

3.2. European Union Harmonization Process in Turkey

European Union transportation policy aim to improve domestic market by improving environmentally friend and practical transportation services (Çelik, 2007), attendance of new members of European Union and expanding single market, circulation of natural resources in Europe (Bithas and Nijkamp, 1999). Turkey has some improvements according to European Union negotiations hence Turkey has to realise transportation regulations and speed up investments (Çelik, 2007). In recent years with the help of Ministry of Transportation and public institutions incentive projects and consciousness- raising studies have improved. Indeed, Turkey aims to improve its transportation policies until 2023 in order to fulfill it's target which is to serve Turkish prosperity (Yersel, 2010). If the full membership for European Union is accepted until 2023, than Turkey will be a bridge for rail, road, pipeline, air, sea, transportation between Europe and southeast neighbours. Consequently, in regional level economic development will be provided and Turkish infrastructure will be progressed since investment of road transportation will be limited (Çekerol, 2007).

Further, Turkey being in the center of Europe, Balkans, Black Sea, Caspian, Middle East and North Africa should have industrial logistics infrastructure in order to benefit from it's geopolitical supremacy (Çevik and Gülcan, 2011) since it has the potential of being the center of logistics center of the region with it's dynamic road fleet and qualified east-west international network system (OECD, 2009). In addition, existing deficiency of infrastructure of Turkey's European

Union Harmonization Process should be revised in National Programme of Turkey. Pursuant thereto, a programme should be enhanced until 2004 which is related to Turkish transportation infrastructure requirements should act together with State Planning Organization, Ministry of Internal Affairs, Ministry of Public Works, Ministry of Energy and Natural Resources under control of Ministry of Transportation (Çelik, 2007). On the other hand, several associations such as UTIKAD, UND, RODER play an important role with the new studies in order to contibute intermodal transportation development in Turkey. These unions play an active role in order to eliminate problems with transit documents during transportation in European countries (Yersel, 2010).

In addition, in 2005 priorities of harmonization policies of Turkey for European standards programme for alignment with the acquis were defined. In this sense, it seems as a path to follow for Turkey for transportation policies such as cost of transportation, environmental cost, security etc. since there are not defined regulations for transportation policy of Turkey. Each transportation policy is followed according to annual plan (Çelik, 2007). In addition, due to misguided and missing applications unbalanced transportation spoiled even more. On the other hand, Turkey became dependent of road transportation since %89 of the freight transportation and %96 of the passenger transportation carried by road (Çekerol, 2007). In Progress Report Turkey should improve it's transportation corridor as well as Trans-Europe Transportation system. In the frame of Single Europe Transportation Market technical standards and security standards, social standards and liberalization of market are included in the report (European Commission, 2004). On the other hand problems in the field of ports, opportunities of combined transportation, qualified staff, technology, know-how, law regulations, customs infrastructure and knowledge-process should be reduced in order to fasten harmonization process of European Union (Çevik and Gülcan, 2011). National Programme which was published in 2003 principles of Trans-Europe Transportation Network Project (TEN-T), traffic security, infrastructure of environment are defined due to EU restrictions and bases of Transportation Master Plan will be discussed (Çelik, 2007). Hence, rail transportation neglects European Union rail transportation acquis in law obligations. Rail industry is not actually liberalized and it is still not independent in trade industry since national

regulations are not structured and organizational structure of certificate of authority, security assessments are not stated. In order to provide workable conventional Europe rail transportation network existing rail infrastructure should be modernized and new reforms, investments are necessary (Euopean Comission, 2005).

3.2.1 Road Transportation

In the past, the Turkish transport system has invested mainly in the generation of infrastructure for land transport. Accordingly, the country has one of the largest land transport fleets in Europe (European Commission, 2013). European Union transportation market completely liberalized and private industry of road transportation is also included (OECD, 2009). European Union created liberalized and competetetive market environment for road transportation. There are several regulations due to technical, social and institutional in order to provide integrated European Union single market. In order to reduce differences between Europe and Turkey the regulations should be applied to laws and adaptation program should be adopted (Çelik, 2007).

No plans to develop transportation cities for trucks. A key point for the Turkish combined transport development consist of the need to exam the efficien operation of combined transport chain. Besides, connection points play a key role on the corridors and have to be analysed (European Commission, 2013). Although road freight transportation has several advantages due to it's fleet volume, geographical location road transportation faces with several problems (Kögmen, 2014). The primary problems are quota and visa problems which influence industry negatively. Especially, with the development of intermodal transportation legislative arrangements were carried out and discipline were taken consider for actors, several certificate of authority obliged for transportation in order to improve in international market (Görçün, 2008). On the other hand, Turkish road transportation is based on semi-trailers and trucks. Turkish trailers are crisp and suitable for European Union standards. On the other hand, it is not right to claim that for trucks which tranport freight in domestic sphere. All in all, their technical sufficiency are substandards since vehicle ages are supernal (Yersel, 2010).

As concerns land transport, Turkey signed the Agreement on the International Occasional Carriage of Passengers by Coach and Bus (INTERBUS) in June 2001. On 16 July 2001, Turkey joined the AETR (European Agreement concerning the Work of Crews of Vehicles engaged in International Road Haulage), thus integrating driving and rest time rules for international road transport operators into its national legislation (European Commission, 2001).

Ministry of Communications prepared legislative regulations about obligations of certificate of authority in December 2004 followed by February 2005. The transportation law no. 4925 declays that in order to carry freight by road operators are obliged to get transportation licensee. The regulations and laws that are enacted are easier to apply to European Union standards (Çelik, 2007).

Furthermore, still adaptation Turkish road fleet transportation continues and there are several standardization process for adaption of technical and environmental regulations. In general, there are several problems occured in security of dangerous goods transportation (Çekerol, 2007).

Consequently, there are regulations adopted for infrastructure of transportation. In order to reduce inefficacy of infrastructures of border gates İpsala, Kapıkule and Gürbulak are recovered and Pendik Ro-Ro harbour was practiced. In 2005, Turkish road transportation industry faced with problems due to new regulations of transportation structure. The basic problem occured due to new financial principles. For instance, only 114 company bought international transportation certificate of authority since it reached up to 400 with the agencies (European Commission, 2001).

In addition, Turkey should provide awareness for Marco Polo Programme which was brought into force by European Union in order to reduce burden of road transportation. Turkey is not included in Marco Polo Programme but it should be a member of the programme since it is important applicant for both environment and transportation issues. For instance, Marco Polo is an important supporting programme for financial development hence international investment banks are not willing to support programs. International funds have basic principle for invesment is that environmental risks should be considered and

business that is funded should have least spread of greenhouse gas since if business has high emission density than investments would be increase in short term period indeed profit will be less (Çevik and Gülcan, 2011).

In additon, the other important reason for road transportation harmonization process is Kyoto Protocol which was declared by UN Climate Change Framework Convention in 1997 in order to reduce greenhouse affect. For this reason, high CO2 emission coal production should be eliminated and usage of renewable energy resources and natural gas should be increased (Yorkan, 2009). Hence, greenhouse affect increased %8 compared to 1990 and for 2020 the main target is to increase energy productivity and renewable energy should be consumed as primary resouce and finally CO2 emission percent should be dropped by %20 (Yorkan, 2006). Turkey signed in UN Climate Change Convention in 24 May 2004 and Kyoto Protocol in 26 August 2009. In order to fulfil European Union Harmonization Process Turkey should apply environmental friendly policies. Industries should implement sanctions like extra tax otherwise improve it's inspections. According to agreements not only governments should take precaution but also industries should take consider the principles of the process. In this sense, Turkey should make policies for to decrease carbondioxide emission and there are two options for this; sign up for carbon industry and play a trade with carbon trade or special sanctions about carbon taxation should be applied for industries. All in all, these all turn back as cost or tax for Turkish industry (Yersel, 2010).

3.2.2 Sea Transportation

Turkey has a competitive advantage in maritime transports inceitis surrounded by the sea on three sides (Mediterranean, Aegean, and Black Sea), together with the straits of the Dardanelles and the Bosphorus encircling the Marmara Sea. The length of Turkey's coastal borders is 8,333 km. Maritime transportation is the most popular method of transportation for Turkey's exports and imports, with respective shares of 50.7 percent and 53.2 percent in total (European Commission, 2013). In the field of maritime transport, Turkey is taking steps to address its problems as regards maritime safety. According to 2000 statistics under the Paris Memorandum of Understanding, the detention rate for Turkish-flagged vessels in

2000 was 23.8%, a slight improvement on the figures for 1999 (24.5%). This compares to an average for EU-flagged vessels of 3.9 % in 2000. Turkey is a signatory of many related International Maritime Organisation rules and regulations and has harmonised its legislation accordingly. Further safety legislation has been adopted and International Maritime Organisation Conventions transposed. Turkish vessels with serious deficiencies receive additional penalties. No progress can be noted as regards lifting the restrictions that Turkey still applies on vessels serving the Cyprus trade and on vessels on the Cyprus register. In addition, market access to coastal trade is reserved for Turkish-flagged vessels (European Commission, 2001).

Turkish sea transportation has powerful private transportation industry is one of the liberalized industries in Turkey. Each port is available to reach rail lines and each port carries 46 million tone raw material and have 2 million tone storage capacity. In recent years, container traffic has increased by %20. Hence, with the available public ports capacity of infrastructure is not suitable for the demand. For this reason, public ports have undergo changes due to several problems because of statusquo. So, in order to improve primary transportation infrastructure port privatization process continue. It is expected that container traffic of private ports will reach %50 in few years. In the long term, strategy for development of ports should be harmonized with the global land use (OECD, 2009). Besides, taking consider of rail traffic has to compete with road transport, the basic objective of the design of terminals and their links has to be that the loading/offloading of goods on/off trains must not be more expensive or more complicated than the loading/offloading of goods on/off trucks and, if possible, cheaper and more straightforward (European Commission, 2013).

The first priority in agriculture and fisheries is to start the introduction of basic mechanisms and structures, (statistics, land register, improved fishing fleet register, plant and animal identification systems, upgrading equipment) to be able to manage these policies. The maritime safety record of the Turkish fleet remains a matter of concern. Maritime and road transport needs to be adapted to EU standards (Çelik, 2007).

There are also limitations on foreign investment in the transport sector (e.g. maritime and aviation companies) and in ports, where foreign participation may not exceed certain ceilings. Foreign investments in real estate are limited, and Turkish insurance companies are not permitted to invest their reserves in foreign assets. Government has administrative arrangement for common identity card in order to control ports (Çelik, 2007). In addition, there are several regulations in order to strenghten law adaption and administrative capacity. In March, 2005 a mechanism enhanced in order to respond in a emergency situation entered into force due to transportation of hazadous substances. Consequently, new regulations held through for vessel wastes in December 2004 (Çelik, 2007).

Furthermore, Turkish maritime fleet capacity should be enhanced since it is still in the black list in Paris Memorandum of Undertsanding. Neverthless, after December 2003 in order to provide qualified security in maritime transportation Maritime Transportation Action Plan (2004-2008) was accepted. On the other hand, still important parts of the targets are not realised (European Commission, 2005). In addition, there are still problems in coastal trade since problems about limitations for registered ships for Southern Cyprus. Still there are no any progress about government subsidies since there is not any association which regulates government aids. On the other hand, privatization of ports have started in 2005 duue to this regulation shipping order became in the first 10th of world trade in quantity and 24th place in fleet trade (Çelik, 2007).

The traditional and respected know how of Turkish port this new privatization process, resulting in a more effective and productive practices has enriched sector. Furthermore it has help aligning Turkish port procedures and operation with those more competitive at international level (European Union, 2013). On the other hand, still there are problems about maritime transportation. Private port operators have greyness due to regulations about public relative rent prices. Also, Turkey doesn't have any logistics base since physical infrastructure is not suitable and transit freight can not reach to it's destionation point because of customs bill of lading and customs infrastructure. Further, with the existing customs legislation transfer duration draw on approximately 1 week whereas in Dubai and Rotterdam ports it may not more than few days or few hours. Also, with the transfer length and customs legislations several problems occured in cabotage transportation. On the other hand, in logistics service, still there are stamps note problem, problems about computers during stamp note, asking for copy of bill of lading, asking invoice for transfer freight, mistakes in manifests, container inspections, deficiency/excess of containers can be specified as problems in maritime transportation. Consequently, foreign trade is based on maritime transportation by %83,3 percentage (Çelik, 2007).

Furthermore, due to investments maritime transportation can be evaluated that Turkish trade fleet is not only enlarged by maritime transportation but also successful in transportation between modes. The other important factor that hinder transportation process is bureaucratic barriers in ports. Customs legislation may cause also extension of time limit in transfer span (Yersel, 2010).

3.2.3 Rail Transportation

Rail transportation Harmonaziton Process is not sufficient due to lack of liberalization, dependency of trade industry, lack of national regulations, licensee, lack of infrastructure, old-fashioned rail infrastructure which is not suitable for traditional Europe Rail Network (Çekerol, 2007). European Union accepted intermodal transportation as primary transportation mode and regulations are considered to improve mode of transportations. As Turkey's European Union membership process taken into consider transportation industry should suit to age. All in all, essential physical and institutional infrastructure for rail intermodal transportation (Tanyaş, 2005).

Further, applications of European Union legislations are defined as short and middle maturity in Accession Partnership Document. In 10 March 2003 technical support study have started in the frame of Turkey- European Union Financial Cooperation. Rail Transportation Law issued in order to determine legal mismatches of European Union, executive differences, structural differences and confirm infrastructure requirements of Turkish rail transportation system (Çelik, 2007). Besides, another Action Plan (2003-2008) was issued in 15 April 2003 in order to practice intermodal transportation with the financial support of European Union (Çekerol, 2007). In order to improve combined transport Turkey needs regional, national and international level planning and, in regional level, Turkey is due to accelerate border crossings procedures (European Commission, 2013). In the following several projects are defined in harmonization process. Financial Management Information System provide easiness for Turkish State Railways (TCDD) for keeping expenditures and incomes since it will help for evaluation of financial performance. This system will also provide calculation of public obligations. Turkish State Railways also have a project for to develop technical devleopment of unit of work and education of managers. In Action Plan it is suggested that a new regulation and law should be organized (Çelik, 2007).

