

**EFFECTS of DECREASE in LOGISTICS COSTS**

**to IZMIR'S FOREIGN TRADE VOLUME:**

**"A Dry Port Application"**

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**ABSTRACT**

**EFFECTS of DECREASE in LOGISTICS COSTS**

**to IZMIR'S FOREIGN TRADE VOLUME:**

**"A Dry Port Application"**

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Recently, Logistics Sector is one of the growing sectors both in the world and in Türkiye. After containerization and globalization processes, growing transportation need between countries increase export and import cargo traffic. The unexpected foreign trade volume causes bottlenecks in the ports. For instance, Izmir Port has port congestion problem due to intensive cargo volume. Therefore, in this thesis, I investigate logistics infrastructure of Izmir and proposed an opportunity to eliminate the port congestion: "A Dry Port". I have prepared a questionnaire and the results support my hypothesis that a dry port will increase Izmir's foreign trade volume.

Keywords: Logistics, port congestion, dry port.

## ÖZET

LOJİSTİK MALİYETLERİNDEKİ AZALMANIN

İZMİR'İN DIŞ TİCARET HACMİNE ETKİLERİ:

“İÇ LİMAN UYGULAMASI”

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Günümüzde Lojistik Sektörü dünyada ve Türkiye’de büyüyen sektörlerden birisi olmuştur. Konteynerleşme ve küreselleşme süreçlerinden sonra, ülkeler arası artan taşıma ihtiyacı ihracat ve ithalat yük trafiğini arttırmıştır. Beklenmeyen bu dış ticaret hacmi limanlarda darboğazlar oluşturmuştur. Örneğin bu yoğun yük trafiğinden dolayı İzmir Limanı’nda liman sıkışıklığı problemi bulunmaktadır. Bu nedenle, bu tezde, İzmir’in Lojistik altyapısı araştırılmış ve bu liman sıkışıklığını bertaraf edebilecek bir fırsat olarak “İç Liman” sunulmuştur. Bu doğrultuda bir anket hazırlanmış ve bir iç limanın İzmir’in dış ticaret hacmini arttıracığı hipotezini destekler şekilde sonuçlanmıştır.

Anahtar Kelimeler: Lojistik, liman sıkışıklığı, iç liman.

To all whom shown patience;

my mother,

my grandmother,

my aunt...

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## 1. INTRODUCTION

The speed of technological changes and emerge of globalization process makes world become more smaller than ever. As a result of this fast changes and integration of markets, logistics sector grows and gain importance. The economic activities of a country gather on the places that the roads pass and the ports that these roads arrive.

The transportation modes and used transportation systems influence the stuffing capacity and efficiency of ports. Transportation in the world is in a fast containerization process which is appropriate for door-to-door transport principle. The movement of containers in different transportation modes continued with combination of different modes which is defined as intermodal or multi-modal transportation. Intermodal and multi-modal transportation concepts took the shippers one step forward. Within these concepts the shippers benefit low costs.

Containerization process also has an impact on increase of cargo handling. As container's movement is easier, due to that fact the transported cargo volumes increased. From a small beginning in the mid-1950s, multi-modal form of transport through containers has become an integral part of international trade and commerce. Containerization of general cargo traffic has progressed steadily over the last twenty years, including a doubling of world port container traffic between 1990 and 1998 to reach 175 million TEUs. Worldwide total port container throughput had been reached over 270 million TEUs by 2005, i.e., a 55% increase over 1998. The growth of container traffic is fuelled by the fact that the shipping liner companies are using large 12,000-15,000 TEU ships, than compared to 5,000 TEU ships few years. Therefore, these companies are able to economize the overall transshipment cost, by using economies of scale, which is key in this business.

The academic spotlight of container shipping was focused for many years on North America and Europe. From the beginnings of containerization in the mid-1960s, ports and container shipping in these areas dominated the academic scene. In the 1990s East Asia became a new centre of attention. This attention reflects in part the dominance of these regions in global trade flows and the diffusion of containerization along with the adjustments that had to be made by the shipping lines. Since the turn of the new century a new region has drawn attention. The evolving container shipping networks and changing status of ports in the Mediterranean basin have attracted the interest of scholars and practitioners because over the last decade this region too has undergone major expansion and restructuring.

Increasing cargo movements create a wide range of jobs in the newly identified “Logistics and International Trade” sector. Ports play an important role in LIT sector workforce and economic development, and a review of current and potential freight mobility and environmental quality improvement projects that can help to ensure sustainability of LIT sector.

When seaway transport became widespread worldwide, the complementary transportation mode railways did not develop as well in Türkiye. Railways are accepted as the sign of the civilization and the efficiency in competition; however, recently in Türkiye we are not able of using railways as a competitive tool. In developed countries, the railways are either an issue that minimizes the cost of transportation or an indicator of development and provide an advantage of transporting at minimum costs in global competition.

