Görkem EKLEME

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AN EVALUATION OF ASYAPORT 'S CONTRIBUTIONS TO THE PLANNED CORLU LOGISTICS BASE

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by

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M.S., Marine Transportation and Management Engineering, Piri Reis University, 2017

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AN EVALUATION OF ASYAPORT'S CONTRIBUTIONS TO THE PLANNED CORLU LOGISTICS BASE

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ABBREVIATIONS

AKCANSA	Port of Akcansa Cement Company in Ambarlı Port Complex
AKPORT	Port of Akkok Company in Tekirdağ
ASYAPORT	Turkey's first sole container hubport
CFS	Container Freight Station
CLB	Corlu Logistics Base
EU	European Union
FEU	Forthy-foot Equivalent Unit
GTL	Global Terminal Limited
IWT	Inland Waterway Transportation
KUMPORT	Seaport Company located in Ambarlı Port Complex
MARDAS	Seaport Company located in Ambarlı Port Complex
MARPOL	International Convention for the Prevention of Pollution from Ships
MARPORT	Port of Marport Company located in Ambarlı Port Complex
MARTAS	General purposed seaport located in Marmaraereğlisi
MSC	Mediterranean Shipping Company
POT	Port of Tekirdag
RO-LA	Rolling Road (Rollende Landstrasse)
RO-RO	Roll on- Roll off
TCDD	Türkiye Cumhuriyeti Devlet Demiryolları (State Railways of Republic of Turkey)
TEM	Trans European Motorway
TEU	Twenty-foot Equivalent Unit
TIR	Transports Internationaux Routiers
UNCTAD	The United Nations Conference on Trade and Development
YOK	Yüksek Öğretim Kurumu
3-E	Efficiency, Effectiveness, Economically

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ABSTRACT

Logistics and transportation get more important due to increasing trade flow in the world. Therefore need for minimization the transportation costs rises. To provide uninterrupted trade flow in economic way, goods have to be carried by economic transportation modes such as rail and maritime transportation. Logistics bases are important to be able to change the transportation modes of goods during its voyage. In Turkey, due to high rate of road transportation, projects to increase the maritime and rail transportation seem necessary. Trakya region, one of the main regions which account for substantial ratio of Turkey's import and export, has high density of trailers. To decrease trailer density, Corlu Logistics Base (CLB) is planned to built. In this thesis, possible contribution of ASYAPORT which is located in Tekirdağ province, to the logistics base which is planned to be built in Corlu region is assessed. Assessment of contribution of ASYAPORT to planned CLB is necessary in terms of reducing the trailer density, ratio of road transportation and increasing the ratio of maritime transportation in the region. In this respect, current trailer density in the region and current capabilities of ASYAPORT are taken into consideration in this paper. Besides by assessing the current container operations in the region, contributions of ASYAPORT to planned CLB in terms of reducing container transfer costs and diversifying the transportation modes are taken into account in the thesis. At first, basic terminologies and definitions related to logistics and transportation are explained. Then the information which gained from the literature related to the study subjects is reviewed. With the help of regression analysis, by utilizing from current statistics of ASYAPORT, operations of ASYAPORT and density of trade which will be through Trakya region is analysed. According to the result of analysis, final assessment related to possible contribution of ASYAPORT to CLB is made. Finally, obtained results and proposals are presented at the final part of the thesis.

Keywords: Intermodal Transport, Logistics Base, Hinterland Analysis, Transportation on Turkish Thrace, ASYAPORT

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ÖZ

Lojistik ve taşımacılık, dünyadaki artan ticaret hacmi nedeniyle daha önemli hale gelmektedir. Dolayısıyla taşıma masraflarını asgari düzeye indirme ihtiyacı artmaktadır. Ekonomik olarak kesintisiz ticaret akışı sağlamak için mallar denizyolu ve demiryolu gibi ekonomik taşıma modları ile taşınmalıdırlar. Lojistik üsler malların taşınması sırasında taşıma modlarının değiştirilemesi açısından önemlidir. Türkiye'de yüksek oranlı karayolu taşımacılığından dolayı denizyolu ve demiryolu taşımacılığının arttırılmasına yönelik projeler gereklidir. Türkiye'nin ithalat ve ihracatının büyük oranını oluşturan başlıca bölgelerden biri olan Trakya bölgesi, yüksek bir TIR/kamyon yoğunluğuna sahiptir. Bu oranı düşürmek maksadıyla Çorlu Lojistik Üssünün inşası planlıdır. Bu çalışmada Tekirdağ'da konuşlu ASYAPORT'un Çorlu'da kurulması planlanan lojistik üsse olan muhtemel katkıları değerlendirilmektedir. ASYAPORT'un Çorlu Lojistik Üssüne olan katkısının değerlendirilmesi bölgedeki TIR/kamyon yoğunluğunun, karayolu taşımacılığının oranının azaltılması ve deniz taşımacılığının oranının arttırılması açısından gereklidir. Çalışmada, bölgedeki mevcut TIR/kamyon yoğunluğu ve ASYAPORT'un mevcut imkânları dikkate alınmaktadır. Ayrıca çalışmada, bölgedeki mevcut konteyner operasyonları değerlendirilerek ASYAPORT'un konteyner transfer maliyetlerinin azaltılması ve ulaşım modlarının çeşitlendirilmesi açısından inşası planlı Çorlu lojistik üssüne olan katkısı dikkate alınmaktadır. İlk olarak lojistik ve ulaşım ile ilgili temel terminolojiler ve tanımlar açıklanmaktadır. Daha sonra çalışma konularına ilişkin literatürden elde edilen bilgiler sunulmaktadır. Regresyon analizi yardımıyla ASYAPORT'un mevcut verilerini kullanarak ASYAPORT'un operasyonları ve Trakya bölgesi yoluyla yapılacak ticaretin yoğunluğu analiz edilmektedir. Analiz edilen verilere göre, ASYAPORT'un inşası planlı Çorlu lojistik üssüne olan katkısına ilişkin nihai değerlendirme yapılmaktadır. Son olarak elde edilen sonuç ve teklifler çalışmanın son bölümünde sunulmaktadır.

Anahtar Kelimeler: Intermodal Taşımacılık, Lojistik Üs, Hinterland Analizi, Trakya Bölgesi'ndeki Türk Taşımacılığı, ASYAPORT

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1. INTRODUCTION

According to the foreign trade data, Turkey's export rate to the European Union (EU) countries is around 40 percent of total export of Turkey for last 10 years [1]. This implies that trade of Turkey with European countries accounts for substantial rate of Turkey's total trade.

Road transportation which is conducted to EU countries which account for the biggest share in Turkey's export is executed via two main border gates (Kapıkule and Ipsala) in Trakya region. Kapıkule border gate enables Trans European Motorway (TEM) to connect Turkey to European countries over Bulgaria. TEM is main subcontinent highway of Europe to enable European countries to connect south-eastern countries as seen in Figure 1.1.

Figure 1.1: General connections of Trans European Motorway
(Source: http://www.unece.org/trans/main/temtermp/about.html)

Ipsala border gate provides connection between Trakya region and Europe over Greece. Kapıkule and Ipsala border gates which reach to international standards technically and legally are totally strategic points for Turkey because main trade stream via road transportation with European countries runs through with these gates. In any case of blockage of these two gates, the road transportation is to be halted and trade betweeen Turkey and European countries is to be cut or delayed. Therefore to keep road

transportation uninterrupted via these two gates is crucial for Turkey's trade potential with European countries.

Due to the high trailer density in border gates in Trakya region, it is necessary to relieve them to conduct the export and import process faster. There are substantial amount of trailer congestion in Kapıkule border gate which cause long trailer queues which exceed 15 kilometers. Any technical problem in the software programs of both Turkish and Bulgarian gates customs causes serious traffic congestions due to high trailer density.

Road dominant transportation brings about enviromental and safety problems. It can be higher risk to carry containers with road transportation in terms of accident probability. Because road accidents account for 97 percent of total within the EU border and more than 93 percent of all accident costs [2]. Despite enhanced conditions with construction of highways, current accident rates of road transportation do not change significantly. Therefore death tolls and economic losses still continue to be an important issue.

Due to the high density of road transportation and industrial facilities in the region, another important point which must be taken into consideration in the study should be decreasing enviromental pollution especially air pollution. Advantages of combined transportation which decrease harmful effects to minimum level during transportation process should also be taken into account. Advantages of maritime transportation related to enviromental pollution are to decrease of gas emissions which may cause greenhouse effect. Convention on the Prevention of Pollution by Ships (MARPOL) provides effective procedures applied on board ships. Policies related to decreasing the negative effect of seaports to enviroment are available for a few years. Seaports which comply with these policies are named "Green Port". Green Port policies aim to decrease the air and sea pollution which are caused with seaport operations and vessels which visit the seaport. Port of Long Beach in Los Angeles and Port of San Diego bring several regulations related to emission control of sea vessels and trailers in the port area. These regulations also control the liquid emission of sea vessels to sea in the nearby region of seaport. Data related to gas emissions of different transport modes especially those of maritime and railway transportations must be taken into consideration to reduce environmental pollution in the region.

In Turkey, the rate of road transportation in all modes is higher than European countries' average [3]. 28 countries of EU conducted their transportation by road 51.2 percent, by rail 11.8 percent, by inland waterways 4.7 percent, by air 0.1 percent and by maritime 32.8 percent in 2010. These countries conducted transportation by road 50.6 percent, by rail 12.3 percent, by inland waterways 4.3 percent, by air 0.1 percent and by maritime 32.7 percent in 2015 [4]. However transportation is conducted in Turkey by road 88.3 percent, by maritime 5.8 percent, by rail 5.3 percent, by air 0.6 percent in 2010. It is the reality that transportation modes in Trakya region heavily dependent on roads [5]. Turkey spends more money on highway constructions than many countries spend on them. Nevertheless, road transportation is less reliable than other transportation modes such as maritime, air and rail transportations because of its accident probability [6]. Therefore, in order to have more dependable transportation system for the trade with European countries, transportation modes in the Trakya region should be diversified.

Is it necessary to have different transportation modes in having trade with Europe? In terms of cost advantage and reliability, it is necessary. The most important advantage of combined transportation mode is to decrease the transportation costs. When transportation modes are reviewed, it is easily seen that unit costs of maritime and railway transportation are quite more advantageous than highway transportation [7]. Costs of highway transportation can be advantageous only if transportation distance is short.

1.1. General Descriptions

In the following paragraphs, various definitions and descriptions related to logistics base and seaports are made. Almost same definitions can be made for close terminologies such as logistics center, dry port, inland port and inland clearance depot. In this thesis, only logistics base is used to define Corlu Logistics Base area.

Relations between logistics bases and ports, general information related to ASYAPORT and Corlu Logistics Base are given to enable readers understand coordinated logistics activities among these facilities easily.

1.1.1. What is Logistics Base (Center)?

The logistics base is defined area where all national and international logistics and logistics related activities are conducted by various public and private sector. In general, logistics bases are built in main production centers such as industrial zones, business centers, cities, railways, road lines and ports. Value added services offered in logistics bases are long distance transportation, distribution, classification and grouping of goods, storage, dismantling and banking, insurance [8].

A logistics base is the hub point of a particular region where all the activities relating to transport, logistics and goods distribution are conducted by various operators [9]. In logistics bases, where both private and public organizations are included, foreign companies conduct highly complicated commercial activities which require coordination and collaboration. Well defined organization and management system is necessary in the handling of such a composite and complex system which includes various type of activities controlled by different authorities [10].

1.1.2. What is Port (Seaport)?

Seaport is an area which consist of land and water including facilities, used mainly for receiving vessels for operations such as loading, unloading and storing cargoes, receiving and delivering the cargoes to land transport [11].

In other words, a port is a complex for receiving ships and transferring cargo. They can generally be located at the edge of an ocean, sea, river, or lake. Ports generally have container handling equipments such as cranes and forklifts in their land area for use of loading/unloading of ships. Harbour pilot and tugboat services can also be provided to maneuver large ships in limited approaching area as ships approach and leave the docks. Ports which handle international container traffic have customs facilities to control and inspect container flow.

1.1.3. Relation Between Logistics Base and Port

As container seaports conduct their loading/unloading processes, the town or city which is adjacent to port can surround the seaport. The surrounding city can limit the enlargement of the seaport and thus the contianer storage area of the port. In this regard, it can be difficult for seaports to develop the container handling process in this limited storage area. Therefore customers which use the seaports in the city can change the ports they use due to high storage costs.

The surrounded ports can allocate additional storage area far from city which is called ‘inland ports’ or ‘logistics base’. These logistics bases must have strong connectivity with seaports in order to provide low cost storage service. Seaports can provide low cost container storage services with ‘logistics bases’, even if they are surrounded by city. However to provide uninterrupted container handling service with the help of ‘logistics bases’, direct connection between seaports and them are compulsory. Railway and highway can be built to provide these connections.

1.2. General Information About ASYAPORT

ASYAPORT was built in Kumbag town of Tekirdag province by Asyaport Liman Company which was founded for container port operations by Global Terminal Limited (GTL) which conducts port investments for Mediterranean Shipping Company (MSC). It is operated by Asyaport Liman Company and began to offer service in 8 July 2015 [12].

ASYAPORT is the first container seaport of Turkey with capacity which can reach up to 2.5 million TEU per year and has berths nearly 2000 meter long total with nearly 20 meter depth. With high depth, it is aimed to offer service not only to feeder ships but also to larger vessels as a necessity of hub ports. ASYAPORT can be used as a maritime terminal of a logistic hub named CLB of the Trakya region with its different transportation modes such as maritime, airport and highway connections.