However the main problem is that most of the existing railway network was constructed long ago, curve radius is very low and it is not adapted for the use of modern technology. This issue complicates the developments that TCDD is

willing to take and it becomes quite complicated to solve the technical gaps using the current infrastructure (European Commission, 2013).

Furthermore, rail transportation mode has least tendency for harmonization process. Although geographical advantage rail network has insufficient capacity for transportation and there are lack of investments. Further, because existing rail network concentrated on few lines rail transportation system developed in several regions. Neverthless, public investment projects realised in recent years since quality and technical opportunities are developed (Çelik, 2007).

The re-organization of TCDD is expected to lead to more market driven policies also in the rail sector and that this sector will have an important role in stimulating intermodal transport in Turkey (European Commission, 2013). Rail Transportation Action Plan was accepted hence renewing of TCDD, regulating ports and railways, competetive market for rail transportation unlatched. The primary principle is to modernize rail infrastructure. The regulation for privatization of trains of TCDD for both passenger and freight transportation accepted in April 2005 since TCDD monopoly ended. Privatization of ports except Haydarpaşa started due to regulation since it will result end of the 2005 but it is still not completed (Çelik, 2007).

Furthermore, Turkish rail transportation industry not concentrated enough on judicial and structural regulations hence corporate infrastructure were not formed for accrediations, infrastructure, security documents. Still industry is not independent and necessary legal harmonization, reforms and investments should be practiced since industry should be modernized in order to cooperate with European Rail Network (Çelik, 2007).

Consequently, there are new investments designed for infrastructure for rail network in 2005 hence investments for rail transportation increased by %36. Neverthless, there are new projects for high speed trains such as İstanbul-Ankara and Marmaray. Ankara-Konya train project also started to operate (Çelik, 2007). All in all, there are several important projects designed by European Union for rail transportation such as Rotterdam- Holland/Germany rail intermodal transportation and Lyon-Trieste high speed train/ combined transportation rail line

projects since Turkey is involved by being in the center of projects (Evren and Öğüt, 2006).

3.2.4 Air Transportation

In the field of air transport, services at airports open to international traffic have been opened. Slot allocations are made according to IATA rules. Turkey has hitherto not shown an interest in participating in the European Common Aviation Area process with the other candidate countries. The Turkish administration responsible for air transport has been restructured through the creation of a Civil Aviation Authority. The Turkish aviation sector is undergoing privatisation, although the latest attempted privatisation of Turkish Airlines was unsuccessful. An amendment to the Turkish Civil Aviation Code was adopted on 19 April 2001 allowing air carriers to set airfares without the Ministry of Transport. This will further promote competition (European Commission, 2005).

Turkey has exceed of 50 km control over Europe, Asia and Africa totally which has ATS route about 1 million km2. In this sense, Turkish aviation has developed in recent years since new airports are constructed and build-operate-transfer model accepted. Turkish aviation system has been enlarged due to supply demand of consumers with the new regulations (BOT) and with the boost of new airlines (OECD, 2009).

The other important European Union harmonization principle for aviation is that improvement works in course of flying safety, environment and passenger rights, rezervation systems and slot allotment system. On the other hand, since there are improvement works for aviation there are still qualified staff problem in the air transportation industry especially for pilots. Further, in the perpective of passenger there should be several policies to be applied for passenger rights since there are lack of showcase for airline foundations. Consequently, according to freight transportation statistics, relating works done for heavy going bureaucracy and reduction of problems occured in customs sphere. The most important problem is lack of infrastructure of aviation in regulations of competetion (Yersel, 2010).

Furthermore, long term targets of Accession Partnership Document can be defined as applying and undertaking of regulations of European Union in the field o fair transportation. International Civil Aviation Agreement was re-organized with the law no. 4647 for Turkish Civil Aviation. In 23 July 1992 with the law no. 2409/92 passenger and freight transportation were yielded to Council Regulation. It is important for sustainable air transportation aviation since legislative harmonization of European Union should be ensured. The important concrete process is that tariff of fares. By reduction of certification each air line operator have the opportunity to decide it's own tariffs freely. In harmonization process, international progress is important since Turkey is a member of European Joint Aviation Authorities (JAA) which provides easiness for harmonization process.

Furthermore, Turkey became a member EUROCONTROL by accepting EUROCONTROL Convention. The agreement entered into force in December 2, 1988 with the law no 3504. In addition, according to programme for alignment with the acquis for air lines get over a limited improvement. On the other hand, for accrediations for pilots of airplanes and helicopters are entered into force in July 2005. On the other hand, there should be accident inquiry unit for air transportation in order to fulfil EUROCONTROL standards (Çelik, 2007).

Furthermore, in September 2005 with the permission of Ministry responsibility of Position Coordination is under control of a commission which was formed by Civil Aviation General Directorate and Turkish Airlines since these two foundations should be strength. On the other hand, as Turkish Airlines being as a flagman should revized it's applications since there are several airlines established. For example, Southern Cypriots still have limitations for to use Turkish national air space regulations since any new regulation is not mentioned in the conventions. In addition, Turkey as a candidate of European Union should develop it's harmonization process since administration is still limited for aviation industry (Çelik, 2007).

Furthermore, aviation industry achieved it's growth in 2005. By the end of 2005, number of private civil aviation industries reached up to 26 and number of airplane reached to 125. Hence, due to growth in aviation industry THY also regenerated it's passenger and cargo transportation. According to statistics, by the

end of 2005 air freight transportation reached up to 745 tone whereas several city don‘t have any airport plant and insufficient for cargo transportation (European Commission, 2013). The other important problems of Turkish air transportation can be specified as ; security, lack of neat environment, customs services and warehouse capacity (European Commission, 2013).

CHAPTER 4

METHODOLOGY

4.1. Methodology

In order to answer the aforementioned research question, study is conducted as qualitative research intended to provide deep insights into relevant literature concerning the topic.

This study aims to reveal the reasons for problems occured between Turkey and Europe in intermodal transportation which are currently not examined comprehensively. By conducting secondary data analysis and semi-structured interviews, high levels of reliability and validity were provided. The deployment of these different methods provided a deeper understanding for the intermodal transportation, problems occured and their effects on logistics companies.

In this study triangulation method is used between interview findings, news and European documentations since researchers provide data validity between two methods. News and documents are examined by critical incident technique and semi-structured interviews were done by observation method. Triangulation methodology is used to adress the same research problem with at least two methods (Morse, 1991). In this sense, news, documents and interview findings promote deeper undertsanding for problems between Europe and Turkey.

In this study critical incident technique is used as secondary data analysis and for semi-structured interviews. Critical incident technique is a qualitative approach that offers a practical step-by-step approach to collecting and analysing information about human activiities and their significance to the people involved. It is important that method reflects real life experiences which outlines procedures for collecting observed incidents having special significance and meeting defined criteria (Flanagan, 1954). Critical incident technique offers defined by John Flanagan which refers following steps; establishing general aims, establish plans and specifications, collecting and analysing datas and interpreting and reporting data. For instance, for data collection study reveals individual interviews or direct observations (Hughes, 2007).

Further, for instance in this study for data collection news are examined as an example for critical incident technique. Also, semi-structured interviews are

important feature for critical incident since semi-structured interviews with observation of the employees are carried as a practical task as interviwees explained their observations and experiences.

4.1.1. Secondary Data

Document analysis, a systematic procedure for reviewing or evaluating documents, both printed and electronic material, requires data to be examined and interpreted in order to elicit meaning, gain understanding and develop emrirical knowledge (Bowen, 2005).

First, in secondary data analysis articles related with agreements and each regulations due to intermodal transportation. *Document analysis* includes studying excerpts, quotations or entire passages from organizational, clinical or program records; memoranda and correspondence; official publications and reports; personal diaries; and open-ended written responses to questionnaires and surveys (Patton, 2005).

In addition, several articles news are obtained from logistics websites and analyzed. According to results, 100 news were analyzed from three websites (Sözcü, Lojiport and Utikad) and related articles were examined through problems occured between Europe and Turkey. Hence, articles scanned between 1 year length which is between May 2015 and May 2016. Sözcü was chosen as an important newspaper in Turkey and Lojiport and Utikad are the important logistics sites for logistics industry.

4.1.2. Semi-Structured Interviews

Interviews yield direct quotations from people about their experiences, opinions, feelings, and knowledge (Patton, 2005).

In a typical semi-structured interview the researcher has a list of questions or several topics as an interview guide but there is flexibility in how and when the questions are put and how the interviewee can respond. Further, the interviewer can probe answers, pursuing a line of discussion opened up by the interviewee, and a dialogue can ensue. In general the interviewer is interested in the content of the interview, how the interviewee understands the topic(s) under discussion (Edwards and Holland, 2013). Semi-structured interviews are selected as the

means of data collection because of two basic features. First, they are well suited for the detection of the perceptions and opinions of respondents regarding any sensitive issues and enable probing for more information. Secondly, standardized interview schedule can be adopted for the varied professional, educational and personal histories of the sample group (Barriball, 1994). Clearly, in this type of interview validity and reliability depend not upon the repeated use of the same words in each question, but upon conveying equivalence of meaning (Denzin, 1989).

In addition, the semi-structured interview does not only give interviewers some choice in the wording to each question but also in the use of probes (Barriball, 1994). Probing generally, allows for the clarification of interesting and relevant issues asked by the respondents (Hutchinson and Skodal Wilson, 1992); provides opportunities to explore sensitive issues (Nay-Brock, 1984). Moreover, probing can find out valuable and absolute information (Gordon, 1975) and can help respondents recall information from their memories (Smith 1992). For instance, in the research several questions were asked about intermodal transportation based on their experiences and interests.

Further, interviwee may refuse to be interviewed, feeling apprehensive about being interviewed, not wishing to answer certain questions during the interview, refusing to have the interview audio taped (Barriball, 1994). Audio taping is frequently the method of choice, as it provides a detailed insight into the performance of both the respondent and the interviewer. Further, audio taping also reduces the potential for interviewer error by, for example, recording data incorrectly or cheating by logging an answer to a question that was not asked. collection phase which will enhance the validity and reliability of the research findings (May, 1989). Hence, in this paper audo typing is used for recoding each interview. All of the managers permitted for record also reasearch is supported by taken notes. Besides, two firms (Company E, Company B) sent slides for the researcher to obtain knowledge about the firm.

For analyzing different aspects seven semi- structured interviews were conducted. Through judgemental sampling interviews were done with six managers of forwarders and 3PL's conducting intermodal transportation. The interviews lasted around 35 minutes and were recorded by the researcher. On the

other hand, two interviews (Company B and Company G) done via Skype because of location factor whereas other were done face to face. The themes of the interviews were predetermined as follows;

- ⊡ Preffered transportation modes in intermodal transportation: sea, air, rail or road
- ⊡ Advantages and disadvantages of intermodal transportation
- ⊡ Comparison of each mode according to their benefits
- ⊡ Problems most recently faced based on countries
- ⊡ Sources of intermodal transportation problems
- ⊡ EU transportation policies and adaptation problems
- ⊡ Transportation documents
- ⊡ Turkey's position and development in intermodal transportation
- ⊡ Solutions for the problems
- ⊡ Vehicle Tracking Systems
- ⊡ Benefits of intermodal transportation for operations in Europe
- ⊡ Environmental awarenes: companies sensitivity of sustainability and environmental issues

4.2. Data Analysis

4.2.1 Transcribing

Transcribing is the other important part of data management and analysis. For this study a word processor, Microsoft Word, and Excel were used to support the analysis and to help manage the interview data. For example, after coding the interviews in Excell all passages assigned to a specific code for view on screen and get printed. The interview transcripts were formatted in a particular way in Microsoft Word. Furthermore, meaningful information about the interview was placed in the findings section quote by quote. Each quote is specified under single concept.

4.2.2. Coding

Interview questions should give as little guidance as possible to allow the interviewees to talk about what is of importance to them regarding a given context. The researcher needs to extract those experiences significant to the interviewee by assigning a conceptual label, known as a *code* also known as a

concept by Strauss and Corbin (1998). Several codes can be grouped into more abstract categories which will eventually form the basis for the developing theory (Gorra, 2007). Interview coding is used to capture what is in the interview data, to learn how people make sense of their experiences and act on them. Coding is the first step of data analysis, as it helps to move away from particular statements to more abstract interpretations of the interview data (Charmaz, 2006). Some codes or concepts will share the same or similar characteristics and can be pulled together into more abstract *categories*, which can typically be interlinked and build the basis for a theory (Gorra, 2007).

Furthermore, in this study open coding, axial and selective coding are used. In open coding process of breaking down, examining, comparing, conceptualising and categorising data are used (Grinter, 2005). Data reduction is the important feature in open coding since in this study coding of interview is retrieval of reduntant information. Inductive method is also another feature of open coding since in this study interview codings are generalized.

In this sense, open coding involves discovering categories, developing categories and labelling phenomena (Grinter, 2005). In labelling phenomena asking questions about notes is the another feature of open coding. In addition, in this study questions are asked to interviewee about problems faced between Europe and Turkey about intermodal transportation according to interviewee's ideas, experiences or incidents, events observed by the interviewee. Further, phenomenon is named according to it's concept such as in this study environmental issues, advantages of intermodal, disadvantages of intermodal etc. are specified as concepts. For developing categories piece of notes are important in this sense lots of concepts should be coded since next step is grouping concepts into categories. Furthermore, categories are classified according to its' concepts by comparing each whether they are similar or not (Grinter, 2005). In this study, categories are developed according to interviewee's answers to label categories since it is started when labelling phenomena's. In this sense, properties, dimensions are importantsince they will helps us to develop broader relations between concepts in order to develop codes. Further, computers probably useful

for open coding since in this study coding is prepared by Excel than transcribed to Word. On the other hand, post-it notes for each concept also an useful method since in flat surface it is helpful to see overall concepts since colouring of each concept is important to see generalized codes.