The logistics service that can increase companies’ competitiveness demonstrates itself with its quality. Providing quality can be maintained by infrastructure. Within the application of developed IT, quality of the logistics service increases. Logistics company that completes infrastructure projects for domestic distribution, storage, and information processing, has

turned its attention to international transport organization and intermodal transport. Logistics company that combines sea, ground, and rail transport, can provide its customers with the most effective solutions and door-to-door service.

When we analyze Türkiye with its geographical positioning the road, sea and air transportation should be used more effectively and productive. Türkiye has high volumed container ports with an increasing container traffic annually. One of the biggest container ports of Türkiye is Alsancak Terminal whichs located in Izmir. The limps that had been faced in transportation system prevent development of a region that has rich sources and geopolitically appropriate for trade. Izmir, as the most secure port of West Anatolia, was being a trade center over decades. Izmir with its hinterland was the first container port with 847.926 teus cargo handling in 2006. As of the end of June 2007 438.697 teus handled. Izmir port approxiamately doubled its cargo handling capacity through 2000-2006. (470.576 in 2000, 847.926 in 2006 as per container traffic data published by TCDD)

Foreign trade is the most important tool to increase national income. As known in literature, export increase effects positively to the economies. Izmir Port's capacity has been overloaded within the increase of export cargo handlings. Export cargo handling also doubled through 2000-2006 (241,301 in 2000, 424,472 in 2006). Due to cargo handling increase, the terminal become inadequate and port congestions are being the biggest problems of Izmir port recently. Also there caused traffic bottlenecks through the cargo delivery roads, because approximately 95% of transportation from Alsancak Terminal is done by truck. Truck transportation causes road congestions around the port area.

In the lights of above, the aim of this study is to investigate logistics infrastructure of Izmir then analyze how the growth of logistics sector and the opportunity to construct a dry port with a railway link to seaport, in order to avoid congestions and other environmental

damages, will effect the export volume of Izmir. Briefly to analyze how logistics opportunities affect on Izmir's foreign trade volume.

After literature review of logistics and dryport, in the first part emerging trends in logistics, the role of logistics in the economy and in the organization, and the most important logistics activity transportation, new trends in transportation such as intermodal and 3PL and lastly logistics in Türkiye and Izmir's infrastructure have been mentioned. Then in the second part the advantages of the dry port, worldwide dry port samples, projects and the dry port application to Izmir have been identified. In methodology, results of the questionnaire have been analyzed via SPSS. In conclusion, the outcomes have been evaluated.

## 1.1. Literature Review on Logistics

When background of logistics has been investigated, the logistics term was first used in military as the art and science of planning and carrying out the movement and maintenance of military forces. In the course of time the term has been evolved.

According to the Council of Logistics Management, logistics is “that part of the supply chain that plans, implements and related information from the point of origin to the point of consumption in order to meet customers’ requirements”. This definition includes inbound, outbound, internal and external movements. Logistics is not confined to manufacturing organizations. It is relevant to service organizations and to both private and public firms.

The Council of Supply Chain Management professionals defines *Logistics Management* as “a part of Supply Chain Management that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers’ requirements.”

The National Association of State Directors of Career Technical Education defines the *Transportation, Distribution and Logistics* career cluster as “Planning, management, and movement of people, materials, and goods by road, pipeline, air, rail and water and related professional and technical support services such as transportation infrastructure planning and management, logistics services, mobile equipment and facility maintenance.”

As per Cooper’s<sup>1</sup> definition, “Logistics is the strategic management of movement, storage and information relating to materials, parts and finished goods in supply chains through the stages of procurement, work-in progress and final distribution.” Its overall goal is to

contribute to maximum current and future profitability through the cost effective fulfillment of customer orders.

In 50s & 60s distribution systems were unplanned and unformulated. Distribution was broadly represented by the haulage industry and manufacturers' own-account fleets. Then in early 70s development of physical distribution, transport, storage, materials handling and packaging could be linked together and managed effectively in total cost perspective.

In 70s distribution was included in the functional management structure of an organization. The structure and control of the distribution chain was changed. The manufacturers and suppliers power was declined. Larger retail chains developed their own distribution structures.

In 80s cost increase and clearer definition of the true costs of distribution contributed to a significant increase in professionalism within distribution. There were long-term planning and cost saving measures. Cost saving measures were; centralized distribution, severe reductions in stock-holding, use of computer to provide improved information and control.

It can be said that 80s was the growth of 3<sup>rd</sup> party logistics (3PL) (developments in information and equipment technology). Integrated logistics systems were recognized by forward-looking companies that participated in distribution activities.

In late of 80s and early 90s organizations broaden their perspectives in terms of the functions that could be integrated. There were combining of materials management (inbound side) with physical distribution (outbound side). Terms logistics was used to describe the concept. Customer service was improved and the associated costs were reduced.