ASYAPORT has capability to offer services such as container loading, unloading and shifting containers on the ships, container terminal Container Freight Station (CFS) services, reefer container, and container maintenance.

Rate of maritime transportation in Turkey's trade is lower than European countries' average [4][5]. Because of lower rate of maritime transportation, density of maritime transportation operations in Trakya region is also extremely limited. There are few seaports which enable to conduct container loading/unloading operations. ASYAPORT and AKPORT in Tekirdağ, MARTAS port in Marmara Ereğlisi and Istanbul ports conduct limited loading/unloading operations. These ports are used for limited operations. Nature of the goods being transported via Trakya region in terms of maritime operations brought about necessity for container port. Istanbul ports have different transportation goals and serve to transport goods from Anatolia. Therefore, Istanbul ports are not taken into consideration in the study. Apart from Istanbul ports, ASYAPORT is the only port which can conduct sole container operations in the region. Even if ASYAPORT was constructed to execute maritime transportation for transit goods, It is deemed that ASYAPORT could also be used to transport the cargo being transported to Europe via road. It is also built to meet the container transportation demands of region. With increasing container operations of ASYAPORT, maritime operations which cause increasing in trade potential with European countries could be conducted.

1.3. General Information About Corlu Logistics Base

Corlu Logistics Base (CLB) is planned to be built in Trakya region near Corlu town. Corlu Logistics Base is planned to cover more than 150 hectar area after its completion [13]. It has an advantageous position in terms of changing of transportation modes. Its location is close to Corlu airport, TEM highway and ASYAPORT. Because of its advantageous location, it can get a critical role to decrease trailer density to European countries and it can convert road dominant transportation mode to maritime transportation. To succeed it, it is important to build effective maritime routes.

Therefore CLB can be used as a gateway in order to direct container flow to maritime transportation via ASYAPORT with effective railway and highway connection. To sustain the contribution of ASYAPORT to CLB, it is important to provide frequent and constant container flow from ASYAPORT to CLB or vice versa.

The distance between CLB area and ASYAPORT is nearly 50 kilometers as seen in Figure 1.2. If the issue about distance between CLB and ASYAPORT (less than 100 kilometers) is taken into consideration, road transportation can be advantageous between two points. Whereas the density of transportation between two points makes rail transportation more advantageous than road transportation.

Figure 1.2: General view of CLB and ASYAPORT region

Issues related to the objective and role of CLB about its usage, which transportation modes CLB will use, what the maximum capacity of CLB will be and which ports and which connections CLB will support to reach its maximum capacity are still not clear. This study aims to clarify its role by defining the rate of contribution of ASYAPORT to CLB.

ASYAPORT and CLB can be used together for containers which transported from other regions of Anatolia and to European countries. With its huge capacity, ASYAPORT can provide enough service to support CLB. With the completion of CLB, it can enable to direct most of export to ASYAPORT and ASYAPORT can contribute CLB significantly to increase import. Strong connectivity between ASYAPORT and CLB can provide to increase rate of maritime transportation in total trade with European countries.

Along with conventional transportation routes in the region, new potential routes to be able to enhance the region's intermodal transportation is taken into consideration during assessment. When logistics bases' advantages are taken into consideration, building logistics base in Trakya region is necessary.

With the contribution of ASYAPORT, CLB can get critical importance in terms of diversifying transportation mode. Changing transportation mode from road to maritime provides more enviromental-friendly, less costly trade in Trakya region. It is important to analyse the rate of contribution of ASYAPORT to increase the maritime transportation. It directly affects the efficiency of trade with Europe because of its cost advantage.

2. METHODOLOGY

2.1. Aim and Objectives

The aim of the study is to evaluate the contribution of ASYAPORT operations to the planned Corlu Logistics Base. After completion of the construction, CLB will be a hub point for transportation modes such as maritime, air, railway and highway in the region.

Accordingly, main objectives of the study to reach the aim are as follows:

- To collect the data sets related to capacity and current operations of ASYAPORT.
- To collect the data sets about import and export figures to/from European countries over Trakya region with two border gates to obtain the trade potential.
- To indicate the possible link seaports of ASYAPORT to increase maritime transportation with European countries in order to make the possibility clear.

2.2. Scope

This study is limited with the capabilities of ASYAPORT and capabilities of planned CLB. Handling operations of other seaports in Trakya region are not included in the study. Due to the capabilities of ASYAPORT, only container handling operations are included in the study. Other types of handling operations such as bulk or liquid are excluded in the study. One type of container which is twenty-foot equivalent unit (TEU) is assumed to be used for all handling operations and 18 ton is assumed as standart weight of containers in the calculation of handling operations.

Only Kapıkule and Ipsala border gates are included in the study for the trade with European countries. Border passages of Kapıkule and Ipsala border gates are taken into consideration in calculations.

2.3. Research Model and Questions

2.3.1. Research Model

ASYAPORT includes the maritime leg of CLB and it can gain critical role in terms of connection of Turkey with European countries over CLB. ASYAPORT can provide a substantial container flow which comes from European countries to the CLB or vice versa. Trakya region can conduct export/import activities especially via maritime transportation due to its cost advantages.

Because ASYAPORT initiated its handling operations two years ago, ASYAPORT's container handling statistics are limited. Therefore this limited statistics make difficult to foresee its future operations. If ASYAPORT's future container handling operations can be foreseen correctly, the contribution of ASYAPORT to CLB can be well analyzed.

In the study, it is aimed that all the trade flow to European countries is conducted via CLB and ASYAPORT as shown Figure 2.1 and Figure 2.2. Therefore strong transportation link between CLB and ASYAPORT is required to provide sustainable service. It is aimed that all products are transported to CLB with different transportation modes. In CLB all modes change to rail transportation to ASYAPORT. Finally It is assumed in the study that railway transportation change to maritime transportation in ASYAPORT. Trade with European countries are aimed to conduct with link seaports via ASYAPORT.

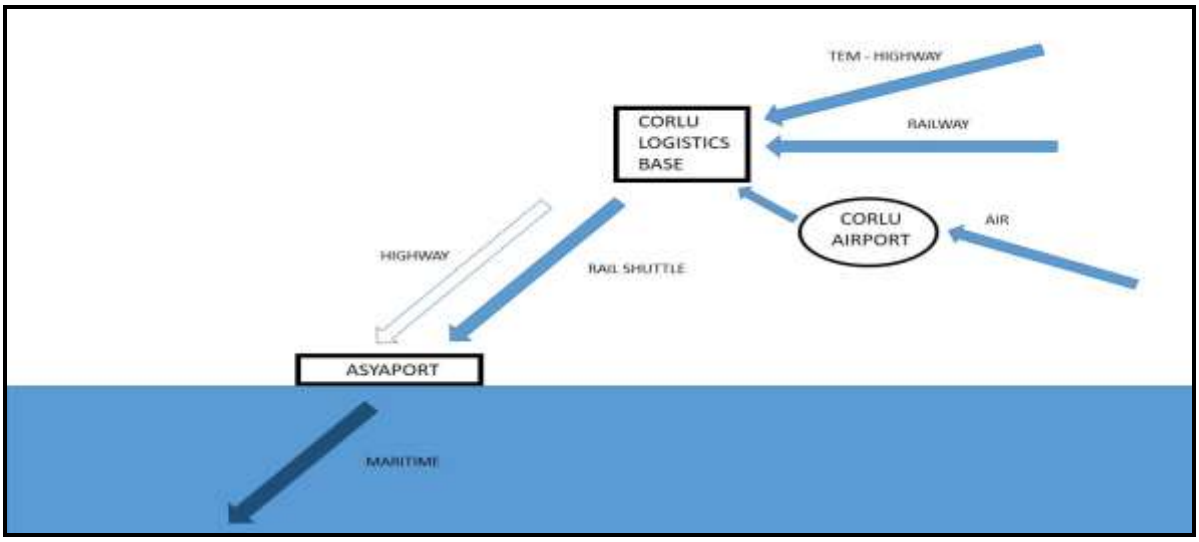

Figure 2.1: The role of ASYAPORT for the Export of Goods through Trakya Region

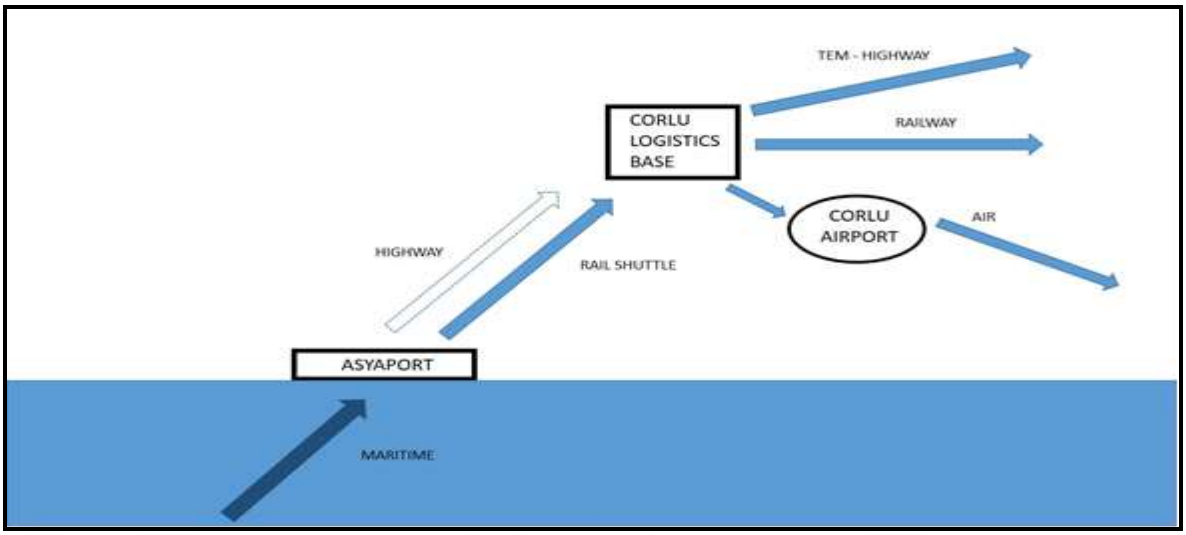

Figure 2.2: The Role of Asyaport for the Import of Goods through Trakya Region

With the 2.5 million TEU capacity, ASYAPORT handled nearly 700000 TEU in 2016 which consists of 30 percent of its whole capacity [14]. Therefore rest of its capacity can be used to contribute CLB's maritime operations. However to analyse the rate of contribution of ASYAPORT, amount of future handling operations of ASYAPORT has to be well foreseen. Because this directly affects the rate of unused capacity of ASYAPORT which can contribute CLB's operations.

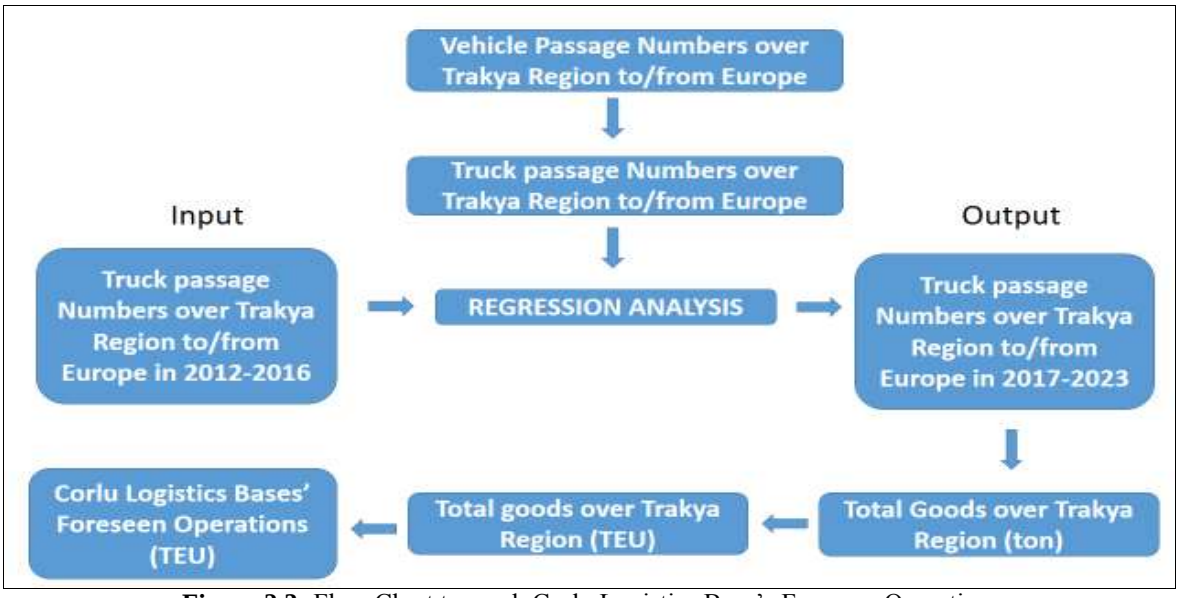

Figure 2.3: Flow Chart to reach Corlu Logistics Base's Foreseen Operations

Steps which are shown in Figure 2.3 has been followed to reach Corlu Logistics Base's foreseen operations. It is assumed that each trailer can carry up to 35 tons, each lorry can carry up to 5 tons and 1 TEU container can carry up to 18 tons. All goods which are transported to/from Europe are assumed to be transported via CLB. Therefore total goods over Trakya Region is assumed to be equal to CLB's foreseen operations.

Because Turkey's economic growth is nearly 4 percent[1], to reach the closest prediction related to ASYAPORT operations, it is assumed that annual increasing of ASYAPORT's handling operation is 4 percent. After the unused capacity of ASYAPORT is found annually, assessment about contribution of ASYAPORT to CLB is made.