The next step of coding is axial coding in which data assembled in new ways after open coding, by making connections between categories (Grinter, 2005). In this sense moving from inductive to deductive is important in the study since new categories are gathered in each code speficied under new categories. Further, at the end categories represent our "phenomena" now. Furthermore, axial coding includes Intervening Conditions (i.e. space, time, culture, economic status, career, technology, history) and (Inter)Actional Strategies (i.e. actions and interactions). In this study, interwiewee's give brief information about their experiences and economic status of each firm and countries since it is important for actions and interactions. Technological improvement is important for European countries since questions and answers are shaped according to intervening and interactional conditions. Also, in interview coding, important points are categorized under each concepts which is an example for process of inductive.

Consequently, in this study for coding last step is selective coding which is selecting the core category and validity of the coding is substantial. On the other hand, a story line needs to priortise one category over all others in selective coding. One category seems more central from others than categories should be dropped (Grinter, 2005). For instance, in this study unique events or experiences of the interviewee's are not written in the paper since it is not commonly faced in intermodal transportation. Furthermore, final step of selective coding is validating the theory against the data. In this study, validity is obtained by checked by three people of codings.

The information sent out via e-mail before the interview included some legal background about intermodal transportation data for interviewee to have an idea about the questions. The aim of sending out information prior to the interviews was to familiarise the participants with the subject area. This seemed necessary

because majority of people who in charge of firms should obtain knowledge about each transportation modes (i.e. road, rail, air, water, all).

4.2.3 Validity

Furthermore, reliability and validity are important features of semi-structured interviews. Reliability assesment includes consideration of determined at the time of pilot-testing the interview schedule, during interviewer training, and periodically throughout use of interview respondents and reliability of instrument itself. Validity of interview information is a complex issue and invalidity in the interview include lack of commonly comprehended meanings, differences in situations and settings, respondents modifying their responses to fit their responses to fit their perceptions of social requirements (Waltz et. al., 2010).

However much self-reported information is hard to validate. There are several ways in which the validity of self-report information can be examined. For instance, the interviewer can observe whether the respondent is disturbed by questions or hessitate to answer. These could be noted so while interpreting this could be taken into consideration. Also, validity can be checked by gathering information external to the interview situation to check the accuracy of responses (Waltz, 2010).

Further, interaction coding schemes that make some claim must meet the traditional requirements of logical and construct validity as well as the more unique requirements of representational validity. The three specific validity types are logical validity construct validity and representational validity. Furthermore, logical validity is that coding system must be internally consistent and clearly articulated and also investigator asks knowledgeable observers to evaluate whether coding is coherent and comprehensive (Lazarsfeld and Barton, 1969), construct validity in which coding system should show relationships to other observable variables predicted from the researchers theoretical network (Folger and Poole, 1981), representational validity is also constructs or message functions identified by the scheme must be consistent with subjects shared interpretations (Poole and Folger, 1981).

All in all, in this study coding schemes are checked by three person which is named as cross check. Secondary data and semi-structured interviews were

according to their problems which were specifically diversified by three observers.

Table 4. Brief Information of Firms

Company	Intermodal Operation	Countries	Duration	Position
Company Gn	International Partial transportation Air transportation Road Transportation Warehousing and Distribution Services Port Operations Cargo Insurance Cross and Transit Trade Services Bulk Cargo Services	Germany Austria Belgium Greece Bulgaria France Iraq Iran Romania Holland	22 minutes	Gn Logistics Chairman of Board
Company G	Seafreight Intermodal Transportation, Bulk Shipping, Project Transportation, Air Transportation, Complete Truck Transportation, Partial Truck Transportation, Railway Transportation	Europe Middle East Russia Turkish Republics	25 minutes	Business Development Manager (seafreight and intermodal)
Company E	Ro-Ro, Block-Train, Air Transportation (Transfer)	Germany Romania Italy Bosnia France Greece Hungary Spain Poland Bulgaria Ukraine	90 minutes	Sales Manager
Company El	Air(sea+air intermodal, animal,perishable products, industrial products such as gold, medical cargo, dangerous goods) Sea (FCL/LCL container transportation, export and import service, door to door, port to port, ro-ro, refeer container, Road freight Transportation (rail + truck)	Germany France Austria Greece Albania Bosnia Macedonia Serbia Croteia Montenegro Georgie Azerbaijan Iraq Iran Syria Armenia Turkmenia Tajikistan Uzbekistan Kazakhistan Mongolia	18 minutes	Sales and Marketing Manager
Company B	Rail Intermodal Transportation Customs Procedure	Hungary Benelux East Germany Austria South Germany	1 hour 8 minutes	Sales and Marketing Manager
Company K	Airfreight Seafreight Overland	Africa, Asia Pacific, Europe, Middle East	25 minutes	Branch Manager
Company S	Short-sea, Container, Sea, Land Transportation Customs Services	Belgium,Austria, France Germany, Italy,Romania,Morocco, Spain, Sweden, Romania, England, Ukraine	30 minutes	External Sales Executive

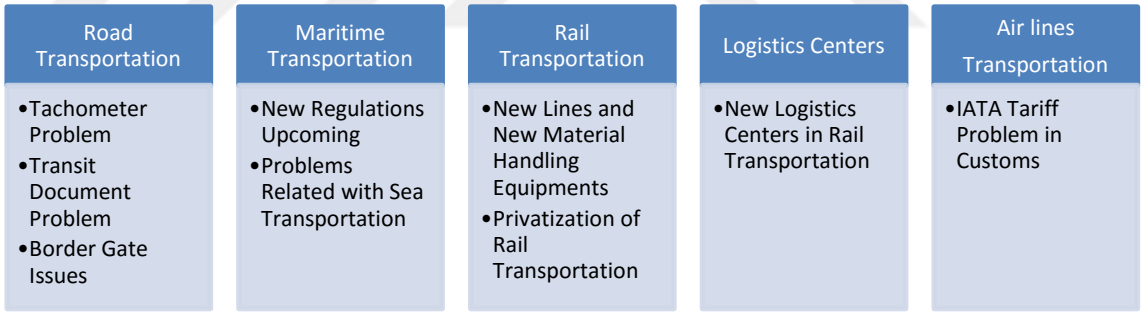
CHAPTER 5

FINDINGS

5.1. Secondary Data Analysis

Several news obtained from websites related with problems of intermodal transportation between Europe and Turkey. Also, 100 news were analyzed for one year starting from May 2015 to May 2016 and most important problems are selected for data analysis related with themes. The three websites were used in the newspaper analysis section which are Lojiport, Sözcü and UTİKAD. Sözcü as an important newspaper for Turkey publishes important logistics news. Lojiport and Utikad are important sites for intermodal transportation. Further, each news are coded and categorized as specified in the following.

Figure 2.8. List of Problems Obtained From News



5.1.1. Road Transportation

A) Tachometer Problem

Turkish transportation companies paid 2 million Euro punishment payment due to taintings on European roads. In Europe vehicles only work for 9 hours as it is limited due to regulations. The duration is measured by the help of tachometer hence if the limited time is expired than drivers would stop and wait until the next span. On the other hand, truck drivers are not sensible with the regulation

therefore Turkish transportation firms pay high tachometer tainting payments. In France it reaches up to 8 thousand Euro whereas payment reaches up to 5 thousand Euro in Slovenia. Further, truck drivers are aimed to unload freight as quick as possible hence they violate regulations and laws. Tachometer follows how many hours trucks on the move. According to tachometer regulation a truck driver can not work continously more than 4.5 hours (Sözcü, 2016).

B) Transit Document Problem

Another problem that comes after tachometer ist hat transit document problem between Europe and Turkey. Because of European Union Environment Protection Standards, member states assign limited tır carnet for other countries. The other name of tır carnet is called transit documents. These documents are generally assigned due to control the entrance and exit of trucks. On the other hand, assigned carnets are never enough for transporters since transit documents are not permanent and several unrecorded entrance delayed. Due to these reasons, Turkish transporters pay punishment payments to European Union countries (Sözcü, 2016).

C) Boarder Gate Issues

- Problems with Bulgaria Boarder Gate

There are truck trailer in the Kapıkule Customs bordergate with Bulgaria due to Easter Holiday. There are truck lines in the Kapıkule bordergate up to 15 km and in Hamzabeyli Bordegate 6 km. Due to intense traffic Bulgaria can not answer Turkish requests. There are limited number of staff work in Andreevo Customs Gate because of Easter Holiday (UTIKAD, 2016).

-Reduction of Transactions at Boarder Gates

%65 of the export bill of ladings are conluced in 1 minute since projects were implemented in order to shorten processing time in border gates. There are special requirements and projects for less bureaucratic processes that are applied for secure and fast trade.

Several steps were taken for foreign trade with projects such as “Single Corridor”, “Single Stop” and “Authorized Economic Operator”. Ministry of Transport by put

projects into force for both to expedite legal law policies and struggle with illegal trade.

In this sense, ministry of transport looks over for security precautions in border gates and to reduce risks due to smuggling. Especially, in Syria, in border gates physical control of staff and equipment are in tight control and face scanning system, congestion mesure system, radioactive substance control system are used in order to control border gates (UTIKAD, 2016).

5.1.2 Maritime Transportation

A) New Regulations Upcoming

- International Vehicle Tracking System in Turkey

International Maritime Organization accepted electronic tracking system application in international maritime transportation. Agreement came into force in January 1st, 2018. Further, FAL (Faciliation of International Maritime Traffic) regulates electronic information interchange between freight and operators. According to alterations public institutions are affected since in three years each should gather vehicle tracking system. By the end of the 12 month period electronic communication system became obligatory. In this sense, Turkey is obliged to form a vehicle tracking system since single window system is obligatory for each country. In this system, public institutions can easily control and follow ships in ports and while it anchores in port. The other important subject is crew permissions for come ashore. According to regulation, each crew dependent on it's colour, belief, policitical opinions, race and nationality can use shore permissions and any humiliation is ignored due to laws. Further, other problem is that stowaway passengers and regulations are updated due to problems (UTIKAD, 2016).

-Regulations for Wrong Container Weight

A new regulation will be applied at the end of July, 2016 in order to reduce wrong container weight problem. Hence, it will be beneficial for firms. Also after July, 2016 only 3 month flexibility will be winked at refereer container since it carries perishable goods. On the other hand, accidents due to owerweighted loading of freight and lack of gross weight calculation of containers will be reduced with ne

new regulations which was determined by International Maritime Assosication. It is declared that with the new regulations stawing and loading planning will be also beneficial for transportation firms since they can protect their rights. Also, with the new regulation, weight control document is obliged for transportation firms and before loading freight to vessels that document should be shown to vessel operators. All members of International Maritime Assosication should apply these new regulations (UTIKAD, 2015).

-Environmental Regulations for Maritime Transportation

Turkey in order to develop sea transportation poisonous paint usage is banned since harmful organisms are breed in the vessels. Ships will not allowed to enter into both for European countries and Turkey. Deputy Foreign Minister Delegate Ali Naci Koru declared that in order to save maritime life and for to save human health due to shorten of sea products usage of some chemicals are prohibited in ships. In grand national assembly of turkey human rights investigation commission new regulation was accepted about prohibiting usage of poisonous paint in ships. Also, it is meantioned that in European ports Turkish flagged vessels are not accepted due to poisonous paint hence vessels should be enhanced for the entrance. New law about maritime transportation include ;

Except War (Navy) Ships: Poisonous paint prohibition is applied for every type of vessels, hydrophile boats, air cushion instruments, submersible vessels, fixed or floating platforms, floating processing unit, floating production, stawing and loading units. This prohibition is not applied to war ships and commercial vehicles in charge of government.

Expert Control: Vessel controlment and control are under control of inspectors and institutions which are impowered by state party.

Retaining the Ship: If dangerous chemical is found in vessels than state party would “warn, retain, prohibit vesels to enter into ports and sortie of vessel” (UTIKAD, 2016).

-Shift to Paperless Environment for Container Transportation

Ports will pursue electronic booking for all container transactions. Due to 23.02.2016 dated changes in related regulations, all port transactions for containers will be executed under electronic environment. Consultations with the Customs Bureau have been made to ensure a healthy transition to paperless environment. Based on the consultations it has been decided that all companies with container export and import will be booked in the system until 01.12.2016 . New practice will be closely followed up, audited and deficiencies will be improved; and as of 01.01.2017 shift to electronic environment for all transactions will be competed (UTIKAD, 2016).

B) Problems Related with Sea Transportation

-Problems of Turkish Flagged Ships

There have been changes in Ship Auditing and Licencing Regulations together with International Safety Oversight codes that will be applied to Turkish flagged ships and and Companies. Ministry of Transport, Maritime Affairs and Communication's Regulation to change the Regulation of "International Safety Oversight codes that will be applied to Turkish flagged ships and Companies" has been published in the Official Gazette and the regulation came into force.

Administrative sanctions arranged by Regulations will be issued by general management in headquarters and port authorities in provincial organizations. Other issues related to the implementation of administrative sanctions will be handled based on principles in the Law of Misdemeanor. Additionally Regulation to change "Ship Auditing and Licencing Regulations" has also been published in the Official Gazette and the regulation also came into force.

According to new Regulations, Turkish flagged ships that are found insufficient in international audits may receive additional audits based on international authorities. "Turkish flagged ships' technical conditions, safe manning, safety, security and environmental protection related sections and controls must be in line with legislations. Ships that are not in line with legislations cannot receive official authorization until they improve their insufficiencies. Management investigates

any reports regarding insufficient ships and takes necessary precautions" part has that took part in old regulations been eliminated in new regulations.

Likewise "in case mandatory documents for Internationaly sailing Turkish flagged ships and internationally flagged ships that sail in Turkish territorial waters are deficient, wihout visa or even if documents are proper the ship's actual status being not in line with stated conditions in legal documents, 5K administrative fine will be issued per each lacking document or document not reflecting the actual facts. All operations are banned until insufficiencies are fixed" part has also been eliminated in the new regulation (UTIKAD, 2016).

-Turkish Flagged Vessel Problem with Europe

Last weekend Turkish flagged dry cargo vessels which was cruised to Europe ports was detained due to Paris Memorandum control. Turkish flagged ships were detained by PSC inspectors in the ports since there are several deficiencies of Turkish flagged ships. According to Deniz News Agency Turkish flagged M/V KUZEY 1 ship was detained in Romania's Mangalia Port, Panama flagged M/V MUZAFFER BEY dry cargo container was detained in Italy's Napoli Port and Cook Island flagged M/V KANUNI dry cargo ship was detained in Romania's Köstence Port due to regulations accepted by Paris Memorandum. It is declared that with the overcome of the deficiencies ships will be allowed to transport in it's regulations (UTIKAD, 2016).