In 90s, term supply chain management was used in terminology. Several different organizations involved in getting a product to the market-place. In order to create a logistics

pipeline, that enables efficient and effective flow of the right products through to the final customer, manufacturers and retailers should act together in partnership.

As Christine & Alan (1997) mentioned transportation and distribution systems are frequently seen in larger organizations within the activity referred to as 'logistics'. In simple terms, logistics is "the science which integrates all the activities required to move goods from the original sources of raw materials to the location of the ultimate consumer of the finished product". Peter F. Drucker also stated that; logistics was one of the last frontiers of opportunity for organizations wishing to improve their corporate efficiency.

According to Kent (2003), in the early 1980s, logistics was be considered as a key means of differentiation for the firm. Logistics viewed as a critical component in the strategy of the firm. The concepts emerging were integrated to supply-chain management, logistics channel management, inter organizational efficiency, environmental logistics, reverse logistics, and a heightened awareness of globalization. Information technology as well as strategy concepts have had a significant influence.

2000 and beyond due to the challenges that business organizations have faced there is a need to improve position against competitors to increase profitability. New ideas have to be implemented for improvement as in logistics. Leading organizations realized that there is a positive "value added" role that logistics can offer, rather than the traditional view that the various functions within logistics are merely a cost burden that must be minimized regardless of any other implications. Logistics become a key enabler for business improvement.

The term logistics is very new in business literature. Lambert, et al (2004) mentioned that, despite logistics activity is literally thousands of years old, dating back to the earliest forms of organized trade, it first began to gain attention in the early 1900s in the distribution of



farm products, as a way to support the organization's business strategy and as a way providing time and place utility.

UK Institute of Logistics and Transport, defines logistics as the positioning of resource at the right time, in the right place, at the right cost, at the right quality. (Rushton, et al 2004)

As per Lambert, et al (2004), with rising interest rates and increasing energy costs during the 1970s, logistics received more attention as a major cost driver. In addition, logistics costs became a more critical issue for many organizations because of the globalization of industry. This has affected logistics in two primary ways.

First, the growth of world class competitors from other nations has caused organizations to look for new ways to differentiate their organizations and product offerings. Logistics is a logical place to look because domestic organizations should be able to provide much more reliable, responsive service to nearby markets than overseas competitors.

Second, as organizations increasingly buy and sell offshore, the supply chain between the organization and those it does business with becomes longer, more costly, and more complex. Excellent logistics management is needed to fully leverage global opportunities.

For Balachandran (2004), "Logistics is a major factor in the determination of costs. It has been realized that it is possible to improve margins through a proper management of logistics. Traditionally, costs were sought to be controlled through economies of scale and sales volumes, apart from negotiations during purchases. The principle was that overheads could be distributed over a larger base. The current thinking is that costs are controllable through a careful scrutiny of effectiveness, value and relevance of each activity and also by looking at the possible alternatives."

As Ghiani, et al (2005) explained, *Logistics* deals with the planning and control of material flows and related information in organizations, both in the public and private sectors.

The term logistics broaden its concept today. Rushton, et al (2005) stated that logistics is concerned with physical and information flows from raw materials through to the final distribution of the finished product. Supply and materials management represents flows into and through production process and distribution represents those flows from the final production point through to the customer or end user.

“Logistics is relevant to all types of organizations; the definition of logistics includes the flow of materials and services in both the *manufacturing* and *service sector*. The service sector includes entities such as the government, hospitals, banks, retailers and wholesalers.”  
(Douglas, et al 2006)

Logistics is the art and science of managing and controlling the flow of goods, energy, information and other resources like products, services, and people, from the source of production to the marketplace. It is difficult to accomplish any marketing or manufacturing without logistical support. It involves the integration of information, transportation, inventory, warehousing, material handling, and packaging. The operating responsibility of logistics is the geographical repositioning of raw materials, work in process, and finished inventories where required at the lowest cost possible. As such, logistics is commonly seen as a branch of engineering which creates “people systems” rather than “machine systems”.  
(Akman, 2006)

Dr. John E. Husing and the Southern California Association of Governments define the *Logistics and Distribution* sector as comprising the following North American Industry Classification System (NAICS) codes: 42 (Wholesale trade), 481 (Air Transportation), 482 (Rail Transportation), 483 (Water Transportation), 484 (Truck Transportation), 488 (Support

Services For Transportation), 492,110 (Non-Local Couriers) and 493 (General Warehousing and Storage).<sup>2</sup>

There is realistically no true name or definition that should be pedantically applied, because products differ and systems differ. Logistics is a diverse and dynamic function that has to be flexible and has to change according to the various constraints and demands imposed upon it and with respect to the environment in which it works.