2.3.2. Research Questions

In order to reach the aim, questions which are shown below related to study must be answered.

a. What is the volume of road transportation of Trakya region for trade with European countries?
b. What is contribution of ASYAPORT, if all of the unused container capacity of ASYAPORT is used for the CLB's container handling operations?
c. What is the transportation infrastructure requirements of the region in case of ASYAPORT and CLB combined usage?

[1] Turkey's growth rate is declared as 3 percent for 2016, as 5 percent for first quarter of 2017 by Turkish Statistics Bureau (www.tik.gov.tr, 12.06.2017.)

3. RESEARCH

During the literature research, it is found that there is no research or study about relationship between CLB and ASYAPORT or relationship among different logistic bases in the region.

When it is searched as "logistics base" in YOK website, it is found thesis which are explained in following paragraphs.

M.sc. thesis whose subject is "A Research on Turkey Being Global Logistics Base (Center) and Logistics Excellence Center in the Process of Economical Globalization" was studied by Ilknur DUTAK PAMIR in 2011. In the thesis, concept of globilization, current situation of globilization in the world, global logistics sectors, operations of regional, national and international logistics bases, concept of logistics and supply chain management, logistics activities in Turkey issues has been studied.

At the initial parts of this study 'globalization of countries' and 'effects of globalization to logistics activities' is emphasized. 'Factors which shape logistics activities among countries' has been also explained in the thesis. Role of logistics centers in the logistics activities which is substantial part of globalization has been studied in the thesis. However all the issues which was studied in the thesis is not directly related to subject of this thesis [15].

M.Sc. thesis whose subject is "Turkey's Potential Analysis of Being a Logistics Hub by using TOPSIS" was studied by Coskun DOGANCELIK in 2010. Concept of logistics and global logistics, concept of logistics base and their functions, criterias of logistics bases has been studied in this thesis.

The aim of the thesis is to analyse the potential of Turkey in terms of being logistics hub in the region by assessing the results of TOPSIS method. Therefore detailed information about TOPSIS method has been given in the thesis. At the end of thesis, results which

come out from TOPSIS method is analyzed in terms of Turkey's convenience to be logistics hub in the region [16].
All method and analyses which is studied in the thesis are not related to this thesis. Any related subjects which can be refered are not available in previous thesis.

The M.Sc. thesis whose subject is "Evolution of Turkey's Seaports as Logistics Hub" was studied by Atalay CETINKAYA in 2010. The issues related to 'transportation modes', 'concept of logistics bases', 'function of logistics bases', 'transportation policies of EU', 'transportation operations of the national and international ports' are studied in the thesis.

Relations of logistics operations with production activities and transportation policies of Turkey are among subjects which was studied in the thesis. At the end of the thesis, comments about transportation activities in Turkey which is in relation with EU transportation net took place. The aim of the thesis is to point out the current conditions of Turkish Ports considering the global cargo traffic and comparing the logistics hubs of the world as examples [17].

The M.Sc. thesis whose subject is "The Development of Strategies with regard to the logistics base for Turkey: SWOT Analysis of International Transport Corridors" was studied by Serhan DEMIRKOLLU in 2004. Issues related to 'transportation corridors in the region', analysis related to 'requirements of transportation in Turkey', 'supplies of transportation in Turkey', 'infrastructure situation of transportation' and 'administrative structure of transportation in Turkey' are among the subjects which was studied in the thesis [18].

At the last part of the study SWOT analysis was made to determine strong and weak points of Turkey to be logistics hub in the region by taking consideration of international transportation corridors. At the end of the analsis, results and proposals according to this results have been presented.

All the issues and analysis which is studied in the thesis are not directly related to subject of this thesis. The thesis aimed to reach a conclusion about convenience of Turkey to be a hub point in its region by assessing SWOT analysis.

The M.Sc. thesis whose subject is “Evaluation of Turkey's potential to become a logistics hub with cluster analysis” was studied by Sakin KUTSAL in 2008. In the thesis, information about ‘global trade’ , ‘international and national logistics activities’, ‘criterias from different sources to be a logistics hub point’ are presented [19].

Detailed information about cluster analysis is also given in the thesis. Research about potential of Turkey to be logistics hub point is analysed. At the end of analysis, results and proposal are presented. All these issues and analysis presented in the thesis are not directly related to this thesis.

The M.Sc. thesis whose subject is “Logistics center management: A study on the potential areas of logistics centers in Istanbul” was studied by Adil UNAL in 2013. Issues related to ‘logistics base concept, functions and classifications’, ‘Administration models in logistics bases’, ‘Technology applications which are used in logistics bases’ are presented in the study [20].

‘Logistics base examples in the world and in Turkey’ and ‘potential of Istanbul region as a hub point’ issues were also studied in the thesis. The main aim of the study to determine potential of building logistics base in particular areas in Istanbul region. Therefore even if there are some issues which are related to this thesis, the study is not directly related to this thesis.

The M.Sc. thesis whose subject is “The comparison of the business models for logistics villages in Turkey and evaluation of Samsun logistics center” was studied by Gulsen YELKENKAYA in 2017. In the thesis, it is studied comparison of logistics village in Samsun with the one in Europe for a better analysis of the state of the logistics village and to determine if the logistics village in Samsun could set an example to the other logistics village projects [21].

Issues related to ‘concept of logistics and global logistics’, ‘logistics and transportation activities in Turkey’, ‘logistics base examples in Europe’, ‘administrative criterias of logistics bases’ and ‘current situation of Samsun logistics center’ are also presented in the

study. When the study is searched, it is easily seen that there is no direct related issues between two studies.

The M.Sc. thesis whose subject is “The effects of logistics centers on freight transportation within transportation modes” was studied by Tarık EREN in 2017. The study aims to find to change of modes situation about logistics centers. The main objective of the study is to make an assessment about freight changing between road and railway in logistics centers.

Issues related to ‘logistics activities in Turkey’, ‘activities of logistics bases in the Europe’, ‘logistics centers in Turkey’, ‘concept of intermodal transportation’ are presented in the study [22]. There is no direct related issues between this two studies.

The M.Sc. thesis whose subject is “Ports as logistics centers: An analysis in the context of transportation policies applied in Turkey” was studied by Esat KOCAK in 2013. Issues related to ‘transportation policies of Turkey’, ‘logistics policies of Turkey’, ‘research findings from various methods’ are presented in the study [23].

The final assessment of findings from grounded theory method is also presented in the study. The aim of the study is to find the suitable methods to build a competative logistics base in Turkey. Even if the study containes related issues, there is no direct relation between two studies.

The M.Sc. thesis whose subject is “Management and organisation in logistics centers: The Thrace Logistics Master Plan sample” was studied by Selin BAHAR in 2013. Issues related to ‘concept and history of logistics’, ‘logistics operations in the world and transportation corridors’, ‘logistics operations in Turkey’, ‘concept of logistics master plan’, ‘logistics base examples from Europe’ and ‘logistics base activities in Turkey’ are presented in the study [24].

Even if this study focuses on logistics activities of Trakya region and convenience of this region in terms of building a logistics base, there is no direct relation between two thesis.

The M.Sc. thesis whose subject is “The site selection criterias of logistics center and Istanbul example” was studied by Tonya TURKER in 2010. The aim of the study is to determine the criterias to find the suitable locations of storage facilities and importance levels of these criterias [25].

Issues related to ‘concept of logistics’ , ‘relations between local economy and logistics activities’ , ‘logistics sector and transportation net’, ‘logistics base examples in both Turkey and world’ and ‘criterias of finding location to logistics base in Istanbul region’ are presented in the study. Therefore there is no direct relation between two studies.

All the thesis mentioned above are not directly related to the subject that will be examined in this study.

When it is searched as “ASYAPORT”, it is found one study which is named as “Assessment of ASYAPORT Seaport Company's Market Share by Its Container Terminals in the Marmara Region” completed in 2014. This study provides detailed info about ASYAPORT, its construction phases, its superstructure equipments and geographical features of ASYAPORT’s construction area.

One other study is titled as “Coastal Zone Management and the Sample Area of Coastal Structures Tekirdag Port” completed in 2009. This study provides details about AKPORT and solid waste of ships which visit AKPORT in Tekirdag province. This study is also out of scope of our study.

During the literature review it was seen that researches about planning of the port storage area, container storage problems in port operations, port producitivity measurements, ports’ potentials as main HUB port features, evaluations of container terminal performance, optimization of ports storage areas, performance measurements in TCDD ports are also available. Those studies has been facilitated during the study by references.

3.1. Concept of Logistics and Transportation

At first, the term logistics, which is derived from ‘logistikos’ which means ‘calculatory’ or ‘rational’ in Greek language, was used by the military to define the science of planning the supply chain to support troops. The term is now also used by commercial companies to explain the process of rationalizing supply chains to support their commercial operations [26].

Logistics is chain of processes which consist of planning, conducting and controlling of the voyage of goods from their initial points to their destination points. Logistics include both transportation and storage of goods. Its aim is to sustain an effective and efficient process during goods’ voyage. Logistics has to take into consideration the requirements and demands of costumers related to transportation and storage process [27]. Logistics also includes integration of transport modes, storage facilities, cargo-handling facilities, information management, performance measurement and monitoring [26].

While logistics indicates operations which are conducted by a single company or organization, supply chain indicates a series of organizations which work together [28]. The supply chain is the connection of all operations which take place to guarantee of goods moving from production point to their demanded point when they are demanded [29]. Transportation indicates a device which enables to send an equipment/product/raw materials to particular point/customer via different modes such as air/sea/land vehicles.

Transportation means movement of products from where they are produced to where they are needed. The distance of this movement across space adds value to products. Transportation carries products to markets in seperated regions and offers added value service to customers when the products arrive on time, undamaged and in the required quantities. Transportation is one of the largest portion of logistics costs and may account for a significant portion of the selling price of some products. It also includes mode selection, the route of the shipment, assuring of conforming to regulations in the region of the country where shipments is occuring and selection of the carrier [30].

3.1.1. Basic Intermodal Systems

Intermodalism means usage of different modes during goods/products' transportation. It is a popular term especially in this period when containerization become more common than before. A container can alter its mode during its voyage from initial point to its destination. In fact containerization provides us chainging its mode.

In transportation process a node term can be described as changing point of modes such as seaports, logistics bases or airports. A link can be defined as corridors which provide connection between several nodes. Roads, railways, sea routes and air routes can be examples of links [31].

Road / rail and sea intermodalism type is the most common type among all types. With the development of containerization, all types of goods from indivisible equipments to small packages can begin transportation with trailers, it can go on its journey via rail or sea to decrease its transportation costs. Road / sea (Trailer and RO-RO) intermodalism type is getting more common than before and it enables trailers to continue its journey even if it changes its mode. In the first part a tractor unit bring the trailer to ferry and leave it on ferry. Trailer goes without tractor unit throughout its voyage. At the destination port, second tractor unit takes the trailer to its final destination. The main disadvantage of this movement is its enviromental effect due to emissions from trailers. Road / Rail intermodalism type is the one of the most used types. It can enable to be carried containers/bulks from trailer trailer to rail wagon car. It can be mostly used in door-to-door transportation in the same continent. If it is assumed that one train can carry containers same as forty trailers, rail connections in transportation is fairly advantageous. Road /air intermodalism type is used when carried products are valuable or have limited carrying time. Generally road transportation ends in the hub airports and it starts in another hub airports.

3.1.2. Modal Interfaces

This is the term which is used for seaports, airports, logistics bases which enable goods to alter their transportation modes. It can be defined as hub points, nodes as an abstract term

as mentioned before. To sustain uninterrupted flow of goods from beginning point to destination, it is important not to build a system which creates a delay or problem in these gateways. The punctuality is the most crucial issue to meet the custumers' demands/needs.

3.1.3. Importance of Containerization in Trade

The container is defined as "a transport equipment of a permanent character and accordingly strong enough for repeated use, specially designed to facilitate the transport of goods by one or more means of transport without intermediate reloading, designated to be secured and/or readily handled having corner fittings for these purposes and of a size such that they are enclosed by the four outer bottom corners is either at least 14 sqm or at least 7 sqm if it is fitted with top corner fittings." [32].

To put another way, a container is a term for a box to transport freight, strong enough for repeated usage, generally stackable and fitted with devices for transfer among modes. The early declaration of standarts on container dimensions can be described as reason of the popularity of containers. A declared standard container which is referred as TEU is the 20-foot box, 8.6 feet high and 8 feet wide. But the container size with 40-foot box which is standardize as FEU is also widely used. Containers can be made of either steel which is used for maritime transport or aliminum which is used for domestic transport.

The standart dimensions and weights related to containers was standardized by ISO. The standardized length of containers was declared as a multiple of 10 feet with standarts developed for 10 foot, 20 foot, 30 foot and 40 foot units. However only 20 and 40 foot long container was accepted to be adapted by the deep sea container ship operators [32].

Due to its standart dimensions, it can be used commonly for all transportation modes. In all modes, it can be carried by different vehicles such as ships, trailers, trains. The main advantage of containerization is to decrease of transshipment times between two different vehicles. One container can be carried from ship to trailer within two minutes. That situation directly affects speed of the transportation with different modes.

The general type of containers can not be suitable for all types of cargo. To carry all types of cargo effectively and compatible with general type of containers, different types of containers have been developed. Via different types of containers, almost all types of goods, including liquids can be carried.

The containerization transformed cargo liner shipping in second half of 1960s. The usage of containers increased productivity to more than 30 tonnes perm an-hour [33].