According to Paris Memorandum the organization consists of 27 participating Maritime Administrations and covers the waters of the European coastal States and the North Atlantic basin from North America to Europe. Current members include, Belgium, Bulgaria, Canada, Croatia, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Malta, the Netherlands, Norway, Poland, Portugal, Romania, the Russian Federation, Slovenia, Spain, Sweden and the United Kingdom. The mission of the organization is to eliminate the operation of sub-standard ships through a harmonized system of port State control. Further, more than 18.000 inspections take place on board foreign ships in the Paris MoU ports, ensuring that these ships meet international safety, security and environmental standards, and that crew

members have adequate living and working conditions. According to new Strategic Plan Paris MoU1 2012-2017 (REV) mission statements are renewed.

Mission of the Paris Memorandum can be specified as maritime safety, environmental issues and maritime security.

Furthermore, maritime safety concerns growth of the fleet, the entry into service of very large carriers for the transport of both passengers and freight and the exponential growth in shipping operations will significantly add to the pressure on maritime safety. Increasing the number of open and navigable waters will inevitably attract traffic through the so-called Northern Sea Route with its special requirements. An expansion of the Suez Canal would mean larger vessels and more traffic across the Mediterranean with bigger risks. Enhancing maritime safety by ensuring that each link in the chain of responsibility fully meets its obligations is a priority for the maritime community as a whole. Flag and Port States, ship owners, Recognized Organizations and other stakeholders all have an important role to play in collectively implementing, maintaining and raising the standards of shipping.

Next, access to information, transparency, and an inclusive approach in developing measures for the uniform and effective implementation of the Paris MoU instruments are also critical success factors in enhancing maritime safety. The challenge for the Paris MoU is to contribute to technical, operational and safety management standards and to eliminate shipping that fails to meet and maintain these standards at all times.

Conclusion, the enhancement of a sustainable environmental policy for the shipping industry remains a high profile matter (Paris Mou, 2016).

5.1.3. Rail Transportation

A) New Lines and New Material Handling Equipments

- Rail Mounted Gantry Cranes

RMG (Rail Mounted Gantry Crane) named cranes will be used in Turkey for the first time in order to gather pace and for time saving. Safi Holding Chairman of the Executive Board Hakan Safi explained that at the end of 2019 1 million tone

network will be constructed and 4 million freight will be transported through Derince railway line. According to Safi, at the second part of 2016 freights which are loaded on railway will be handled and in the middle of 2017 in order to handle freights on railway rail mounted gantry crane will be ready. By the help of gantry crane 8 rail lines and 2 road lines will be handled at the same time and this will be the first used in Turkey (LOJİPORT, 2016).

- New Rail Line (İZBAN Launches a Railroad Line for Freight Trains)

TCDD General Management has announced the addition of 3rd Railroad line in Alsancak-Eğirdir railroad between Kemer-Gaziemir stations. Additional 3rd railroad line between Kemer-Gaziemir stations will be constructed parallel to current IZBAN railroad. A tunnel will be excavated between Kemer –Gaziemir with a 8.5 million TL budget. Freight Trains will be directed to this new 3rd line and this will allow a more rapid transport for IZBAN passenger trains eliminating the durations passenger trains had to wait for the passage of freight trains.

3rd railroad line will be constructed between Kemer-Gaziemir with a joint project of TCDD and İzmir Metropolitan Municipality. With the tunnel and new line that will be constructed parallel to the current railroad used both by passenger and freight trains, the target is to relieve railroad traffic. The new railroad will start at Kemer and exit at Gaziemir after 14 kilometers. The tunnel will take place between 4.2 km to 6.4 km of the railroad line and after exiting the tunnel the line will pursue parallel to current railroad line. This 3rd line that TCDD will construct for freight trains will connect Alsancak Port to southern destinations (LOJİPORT, 2016).

B) Privatization of Railways

According to Development Plan of Ministry of Development Turkey will be the heart of rail transportation network by earning money almost 75 billion Euro. It is targeted that Turkey could compete in the global sphere and it will have developed logistics position. Turkish State Railways will go under for privatization and private operators could transport freight will be liberalized with the new transportation regulation. Naturally, aims could be figured out by reducing logistics costs, shortening lead time, spreading intermodal transportation.

Our ports are full complement but rail network should be impowered in Turkey. According to Safi, in this perspective it is important to make investments for logistics and rail network since logistics centers will contribute for this system (LOJİPORT, 2016).

-Rail Privatization in Turkey

Turkey has accepted that rail transportation will be reformed after June, 21. Private industry will run it's private wagons. There are only 7 firms applied for Ministry of Transportation. Rail transportation will be liberalized and it will be more productive system. Further, with the new settlement, railway infrastructure operator TCDD will notify about lines, type of rail lines, access charge of rail lines and assign train line for firms for to use in one year interval.

Between 2003 and 2015 government investment reached up to 50,1 billion dollar for rail transportation and expected to reach 55 billion dolar by the end of year 2023. In this sense, for rail privatization June, 21 is considered as a turning point. According to Ministry of Transport, Maritime Affairs and Communication enforced law in 1 Mayıs 2013 for to renew rail infrastructure and it will renamed as TCDD Transportation Corporation.

In rail transportation, rail lines are enhanced only for 1 year length due to access charge. There won't be any special requirement for passengers and freight. Operating right will be given to rail operators due to Access charge and there will be extra charge due to destination differences. Also, maintanence and repair charge will be added by train operators. In addition, special requirements are obliged for private industry for to run rail transportation. Firms should reigster their vehicles according to regulations. A special provision which is still in draft requires that for freight and passenger transportation a special cartificate of authority is needed. In addition, operators are obliged to special requirements for security (UTİKAD, 2016).

5.1.4 Intermodal Logistics Centers

-New Rail Transportation Logistics Centers

Intermodal transportation logistics center will be established in Turkey. Derince port ist he only port that has rail terminal network in the bay area hence with this feature it is important to handle each freight through rail network.

Further, by the new regulation studies it provides transportation opportunity for sea-road-rail network by being this leg of sea-road transportation system. In addition, by this privilige Derince can be defined as Railway Port. On the other hand, intermodal logistics center base is constructed to Derince since it is important for rail transportation development in Turkey. By this improvement integrated transportation organization will be easy to reach both for Europe and Asia (UTİKAD, 2016).

5.1.5. Airlines Transportation

- IATA Tariff Problem in Customs

There are problems occuring in cases when a lower transportation fee is paid to an airline and even if this payment is authenticated, customs administration may take into consideration a higher precedent in announced by IATA. The importance of imported goods' transport costs in customs is due to the reason that the amount is added to customs values. This amount based on items delivery type is included into import tax assessment either with a seperate invoice or included in the cost of goods. In cases where airfreight is preferred, transfer companies may take into consideration a "precedent transport cost" based on IATA transportation tariffs. This may result in an excessive import tax to be paid by importing companies.

There is a close relation with customs value and delivery type. INCOTERMS 2010 revision issued by ICC (International Chamber of Commerce) in 27.09.2010 and came into force in 01.01.2011, defines commercial rules and practices that will be applied in the transport of goods, defines dual responsibilities and how

risks will be allocated in case defaults in responsibilities occur. Accordingly the payer for transport is defined based on delivery type.

Transport cost included delivery types include CPT, CIP, CIF and CFR. In case one of these delivery types are preferred in import, transport cost together with the cost of goods will be included in the invoice issued by the seller.

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Transport cost excluded delivery types include FOB, FCA, FSA and it is observed that the same procedure is applied in these delivery types as well. In these delivery types even if the delivery cost is paid to transport company accompanied with an invoice, customs management compares this payment with IATA tariffs. Most companies tend to consider IATA tariff in a tax declarations (even if their transport cost is lower) and include the difference amount in customs tax base to avoid penal procedures.

Sections 23 to 31 in 4458 numbered Customs Law have issued methods and principles to identify value of goods customs. Accordingly imported goods customs value is the sales of the good. Sales price of the good based on an export related sales to Turkey is the price actually paid or to be paid based on rectifications made based on clauses 27 and 28. Clause 27 states that transport costs paid until the entrance to Turkey are to be covered in the export goods' paid or to be paid price. Moreover in Customs Law Clause 26 subclause 2g it is clearly stated that arbitrary or fictitious values cannot be relied on while designating customs value. Additionally subclause 3 of the same law states that no other costs can be included in the actually paid or to be paid price while designating customs price. Only in cases where waybill cannot be submitted during import, 10% of FOB price can be applied as stated in Customs Regulations.

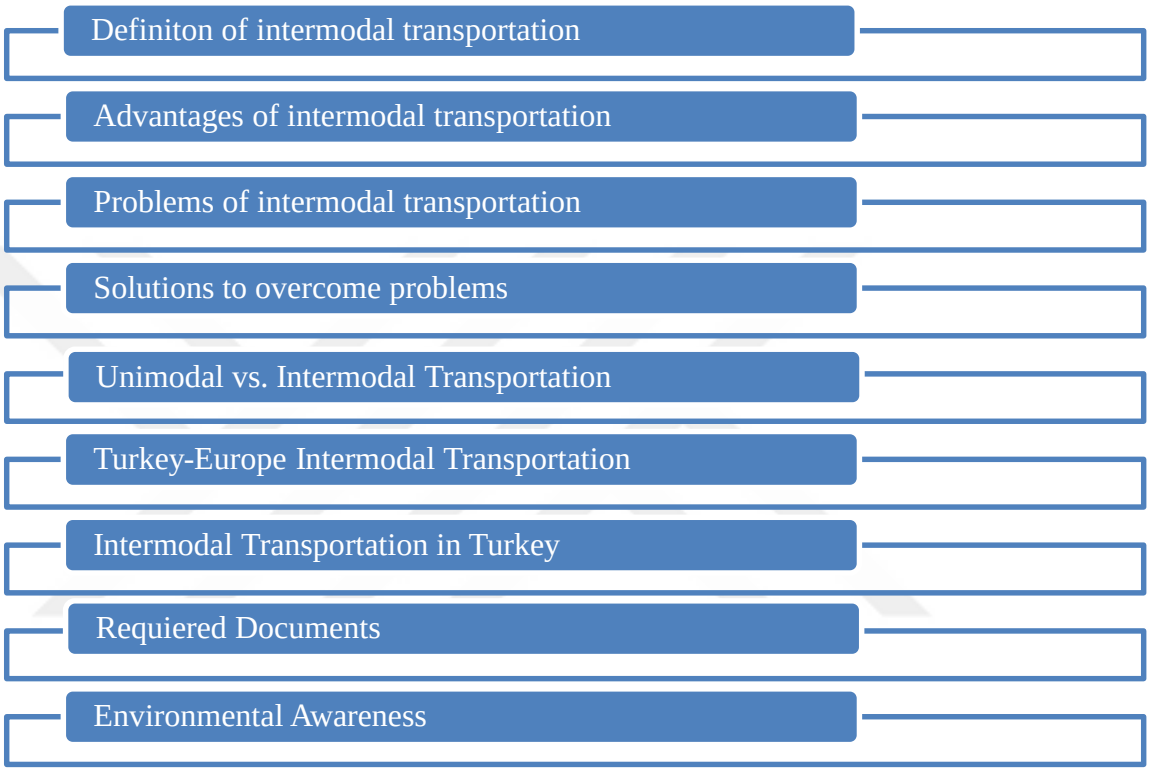
Consequently, transport costs being a part of sales price and paid either to the seller within cost of goods or to transport companies must be included in customs value.

The application of freight difference resulting in the payment of additional export tax has no consideration in designating customs value. IATA tariff can be used as a check point for transport costs but in case where the transport cost is in fact lower than IATA price and the exporter can prove this by an invoice or delivery type, this cost must be taken into consideration while designating customs value. Such applications of the Customs abolish commercial advantages and competitive edges gained by corporations (UTİKAD, 2016).

5.2. Interview Findings

Interview finding are obtained from several interviews done with sales representatives and managers of each logistics firms through coding. Findings are categorized as it follows;

Figure 2.9. List of Problems Obtained From Semi-Structured Interviews



5.2.1. Definition of Intermodal Transportation

Definition of intermodal transportation can be defined as using several transportation modes for instance rail-truck, ship-rail, rail-air transportation chains for transporting goods under a single bill of lading. All firms claim same definition for intermodal transportation. On the other hand, each firm explains intermodal transportation as “using two different modes for transportation” whereas intermodal transportation is defined as “using different transportation modes under single bill of lading”. In the following several managers and sales representatives defined intermodal transportation as it follows;

“You can define Intermodal Transportation (IM) as a type of Transportation using a single box ex: a container box and carrying it with more than 2 types of Transportation modes. In our case, we do a land trucking from the loading point to the train terminal, then transport the container on the wagons to Germany but then again we take the container to the final unloading point with trucking as well. Therefore, we use trucking-rail roads-trucking again for a A-to-B Transportation” (Company B).

“Intermodal transportation can be defined as type of combined transportation using different type of modes (Ship- Rail, Ship-Rail-Road, Air-Road etc.) In general it is a system which provides door-to-door service under a single operator for the customer. In our global world, the center of intermodalism is rail transportation. Without rail transportation it is impossible for intermodal transportation” (Company G).

“Intermodal transportation especially used in last 10 years by using several multi transportation modes. Namely, freight transportation starts in railway than it reaches to ports after it is loaded it reaches other ports. After freight reaches to other port freight is transported by rail or rad transportation system until it reaches to final customer or producer. This process is called Intermodal transportation” (Company Gn).

“If we define intermodal transportation briefly freight transportation by using combination of different modes. For instance, road-rail transportation is the preferred mode in general. Shortly, it can be defined as freight is transported without any easing down by using more than one transportation modes” (Company E).

“Intermodal transportation can be defined as using different modules in the same transport. Such as; as an example for intermodal transportation can be a container which is exited from export port and reached to final destination. For instance, in maritime transportation a freight is landed to German ports and transferred to last customer by land transportation” (Company El).