## 1.2. Literature Review on Dry Port

In 1990 the British professor Anthony Beresford and the Indian professors RD Dubey published a handbook with the title "Management and Operation of Dry Ports". In this book, they stated some different aspects, which should be considered before initiating the dry port concept in an area. These aspects concerning the area to develop into a dry port encompasses: the type of facilities that costumers will require, the initial volume of goods, estimated volumes for a ten year horizon.

As per OECD's definition, dry port is an inland terminal which is directly linked to a maritime port. According to United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) definition, "Dry Port" refers to a defined inland location for the consolidation and distribution of goods that has functions similar to those of a seaport, and which includes customs clearance services. Seaport functions that could be expected to be typically present at these dry ports include container (and possibly bulk) handling facilities; intermodal infrastructure connections; a geographical grouping of independent companies and bodies dealing with freight transport (including, for example, freight forwarders, shippers and transport operators); and the provision of accompanying services such as customs inspections, tax payment, storage, maintenance and repair, banking and information communication technology connections.

"A Dry Port is an inland intermodal terminal directly connected to a seaport, with high capacity traffic modes, where customers can leave and/or collect their goods in intermodal loading units, as if directly to the seaport" (Leveque and Roso, 2001). In addition to transshipment, which a conventional inland intermodal terminal provides, services such as storage, consolidation, depot, tracking and tracing, maintenance of containers, and customs clearance are usually available at dry ports.

A dry port is a particular type of inland intermodal terminal: *“A Dry Port is an inland intermodal terminal directly connected to a seaport, with high capacity traffic mode, where customers can leave/collect their goods in intermodal loading units, as if directly to the seaport.”* (Roso, et al 2006). Basically a dry port is a multi-modal logistics hub having both rail and road based connectivity and catering to the Export and Import (EXIM) traffic. <sup>3</sup>

In other definition ; a dry port is a port situated in the hinterland servicing an industrial/commercial region connected with one or several ports with rail- or road transport and is offering specialized services between the dry port and the overseas destinations. Normally the dry port is container and multimodal oriented and has all logistics services and facilities, which is needed for shipping and forwarding agents in the port.<sup>4</sup>

The dry port is a yard used to place containers or conventional bulk cargo, usually connected to a seaport by rail or road. A dry port is an inland intermodal terminal which has services like, storage consolidation, depot, maintenance of containers and customs clearance. They may be used for shipping, receiving and distribution centers designed to relieve the congestion in increasingly busy seaports, like an inland port.

As published on website [bilbaoport.es](http://bilbaoport.es); the dry port has been defined as, *“any industrial complex, which is without an outlet to the sea, has different transport infrastructures making up intermodal terminals that speed up the arrival of its products to the sea port they are linked with.”*<sup>5</sup>

A dry port is a port located in the country in a transport centre (transport junction). It has the same administrative, customs and cargo receipt functions as a seaport, and is designed to receive containers, etc., and then to distribute cargo using various means of transport.

The conception of dry port is used in several connections and with multiple meaning. Dry port integrate value added activities, port related routines and the multimodal transport chain through IT solutions and innovative integrated transport techniques.

“The dry port concept is based on a large hub - often a port - that is connected with a number of smaller terminals where goods can be turned in as if directly to the port. These terminals are mostly located interior from the coast, thus their name is dry port. Between the hub and the smaller terminals relatively large goods flows are being concentrated, giving place for more traffic modes than trucks. For pure dry port concepts the port or shipping companies manages the transports between the dry ports and the actual port. More conventional railroad carts can also be counted as parts of the dry port concept.”<sup>6</sup>

In other words the dry port concept is based on a seaport directly connected with inland intermodal terminals, where goods in intermodal loading units can be turned in as if directly to the seaport. Between the seaport and the inland terminals, here denoted dry ports, relatively large goods in intermodal loading units can be turned in as if the terminal was positioned directly to the seaport.

## **2.LOGISTICS**

Today some of the transportation companies change their names as logistics companies. However logistics is not only transportation. As also Ghiani , et al (2005) stated, mission of logistics is to get the right materials to the right place at the right time, while optimizing a given performance measure (e.g. minimizing total operating costs) and satisfying a given set of constraints (e.g. a budget constraint). In civil organizations, logistics issues are encountered in firms producing and distributing physical goods. The key issue is to decide how and when raw materials, semi-finished and finished goods should be acquired, moved and stored.

Logistics = Supply + Materials Management + Distribution

Logistics has evolved and received much more attention recently. The new trends like globalization is accepted as one of the drivers of the logistics. Though the emerging trends has been mentioned to illustrate the evolution of logistics.

### **2.1.Emerging Trends in Logistics**

Globalization of the multi-national customer, demand on ability to provide consistent product solutions throughout all regions of the world. Therefore there is need to globalize logistical ability to meet the demands of customers, develop a global supply base, and position against emerging competition.