3.1.4. Advantages of Maritime Transportation Against Other Types Of Transportation

Since 2006, maritime trade accounts for nearly 90 % of global trade in terms of volume and more than 70 % in terms of value. Maritime transportation is one of the most globalized industries in terms of ownership and operations [34].

In transportation implemented on seaways, ships can carry 99 % of world trade volume and 80 % of world trade value [35]. This data shows how frequently maritime transportation is used for global trade due to its advantage.

With the improvements in global trade, distance for transport of products is rised and transportation modes are diversified. Transportation modes classify as transportation by air, railway trailers, land transport, maritime transport and inland water transport.

Land transport is preferred due to its ability to move goods directly and without transshipment feature. Nevertheless, how much the distance is increased, land transport gets more costly and less advantageous.

Railway transport is the most economic and secure way in long distances. However railway carriage needs more time than the others types. Railway carriage needs huge infrastructural investments.

Due to its high costs, air transportation is only preferred especially for the carriage of small sized and expensive goods.

Maritime transportation needs less infrastructural investment than railway transportation. However maritime transportation requires huge capital to own vessels. Maritime transportation is 14 times cheaper than air transport, 7 times cheaper than land transport and 3,5 times cheaper than railway transport. That is why maritime transportation is the most advantageous mode. The most distinctive feature of maritime transportation is that substantial amount of containers can be moved to the distant countries in the cheapest way by large vessels [22].

To be able to carry the load of an ordinary bulk fleet carrying 150000 ton iron ore, it needs 4000 articulated trailers [36]. The researches about carriage costs reveal that maritime transportation is the most economic way to carry products [37].

Every transportation modes have different advantages and disadvantages. Therefore none of the transportation system is ideal. However, due to its high carriage capacity, low energy consumption and most enviromental friendly feature makes maritime transportation ideal among all modes. Therefore, it has a great importance when compared to the other type of transportation modes. With the exception of maritime transportation, another transportation modes are not preferrable due to their certain loading limits. It is natural for all customers to prefer maritime transport for all kind of bulk freights (coal, cereals, iron ore, oil, cement, fertilizer, phosphate) because of its cost advantage [38].

3.2. Importance of Maritime Transportation in Global Trade

The most important factor of the economics of shipping is its high capital costs, which require financing. Because of their size, ships represent an investment for huge capital.

The buying of these vessels accounts for the largest item of operating costs, which account for more than half of the yearly operating expenditures. Container shipping requires the deployment of many ships to maintain a regular service which causes serious obstacles on the attandance of new players to the sector.

The most important advantage of maritime transportation is clearly being the cheapest per unit among all transportation modes, which makes it the most suitable for heavy industrial operations. At the same time, maritime transportation has one of the highest entry costs which form the maritime life cycle that consists of construction of vessel, registration, their operations and the final scrapping of the vessel [39].

3.2.1. Importance of Seaports on Maritime Transportation

A seaport can be described as a gateway point through which goods or products move from and to the sea. Seaports are contact points between land and maritime operations, which are named as nodes where ocean and inland transport lines meet each other. It forms intermodality among different modes [40].

Seaports are a subsystem of the logistics and provide a crucial link in the transport chain that facilitates the flow of cargo. Seaports are the most important elements which provide value added services in supply chain [41].

In today's contidions seaports have to be adaptive to different situations. They have to be flexible. In case of any delay or accident in any part of the transportation process, seaports have to adapt themselves to new conditions. They have to be well designed to sustain smooth operations from inland carriages to large vessels or vice versa. It enables to sustain smooth flow of goods from initial points to their destinations.

There are several factors which can disrupt smooth flow of goods in seaports such as lack of storage, excess waiting time and limited berth capacity. They have direct effect to efficiency of seaport. Smooth operations of seaports of a country make this country an ideal trade partner. They directly affect exports and imports of a country. The countries which have seaport with smooth operations can be selected as a transshipment point as well. Seaports with smooth operations bring innovation and investment to their country. They have direct effect to stimulation of its economy.

To analyse the contribution of ASYAPORT to CLB and naturally Turkey's economy, firstly it is necessary to mention the link between seaports in maritime transportation. Then it is better to mention possible sea route links of ASYAPORT in terms of increasing of trade between European countries and Turkey.

3.2.2. Seaport Links in Global Trade

In the global trade, seaports are divided into two according to their functions. Each continents can have numerous relatively small ports which serve feeder ships. Feeder ships can be described as relatively small vessels. Goods and products are carried from several different seaports to main seaport, which is named as hub port. Hub port can be described as meeting points for feeder ships. Hub ports can be large enough to serve several feeder vessels and large vessels at the same time. Each continent has to have one or several hub ports to provide the efficiency of transportation. To sustain the most advantageous transportation cost, the route between hub ports should be as much as possible. Hub ports have to be well equipped to conduct several loading and disloading operations at the same time.

3.2.3. Probable Sea Links of ASYAPORT

To shift road dominant transportation type in Trakya region to maritime dominant transportation, new alternative routes have to be created. Therefore to increase the maritime trade with European countries, ASYAPORT needs new link seaports.

To enhance maritime transportation in trade with Europe, partnership can be formed with both south European ports and north-western ports. Port of Venice, Port of Barcelona and Port of Marseille can be a good example of southern ports which can be partner of ASYAPORT. Port of Venice can be a hub point for southern countries such as Italy, Switzerland, Slovenia and Croatia. Port of Barcelona can be hub point for Spain and Portugal. Port of Marseille can be hub point for countries such as France. Port of Antwerp, Hamburg and Rotterdam ports can be an example for north-western ports. They can be hub points for northern countries such as Germany, Belgium, and Netherlands.

3.2.3.1. Rotterdam International Port (Netherlands)

The Rotterdam Port is the largest seaport in Europe which is located within the border of Netherlands. In 2011, Rotterdam was the world's eleventh-largest, in 2012 sixth-largest container port in terms of TEU handled.

It has connection with all modes of transportation including inland waters. Due to strong connection with more than 1000 ports within and out of Europe, Rotterdam port should be used to connect ASYAPORT as a hub port [42].

3.2.3.2. Hamburg International Port (Germany)

With more than 8 million TEU per year, it is the third largest seaport in Europe. Strong connectivity can be formed between Hamburg International Port and ASYAPORT. This connection enables Turkey to stimulate trade with North European countries. Both Hamburg Port and ASYAPORT can be used as a hub port for their own region [43].

3.2.3.3. Port of Antwerp

With more than 14000 ships handled, Port of Antwerp is the second largest port of Europe. Due to its role as a hub port, Port of Antwerp can form a strong partnership with ASYAPORT. Port of Antwerp can serve to all North-West European countries. Along with Rotterdam port, Port of Antwerp can be transshipment point to landlocked countries due to its connection with inland water and railway net [44].

3.3. Port Concept

Port are defined in many ways from more than a century. A seaport first considered as *'a logistics and industrial node in the global transport system with a strong maritime character in which a functional and spatial clustering of activities takes place, directly or indirectly linked to seamless transportation and transformation processes within logistics chains'*. More shortly, '*the seaport cluster consists of all economic activities related to the arrival of goods and ships'* (SOARES Guedes 2015) [45]

3.4. Logistics Base

Logistics base concept states conducting of several complex logistics operations such as transportation, distribution, storage, handling, consolidation, deconsolidation, custom services, export, import and transit activities, infrastructure services, insurance and banking, consultation and production in a particular area. But as it is mentioned before, all logistics activities are not conducted in logistics bases. Organizations and people have stated different definitions about logistics bases in some periods in the past as shown in Table 3.1.

3.4.1. Terminology of Logistics Base

Table 3.1: Definitions of Logistics Base [46].

Source	Term	Definition
UNCTAD (1982)	Inland Terminal	An inland terminal to which shipping lines issue their own bills of lading for import cargoes, assuming full responsibility of costs and conditions and from which shipping companies issue their own bills of lading for export cargoes
UNCTAD (1991)	Inland Clearance Depot (ICD)	A terminal located in the hinterland of a gateway port and serving as a dry port for customs examination and clearance of cargoes, thereby eliminating customs formalities at the seaport.
Economic Comission for Europe (1998)		A common user inland facility with public authority status, which is equipped with fixed installations and offers services for the handling and temporary storage of any kind of goods (including container) carried under customs transit by any applicable mode of inland surface transport, placed under customs control to clear goods for home use, warehousing, temporary admission, reexport, temporary storage for onward transit and outright export.
Leveque and Roso (2002), Roso (2005), Roso et al. (2009)	Dry Port	An inland intermodal terminal that is directly connected to seaport(s) with high capacity transport mean(s), where customers can leave/pick up their standardized units as if directly to a seaport.
Ng and Gujar (2009)		A dry port can be understood as an inland setting with port -handling facilities to allow several functions to be

		carried out - for example, consolidation and distribution, temporary storage, customs clearance and connections between transport modes - allowing for the agglomeration of institutions (both private and public), which facilitates the interactions between different stakeholders along the supply chain.
Roso (2005), Jaržemskis and Vasiliauskas (2007), Roso et al. (2009)	Inland Container Depot (ICD)	A common user facility with public authority status, which is equipped with fixed installations and offers services for the handling and temporary storage of import/export loaded and empty containers

3.4.2. Probable Benefits of Logistics Bases

A logistics base can be defined as an inland setting with cargo-handling facilities allowing several functions to be carried out, for example: consolidation and distribution, temporary storage, customs clearance and the connection between transport modes.

A logistics base is also known as an inland intermodal terminal directly connected to seaports with high capacity transports carriages, where customers can leave and remove their goods/products as if dealing directly with a seaport. A logistics base is a node which increases cost-efficiency, enviromental-friendly performance and the quality of hinterland network connections [46].

A logistics base can be described as a facility which enables products to shift their modes. It should have strong connection with transportation networks. It has to be close to industrial areas to protect its sustainability. The main aim of logistics bases are to have an ability to change products' mode in order to decrease transportation costs.

Logistics bases can offer some of the additional services which are given by seaports such as storage, custom services, maintenance services etc. This services can relieve sea ports' congestion [46].

Logistics bases have to offer several fundamental services to containerized trade.

Due to the negative trade balance, full containers which arrive to country need to stay empty. Logistics bases need to have enough storage to keep them and capability to reposition them. It needs to have a capability to integrate them to logistics net again.

Logistics bases have to regulate inbound and outbound container flows. That regulations provide logistics base not to have unused empty containers. The most common way to do it to fill the containers which are emptied with imports, with export products.

With the capability to chance transportation mode, logistics base can be great chance for small companies due to its capability to reduce transportation costs. Logistics bases allow companies to move their containers between seaports and meet just in time requirements of customers. Therefore logistics bases can stimulate the trade in the region where they are in [47].

Logistics bases are getting a crucial part in the relationship between transport infrastucture, and supply chain management. The enhancing of inland terminals is crucial in a supply chain context.

Logistics bases have an ability to relieve the trailer congestion of the entrance of seaports which are served as a hub port. They can direct the congestion from seaports to loading/unloading stations or rail stations within the logistics base. Seaports which sustain their connection with logistics bases can preserve their attractiveness for the customers and shippers.

Logistics bases can increase the value of the market. Shippers want to integrate logistics bases in their logistics plannings both for import and export of cargo due to decreasing of transportation cost.

The benefits arising from building logistics bases and related facilities can change according to each case considered, depending on the available procedures, routes used, facilities provided and local conditions.

Logistics bases can have an ability to add value to whole region where they are in.

With the rising usage of containers, containers which are routed through logistics bases can provide decline in handling costs, shipping times and port expenditures. In most of transport prices, it decreases with rising distances. Because the cost per unit of distance generally decreases as the length of the trade route rises. In the conventional transportation, it can be normal to be subjected to different transportation fees according to each leg of voyage. However, with the usage of logistics bases customers can not benefit from advantageous fees due to standart fees for the whole voyage.

Clearing and forwarding agents' fees at sea ports can be avoided if customers use combined transport bills of lading or multi-modal transport documents which are under the regulation of logistics bases' management. If these documents are issued by shipping companies, they become fully responsible for the whole transportation process.

In conventional transportation, goods/products are kept in border gates because of non-availability of documents, cargo disaccord in available documents, prepayment of landing fees in other countries' currency, non-availability of onward transport, etc. In case of these circumstances, additional fees over the permitted free periods may be demanded, or demurrage fees and late documentation fees may be requested from liners.

With the usage of logistics bases and combined transport bills of lading, inspection related to customs which is conducted at the maritime ports and at the border gates of transit countries can not be necessary or can be minimized and many of the passages which cause delay at ports can be minimized.

If shifting of available long-distance raod transport with rail and maritime transport can be encouraged to customers, there may be savings to be gained in transportation costs. Because of the significant transport cost difference between rail cars and road trailers, with the usage of logistics bases, rail and maritime transportation can be encouraged.

Logistics bases can decrease empty rail cars' returns or trailer movements. Because they act as a buffer center for return loads of export cargo. Logistics bases with container-

handling facilities can encourage nearby companies to greater usage of containers. Because they can act as a transit center which enable to change the transportation mode and usage of containers makes easier for companies shifting transportation modes.

Logistics bases can offer a custom inspection service at the same base area. Instead of offering inspection service in each seaport connected to logistics service it is possible to offer inspection service at the logistics base area with fewer custom staff. By combining several sea ports to one logistics base, logistics base provides custom inspection service itself and provide staff savings.

Apart from reducing trailer congestion, logistics bases provide additional storage space which causes lower request for storage space in seaports. Due to rapid transit operations in seaports, storage spaces, handling equipments and warehousing are not necessary in seaports as they were before. Thanks to transit operations in seaports, the efficiency of seaports can directly increase with the advantage of higher berth through-puts.