> “In general transportation starts by sea transportation. In this sense, intermodal transportation can be defined as combination of different several transportation modes. For instance, when a trailer/tır transferred by highway reaches to a port than it is carried by RO-RO on seaway. It reaches to Trieste Port which is the biggest port of Italy. Further, it reaches to it destination point such as Austria by rail transportation or road transportation. This transportation mode is road intermodal transportation. Another example can be a maritime intermodal transportation which is loading containers from İzmir port and transfer to Europe or America” (Company K).

5.2.2. Advantages of Intermodal transportation

Intermodal transportation has several advantages such as door-to-door transportation, environmentally friendliness, cost advantage, reducing waste of time, reducing congestion, carrying large volume of freight, transit time advantage, carrying goods under bad weather conditions and distance advantage. However, generally all firms claim that intermodal transportation is chosen for eliminating of high transfer cost. On the other hand, second mentioned basic advantage of intermodal transportation is lead time. Further, some findings for advantages of intermodal transportation stated by the companies given as follows;

-Door-to-door Advantage

According to firms door-to-door is the important advantage of intermodal transportation. For instance, in the following firms reveal that door-to-door advantage is important since competitive advantage between firms are increased and market coverage is the another feature for usage of door-to-door transportation.

> “The most important advantage of intermodal transportation system is it providing door-to-door service. Logistics firms which has infrastructure for door-to-door have seriously get ahead of the game” (Company G).

-Environmentally Friendliness

Another important advantage of intermodal is providing environmentally friendliness transportation system since firms give importance of fuel saving.

> "One of the important reason for development of intermodal transportation is being an environmentally friendly transportation system. Especially, in Europe large-scaled firms prefer to carry freight by rail transportation are affected since suppliers and consumers of the firms affect directly. For instance, if we compare fuel consumption of carrying freight by truck for 2000 km and locomotives that carry 32-36 containers by rail transportation system it seems truck transportation harm environment more. So, intermodal transportation is useful in order to reduce redundant fuel consumption" (Company G).

Furthermore, firms are sensitive about environmental issues since transportation mode is selected according to their fuel saving level. For instance, Ro-Ro transportation is much a fuel saving transportation mode compared to road transportation system since trucks are less sensitive about fuel saving and corbon emission.

> "If we analyze environmental dimension, for example if we carry freight on road it reaches 400-500 km wheel rotation however for freight carriage to Italy by RO-RO transportation system it is more useful for fuel saving. For example, in 1-2 km distance, custom distance is added also such as 100 km and customer distance reaches up to 300-400 km this means spending more fuel until destination point. So, intermodal transportation helps for fuel saving" (Company E).

Furthermore, intermodal transportation also eliminates CO2 exhaust emission and traffic pollution.

> "For example, if we use rail+truck transportation than it is also beneficial for CO2 exhaust emission since it is not only truck transportation.. Also it is advantageous for traffic pollution since congestion is reduced by decreasing number of vehicles on road" (Company El).

-Cost Advantage (reduction & cost)

All firms agree that intermodal transportation is preferred primarily due to it's cost benefits since intermodalism is the key for reduction of costs. According to Company Gn Logistics it is claimed that intermodal is important since several

transportation modes are used. Hence, road transportation is the most expensive transportation system and rail transportation is the cheapest. By combining these modes compared to unimodal transportation cost advantage is another feature for intermodal preference.

> "Generally the aim for combining several different instruments has an important reason that is cost advantage. Intermodal transportation is highly beneficial compared to road transportation in this sense due to cost advantage. The most important reason is cost advantage in general" (Company Gn).

> "Intermodal transportation is inevitable. In other words, the most important advantage is cost advantage. If we think that a truck which is loaded from Spain it costs twice as price compared with sea transportation. It is not related with only transit lead time. For instance, if we load freight and transport by seaway to Barcelona directly than it takes freight to reach within 7 or 8 days. However, ships also directly reaches to a port in Barcelona almost 8 days and transport freight in inland almost takes 2 days by rail or road. So it totally reaches up to 10 days. So, when compared to road transportation the lead time is almost similar maybe 1 day earlier but cost advantage is beneficial" (Company K).

> "From time to time rail transportation is included to intermodal transportation as it is called rail+ truck. This is also another method for cost reduction. These modes eliminate cost. It almost increases transit time but cost advantage is more important in transportation since it provides marginal profit for consumer and charger. Customer demands are correspondingly related with cost advantage. Because customers in general, make price analysis get a price from each logistics companies and choose the best one according to cost advantage. In this sense, our firm uses rail+truck due to cost advantage" (Company El).

Customers preffer intermodal transportation if there is no lead time problem. If a firm has several days for freight convey than lead time would not be so important since cost is the primary feature of intermodal transportation.

> "On the other hand, customers have lead time demands. For example a customer might willing to send its' freight in 3 days or in 1 month length. Than best possible cost is chosen. For example, Ro-Ro transportation is used for car transportation as it is more practical and at no cost. As I said before due to type of product and lead time should be taken into consider these all transportation modes can be used. Rail transportation is preferred where rail lines are available and sea transportation is logical for container transportation. All in all, according to type of product and case by case best advantageous transportation mode is chosen" (Company El).

On the other hand, firms choose intermodal transportation compared to unimodal since in long distances intermodal is costly beneficial.

> "For long and middle distance intermodal transportation is less costly. In short distance, unimodal transportation is preffered or road transportation is another option in other perspective" (Company E).

-Volume of Freight

According to firms intermodal transportation is important since container transportation has the capacity of carrying oversize freight. On the other hand, it is hard to carry oversize freight by unimodal transportation since it costs more than intermodal transportation.

> "Due to increase in volume of freight intermodal transportation seems as a must. For example in global world the most preffered mode is maritime transportation. Also, freight is transported by rail or road transportation since ships can not move on land. Shipment is done by vessels since it is more cheap in unit load. Hence, as an example, a big mine firm can not transport it's product since it is 1 million tone or 1.5 million tone burden with an unimodal transportation. Especially, road transportation is impossible. Than, rail transportation is the best solution to carry oversize freight" (Company Gn).

- Weather Conditions

Intermodal transportation is important since it has privilege to protect freight from bad weather conditions.

> "If we consider advantages, intermodal transportation is a best way to protect freight from bad weather. For example, Bulgaria claims that in summer time asphalt is melted hence load transfer is waited in the borders almost for 1-2 hours. Besdes, in Italy during winter time while transferring freight for rail icing risk is reduced by intermodal" (Company E).

- Distance Advantage

Unimodal transportation system is important since it can reach each point of European countries. If there are no available ports in countries than rail transportation network would be sufficient for freight transportation.

> "For example, in Europe such as Sweden, when a firm transport freight to interior point intermodal transportation is a must since Sweden does not have any ports for maritime transportation. For instance, another example is Germany… freight transportation to an interior point is done my rail transportation. Germany doesn't have any ports other than Hamburg and Bremen. It is impossible to reach South Germany" (Company K).

-Advanced Techniques

Advanced techniques are important in intermodal transportation since handling of freight should be developed in order to reduce time lag.

> "By using advanced techniques for handling freight also contributes for intermodalism. In this sense, vessels don't wait for long hours in the ports and shipping yields are improved" (Company E).

5.2.3. Problems of Intermodal Transportation

According to results of interviews the most important problem between Turkey and Europe is the lead time problem. Hence, due to different holidays or vacations several problems occured. On the other hand, transit documents are the other main problem between Turkey and Europe since Europe raise difficulties for Turkish operators such as environmentally or regulations about tachometer, infrastructure, or lack of transit documents. According to results, damage or lost of freight is not commonly faced problem. The other main problem is unqualified staff problem which is almost a big problem for firms since intermediate staff are not educated.

All in all, only one firm (Company E) mentioned about infrastructure problem of rail transportation.

-Lead time problem

Furthermore, firms included that the most common problem occurred in intermodal transportation is lead time problem since customers do not want to wait for long hours and there are several regulations that is obliged hence time lag is inevitable. For instance, European countries work with appointment policy hence Turkish forwarders suffer due to system. All in all, trucks and vessels should wait in order to get permission from European countries and it causes for time lag.

> "The biggest disadvantage is network and control problem between transportation modes since it cause for delay on transportation. Hence, the important disadvantage is delivery date and hour of receipts. European firms work by a system which is getting on appointment from other firms and Turkish importers are suffering because of this system. If a firm can not get appointment from European firm than vessels or trucks wait and there are delays on delivery" (Company G).

Customers do not want to wait for long hours and expect for door-to-door advantage hence this is one of the disadvantages of intermodalism since it takes longer time to transport goods.

> "Customer wants from firms to transmit freight to destination point as soon as possible and economically rather than entangle the freight. As an exporter firm should increase it's speed. Europe has mobility also hence firms can face with lead time problem" (Company Gn).

Further, another disadvantage is determined train hours in freight transportation. Firms have to wait for those days in order to transport freight and this is an important time loss.

> "As an example for disadvantage for instance if we consider rail+truck transportation, in Europe rail+truck transportation is preffered. It might be cheap as cost reduction but train takes off in determined days. So freight should be transported in those days. It means arrival of containers act in

the right time with take off of train. If it is not corresponds than delivery time can be lenghtened and anticipation can be occured. The waiting time cause customer to reach it's freight tardy" (Company El).

Time lag also occurs in intermodal freight transportation since transit time takes longer hours due to regulations of European countries. For instance, hazardous substances are controlled in the customs and this causes time lag. In the following Company E Logistics stated that;

> "For instance, automobile industry competes with transit time. Firms want to send auto to it's supplier and your firm must send transmit auto part. For example think for a big car firm such as Mercedes...Firms have to rent rail wagons. For instance, a tailer is landed in 4 o'clock and shipment dispatch is at 6 o'clock. Freight transportation is just in time. Driver should pass through x-ray, or controlling freight... These all affect timing or just in time" (Company E).

There are several problems occurred since there are multiple number of transportation modes. Synchronisation of modes is difficult since lead time would be longer if there is not synchronized network.

> "There should be cooperation in order to balance transportation modes since each mode is independent from each other. If there is time lag due to problem occured from RO-RO transportation than there would be big mistakes that can not be mended. So there should be synchronisation in order to eliminate mistakes" (Company E).

Furthermore, renting railways in Europe may cause time lag since sea transportation is connected with rail transportation in order to reach freight to its' destination point. Firms rent railways to reach interior points but it causes time lag.

> "Renting railways is the another problem occurs in intermodal transportation hence it causes time lag" (Company E).

-Terminal Cost Problem

Terminal cost problem costs a lot since transfer of goods add extra cost for transportation of freight. During transfer of goods terminals are used as storage and it is accepted as extra price for firms.

> "….While transferring freight for each intermodal transportation mode cost of terminal is added hence in order to decrease the cost of terminals between transportation modes handling should be enhanced since terminal cost should be pushed down. I fit is not reduced intermodal transportation would be comprimised deificient" (Company Gn).

-Tachometer Problem

Tachometer is an instrument measuring the rotation speed of disk, as in a motor or other machine. Tachometer is important in transportation freight since it measures speed or time. European countries want to interfere in tachometer whereas it is impossible to break tachometer kit. Tachometer problem is a common problem for instance, refer to news, Turkish transportation companies paid 2 million Euro punishment payment due to taintings on European roads. In Europe vehicles only work for 9 hours as it is limited due to regulations. The duration is measured by the help of tachometer hence if the limited time is expired than drivers would stop and wait until the next span. Tachometer follows how many hours trucks on the move. According to tachometer regulation a truck driver can not work continously more than 4.5 hours (Sözcü, 2016).

> "… vehicle such as tır/truck when on the train firm cannot interfere when a problem is occured. For instance, in Europe sometimes firms want to break tachometer speedometer while truck is on rail transportation and forwarders can not interfere in" (Company E).

- Infrastructure Problem

Intermodal transportation infrastructure concludes terminals, instruments, labour since infrastructure should be strong enough to maintain intermodal. For instance, in Sweden there are hard enough to reach interior points due to geographical reasons. Further, in developed countries like Sweden, infrastructure is developed to gather intermodalism.

"Infrastructure for intermodal transportation is important structure since it can be overrun in lines which have infrastructure. On the other hand, developing countries have problems due to lack of infrastructure. According to preferance for RO-RO ve RO-LA transportation high cost investments are needed" (Company E).

-Damage Risk, Lost Risk and Wrong Delivery of Freight

Further, firms claimed that they faced with several problems due to loss, damage risk and wrong delivery. On the other hand, it is declared that each transportation mode has several risks but mostly firms stated that air transportation is convenient for wrong delivery of freight. For instance, it is stated that loss of freight is commonly faced by firms due to oversize freight transportation and lack of hubs in terminals. Besides, firms declay that in cargo transportation cargo is loaded at the very last since airlines (THY, Pegasus etc.) regulations passenger and their stuff is important than cargo transportation.

"In general loss of freight is occured in air transportation during transfer of freight. I mean freight is lost by airlines. The most recently faced situation is that problems occured due to hubs. For instance, a firm wants to transport freight to Africa but there are not any direct flights. Firms should sent freight to Kenya or indirectly transport freight to Paris of Frankfurt in order to transfer freight to Africa. On the other hand, if the traffic of hub is overcrowded such as Christmas time or in vacations… or in Middle East, such as Dubai in ramadan holiday there might be extraordinary traffic and airlines might loose freights and face with problems such as finding locations of freight. I mean freight can be founded in any airport but than damage risk is increased" (Company K).

"For example, once our firm was carrying freight by Turkish Airlines and freight was found in Nigeria. Another example ist hat a freight was lost by Lufthansa airlines. The size was one pocket but goods were about 600 kg in Nigeria. For example, there were 200 container that should be transported, 198 container were reached to it's destination point but 2 container were lost. For example, while loading cargo is placed, the priority is passengers than baggage of passenger and at last cargo are

laided. If the volume of aircraft is oversized than cargo is unloaded as a primary source. There is limitation for loading and unloading of freight due to balance gauge. If passenger weight is heavy than freight would be transported by coming up next aircrafts" (Company E).

Furthermore, according to firms damage risk of freight is possible whereas firms states that robbery case is not faced commonly. Damage of freight is almost adds extra margin for transportation cost.