One area of significant change in recent years has been the increase in the number of companies operating in the global market-place. This necessitates a broader perspective than when operating as an international company. In the latter; although companies may have a presence across a wide geographic area, this is supported on a local or regional basis

through local or regional sourcing, manufacturing, storage and distribution. In the former, the company is truly global, with a structure and policy that represents a global business.

As per investigations of Canci & Erdal (2004), to serve global markets, logistics networks become, necessarily, far more expensive and far more complex. Once again, the need is to plan and manage logistics as a complete system. As well as the attributes already mentioned, companies operating in a global market area often involved in the outsourcing.

The major logistics implications of globalizations are; extended supply lead times, extended and unreliable transit times, multiple break bulk and consolidation options, multiple freight mode and cost options, production postponement with local added value.

According to Ghiani, et al (2005) in recent years, several strategic and technological changes have had a marked impact on logistics. Among these, three are worthy of mention: globalization, new information technologies and e-commerce. Below are the expressions of Ghiani, et al (2005) concerning these three impacts.

An increasing number of companies operate at the world level take advantage of lower manufacturing costs or cheap raw materials available in some countries. This is sometimes achieved through acquisitions or strategic alliances with other firms. As a result of globalization, transportation needs have increased. More parts and semi-finished products have to be moved between production sites, and transportation to markets tends to be more complex and costly. The increase in multimodal container transportation is a direct consequence of globalization. Also, as a result of globalization, more emphasis must be put on the efficient design and management of supply chains, sometimes at the world level.

The actors in the global arena, the suppliers and manufacturers, should be aware of information technologies effectively. They make use of electronic data interchange (EDI),



which enables them to share data on stock levels, timing of deliveries, positioning of in transit goods in the supply chain etc. At the operational level, *geographic information systems* (GIS), *global positioning systems* (GPS) and on-board computers allow dispatchers to keep track of the current position of vehicles and to communicate with drivers. Such technologies are essential to firms engaged in express pick-up and delivery operations, and to long-haul trucking companies.

An increasing number of companies make commercial transactions through the Internet. It is common to distinguish between *business-to-business* (B2B) and *business-to-consumers* (B2C) transactions. The growth of e-commerce parallels that of globalization and information technologies. As a result of e-commerce the volume of goods between producers and retailers should go down while more direct deliveries should be expected between manufacturers and end-users.

E-commerce leads to more complex organization of the entire logistics system (*e-logistics*), which should be able to manage small - and medium - size shipments to a large number of customers, sometimes scattered around the world. Furthermore, the return flow of defective (or rejected) goods becomes a major issue (*reverse logistics*).

IT and globalization mutually effect each other and for the time being they determine the competitive edge. Further IT applications will change companies business skills and this will effect global postioning and competitiveness. Therefore the investment on IT has great importance that world become one click far. In near future we will exprience *business-to-logistics* (B2L) which will be an integration of e-commerce and e-logistics.

These trends that effect logistics, also have a great impact on the role of the logistics in the economy and in the organization. As logistics improved with the effect of globalization the positive economic growth also reflects to the economies. Also within the integration of IT

structures (e-commerce & e-logistics) efficient relationship and cost minimization can be achieved in the organizations.

## **2.2.The Role of Logistics in the Economy and in the Organization**

Logistics can be considered in the context of business and the economy as a whole. Logistics is an important activity making extensive use of the human and material resources that affect a national economy.

As per Lambert, et al (2004), there is an important role of logistics both in the economy and in the organization. As per their findings, logistics play a key role in the economy in two significant ways. First, logistics is one of the major expenditures for business, thereby affecting and being affected by other economic activities. By improving the efficiency of logistics operations, logistics makes an important contribution to the economy as a whole.

Second, logistics supports the movement and flow of many economic transactions; it is an important activity in facilitating the sale of virtually all goods and services. To understand this role from a system perspective, consider that if goods do not arrive on time, customers cannot buy them. If goods do not arrive in proper place, or in the proper condition, no sale can be made. Thus, all economic activity throughout the supply chain will suffer.

Another important role is, logistics has a push role in the economy as being a key enabler of the companies effectiveness. In globalization process reliable and qualified logistics services are as important as to market goods. As stated above if the goods cannot be delivered on time it does not matter how qualified they have been manufactured.

In economy's literature market price is made up of demand and supply sides. The agreed supply and demand sides build up the market price. In that sense if agreed supply is on the market at proposed time than the agreed demand will be satisfied. However, if logistics used

in an inefficient manner and supply cannot be on the market at proposed transaction time than the demand turns its attention to the other supply side (the other supplier). Here, the other supplier is the supplier of other economies. In fast globalization process, countries are fighting besides companies. And economies are effected by this rivalry. Here it is obvious that logistics become a weapon in all economies.