Thanks to logistics bases, container handling duration in seaports declines. It increases the punctuality of operations in seaports. The punctuality and reliable delivery time provide decrease the stock fluctuations. Therefore decreasing of stock fluctuations enables customers to keep their inventory lower. Lower inventory provides customers cost saving in inventory keeping.

Rapid and accurate transfer of data related to containers, efficiency of transportation can be provided with strong computerized infrastructure in built logistics base. This computerized network can increase the compiling of data related to custom process and container handlings. It directly decreases the human sourced errors in the process. The strong computerized infrastructure enables logistics bases to offer the customers which use logistics base accurate summarized information related to their containers.

3.4.3. Types of Logistics Bases

Logistics bases can serve in different ways according to their role in logistics. If they are integrated to sea ports which are surrounded by city, logistics bases can handle all services

which is done by sea ports before such as customs, storage, maintenance, control services. Because storage services can not be given effectively due to lack of space by the surrounded seaports. It has limited space for enlargement projects. Surrounded seaports can not give an effective customs service due to waiting time. All services such as maintenance, control have a direct effect to increase waiting time, naturally trailer density and trailer congestion.

On the other hand, some logistics bases can serve as a satellite terminal just for particular service such as loading/unloading. All the services excluding loading/unloading services, are given by seaports.

3.4.4. Logistics Bases' and Seaports' Links

The logistics bases are generally located away from coastal areas, but they need to have a direct connection with seaports. This connection can be with road, rail or barge/inland waters. But responsibility of management of link services (who is charged of transportation) can be changed acoording to the region. In North European countries, this connection is largely provided by inland waters. However in south it is provided by railway nets due to geographical features.

According to the function of a logistics bases, logistics bases can be divided as three principal type (distant, mid-range and close). A distant logistics base is the most conventional one due to its distance from seaport. This distance makes railway the most suitable for the link of logistics base with seaport. Longer distance between them means larger hinterland. Therefore distant logistics base is the most advantageous one in terms of hinterland [48].

In the places where carriying with rail has more advantageous than road, mid-range logistics base can be built. Mid-range logistics base has another advantage, it can buffer excess containers of sea ports. In case of excessive flow towards sea port, some of the containers can be directed to logistics base to relieve sea ports' operations [48].

Due to sea ports location within city boundries, they face different difficulties such as congestions, excessive waiting time. To relieve sea ports' operations, close logistics base and rail shuttle linked to it, can be necessary. Thanks to them, all trailers which carry containers leave their containers to logistics base. A train can carry more than 40 containers every movement. It can directly reduce trailer congestion near seaport [49].

3.4.5. Logistics Base Examples Outside of Turkey

With its strong transportation net, Europe is in advantageous situation with sufficent logistics base facilities. Within the EU boundries, it is possible to shift transportation modes several times. They provide the most suitable transportation costs to their customers. Several examples related to logistics bases within EU are given below.

The Interporto Quadrante Europa is the most important logistics base in Italy in terms of combined transportation. It has been recognized as the best dry port of Europe in terms of intermodality. Nearly 6 million tons of goods are carried by rail cars and more than 20 million tons are carried by trailers per year. With several projects it will get a direct connection with sea and river canal system. The management has indicated its intentions related to form strong connectivity with maritime traffic in Mediterranean sea ports on the Tyrrhenian and Adriatic Seas.

Eskilstuna logistics base is the terminal in Sweden that has strong transportation connection between Port of Göteborg. The logistics base is located 380 kilometers from the Port of Göteborg. There are rail shuttles from Eskilstuna and to Port of Göteborg daily, to Gävle five times a week. The terminal area is 9000 sqm including storage capacity of the depot of nearly 800 TEUs. Apart from handling service of conventional containers, it offers services of handling dangerous goods, road haulage and storage of containers.

Dry port of Madrid is located in Spain. The location of logistics base of Madrid provides privilege in terms of connection with different sea ports of Spain. It also provides combined transportation such as road, rail and air. It offers air transportation service via The Air Cargo Centre of Madrid-Barajas International Airport. Strong railway link

between several seaports such as Valencia, Barcelona, Bilboa and Algerias is available. It provides uninterrupted transportation services with these ports. Container handling statistics of Dry Port of Madrid are specified in Figure 3.1.

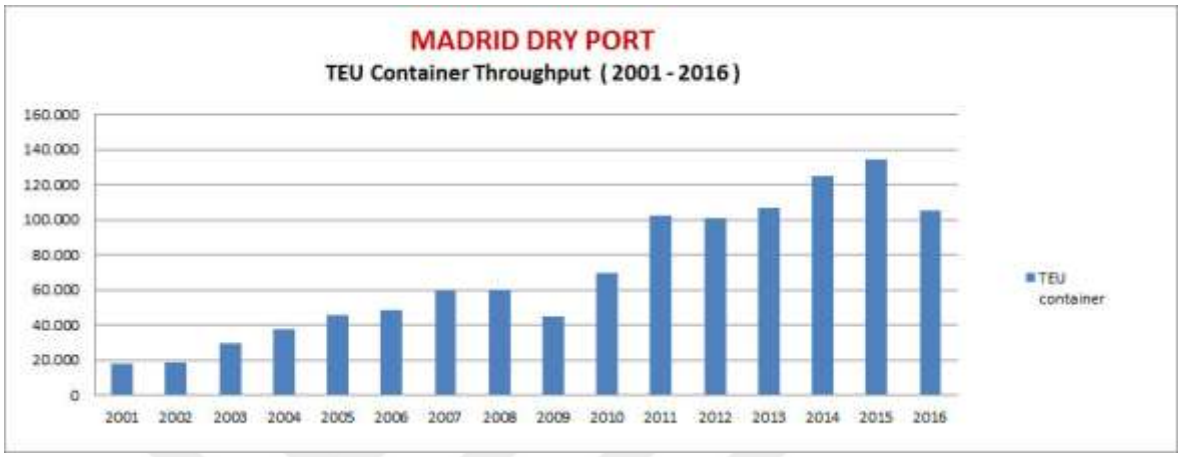

Figure 3.1: Container Handling Statistics of Madrid Logistics Base.

3.4.6. Logistics Base Examples in Turkey

In terms of logistics, the aim of logistics bases is to decrease transportation costs, enhance trade in the country and increasing competition by being a logistics hub in the region. It is aimed to increase the level of service to customers by putting forward reliability and speed terms, increase the rate of undamaged delivery and decrease the time of transit transportation.

It is important to offer effective, productive transportation services ecofriendly and safely, to increase the rate of rail and maritime transportation by enhancing the combined transportation in freight transportation, to improve the safety in transportation [50].

The main purpose of building logistics bases is supply chain optimization, usage of warehouses, optimization of manpower, decreasing of total transportation and personnel costs and reaching high quality level by increasing transport operators' total business volume. After beginning of operation of logistics bases, they will contribute to economic improvement and trade potential of region they are in, get the customer satisfaction by rising of transportation quality and meeting all the social and technical needs of costumers.

Logistics bases both contribute to cultural, social and economic enhancing of the region and regulate the traffic in the region.

In different regions of Turkey, 20 logistics bases are projected to be built. Unfortunately as European countries enjoy the cost advantage thanks to logistics bases, Turkey needs several years to complete building all projected logistics bases. Road/rail intermodalism is projected to be used in these logistics bases.

3.4.6.1 Halkalı Logistics Base (Istanbul/Turkey)

Halkalı logistics base which operates as Istanbul centered, benefits from Istanbul's advantage in the area of freight transportation. It is positioned in Halkalı town in European side of Istanbul. Most of freights are transported through Halkalı region, it creates serious traffic congestion and pollution in the region. Hence logistics base that will be in operation in the region can reduce the problem. Halkalı logistics base is projected compatible with RO-LA transportation and roads and ramps were built for the logistics base [51].

3.4.6.2. Köseköy Logistics Base (Kocaeli/Turkey)

Kosekoy logistics base is projected to be built on 59 ha wide-area. As a logistics base, it is aimed to rise of freight storage area to 2.5 million tons. With its 500 meter distance to E-5 and 1.5 kilometer to TEM highway, it is projected to service to Bursa-Sakarya and Gebze-Izmit lines. The most important point of logistics base is its position close to Kocaeli industrial area [52].

3.4.6.3 Hasanbey Logistics Base (Eskisehir/Turkey)

The total area of the logistics base established in Hasanbey in Eskisehir province is 541000 sqm and the total cargo carriage capacity is around 1.4 millon ton [53]. It is in the important railway intersection. The city is located at the intersection of railway and road transportation, the population of the city is intense, and it is an industrial center in terms of economic life. Many qualities such as the suitability of energy and raw material resources,

the characteristics of the industrial center, the character of the commercial center, and the fact that it has a educated population are the main reasons for the establishment of Hasanbey logistics base.

3.4.7. Corlu Logistics Base

Corlu Logistics Base is planned to built as a hub point which is aimed to diversify the road dominant transportation in Trakya region. Turkey's trade with European countries heavily depends on roads of Trakya region. It sometimes causes delays in border gates to European countries. Aim of logistics base is to relieve the border gates by altering road dominant transportation to maritime transportation via seaports in the region.

To form a strong partnership with Corlu Logistics Base, it is really important for seaports not to be surrounded by city and not to have limitations for expanding. Because the aim of this project is to offer uninterrupted service in case of increasing demands of customers. To meet the increasing demands of the region, both logistics base and seaport which offers service for logistics base must have enough area to expand for warehouses and storage areas.

The location of ASYAPORT, container handling operations in previous years and suitable expanding area are taken into consideration, ASYAPORT is the most suitable seaport for partnership to Corlu logistics base. All other seaports in the region either have limitations for expanding for being surrounded by city or do not have enough infrastructure to offer container handling service which can reach up to 2-3 million TEU's.

With the current situation of ASYAPORT, it has insufficient infrastructure to sustain the uninterrupted container flow. Corlu logistics base needs railway and highway connection to meet the increasing demands of the region.

CLB's region is close to Corlu airport, railway and TEM highway. Railway line from Istanbul (Halkalı) to Kapıkule border gate is available in Trakya region. Railway lines enable containers to be carried long distances with their cost advantages. CLB's distance to

railway is nearly 4 km and TEM highway is nearly 8 km. The distance between logistics base to Corlu airport is approximately 11 km. In CLB, rail/road, air/road and air/rail intermodalism types will be used.

CLB is planned to be built more than 400000 sqm superstructures. Then more than 350000 sqm (additional) is planned to be built. The area of 370000 sqm will be allocated to infrastructures, security walls, roads within base and green area [13]. However schedule related to plan of construction is not clear. So it is not possible to indicate completion time for construction of superstructures of CLB.

CLB is the base which will be constructed according to the logistics requirements of industrial facilities. With excessive trailer flow to/from European countries, Trakya region needs logistics base which enables to diversify transportation mode, regulate the container flow of the region and meet the demands of the industrial facilities of the Trakya region [13].

CLB will be built as a gateway for the trade of Turkey with EU countries. The biggest ratio among Turkey's trade partners is belongs to Europe [54]. It explains how important role CLB will get. CLB will be the closest logistics base to border gates such as Kapikule, Hamzabeyli, Ipsala, with its 150 kilometers distance to Kapikule and Ipsala, 170 kilometers distance to Hamzabeyli border gates.

CLB has an advantageous location close to TEM highway. Distance between ASYAPORT and CLB will be nearly 50 kilometers. It is used both by trailers which provide Turkey-EU trade and EU-Middle Eastern countries. Therefore Trakya region is in international transportation corridor.

CLB can be regarded as close logistics base due to its shortness of distance to ASYAPORT. It can offer a full service to customers to relieve ASYAPORT's operations. CLB's role has to include customs, storage, maintenance, control services. After these processes, containers can be carried via rail shuttle service. ASYAPORT will be a gateway station which changes transportation mode from rail/road to maritime transportation or vice versa.

Due to short distance, road transportation is the most suitable mode among all modes between CLB and ASYAPORT. A container can be carried within nearly 30 minutes from ASYAPORT to CLB or vice versa. But using road transportation for excessive numbers of containers, can cause harmful effect to enviroment. Therefore railway net between CLB and ASYAPORT is necessary. Rail shuttle service can be thought to be used in different logistics bases in European countries due to its speed and cost advantages. Frequent shuttle train service can be used to carry between 10-20 containers at the same time. This provides containers speed and punctual deliveries to customers. If the trains' capacity increase, waiting time to load it fully increases. The more waiting time means more delay of containers to the their destinations.

With the completion of CLB, industrial companies in the region will enjoy decreased transportation costs. Because trade with European countries heavily depends on road dominant transportation. CLB's aim is to change the transportation mode in Trakya region. Strong integration between ASYAPORT and CLB enables huge capacity of containers to move from CLB to ASYAPORT or vice versa.

Companies will be able to enlarge regions where they offer service thanks to CLB and ASYAPORT. With the highway and railway net, it will have a direct connection with both Europe and Middle East. In addition, industrial companies in the region will be able to use both CLB's storage area and thier own storage area more effectively.

3.5. ASYAPORT

ASYAPORT is the first port which is planned to built as a container port in Turkey. The ports which are used as container port (Haydarpaşa, Izmir, Mersin, Ambarli, etc.) in Turkey were not projected and built as a container port. These ports were converted to container port from bulk port. Because ASYAPORT, first time in Turkey, was projected and built as a modern container port which has international standarts. It is assessed that the fastest container handling operation in Turkey is carried out in ASYAPORT [55].