> "…Once we loaded chicken freight which is carried by reefeer container. During transfer lifting crane is broke down. Container fell down and all chickens were spilled out of container. All chickens were annihilated since chickens were not suitable for human health. All in all, customer also had problems" (Company El).

> "We did not face with any robbery case. But we should take in consideration of type of product. For example first, we have service of ceramics for America whereas for west coast has rail transportation line and it is almost suitable for intermodal transportation. On the other hand, ceramics is a product that is delicate hence it might be break apart during transportation in rail lines. Second, computer hard disks, cigarettes and alcohol are not suitable for multiple handling since when containers are tumbled down than robbery risk is almost increased. Firms should take consider of those risks" (Company K).

On the other hand, firms claimed that they were not faced with any problems due to loss, robbery or damage. According to firms, it is hard to face with robbery case since containers are made of rigid steel or hand made material.

> "We were not faced anything about loss of freight or robberry. Only before 2 years our train hit a vehicle coming in the opposite direction. Our trailer did not fall down and all crops were sprinkled. There were not fire burned out since the freight is not hazardous substance" (Company E).

-Problem of Lack of Information About the Goods

According to firm, there are problems about information of goods since in maritime transportation since operators declare wrong size of freight which is

important for forwarders or 3PL'S due to vessel capacity. If it is overloaded than it might cause accident.

> "For instance, we have problems due to operators are not giving specific and right information about goods even it is road, rail, maritime or air transportation. For example, a good can be hazardous substance or flammable. For example, lithium batteries all are included in hazardous substance expecially in air transportation. For example, a firm wants to transport 50 cell phones and some say that it is not dangerous goods but in case it is. Another example is in maritime transportation. Operators declare actual weight incorrect for example they claim that container capacity limit is 22 tones but actually it is 26 tones. It is risky." (Company K).

-Staff Problem

Staff problem is another problem of intermodal transportation since qualified staff is hard to scare up. Also, firms complain that educating intermediate staff costs a lot since qualified staff is hard to find. While educating staff also damage of risk increases.

> "The biggest problem of road transportation is stuff problem since there are lack of qualified stuff. I mean intermediate stuff problem. For example, if you are a manager of a company but still you would face with intermediate stuff problem. I think it is general problem in Turkey not specific for us. Number of nonskilled stuff is more than qualified intermediate stuff hence you have to train unskilled stuff in order to educate and become a skilled labour and this costs a lot. Firms want to use existing resources because if your labour is experienced than it is not useful only for cost but also cost of damage risk is reduced. You have to know that risk of damage is high possibility while unskilled stuff as becoming a qualified stuff since it makes lots of mistakes. So, logistics firm and all industries have gaps about stuff problem hence no one wants to educate unskilled stuff" (Company Gn).

-Document Problem

Document problem is one of the common problems faced by firms and 3PL's since European countries provide only few documents such as forwarder documents, dozvola transit document. For instance, in some countries dozvola document duration is cancelled hence trucks wait for long time. Also, firms declay that in bill of lading firms are not sensitive as European ones.

> "Also we faced with several documentation problem since Europe has regulations about quotas for international transportation. On the other hand, problems are overcome in intermodal transportation easily since European Union countries prefer for coast transportation and intermodal transportation. So in Europe document implementation is less than unimodal" (Company Gn).

> "For instance Europe while transporting freight to Irak hard to find an active port for export of goods. In this sense Europe pass through Mersin port in order to reach destination point. This is also examplified as intermodal transportation since containers reach to Mersin port and transferred to trucks or tır than again it is transferred to Irak. For instance, in this transportation documentation problems or bill of lading problems might occur such as there are differences between check list and product list or customs problem due to extra costs may added. For example, warehouse or demurrage problems might occur than firms inform customers in order to get revised document list. On the other hand, in this time zone, there is also warehouse cost and vehicles can wait it is also an extra cost. So, documentation problem also cause extra cost in order to reduce this customers should be sensible" (Company El).

European Union countries provide special rights for their members. Besides, in order to get documents Turkey should pay extra fund. This is one of the important problem since Turkish transportation can not be developed.

> "European Union provides extra rights for the European countries that takes transit documents. This is also a problem for Turkish operators due to extra cost and transit documents. Because criterias applied to Turkey are

not valid for European countries. For example, our competitors such as old east block countries such as Bulgaria and Romania have old fashioned tır fleets that swing higher carbon output but European Union allow these countries to pass without any transit document. As a conclusion, European Union put barriers to Turkey" (Company Gn).

Further, there are also problems based on country specific transit problem can be dozvola document problem in Italy. In the middle of the year, length of dozvola document is finished hence trucks wait for a long time. Original document problem is the other problem occurred in intermodal transit problem since transferment of freight from each mode loss of document is possible.

"For example the biggest problem occurs in Italy. In the middle of the year Dozvola transit document is setasite hence transportation also cancelled. Than Ministry of Communication ordered new documents than operators have to wait for 1 or 1.5 month. If your firm does not have new Euro type vehicle than your firm would pass to Italy easily. However, UBAK document which is a document that provides multimodal transportation is required.. but this document is not given for each firm and if you have that document than it is easier to pass because it is not cancelled. During these periods transportation costs are highly expensive. Volume of freight is same but vehicles are less so costs are almost expensive due to these reasons" (Company Gn).

"…for example in land (road) transportation Italy obliged firms to buy dozvola transit document. Generally, this document is finished by the end of May or June. However, Italy again handle new Dozvola document for due date August or September. On the other hand, if length of dozvola is finished than freight which is transported through Italy can not reach Germany" (Company K).

According to Company B Bulgaria has special regulations for rail transportation since containers should be revised each year and tested whether they are suitable for carriage of freight or not.

"Bulgaria and Turkey has document problems for rail transportation. For example, detailed requests are not substantial but if the trains are not well-groomed than containers might sent it back by Bulgaria. Containers must be revised in right way which includes to be well-groomed and fit into standards, whether it gets sunshine or air. The biggest problem about documents is as Company B carries every type of freight and TCDD wants firms to inform about whether freight is suitable for the container label. For example, 3.2 class is classified as flammable liquid and labeling should be fit into container. Certificate is required from exporter firms but Company B is obliged to check the containers. We can not gather documents" (Company B).

-Customer Problem

Customers are not well informed about intermodal transportation since customers do not want to deal with several transportation modes. Firms try to explain advantages of intermodal but customers are not used to send freight by intermodal.

"The other problem is explaining our services to customer since customers get used to unimodal transportation system and customers are hard to believe that transportation of freight is reached to customer in the same time period like in unimodal transportation" (Company G).

-Problem of customs

Custom problem is another important problem since most of the forwarders can not provide customs service.

"There are also problems about customs for sure…For example, in Sweden a firm should transport freight through Hamburg or through alps. Forwarders can not provide custom service in the name of Sweden since firms are not settled in Sweden. Turkish firm can not entry in the name of European Union firm. So you have to do transit entry for Sweden in the transfer port. In this sense, service providers are really important" (Company K).

> “Sometimes we face with customs documentation problem since time out of bill of lading. Especially, Europe is much more planful in intermodal transportation since they work with reservation” (Company S).

-River Transportation Problem

Europe has the capacity of river transportation but it is still not preferred since its’ flow of water is not regular. On the other hand, it is also loss of time.

> “River+truck transportation is not preffered in Europe since river transportation is not so commonly used and not regularly due to sea flow and cause for time lag. Sometimes in Europe there are few places that hard to reach by river transportation and it is disadvantage for the firms” (Seago Line).

- Gauge Problem in Rail Transportation

Intermodal transportation is combination of several different transportation modes. On the other hand, rail transportation has several regulations in Europe. Each container is not suitable for tunnel gauge. Most railways in Europe use the standard gauge of 1,435 mm (4 ft 8 ½ in). Furthermore, a container is not pass through tunnel hence maritime transportation will be the best solution to carry freight by containers.

> “Rather than damage of freight intermodal transportation is a system that is combination of different transportation operators. For instance rail operations are different from maritime operations or land transportation. Each country has specific regulations. From port to port it is easier to carry containers since each container has special capacity however if the freight is unloaded than rail transportation has limited capacity of weight or height limit. Rail transportation is not suitable for every container. Also freight transportation is limited due to height and width of tunnel. If the freight is exceed of gauge than firm would not use rail transportation. Hence, unimodal transportation is not suitable. For example, freight is loaded on bulk container vessel and height of container is 6 meters and width is 4 meters hence it is easy to carry freight from port to port” (Company K).

-Weight Limitation

Further, each country has special regulations for weight limit in containers. Firms complained about that there are several problems occurred due to wrong information about container weight. According to European countries, for instance steel containers maximum gross capacity is 30.480 kg and with corrugated walls and wooden floor it reaches up to 67.200 (European Commission, 2002).

> "… each country has specific regulations. For instance, weight limit is different in different countries. Especially for rail transportation…each country has different weight limit whereas they are approxiamately same but regulations are different" (Company K).

-Country Regulations

England has regulation due to container discharge hence it is a problem for Turkish firms since they should pay extra money for every extended hour.

> "For instance, in England there are special regulations and restrictions. For example, in England a firm only has 3 hours to discharge container when it is reached to customer by door-to-door transportation. Also, after freight is reached to it's final destination driver turns on tachometer and for each time overrun firm has to pay 20 or 30 pounds punishment payment. It is also a disadvantage for firms" (Company S).

5.2.4. Solutions to Overcome Several Problems

Each firm has to develop solutions to overcome several problems. Hence, firms suggested commonly vehicle tracking system in order to control vehicles, vessels, trains and aircrafts. On the other hand, intermediate stuff problem is overcome by firms by opening education schools for employees. Also, for loss of property surveys are important for to determine damage or loss. For better understanding, solutions for problems in intermodalism are given in the following.

Vehicle tracking system is the important feature for each firm in order to provide constant control. Firms have developed several vehicle tracking system according to their firm policies. Each firm tries to develop its' own vehicle tracking system in order to control transportation modes and instruments constantly.

> "Our firm controls all operations since for each transportation mode we have another freight control mechanism. Even our freight transportation is regulated our firm controls freight by one-to-one function" (Company G).

Also, vehicle tracking systems warn firms about wrong route. Firms explained in the following;

> "Our firm provides customers the best service it can be since we make agreements with best suppliers. For example, we are forwarders, we provide customers communication by electronic environment. Customers are informed about notification. We have a special tracking system which customers can easily control and follow it's own freight and routes. Our duty is to input datas given from suppliers and armatuers. So in this sense, customers can see freight destination, time lag or span of freight. Hence they can ask questions via e-mail or from tracking system" (Company El).

> "Our firm uses it's own software programme which is formed by Research and Devleopment. The system calculates +5 and – 5 standard deviation. Also we can see where vehicle is. Firms want to know route and destination point of freight. Before there were satellites but now there are dynafleet. Also Company E uses "quadro net system" which is suitable for us to follow freight documents and ladings" (Company E).

Firms try to develop new policies in order to eliminate loss of property by surveys.

> "…we are contractual survey firms that report of survey and find out damage risk. Freely, independent surveys that are not supportive of firms. According to report, customers appeal to insurance company and want compensation" (Company El).

Educating intermediate staff and qualified employee is the other solution for the problems. For instance firms develop their own policies for educating staff.

> "In this sense we established out own school at the end of 4-5 years training period. At the end of 2015 with the support of İŞKUR and trade

associations Company Gn established vocational courses in order to train drivers and qualified stuff" (Company Gn).

Firms have the Communication with agencies in order to face with problems. Each firm communicate with employees in the meetings.

"We do meetings in order not to face with problems again" (Company G).

Follow up of the logistics institutions is the other feature for logistics firms since new updates play an important role in logistics industry such as new developments for research and development.

"We communicate with logistics institutions and follow up recent updates and give information to relevant departments" (Company G).

Fairs are important for firms to develop new entegration of the current developments.

"Internal/External fairs are important for us since updating news and crucial developments are important for our system" (Company G).

Government support is important for firms since firms make trade with Europe and best solution for development is government support since highways and railways can be developed with government support.

"If govenrment support is started than intermodal transportation would be an important essential for Turkey. It would be important for Turkey due to it's geopolitical location which is in the center of Europe and Asia" (Company G).

5.2.5. Intermodal Transportation vs. Unimodal Transportation

When firms are asked to compare each transportation mode there are several assumptions are concerned. For instance, each firm claimed that timing and cost are the biggest factors while choosing the right transportation mode. For example, according to interviews it is recorded that maritime transportation is important since suitable for to carry high volume freight and cheapest transportation system. Air transportation is the fastest and most expensive transportation mode. Road transportation is expensive and length of freight access is much more when compared to time period. Rail transportation is the slowest transportation type but

the cheapest one. All in all, according to semi-structured interviews it is claimed that intermodal transportation is more environmentally friendly, includes less time lag and cheap when compared to unimodal transportation.

-Intermodal vs. Road Transportation

Intermodal transportation has several advantages compared to road transportation since it is more environmentally friendly and lack of time lag.

> "Intermodal transportation has cost advantage when compared to land transportation and environmentally friendly for sure due to carbon emissions" (Company G).

-Intermodal Rail Transportation vs. Unimodal Transportation

Intermodal transportation can be defined as combination of several transportation modes in order to transport freight by reduction of cost, environmentally friendly without any risk of damage of loss. On the other hand, rail transportation is the main feature of intermodalism since it provides stable freight costs all around the year when compared to unimodal road transportation. Road transportation is the fastest mode whereas it is expensive when compared to rail transportation.

> "Our train has many advantages compared to other modes of transport. These are; More economic freight rates, Stable freight costs all around the year, More tonnage can be carried in a single run, Environment friendly way of transport.. trains offer cheaper freight rates to its customers. If we compare trucking-roro shipments and IM modes all together, it is possible to say that the most expensive and fastest mode would be the trucking option. When customers have a bit more transit time and looking for a cheaper alternative, roro shipments would be feasible. If the customer has a few more days but looking for the cheapest alternative, IM trains would be the choice. Compared to land Transportation, IM Transportation consumes 50% less energy and pollutes 66% less CO2 emissions to the climate" (Company B).