With rising interest rates and increasing energy costs during the 1970s, logistics received more attention as a cost driver. Global logistics-world class competitors increased emphasis and importance of logistics is growing on cost control. The firms realized that in order to gain and sustain competitive advantage logistics costs should be minimized. The total cost concept is the key to effectively managing logistics processes. The goal of the organization should be to reduce the total cost of logistics activities, rather than focusing on each activity in isolation. Reducing costs in one area, such as transportation, may drive up inventory carrying costs as more inventory is required to cover longer transit times, or to balance against greater uncertainty in transit times. (Lambert, et al 2004)

As per Balachandran (2004), logistics is an important contributor to one's effectiveness. The manufacturer of a motor car, using more than 4,000 parts that are procured from far off areas, even across continents, can implement his production schedule only if the necessary parts are not out of stock at any time. Among the many alternatives tried out, the Just-in-Time (JIT) system happens to be the most cost-effective, as the inventory carrying costs are reduced to zero. Among the systems that have to be in place for this to happen, logistics is an important one.

One of the main reasons for those cost differences is that logistics structures can and do differ quite dramatically between one company and another, and one industry to another. Channels can be short (i.e. very direct) or long (i.e. have many intermediate stocking points).

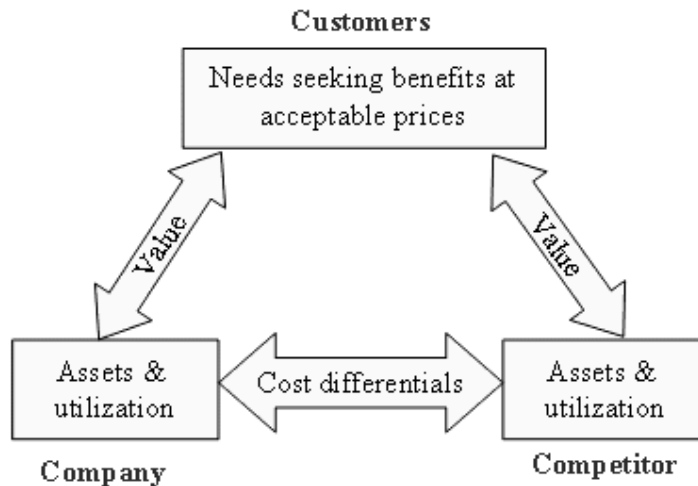
Also, channels may be operated by manufacturers, retailers or as is now becoming increasingly common by specialist third party logistics (3PL) distribution companies. For instance cement is a low-cost product (as well as being a very bulky one) so relative costs of its logistics are very high. Spirits (whisky, gin etc.) are very high value products, so the relative logistics costs very low.

Logistics offers companies a competitive advantage, can yield cost savings that greater product variety requires improved logistics, also improvement in distribution efficiency are possible due to information technology. Due to these facts, greater emphasis is being placed on Logistics as per Kotler.

Logistics may be the best source of competitive advantage for a company because it is less easily duplicated than other elements of marketing mix: product, price and promotion. Consider, for example, forming close, ongoing relationships with carriers or logistics service providers can help give the firm a distinct competitive advantage in speed to the customer, reliability, availability, or other customer service factors.

It is only in the recent past that business organizations have come to recognize the vital impact that logistics management can have in the achievement of competitive advantage. The source of competitive advantage is found; in the ability of the organization to differentiate itself, in the eyes of the customer, from its competitors, and by operating at a lower cost and hence at greater profit.