ASYAPORT when compared to other seaports in Trakya region, is the most suitable seaport to improve intermodal transportation in the region in terms of its surrounding area

and its infrastructure. ASYAPORT is equipped with most modern cranes and superstructure facilities. Therefore it is most suitable seaport to offer intensive non-stop container handling service.

Due to its surrounding area, ASYAPORT is in eligible region for expanding when compared to other seaports in Trakya region such as Ambarlı port, Akport and Martas. Expanding process can consist of building additional warehouses, customs buildings, storage areas, transshipments area which can be used to load/unload containers from trains to trailers or vice versa.

3.5.1. Capabilities of ASYAPORT

Transshipment ports enable to offer handling service to extra large vessels to transship their containers to feeder ships to send them their final destination. Due to lack of availability of ports which can offer service to extra large vessels in Turkey, these ships could not conduct handling operations in Turkish ports. ASYAPORT can be an alternative port for transshipment ships. ASYAPORT has been planned as transshipment hub % 80 and hinterland hub % 20 [56]. Large vessels which carry containers to Black Sea region countries avoid passing through Istanbul strait due to its navigation danger. Large vessels prefer to divide their whole containers to several feeder ships to decrease the danger and they need transshipment ports in Marmara Sea. Ships which does not want to navigate through Istanbul strait can visit Turkish ports by using ASYAPORT as a transshipment hub.

Triple E class ships were designed for efficiency, economy of scale and environmentally improved. They use their emission gases to produce additional power for their voyage and with their huge container capacities, they provide economy of scale to their customers. They emit harmful gases 35 percent per container they carried compared to conventional vessels in Asia-Europe line [49]. Therefore Triple E class ships are prefered in the long voyages. ASYAPORT was planned and built as a port which has capacity and capability to be able to service to the biggest 3E ships (Maersk Triple E 72 Class) [57].

3.5.1.1. Containerization Capacity of ASYAPORT

ASYAPORT is classified as a fully containerizationed seaport. With high speed of transportation due to containerization, most of the ports are converted to ports compatible with container operations. Some of the main ports of Turkey have berths compatible with container operations. To be integrated to global trade, it is important to have container ports for all countries. To be a part of global trade today, it is really important to meet the demand of logistics. That is why ASYAPORT is the only port in Turkey which is built as a sole container port.

3.5.1.2. Handling Operations in ASYAPORT

Table 3.2: Container Handling Statistics of ASYAPORT.

MONTHS	SHIP NUMBER	TOTAL TEU
Total 2015 (6 months)	130	129297
Total 2016	639	693653

Container handling statistics of ASYAPORT are shown in Table 3.2. Eigthy percent of total container which is handled in ASYAPORT is transshiped to Black Sea region countries and Danube canal countries [57]. It enables to reduce the risk of danger of large vessels which navigate through Istanbul Strait. ASYAPORT's location is main advantage in term of relief of Istanbul Strait's vessel traffic.

3.5.2. Mutual Concept of Corlu Logistics Base and ASYAPORT

After completion of CLB, it has to be used as a gateway from whole Europe to Anatolia or vice versa. CLB has to have strong connections among different modes. CLB has an advantage with its short distance to the TEM highway, railway and Corlu airport.

With the rail connection between ASYAPORT and CLB, CLB will have a role to shift all transportation modes such as air, road from different parts of Anatolia to rail transport via rail shuttle service.

Rail shuttle services has to be rapid enough to handle all container flow from CLB and ASYAPORT or vice versa. Timetable of rail shuttles have to be frequent enough not to cause any delay. After completion of highway construction, highway can be used between CLB and ASYAPORT, in case of any problem in rail transportation. Therefore strong highway connection has to be built between CLB and ASYAPORT. ASYAPORT has to have an effective infrastructure and superstructure to provide a rapid shift of transportation mode from rail to maritime or vice versa.

Dry ports generally used to relieve seaports handling and secondary operations such as maintenance, security and customs services. Therefore CLB has to offer maintenance service if needed during changing process of modes. All security processes such as X-ray scanning, opening and unloading suspecious containers by police department have to be conducted by CLB management. It has to alter the modes of containers after completion of customs process.

ASYAPORT's only role has to be to meet the rail shuttle service from CLB and shift containers mode to maritime by loading them to ships. Although it seems a basic process, when it is thought rail shuttle service brings containers within short intervals, container loading/unloading, ship's berth planning has to be well planned. Any problem in planning can cause disruption in container flow.

Apart from any emergency situations, trailer entrance will not be expected in ASYAPORT area. Because rail and maritime transportation mode change process will be conducted in ASYAPORT with the completion of CLB construction. However road transportation will be used in case of any disrupt in rail shuttles. ASYAPORT's infrastructure has to be sufficient to meet large number of containers' arrival to ASYAPORT with road transportation and to load them ships.

After completion of CLB, it has to be capable enough to overcome the difficulties which arise from altering different modes to rail transportation. CLB offers service to provide uninterrupted container flow both air to rail and road to rail intermodalism.

4. DISCUSSION

4.1. Volume of Road Transportation Which can be Directed to ASYAPORT

Due to the high trailer density in border gates in Trakya region, it is necessary to relieve them to make the export and import faster. There are substantial amount of trailer congestion in Kapıkule border gate which cause long trailer queues which exceed 15 kilometers. These congestions occur due to technical problems in the software programs of customs, slow custom passage process of both Turkish and Bulgarian gates. It can occur due to slow passage process because of security concerns.

In July 2016, trailer congestion happened in border gate to Bulgaria due to technical problem. It caused trailer queue which reach up to 25 kilometers. In October 2016, due to software problem of police department related to passport control, passage to European countries from Turkey has stopped for six hours in Kapıkule border gate.

In December 2016, there was congestion in Kapıkule border gate which caused trailer queue which reachs to 14 kilometers. It is indicated that its reason was slow process of control in Bulgaria border gate.

It is better to analyze the density of border gates in Trakya region. Figure 4.1 shows the amount of passage from border gates in last 5 years [58].

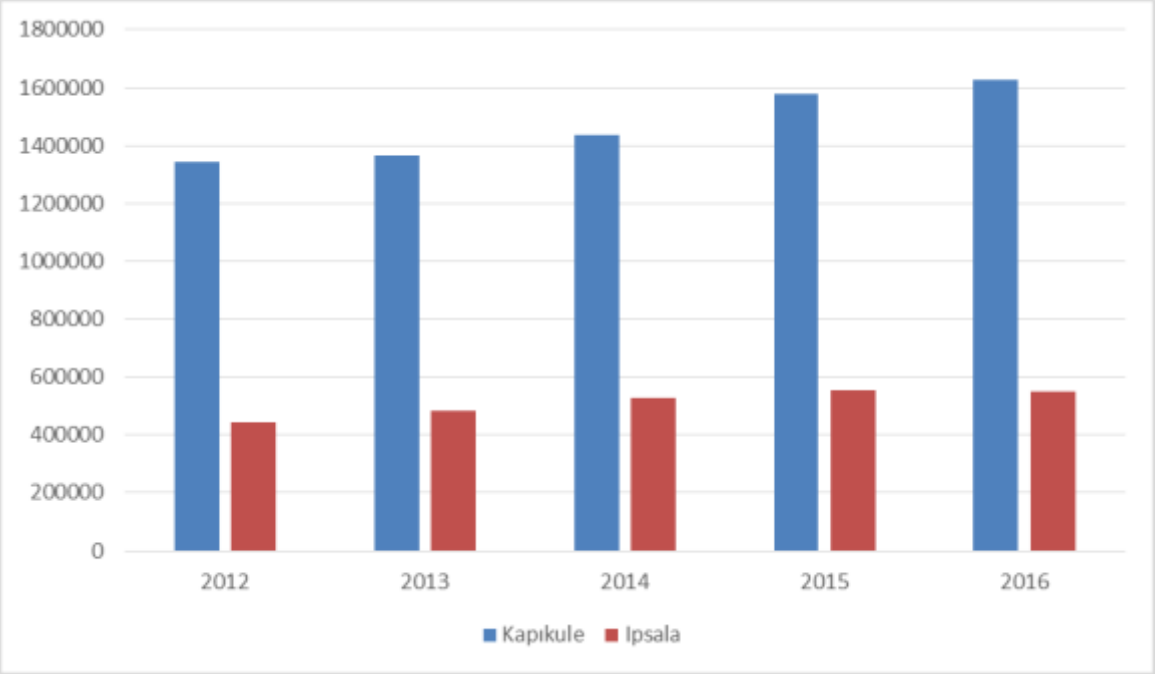

Figure 4.1: Passage numbers of total vehicle according to border gates in Turkey [58]

To analyze the close numbers related to trailer density, rate of trailer which passed through the border gates has to be found. This rates are not clear. It is better to make an assumption to find the approximate number or rate of passage. Figure 4.2 shows the amount of total vehicle and trailer passage in all border gates of Turkey by years [59].

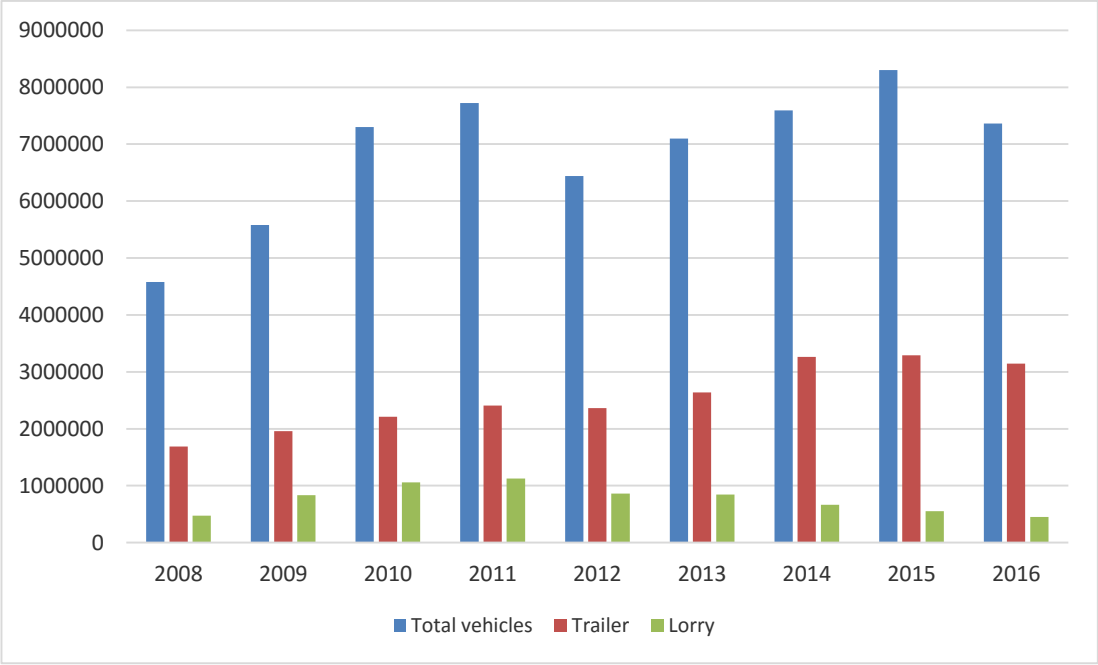

Figure 4.2: Passage numbers of total vehicle and total trailer in Turkey [54].

It is better to make a calculation to find trailer and lorry rate for each year. Figure 4.3 shows the trailer numbers rate to total vehicle numbers. It is found by dividing trailer and lorry numbers to total number. According to rates anually, it is better to assume an average rate of trailer passage for each border gate.

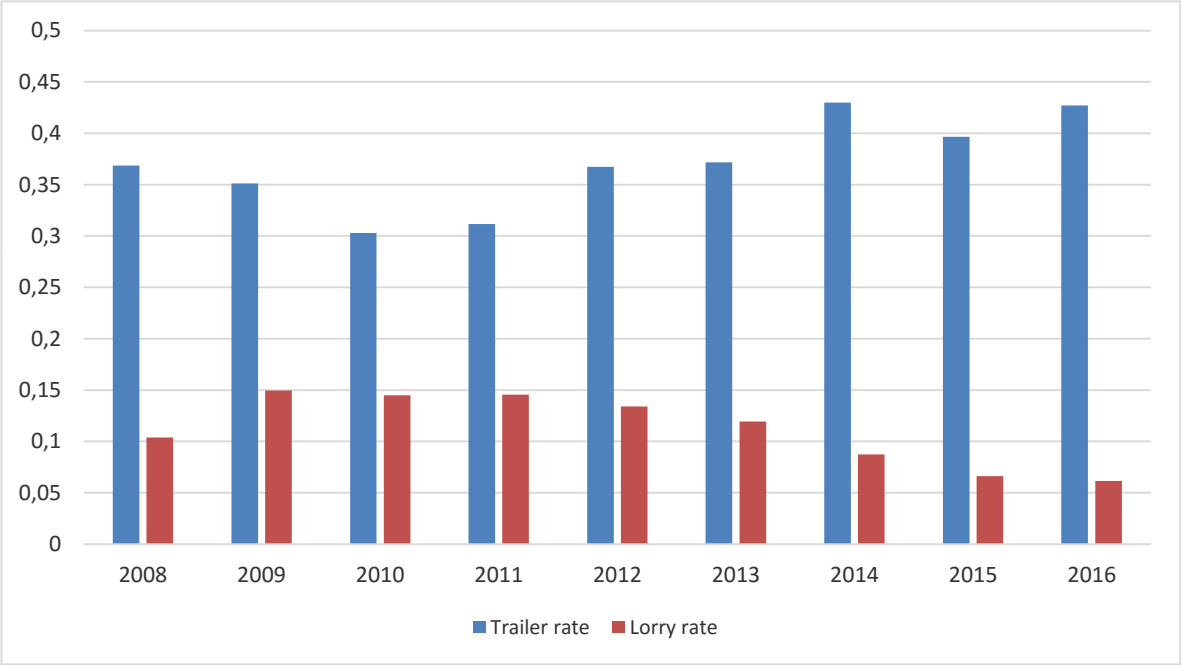

Figure 4.3: Rate of numbers of trailer and lorry to total vehicle in Turkey.