Customers want stable or fixed cost for freight transportation and intermodal rail transportation provide customers this option whereas in road transportation it's like stock market since market rates are change due to price of unit load.

> "It is possible to load up to 28 tons of net Cargo into 45' HCPW containers as well. This would not be possible with trucking. Also it is important to say that trucking rates are like stock market rates that changes every week/day even. In IM Transportation customers can obtain a fixed rate for 12 months or more" (Company B).

Intermodal rail transportation has several advantages since they can carry few containers in single wagon when compared to trucks.

> "Rail transportation has cost advantage compared to road transportation. Hence, it is suitable to carry freight in a easy way. In road transportation you can only transport 2 containers in 2 times. However, in road transportation in one service you can transport 20 or 30 containers" (Company S).

-Intermodal Transportation vs. Sea Transportation

Intermodal transportation in general when compared to sea transportation it is costly expensive whereas advantegous for lead time.

> "When intermodal transportation is compared to sea transportation cost is highly expensive but lead time advantegous is more draw the attention. For instance, in sea transportation to Germany there are only 1 or 2 services but in intermodal transportation 6 vessels and 3 rail transportation are in operation in one week. Containers and trailers are special equipped units that can carry freight same as with tır/truck. Intermodal transportation capacity of volume of freight is %20 more than sea transportation" (Company G).

-Intermodal Sea Transportation vs Unimodal Transportation

Intermodal sea transportation has flexibility of freight and lead time since it carries freight for over sea. Time flexibility of freight is important for customers.

> "If we compare each transportation mode than we can see several advantages of each one. However, intermodal sea transportation has freight flexibility and lead time flexibility are glitterly compared to other transportation modes" (Company E).

- Air Intermodal Transportation vs. Unimodal Transportation

In intermodal transportation air is not preferred since it is expensive and there might be risk of loss and damage of freight. In air transportation mode it is hard to carry oversized volume of freight. Further, in freight transportation aircrafts has limited capacity for both passenger cargo and freight since cargo is less important for airlines.

> "If it is too urgent than air transportation is preferred but it is not suitable to carry all freight in single round. Transportation cost will be expensive and volume of freight will be less such as if the freight is 50 m3 and costs 10.000 euro than it will be disadvantage for the firm. If the freight is not counted as cargo than it is really hard to carry. Since there are also passangers and freight in the aircraft. Hence, freight is divided into 3 parts and all parts will be reunited in Europe. For instance Delphi Diesel…It is auto industry which has big volume freight" (Company E).

5.2.6. Turkey-Europe Intermodal Transportation

The transportation between Europe and Turkey is shaped due to Turkey is the bridge between Asia and Europe. According to interviews, Europe and Turkey have several problems such as document problems, lack of infrastructure and required documents problems and development of rail transportation problem. On the other hand, there are sea, air, road and rail transportation between Europe and Turkey. According to results, Turkey and Germany have the biggest export/import volume specifically. On the other hand, Turkey has increased intermodal transportation in transportation percentage compared to unimodal transportation.

-Intermodalism in Europe

Turkey and Europe has network for intermodal transportation since infrastructure of intermodal transportation. Intermodal development started in Europe since 1980's.

> "Intermodal transportation most commonly used in Europe. Connection between ports and rail lines are strenghtened and rail services reach each city in Europe since Europe has developed infrastructure" (Company G).

Turkey almost have network with Germany, England, France, Austria. Intermodal rail network is developed in Turkey since Halkalı is the improved terminal for European rail network.

> "Intermodal transportation is commonly used in North and West (Germany, Belgium, Holland, France and England), Scandinavia line (Finland, Denmark, Poland, Czech Republic, Hungary). Containers which are loaded from Turkey reach to Germany and than it is expand to other cities in Europe" (Company E).

> "Our main destinations and origins are Austria and Germany at the moment. Our trains depart from Halkalı, Turkey and stop over at Sopron first. Then we send containers to Ludwigshafen or Duisburg terminals as required. Different operators would have different origins and destinations however" (Company B).

5.2.7. Intermodal Transportation in Turkey

Intermodal transportation have been in vogue in last 10 years due to cost advantage, environmentally friendly, lead time advantage and due to lack of damage or loss of freight. On the other hand, rail intermodal transportation is developed since government attempts are swelled such as BALO Project is the most important one. On the other hand, development is not reached in the requested level. According to interviews, it is claimed that, lack of infrastructure, customer preferance are the specific reasons for undersized intermodal transportation in Turkey. Besides, managers and representatives declared that government attempts for intermodalism and rail construction were not so important before. In this sense, rail+truck intermodalism were not unadvanced.

-Development of Intermodal Transportation in Turkey

Intermodal transportation is not an old concept in Turkey since there are still problems that firms should face and find solutions. Turkey plays an important role in international trade market as well as in freight transportation. Ports are the important factor for logistics industry in both for rail and road transportation in Turkey since Turkey is a bridge between Asia and Europe. Further, even though Turkey wants to become a regional power in integration process with European

Union still lack of intermodal transportation in global world. In addition, in 80's and 90's Turkey has developed its integrated infrastructure for road, rail, sea and air and continued to improve its development until 1990's. Logistics is not a common term to Turkish logistics until 2000's. Especially in last 20 years as industry and trade developed storing, information and document management, cooperation among national and international companies, introducing new offices in abroad, improving quality have increased. In addition, several logistics companies are constituted. Further, unimodal transportation transferred as multimodal transportation in logistics companies.

> "Intermodal transportation is in currency in last 10 years. However, it is not easy to8 say that Turkey as an developing country reached up to important point in intermodal transportation. Yes, sure we have important place in international level but it is not easy to say that it has a significant share in total transportation. If you ask me it's size, I think it's not even 5%, in developed countries it is around 10-15%. So I believe Turkey is just in the beginning" (Company Gn).

Furthermore, in Turkey customers are not aware of intermodal transportation hence intermodal transportation can not be improved since customers do not preffer intermodal transportation hence firms want to explain benefits of intermodalism. In this sense, development of intermodalism can not take a further step in intermodal.

> "Intermodal is not preffered compared to unimodal transportation (i.e. rail/ maritime). For instance in Turkey we have only two intermodal operators. The new concept make nervous of customers. Also, customers do not have knowledge about intermodalism. We try to explain intermodalism as environmentally friendly and secure" (Company B).

Further, rail transportation is developed in Turkey due to government investments and rail infrastructure policies of Turkish State Railways. Firms gave example for rail transportation in Turkey since firms claim that intermodal transportation can be provided only by development of rail transportation.

> “However, railways which is a headstone of intermodal transportation, is still not turned into a government policy. Railway transportation is expanding in our country with the help of private companies themselves or with their foreigner partners. As an example, railway lines that link Anatolia to Europe are in maintenance for a long time and not used. Container or tractor-trailers are transported by roadway whereas it could create a huge cost and environment advantage. Ro-Ro/Railway line which is considered to be opened to Tekirdağ from Bandırma is in process of a project for 3 years and still not opened. These kind of problems are becoming obstacles for this transportaion system which can be very beneficial. Also, connection of Georgia from the historical Silk Route Project, is not combined due to the disagreement between two countries” (Company G).

There are many investments and projects for rail transportation in Turkey in order to develop rail transportation in Turkey due to improve intermodal network. By government support rail privization will be the new project for Turkey since new private companies will make investments for rail network.

> “There had been many investments to railways in tha last ten years. Current government took a positive action about railways and now we are waiting to be privatized like airways such as Pegasus, Sunexpress. We make investments as carriage but not as locomotive. There will be usage in definite hours in railway like airways does. Of course its standards will be the ones that the government determines. This way, railway will increase in usage. I think these investments are going to increase with private sector in the next 5 years. As a country we will reach the percentage level of developed countries when costs become competitive. Since the costs will decrease, competition will increase in internal parts of the country. The east and the west of Turkey both will become competitive powers. It will also reduce the migration from rural parts. The grand development in a country can be actualized by transportation” (Company Gn).

In Turkey the important rail transportation investments are developed in the last 10 years for instance with new railway lines are constituted and new projects were in the subject.

> "Almost we have only 3 years past in the industry. IM Transportation has begun (in terms of railroads with Europe) in the mid 80s in Turkey with Danzas. Since then many companies and operators have operated block trains between Turkey and Europe. The big Picture, however, especially the last 4-5 years have been very damaging to the market due to infrastructure works in the railroads in Turkey, Romania and BulgariaSince 1980's. Project is not a national project but it is considered as national train project. Also, our project has 120 owner and it is considered as train operator. As it means, we have wagons and containers almost about 300 each are 45" DC and each wagon is transported in several days in a week. Route starts from Tekirdağ and containers are waited in Hungary border gate than container is directly transported to Germany. The most important thing is Company B is a notr logistics operator which provides service for logistics firms. For instance, in Turkey a logistics firm make agreement with Arcelik for to transport refrigerators and logistics firms ask Company B to carry freight hence 200 containers are transported by wagons by rail line" (Company B).

Future of Rail Transportation is the another important subject for intermodal transportation in Turkey since rail transportation is considered as main feature of intermodalism.

> "For example, independent from operator firms we are dependent on TCDD and government. For example, in the long term Turkish rail transportation system is expected to go under for privatization. For instance, after privatization wagons will be strung and wait to carry by locomotives. If you have a strong rail transportation firm than you can buy locomotives and free trade will start. For instance by special regulations and laws foreign firms can connect it's rail line with Turkish rail lines since there will be more inverstments" (Company B).

5.2.8. Required Documents

For better understanding, according to interviews there are special requirements are necessary in order to provide sustainable intermodal transportation between Turkey and Europe since several documents are required from firms. For instance, in road transportation there are K, L, C2, R2, N1 and N2, L documents are required in order to pass border. Each documents are used for special requirements. On the other hand, for sea transportation forwarders claimed that there were not any special required document. Besides, for air transportation IATA is a must for to carry freight by cargo or airline firms. All in all, according to firms, there are not special documents for rail transportation. On the other hand, the commonly all firms cliamed that in order to provide intermodal transportation firms should buy Dozvola transit document since it has several benefits for European transportation.

-Required Document in Road Transportation

There are special regulations for harmonization process of Turkish and Europe relations. For instance, Dozvola is the important transit document for road transportation since Europe obliged Turkey to buy documents.

> "Dozvola transit document is a must for European transportation. On the other hand, there are several documents for road transportation since each document has a meaning. For instance, we use R2 document which is an international organizer document since it involves national and international transportation. For instance, K and C documents are also international transportation documents. L document defines logistics organizers. Each document has special context and cost" (Company Gn).

Forwarders and 3PL's claimed that there are not special requirements for firms since there are only laws that firms should be applied due to international water regulations.

> "We work with ship-owner companies in sea loading. So what is important for us is the right delivery of documents such as bill of lading, certificate of wight, declaration, declaration of export and certificate of

> free circulation to its customers. Other than that we don't face any document problems" (Company El).

Required Documents in Air Transportation is a must in order to carry freight by cargo and airlines. In this sense, Turkey firms are obliged to buy IATA. Also, there are problems occuring in cases when a lower transportation fee is paid to an airline and even if this payment is authenticated, customs administration may take into consideration a higher precedent in announced by IATA. In cases which air freight is preferred, transfer companies may take into consideration a "precedent transport cost" based on IATA transportation tariffs. This may result in an excessive import tax to be paid by importing companies (Lojiport, 2016).

> "Air transportation requires IATA document, documents of customs, export, import.Otherwise it requires working with an agency which means extra cost. Airway cargo transportation document is same in up country.Ther are many firms like THY, Pegasus etc." (Company E).

Further, it is claimed that there are not obliged special required documents in rail transportation

> "We do not need any special documents/licenses or transit documents (like dozvola in trucking) in IM. IM Transportation requires from the operators certain conditions to operate their wagons and containers internationally. The wagons must be ECM certified. Revisions to the wagons must be made periodically. Also our containers must be in good shape not to damage the Cargo inside or any other operating party" (Company B).

5.2.9. Environmental Awareness

According to regulations of European Commission environmentally friendly policies should be applied in intermodal transportation since White Papers and Harmonization Process are maintained in this field. For instance, in road transportation it is obliged that carbon emissions should be lowered and new Euro type of trucks should be used in highways, for maritime transportation low sulphur ratio vessels should be used in seaway. In the following firms claimed that they are obliged to develop new policies for environment.

For instance, eliminating gas emission is one of the main feature of European Union White Paper documents hence Europe is obliged to decrease gas emission in transportation modes. European Union standards obliged firms to use Euro type of oil due to carbon emissions. For example, by 2050, the EU must cut transport emissions by 60% compared with 1990 levels. Within the European Union, road transport is responsible for about 20% of all CO_2 emissions. The target fixed at Kyoto Protocol was an 8% reduction of emissions in all sectors of the economy compared to 1990 levels by 2008–12.

> "….we have to show sensitivity for environment. In case, we all humanity should think about the future since carbon emission is the biggest enemy for environment since it depletes ozone layer. Hence, as ozone hole gets bigger global warming also increases. Also, we have to increase intermodal transportation in order to contribute environment. For instance, by shifting road transportation to rail transportation…So, it is possible to carry freight by only one wagon rather than 50 trucks. Locomotives, especially used in Europe are turn over by electricity since it is not harmful for the environment. For instance, Turkish locomotives are considered as diesel locomotives hence it gives harm to environment at least amount. Our vehicles are also less carbon emissioned vehicles since they are specified as Euro type vehicles. On the other hand, cost is also another feature in environmentally friendly policies. Because, as you step one level further such as from Euro 5 to Euro 6 than it needs more investment as it means more cost. Also, our firm tries to shift freight from road transportation to rail transportation or carry freight by sea transportation. We try to renew our vehicles… I mean we try to use Euro 3,4,5 fuel oils" (Company Gn).

Measurement of Carbon Footprint is also another important step for environmental awareness.

> "For example, carbon foot print is calculated and there are several targets. For instance, in road transportation eliminating diesel transportation in minumum level. Each transportation mode is tested for carbon footprint. For example in road transportation Euro 5 or 6 Fuel Oil should be used and

without Euro certificate no entrance is allowed for any vehicle" (Company K).

Ecocredential fuel usage in maritime transportation is important due to European regulations.