**Figure 1. Competitive Advantage and The “Three Cs”**

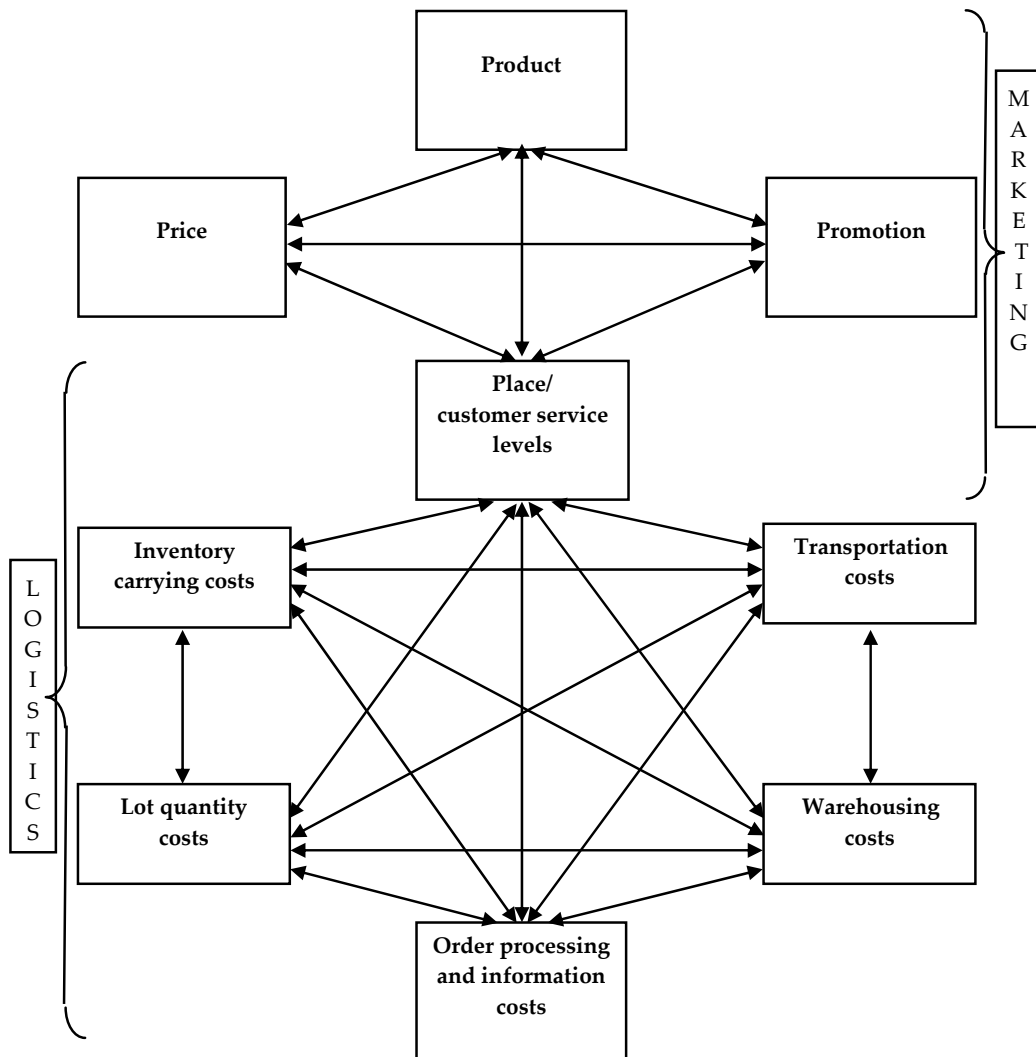


**Source:** Lambert, et al 2004

The total of logistics expenditures such as carrying inventory, transportation, and information/order processing can be viewed as the company's expenditures on customer service. Logistics management targets improving customer service level by determining a system approach with maintaining cost trade-offs between these activities which are alone a cost issue. Figure 2 illustrates the cost trade-offs and considerations required to implement an integrated logistics management concept. Lambert, et al (2004) explored that the objective is to provide the organization with the lowest total logistics costs, given a specific customer service level. While figure 2 shows logistics issues as trade-offs, in some cases simultaneous improvement may occur in multiple areas, and the organization reduces its total cost while providing improved customer service.

A well achieved logistics management can increase quality and has an effect to companies competitiveness both in domestic and international market. In this respect recently, effective logistics management has been recognized as a key opportunity to improve both the profitability and competitive performance of the firms. Even organizations that had previously adhered to the “marketing concept” were reexamining what it meant to be customer-driven. The trend toward strong customer focus continues today. The marketing concept is a marketing management philosophy which holds that achieving organizational goals depends on determining the needs and wants of target markets and delivering the desired satisfactions more effectively and efficiently than competitors. Here logistics play a key and differentiator role due to fast globalization process.

Figure 2. Cost Trade-Offs Required in a Logistics System



Source: Lambert, et al 2004

As Balachandran (2004) emphasized that many organizations have found it economical to entrust the entire responsibility of logistics to specialized logistics companies. Logistics has developed as an important service business in recent times. Retailers like Wal-Mart, which

procure goods from hundreds of suppliers all over the world, in preparation for the sales during Christmas, for example, may not be able to manage the logistics themselves and therefore, use third parties. Even if they do it themselves, they will have a separate division to manage it, as there is need for information and decisions that are totally different from that of procurement and retailing.

The major infrastructure required for moving goods from one place to another in India involve the active roles of roads, road freight industry, railways, ports & shipping (combined together and referred to as "Macro Logistics") all of which are either managed or regulated primarily by the government. Studies reveal that in India the total logistics costs constitute nearly 10 percent of the gross national product (GNP) out of which nearly 40 percent is due to transportation alone. In the US, the estimates show that the cost is around 6 percent of the GNP.<sup>7</sup>

The relative importance of these various aspects of logistics may differ between one company and another. The choice of transport mode could, for example, be an initial strategic decision and a subsequent tactical decision for the same company. It might also be a strategic decision for a company that is setting up a new global logistics operation, but might be a tactical decision for another company that is principally a supplier to a locally based market and only occasionally exports over long distances.