According to charts above, it is clear that trailer passage through borders increases year by year. In case of problem in borders increasing passage numbers cause traffic congestion in border gates. It can be neglectible for this decade but traffic congestion will be serious problem for next decade in border gates. Because current capacity of border gates will not be sufficient to sustain uninterrupted traffic flow to/from European countries.

It is important to transfer road density in borders to seaport in Trakya region. Transfer from road transportation to maritime transportation will decrease traffic density in roads and cost of per container, relieve the borders and increase the efficiency. It will also decrease the harmful effect to enviroment in terms of carbon emission.

As shown in Figure 4.3, trailer numbers rate to total vehicle numbers changes between 30 percent and 45 percent. As an average ratio of trailer passage, it is possible to make an **37 percent** assumption. Numbers of lorry rate to numbers of total vehicle changes between 6 percent and 15 percent. For the lorry passage average, **11 percent** assumption is possible. These assumptions are used to calculate foreseen operations of CLB in the following part of study.

Figure 3.4 shows the previous 5 years trailer passage. To foresee the trailer density for next 6 years, regression analysis is necessary. Data related to next 6 years is found via regression analysis.

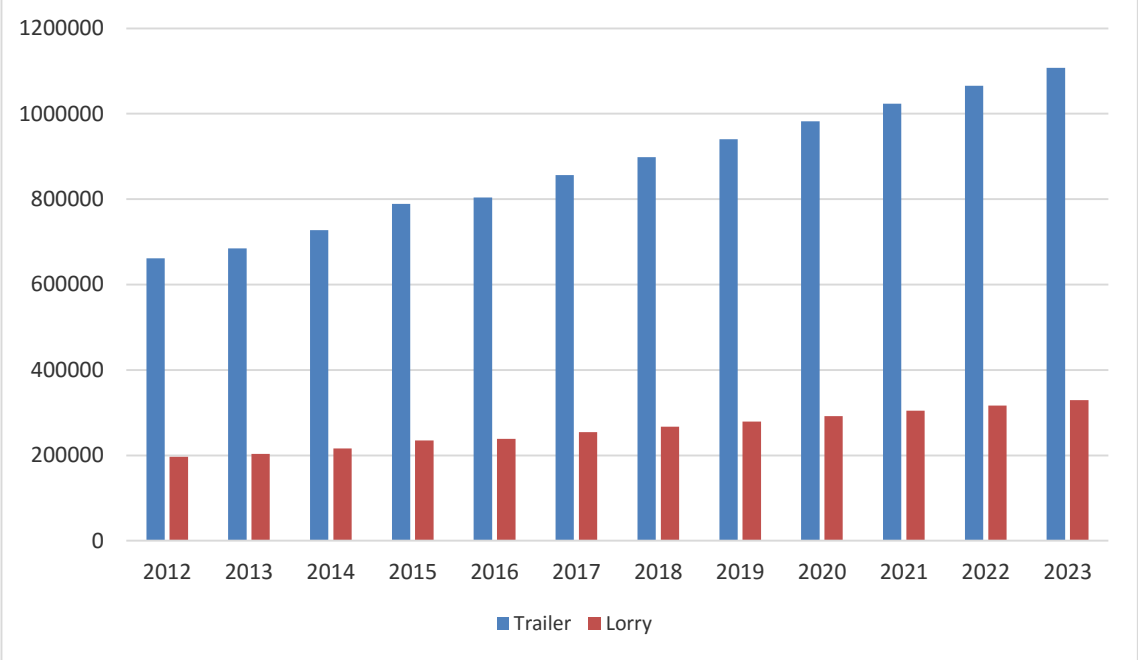

Figure 4.4: Numbers of trailer and lorry which are used for trade with Europe.

In the study, for the trade with Europe, it is assumed that trailer passage in Trakya region has increased from 660000 in 2012 to 800000 in 2016. Lorry passage in the region has changed between 200000 and 220000 in the same period.

According to regression analysis, foreseen total trailer and lorry passage numbers of Ipsala and Kapıkule border gates are displayed in Figure 4.4.

According to total passage numbers, second assumption has to be done. Each trailer is assumed to carry up to 35 tonnes. Each lorry is assumed to carry up to 5 tonnes. Total tonnes of carried goods is specified in Table 3.2 according to this assumption.

Table 4.1: Total tonnes of goods carried by trailers and lorries in Turkey.

Years	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Total tonnes carried	25303920	26196000	27832896	30194784	30762600	32761992
Years	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Total tonnes carried	34368161	35974330	37580498	39186667	40792836	42399005

Carried goods data have to be converted from tons to TEU numbers. According to carriage capacity of containers, 1 TEU container is assumed to carry goods which weight 18 tons. In the study, this assumption is taken into consideration in following calculation.

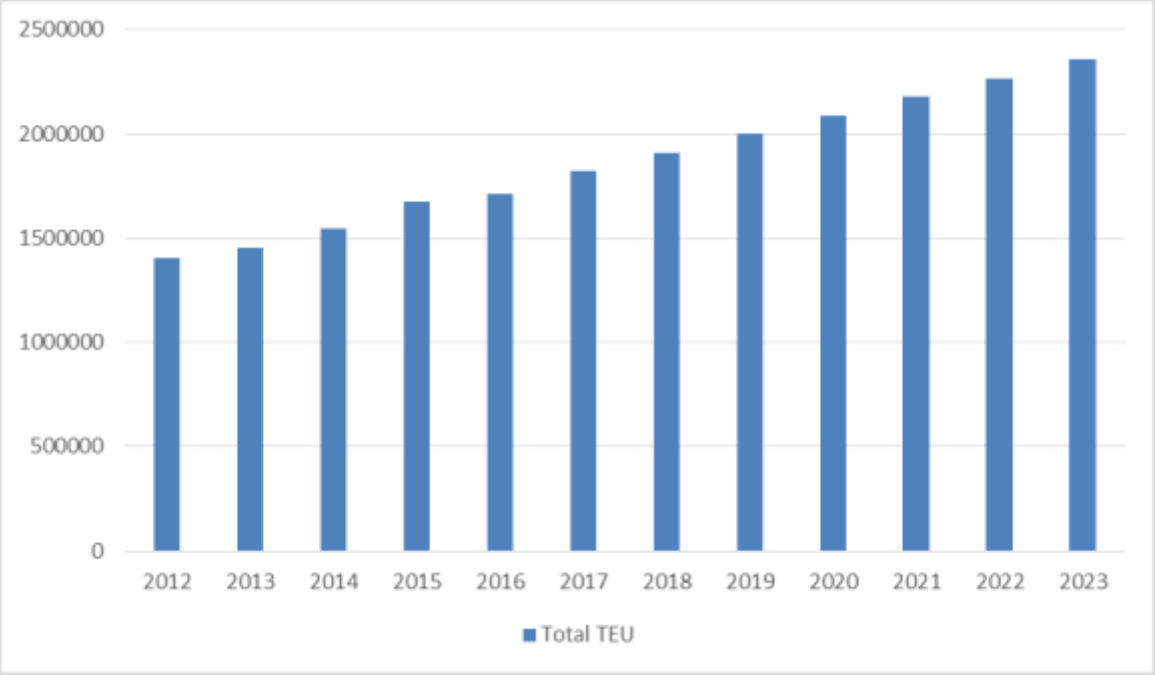

Figure 4.5: Total TEU numbers which CLB is expected to handle.

4.2. Probable Contribution of ASYAPORT to CLB

According to assumption in the study, as shown in Figure 4.5. over 1.4 million TEU has been handled in 2012, over 1.6 million TEU has been handled in 2016. By using these findings, CLB's foreseen operations have been reached until 2023 with regression analysis.

It is expected that CLB will handle more than 2 million TEU after 2020 if all the goods which are exported and imported in Trakya region, are handled with CLB. To foresee ASYAPORT's handling operations current handling data of ASYAPORT is not sufficient.

According to average of 4 percent economic growth rate of Turkey, ASYAPORT's operations related to next years is foreseen. Foreseen handling numbers are shown in Table 4.2.

Table 4.2: Total assumed number of TEU handled of ASYAPORT.

Years	Total Numbers of TEU handled	Unused Capacity (TEU)
2016	693653	1806347
2017	721399	1778601
2018	750255	1749745
2019	780265	1719735
2020	811476	1688524
2021	843935	1656065
2022	877692	1622308
2023	912800	1587200

To analyze the contribution of ASYAPORT to CLB, unused capacity of ASYAPORT and foreseen handling operations of CLB is compared to understand which rate ASYAPORT can support CLB's operations.

In best-case scenario, ASYAPORT's operations will rise less than 4 percent, ASYAPORT's unused capacity will gradually decrease less than 4 percent. In this scenario, ASYAPORT will contribute CLB longer than expected. However in worst-case scenario, ASYAPORT's operations will rise more than 4 percent and its unused capacity will decrease more than 4 percent. In this scenario ASYAPORT will not be sufficient to contribute CLB's handling operations.

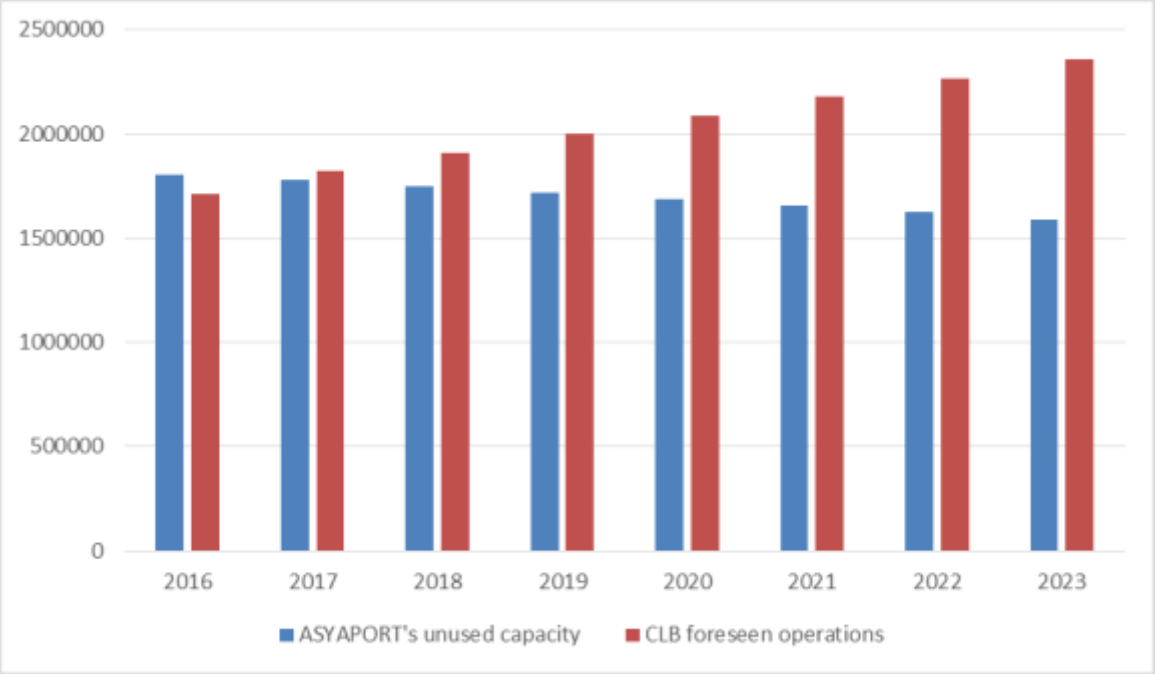

Figure 4.6: ASYAPORT unused capacity and CLB foreseen operations (TEU).

As seen above, ASYAPORT can support almost all operations of CLB. Because foreseen operations of CLB and ASYAPORT's unused capacity is close to each other. With the growing operations of ASYAPORT, it is getting more difficult to support totally to CLB operations. In the Table 4.3. support rates of ASYAPORT to CLB's foreseen operations are displayed.

Table 4.3: Rate of contribution of ASYAPORT to CLB foreseen operations.

Years	2016	2017	2018	2019	2020	2021	2022	2023
Rate of support (%)	106	98	92	86	81	76	72	67

It is assumed that ASYAPORT's container handling operations will increase 4 percent annually. This assumption depends on average economic growth of Turkey which is nearly 4 percent annualy.

ASYAPORT's handling operations are expected to increase from 700000 TEU to 900000 TEU in 2023. Therefore this will decrease the unused capacity of ASYAPORT. In 2016, ASYAPORT used 30 percent of its total capacity. Remaining 70 percent of capacity is unused. But with the increasing handling operations of ASYAPORT, unused capacity is expected to decline to 65 percent in 2023. This unused capacities can be used for contribution to CLB's maritime operations.

As seen in Table 3.4., rate of contribution of ASYAPORT decreases as a result of rising expectation of CLB's operations. After 2017, ASYAPORT alone will not be sufficient to contribute. ASYAPORT's unused capacity can contribute to CLB's operations with more than 90 percent in 2018, more than 80 percent in 2019 and 2020, more than 70 percent in 2021 and 2022, 67 percent in 2023. Only ASYAPORT will not provide sufficient contribution to CLB after 2017. To convert all transportation to maritime transportation, CLB will need other seaports' unused capacity in Trakya region.