> "Moving goods by sea is really environmentally-friendly method since for every kilometre that a container ship carries a ton of cargo it emits 40 times less CO2 than a large air freight transporter and over three times less than a heavy truck" (Company K).

Measurement of sulphur ratio is accepted after January,1 with new sulphur usage regulation. It is obliged for firms to decrease oil pollution in maritime life due to human health and sea animal life.

> "…in sea transportation low-sulphur regulation was started both in Europe and America. In vessels sulphur ratio of diesel fuel oil should be used at least amount since it is tested in several periods. For instance, in ports when a vessel comes to near by ports ships are obliged to use fuel oil with less sulphur ratio. It is called low sulphur regulation in Europe" (Company S).

Environmental projects are important since firms are representatives of Turkish intermodal transportation. Each firm develop new projects for environment since they are obliged to develop environmentally friendly policies.

> "….according to projects we follow UTIKAD awarded us. For instance, we try to eliminate CO2 consumption and tree damage. In Europe line Company E tries to develop intermodal transportation since it is less defacer of environment. Also, our policy is to provide jobs for women in order to involve them and provide a start in business life. CREAM Project was started in 2008 since it is developed by Eruopean Union financial corporation with AR-GE. Hence, Turkish-European Union intermodal transportation will be developed also with the projects" (Company E).

CHAPTER 6

DISCUSSION

6.1. Discussion

Intermodal transportation system is sprung from combination of several transportation modes in order to carry freight and adoption of environmentally friendly transportation system. In is stated that under a single bill of lading pertaining to or suitable for transportation involving more than one form of carrier, as truck and rail, or truck, ship, and rail is defined as intermodal (ECTM, 2010). Especially, in terrestrial area, intermodal transportation provides freights to be carried by road transportation in short distances and by combining different types of transportation modes to carry freight in single container. The most important reason to use intermodal transportation system is to eliminate a set of negations about road transportation. On the other hand, according to semi-structured interviews demonstrated that firms do not have any specific intermodal definition since each firm has mixed terminology hence firms do not specify the differences between multimodal, combined and intermodal transportation.

Further, according to themes advantages of intermodal transportation can be specified as; reducing infrastructure cost, eliminating traffic congestion in land transportation, providing optimum usage of resources, integration flexibility, reducing risk of damage/loss, being environmentally-friendly, providing energy consumption can be counted as several economic and social reasons for customers to use intermodal freight transportation (Tsamboulas, 2007). On the other hand, Europe has several laws and regulations in order to support intermodal transportation across the world. Besides, reduce imbalances between transportation modes is another reason for the development of intermodal transportation. European Union transportation policies can be seen as a step to adopt intermodalism in the world. In such, White Papers are accepted in order to emphasize the importance of intermodalism which are supported by supportive programmes such as Marco Polo, Cabotage and Trans-Europe Network Projects.

Furthermore, intermodal transportation has several applicants in Turkey but level of development is not sufficient. However, Turkey has the capacity to become a developed logistics base. On the other hand, Turkish transportation industry is inbalanced (Yersel, 2010). In this sense, in order to provide balance in transportation modes European Union standards should be adopted. Turkey, as considering the transportation modes, surrounded on three sides by the sea and spinned by rail and road transportation network, also has airports in several cities. For instance, road transportation has a share of % 92,5 in logistics industry hence imbalanced distribution of transportation modes are unfolded. The best alternative way that can solve this distribution problem is intermodal transportation. Financial incentives to be utilised to stimulate intermodal operations, vehicles using Ro-Ro and Ro-La lines should be exempted from quota restriction, use of Ro-Ro and Ro-La should be encouraged by incentives such as bonus permits, lower tariffs etc.. In addition, more accessible intermodal terminals should be constructed, customs procedures should be accelerated and simplified, electronic applications should be used in order to develop Turkish intermodal transportation.

Furthermore, Turkish air transportation has been developed after 2003. Road transportation industry is also descent in national and regional level since road transportation is also important in international transportation. Especially these two transportation modes are important in international transportation according to their operations. Hence legal, technical or operational problems can not be mentioned. On the other hand, rail transportation has been a fast-growing industry since the establishment of Turkish Republic. Whereas, it is not so coherent in nowadays. Hence, rail transportation system is expected to develop in 10 years time period. In recent years, high speed train projects give hope to rail industry since projects will have an important share in Turkish industry. All in all, sea transportation also shows development, however, devleopments are still not sufficient. Lately, sea transportation competes with air transportation in the recent years. Furthermore, in Turkey it is expected that ferry-rail and sea bus transportation network will be developed.

Next, interior transportation in Turkey is foreseen to proceed by road-rail combination as intermodal transportation. Rail transportation system provides two way of intermodal transportation which are; *accompanied semi-trailers* and *unaccompanied semi-trailers.* Generally, private terminals are used and container, swapbodies are used in unaccompanied transportation. Turkey as tunnel gauges is suitable for unaccompanied intermodal transportation system. On the other hand, in road-rail intermodal transportation, the largest part of the transportation is comprimised of rail transportation. However, rail transportation mode is not preffered in Turkey. As for to change the perspective of customers, TCDD had posted new regulation system for 3PL agreements for privatization of rail transportation in April 2005.

According to study there are several common problems occured in each mode of transportation between Turkey and Europe. Further, lead time problem is the most common problem of firms since all claimed that delivery date and hour of receipts are changed due to appointment procedure of European firms. Also, , according to European Union standards, there are several documents that are compulsory to obey. Document problem is the biggest problem since international transportation is ceased. Dozvola transportation document has special provisions such as it is given for special period of time.

For instance, country specific problems are also common according to study for instance in Italy dozvola document is assigned as transit document but it should be renewed in 6 months period. The other problem in road transportation is uneducated intermediate stuff problem. Firms should educate their own stuff in order to solve employee problem. For instance, according to findings firms have private education centers for employees in order to eliminate risk of mistakes.

On the other hand, also several problems occurred in the logistics industry in Turkey. Turkish logistics industry when examined in the framework of intermodalism it is obviously important that lack of infrastructure is visible. Hence, intermodal infrastructure should be renewed and developed whereas it is an obstacle for the development of the industry in Turkey. Besides, there are several question marks for equipments and transportation instruments whether they are fertile, about fuel consumption or technically insufficiency in operations.

Also, Turkish fleets are old when compared to European fleets and it might be a disadvantage for Turkey in becoming a global actor in logistics industry.

There are also damage risk, loss of property problem in intermodal transportation between Turkey and Europe. On the other hand, it is declared that each transportation mode has several risks but mostly firms stated that air transportation is convenient for wrong delivery of freight. For instance, it is stated that loss of freight is commonly faced by firms due to oversize freight transportation and lack of hubs in terminals.

Further, environmental awareness is the other subfield of intermodal transportation since intermodal provides several benefits for environmentally friendly transportation system. European Commission has legislative regulations for to protect ozone layer, environment and maritime life. In order to reduce pollution, congestion and high sulphur ratio in maritime life special regulations are obliged (European Commission, 2013). According to findings, eliminating gas emission is the main target of firms since CO2 emission is considered as important feature for the transportation systems. For instance, firms try to use Euro 5 or 6 type of vehicle since it has the lowest carbon oscillation. Measurement of carbon foot print is the main precaution of road transportation since European Union regulations and laws. According to firms, with the developed systems, measurement of maritime transportation can be improved since usage of low-sulphur law in ports and ecocredential fuel usage in maritime transportation is important for sea life. On the other hand, in Turkey firms should develop new environmental projects since still there are lack of improvements for environmentally friendly transportation system.

Furthermore, according to findings in order to eliminate problems firms develop several solutions such as vehicle tracking systems and agreements for insurance of freight. Constant control might be provided by firms with special vehicle tracking systems in such tracking systems provide customers to be informed about freight and routes. In this sense, customers can see their freight. In order to eliminate problem of loss of property the common solution is declared as; customers appeal to insurance company for compensation. The other problem which is uneducated employee problem is prohibited with special centers that are established by firms

in order to support young employees.All firms claimed that communication with agencies, follow up logistics institutions, government support are also main contributions as solutions.

In addition, becoming a member of European Union provides several opportunities in transportation system in order to provide balanced rrelationship between Europe and Turkey. In general, Turkey in European Union harmonization process, get ahead in transportation process but it is not sufficient. For instance, Turkish road transportation got ahead well in European Union legal acquis. However, still Turkey should develop new regulations. Turkey as including all geographical features should develop new national infrastructure regulations. First of all, determined transportation policies should eliminate imbalances between transportation modes. In order to enliven transportation industry, balanced transportation system between modes should be provided for faster and cheaper coordination between transportation modes.

Further, in order to reduce problems between Europe and Turkey new regulations should be developed. According to transportation policies free trade of freight and transportation policies should concerted together. Next, in Turkey new reforms are essential both legally and structurally. In applicant, transportation infrastructure should be modernized for each mode since there are scarcity of resources. Transportation modes except road transportation have been unheeded almost for 50 years and in recent years it is not possible to provide balance between them. Railway industry completely needs to be reformed in the acquis of European Union standards both legally and structurally. Sea and air transportation also should be reformed according to international laws of European Union standards. On the other hand, importance should be given to related institutions in order to complete legal harmonization especially for air and sea transportation. In sea transportation, Security of Sea Action Plan should be applied robustly. In this sense, all limitation including regulations about transportation vehicles are removed by European Commission in the field of free trade of freight.

Each country has special renewing policies for road transportation equpiments such as for trailers, swapbodies and containers. However, should make laws and regulations in order to reduce congestion, for sustain environmental friendly

transportation, and design policies in order to support usage of intermodal transportation rather than buy new vehicles. Road freight transportation policies are met positively in the legal framework. Also, new regulations should be implemented and international conventions should be taken consider for transportation of hazardous substances.

Consequently, in order to reduce problems several institutions and authorities play an important role in order to develop sustainable intermodal transportation in Turkey. In this point, rather than individual success, industrial success and national progress is important in order to enhance Turkey as a logistics base. For this aim, public and private industries, civil institutions and education corporations should carry on study cooperately. All in all, Turkish logistics industries play an important role in intermodal transportation projects both nationally and internationally in order to create sustainable intermodal transportation in Turkey. Hence, projects are necessary both for sectorial and commercial since it would enlarge national competetion in economics.

6.2. Future Study and Limitations

Although this research was carefully prepared, I am still aware of its limitations and gaps. First, the population of the sample group is small, only seven representatives and the majority of the interviwees are sales representatives not all of them are managers since managers do not have lots of time.

Second, representatives had limited knowledge about laws and regulations. The future studies might include much more interviews in order to include much more detailed information.

Third, it would be really difficult to find articles, directives and regulations about European and Turkish agreements since all agreements were done in the past. It will be advantegous for the future studies to examine government archives in order to find eloborated versions. More documents can be examined in order to gather more information about news, regulations and laws.

Besides, it would be beneficial for other studies to look for the need of new investments since rail privatization in Turkey.

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APPENDIX. Information of Firms

Company	Intermodal Operation	Countries	Number of Employee	Services	Present in this Field	Duration	Position
Company Gn	International Partial transportation Air transportation Road Transportation Warehousing and Distribution Services Port Operations Cargo Insurance Cross and Transit Trade Services Bulk Cargo Services	Germany Austria Belgium Greece Bulgaria France Iraq Iran Romania Holland	902 employees	Interurban freigt transportation, staff transport, project transportation, partial cargo transportation, container transportation, express courier, forwarder transportation, railway transportation, storage transportation, container storage, loading and discharge service	Since 1967	22 min.	Gn Logistics Chairman of Board
Company G	Seafreight Intermodal Transportation, Bulk Shipping, Project Transportation, Air Transportation, Complete Truck Transportation, Partial Truck Transportation, Railway Transportation	Europe Middle East Russia Turkish Republics	900 employees	Sea Freight / FCL & LCL Air Freight Land Transportation Warehousing & Distribution services Port Operations Cargo Insurance Cross & Transit Trade services Bulk Cargo services Project Cargo services Supply Chain Management Container Stuffing/unstuffing services Intercity Express Courier services Comprehensive Transportation Partial Transportation Railway Transportation	Since 2009	25 min.	Business Development Manager (Seafreight &Intermodal)
Company E	Ro-Ro Transportation Block-Train Road Transportation Air Transportation (Transfer)	Germany Romania Italy Bosnia France	6.500 multinational employees	Road Transportation Rail Transportation Seafreight Transportation Air Transportation Ro-Ro	Since 1990	90 minutes	Sales Manager

		Greece Hungary Spain Poland Bulgaria Ukraine		Intermodal Transportation National Transportation Fair Projects Project Transportation Depot Management Customs Service Ar-Ge Green Logistics			
Company El	Air Transportation(sea+air intermodal, animal,perishable products, industrial products such as gold, medical cargo, dangerous goods) Seafreight Transportation (FCL/LCL container transportation, export and import service, door to door, port to port, ro-ro, refeer container, Road freight Transportation (rail + truck),	Germany France Austria Greece Albania Bosnia Macedonia Serbia Croteia Montenegro Georgie Azerbaijan Iraq Iran Syria Armenia Turkmenia Tajikistan Uzbekistan Kazakhistan Mongolia	50 employees	Full container loading Partial container service Project freight transportation Complete and partial international transportation Air cargo freight transportation Freight forwarding system Storage and distribution service Custom Service	Since 2002	18 minutes	Sales& Marketing Manager
Company B	Rail Intermodal Transportation Customs Procedure	Hungary Benelux East Germany Austria South	35 employees	Rail Transportation Customs Services	Since 2011	1 hour 8 minutes	Sales& Marketing Manager

		Germany					
Company K	Airfreight Seafreight Overland	Africa, Asia Pacific, Europe, Middle East, North America, South and Central America	66,000 Employees	Door-to-door service Secure Transportation Land transportation	Since 1890	25 minutes	Branch Manager
Company S	Short-sea transportation Container Transportation Sea Transportation Land Transportation Customs Services	Belgium, Austria, France, Germany, Italy, Romania, Morocco, Spain, Sweden, Romania, England, Ukraine	89,000 Employees	Special Cargo Dry Cargo Refrigeratad Cargo Dangerous Cargo Value-added Services	Since 2011	30 minutes	External Sales Executive