4.3. Possible Contribution of Other Seaports in the Region to the CLB

Apart from ASYAPORT, three more different seaports which can be used for container operations are available in the Trakya region. Port Of Tekirdağ (AKPORT), MARTAS Port and Ambarlı Port are the ports in the region.

In Ambarlı Port complex, there are four logistics companies which own ports named MARPORT, KUMPORT, AKCANSA and MARDAS. Brief information relevant to these ports is shown in following paragraphs;

4.3.1. Port of Tekirdağ (AKPORT)

With its 300000 TEU and 3 million ton general cargo capacity, Port of Tekirdag (POT) is one of the ports in Trakya region. It has an advantageous connection, because it has a completed railway net to berths of port [60]. Its hinterland is whole Trakya region. It offers service for goods in container, general cargo, liquid cargo and bulk cargo. Its berth capacity has indicated in Table 3.5.

Table 4.4: Berth capacity of Port of Tekirdağ

Berth	Total (m)	1	2	3	4	5	6	7	8	9
Length	2286	255	67	185	430	321	349	345	145	189
Depth	8-12	8	8	11	10	12	10	9.5	9.3	10

70000 sqm storage area is needed for the operations of POT. With total area of 140000 sqm, POT has 3 gantry crane, 2 mobile crane, 1 reach stacker and 1 loader. It can offer service to RO-RO costumers and to customers who want to carry train cars. According to handling data of POT, its handling operations have decreased one percent average from 2009 to 2013.

Due to its location in the middle of the city center, it can be difficult to plan an enlargement project for the port. Distance between CLB and POT is 45 kilometers. Despite its close location it has disadvantage due to lack of space for enlargement for multimodal container operations.

Table 4.5: Operations of Port of Tekirdağ

Years	2009	2010	2011	2012	2013
Ton handled	1923865	2679450	2469715	1647850	1860853

Due to its location inside the city center, as specified in Table 3.6 handling operations of POT remain limited. Therefore any projects related to contribution of POT to CLB can be limited.

4.3.2. MARTAS Port

Even if MARTAS Port has capability to handle all types of goods, its container handling operation is limited when compared to ASYAPORT [61]. MARTAS port which is located in the boundries of Marmaraereglisi town, offers RO-RO, container, bulk and liquid cargo service. It does not have a direct railway net and its distance to closest train station is 36 kilometers. It has a direct connection to highway. Its berth capacity has indicated in Table 3.7.

Table 4.6: Berth capacity of MARTAS port

Berth	Total	1	2	3	4	5	6	7	8
Length(m)	1437	135	228	218	216	200	100	170	170
Depth(m)	4-18	6-12	12-18	12-18	4-12	4-5	4-10	10-14	8-12

With its 100000 sqm total area, MARTAS port has 9 mobile crane, 6 forklift and 3 trailer. It is predicted that one million sqm additional storage area has been requested for future operations of MARTAS port.

Table 4.7: Operations of MARTAS port

Years	2009	2010	2011	2012	2013
Ton handled	1965532	2199708	2460593	3065677	2711714

As shown in Table 3.8, handling operation of MARTAS port has increased 8 percent from 2009 to 2013. Because its location outside of residental area, MARTAS port has posibility to enlarge when compared to Ambarlı Port and POT. However to increase its handling capacity, railway infrastructure inside the port is necessary. To provide the contribution of MARTAS port to CLB direct railway net between two points will be necessary as well . But compared to ASYAPORT, it has limited container operations and insufficient infrastructure to conduct container opertions. Distance between CLB and MARTAS is 30 kilometers. However, inspite of its advantageous location, it can not be an alternative to ASYAPORT due to its insufficient infrastructure.

4.3.3. Ambarlı Port

Ambarli Port is situated in the north coast of Marmara Sea. It is located 34 kilometers away from Istanbul and close to TEM and E-5 highways. The port is operated by 4 different companies such as KUMPORT, MARPORT, MARDAS and AKCANSA.

Ambarli Port is situated west of the Istanbul strait entrance. Therefore location of Ambarlı Port makes it one of most important seaports of Middle East in terms of transshipment capabilities throught European countries and Russia which can use IWT and railway nets.

Due to its remote location from CLB with nearly 100 kilometers, Ambarlı Port can hardly be used as maritime leg of CLB operations. In addition, link between CLB and Ambarlı Port includes dense highway traffic. Dense traffic causes congestion which brings about delays during transportation. Therefore Ambarlı port can hardly be alternative to ASYAPORT due to previous disadvantages.

Figure 4.7: Ambarlı Port

MARPORT: Marport began its operations in 1996 with the name of Limar Kumport Terminal. It expanded in 2001. East and west terminal conduct operation together in 2003. With the modernization of Marport terminal it has increased its capacity to 1900000 TEU annually [62].

It is located in the west of Ambarlı Port complex. Due to its distance nearly 100 kilometers from CLB, dense container operations and residental area which surrounds it, it can hardly be alternative to ASYAPORT.

KUMPORT: Kumport container terminal is in operation since 1994. Due to its advantageous location within Ambarlı port, modern technology and its human resources, its operation has been increasing. Kumport, which has reached yearly 1700000 TEU container handling capacity at the end of 2011 with investments, has been rised to yearly 2100000 TEU capacity annually [63].

It is located in the east of Ambarlı Port complex and it conducts dense container operations. However its location in the middle of residental area makes difficult to conduct enlargement projects. Therefore KUMPORT can not be used as an alternative port to ASYAPORT.

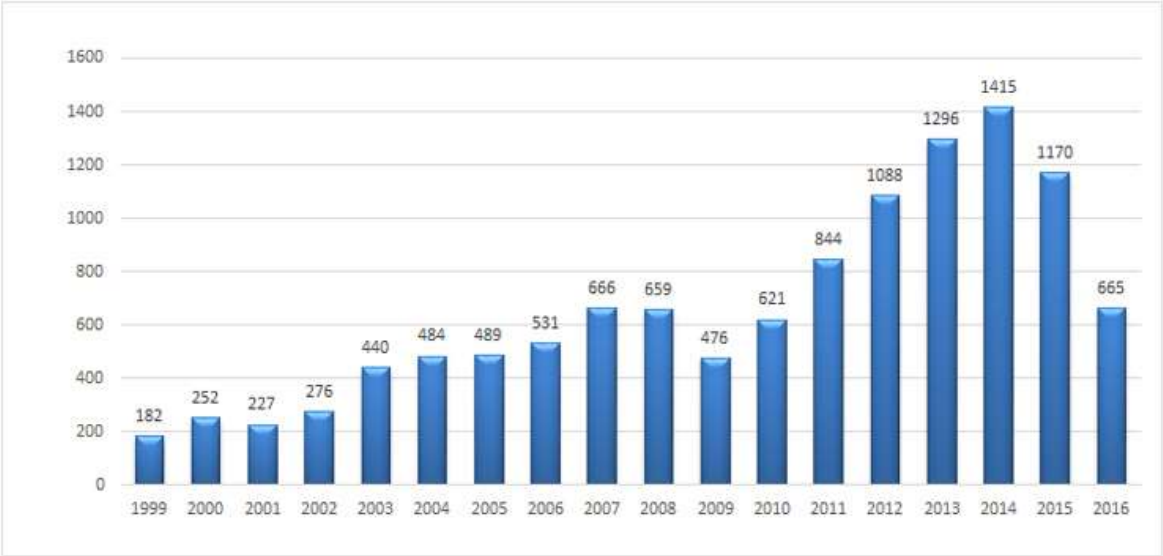

Figure 4.8: Container Handling Statistics of KUMPORT.

MARDAS Port: MARDAS port started its operation in 1991 as bulk cargoes and steel production transportation. With the increasing container operation of maritime transportation, MARDAS port has been converted its terminal compatible with container operations in 2002. Its container operation has increased from 150000 TEU in 2005, to 450000 TEU in 2011.

Due to its 100 kilometers distance from CLB and limited container handling operations, MARDAS port can hardly be alternative to ASYAPORT.

AKCANSA Port: It is in operation for all bulk cargoes and containers. With 40000 sqm total terminal area, it has 1.5 million TEU annual capacity. It has 3 mobile crane and 2 loader. It has 2 berths for general purpose, 1 berth for cement loading/unloading operations.

As shown in Table 3.9, AKCANSA port does not conduct container handling operations due to its infrastructure compatible with cement loading/unloading operations. Therefore AKCANSA can not be alternative to ASYAPORT due to its insufficient infrastructure compatible with container operations.

Table 4.8: Berth capacity of AKCANSA

Berth	1	2	3
Length(m)	310	310	200
Depth(m)	25	25	-

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5. CONCLUSION

5.1. Results

ASYAPORT is the first container seaport of Turkey with capacity which can reach up to 2.5 million TEU per year. However it has reached to nearly 700000 TEU in 2016 which accounts for 30 percent of its whole capacity. Because its construction was completed and it began container handling operations in 2015, ASYAPORT does not have sufficient handling statistics to foresee its handling operations of next years. Even if it is assumed that ASYAPORT's handling operations rise 4 percent annually, it takes several decades ASYAPORT to use its whole capacity.

With the completion of CLB, it is expected to change the road dominant trade with Europe in the region. It is expected to decrease the rate of road transportation in the region. Because the most economic way to conduct trade is to operate it with maritime transportation.

In the study, after completion of CLB, all trade activities with European countries will be conducted via CLB. Handling operations of CLB are foreseen with passage numbers of trailers through Trakya border gates.

It is seen that ASYAPORT's unused capacity can totally contribute to CLB's operations in 2016 and 2017. That means CLB can conduct whole handling operations for trade with European countries via ASYAPORT's unused capacity. After 2018, ASYAPORT can not provide sufficient contribution to CLB. To sustain maritime dominant transportation, CLB will need other seaports' contribution in Trakya region.

Because of insufficient railway infrastructure in the region, roads have to used for the trade with European countries. Until the completion of CLB and its railway connection with ASYAPORT, density in the border gates will still continue. Increasing density cause delay in the border gates and reduce the punctuality of arrival times of goods during trade.

During providing contribution to CLB, ASYAPORT can be capable enough to conduct operations for its own hinterland, for mutual operations with CLB and transit operations to Black Sea countries.

In order to conduct three different handling operations, ASYAPORT can have strong infrastructure and superstructure equipments. If it has needs to conduct handling operations during construction of CLB without any problem, needs have to met.

In order to keep the contribution of ASYAPORT over 1.5 million TEU without any problem, the link between CLB and ASYAPORT has to capable enough. To provide uninterrupted contribution, railway net and highway have to be available between CLB and ASYAPORT. Highway between TEM and ASYAPORT has to be also available as a link road. At the same time highway link has to be available between Corlu airport and CLB.

As distance between two points increase, usage of railway transportation between these two points gets more advantageous. The approximate 50 kilometer distance between CLB and ASYAPORT can be regarded short. Using road transportation can be suitable for short distance transportation. However, if the density of operation which is assumed to reach 1.8 million TEU between two points is taken into consideration, transportation with rail will be more suitable in terms of environmental and economic factors. Using railway transportation in such frequent container flow between CLB and ASYAPORT has to be with trains with limited cars (10-20 cars for each train). But rail transportation has to be frequent enough to keep the flow uninterrupted. In case of any disrupt in railway transportation, highway between ASYAPORT and CLB has to be ready to be used.

According to findings in the study, within 1-2 years ASYAPORT's unused capacity will not be sufficient in terms of meeting the handling needs of CLB. To provide uninterrupted container flow in the region, it is important to appoint other seaports as a gateway to maritime transportation for trade to European countries.

It is clear that CLB will need other seaports' contribution in the Trakya region in terms of keeping the container flow uninterrupted with maritime transportation. It will bring additional transportation infrastructure needs for the region. Dependent to density of usage

of seaports, links between CLB and other seaports in the region have to be built. Because other seaports in the region is more distant than ASYAPORT to CLB, railway transportation will be only way to conduct transportation between these seaports and CLB.

In this study, it is clearly seen that ASYAPORT's unused capacity will not be sufficient in terms of meeting the demands of CLB. Therefore there are two ways to sustain the uninterrupted container flow in the region. One of them is to direct the over-capacity container flow to other seaports such as MARDAS and POT. It will bring additional infrastructure needs as mentioned before. Other one is to increase the handling capacity of ASYAPORT.

5.2. Proposal for Future Researches

Capacities of MARDAS and POT, capacity increasing needs of these ports can be searched for future researches. In case of capacity increasing of these ports, the rate of contribution of ports, the infrastructure needs of the region, can be subjects for future researches as well.

Another solution to keep the uninterrupted container flow is to increase the capacity of ASYAPORT. Therefore the rate of capacity increasing of ASYAPORT to keep it contributing to CLB, can be focused on for the future researches.

What rate of capacity increasing can affect the infrastructure of the region can also be studied. Increasing the efficiency of ASYAPORT in terms of meeting the demands of CLB, technical details to enhance the superstructure capability of ASYAPORT can be a subject of future researches.

With the completion of CLB, efficiency of handling operation of CLB can be studied on. Because its efficiency will directly affect the trade volume of the region. Link efficiency is the another factor for CLB's efficiency. Highways and railway connections of CLB and seaports and increasing their efficiencies can be another study subject for future researches.

Facilities of seaports and their efficiencies are also important factor to increase the trade volume. Therefore optimization related to costs and revenues of the handling operations which is conducted in seaports can be studied.

Efficiency of facilities of logistics bases are also important to provide uninterrupted flow to/from seaports. After its completion, efficiency of CLB and its facility, superstructures and any needs of capacity increasing of CLB can be studied in future researches.

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