Basically logistics activities can be count as follows;

- transportation,
- warehousing,
- material handling,
- protective packaging,
- inventory control,



- order processing,
- marketing, forecasting,
- customer service....

These activities can be expanded as the sector growing and changing in globalization process. From above classification, transportation is the most important activity in logistics. Logistics costs are consist of expenses including all logistics processes, starting from procurement of goods to warehousing, transportation and information technologies. The logistics costs of companies have differences in Türkiye. When the logistics costs of companies that produce consumer goods is approximately 5% of their revenue, it is 20% in manufacturing companies. In other sectors and in small and medium sized entrepreneurs (SME) this rate exceeds 20%. By designing, managing and redevelopment of the logistics processes, logistics costs of the companies can be minimized. <sup>8</sup>

**Table 1. Logistics Costs**

| <b>Logistics Costs</b>  | <b>Rates</b> |
|---|--------------|
| Transportation Costs  | 50-65%       |
| Inventory and Handling Costs  | 20-35%       |
| Business Layout Design<br>(cost of depot and distribution center plan and management)           | 10%          |
| Communication & Information Costs<br>(estimated demands, order processing, production planning) | 5%           |

**Source:** Canci&Erdal, 2001

For instance, cost of transportation is 50-65% among other logisticis activities(See Table 1). Within cost minimization in transportation, companies can be more compatible in global markets. As transportation costs are approximately 50-65% of logistics costs, by minimizing transportation costs the firms can maximize their profit margins. Profit in logistics can be explained as, \$1 saved in logistics costs has greater impact on the organization's profitability

than a \$1 increase in sales. In most organizations, sales revenue increases are more difficult to achieve than logistics cost reductions.

The second important activity of logistics is warehousing. It is the most important issue of physical distribution. Cost of depot in sales is approximately 6-9% in west. In Türkiye warehousing is approximately 16% in share. As seen from the figures warehousing is important in overall logistics costs and in Türkiye the rate is very high. On the other hand, depots are the places that provide optimal distribution. Flow of goods perform in depots. Therefore the characteristics such as system, design and appropriateness of depots to the goods are important.

The inventory management has an important role in both logistics activities and warehousing. Other important activity is handling which is transportation of goods in short distances. Handling is a process starting with transportation of goods to depot, stuffing and then transportation of goods to the truck for loading. Such short distance transportation is important for goods' quality. Fork lifts and cranes are basic stuffing vehicles and within the usage of these basic vehicles there is a requirement for qualified human resource.

Order processing is also an important logistics activity. It consists receipt of the orders, tracking of the process and enable the delivery on time for customer satisfaction. Recently order processing is moved on internet. Within new information technologies and systems, orders can be taken both by telephone and via internet and there is an opportunity for tracking and in this way, distribution costs can be minimized.

Packing has an important role in this process. When the goods are transported from one place to another, one of the most important issue that influence the physical statement and characteristic of a good is packaging. Packaging is performed with taking the transportation

mode and characteristics of a good into consideration. The selection also influence the pacakaging costs.

Procurement is also important in logistics services. There is a strong relation between transportation cost and the place that the raw material provided, and procurement of required goods. In this context, within efficient planning more than one supplier can be used, more qualified material can be provided for companies, risk of working with one supplier can be minimized.

There is a relationship between these logistics activities. Each activitiy can influence the other and can increase logistics costs alone. Therefore, all these activities should be managed due to companies' needs. This process can performed by logistics management. In this process, appropriate logistics management system should be selected to increase productivity and competitive advange.

In European Union (EU) the overall road transportation (both by truck and train) is 45% and overall seaway transportation (both marine and barge) is 43%. In Türkiye road transportation is 93%. Turkish railways and ports are inadequate both in operating and in infrastructure. While 70% of cargoes transported to hinterland via railways in Hamburg, the rate is 1,5% in Izmir Alsancak Port. The rate of railway transportation is 4,45% in cargo base.

9

The cost of transportation by truck is about 300,00-320,00 USD in Izmir city limits. Railway transportation is not used in Izmir. But the cost of railway transportation is approximately USD 100,00 (the calculation is made for shipments between Gaziemir-Alsancak and as per goods upto 20 tonnes).

Cost of warehousing is approximately 5,00-10,00 USD / day, cost of handling is approximately 100,00-120,00 USD and cost of stuffing is 150,00-250,00 USD in Izmir.

In the following part transportation, the most important logistics activity, will be explained. The other activities only explained briefly above as this thesis is related with minimizing the transportation costs.

### **2.3. Transportation**

Lambert, et al (2004) defines that one of the key issues of supply chain decision is transportation. Every movement in supply chain should be evaluated in transportation issue. The movement of raw materials through purchased points to depots, production facilities, distribution channels and end-users is scope of transportation. The decision of transportation mode that supply chain will give by taking into account customer satisfaction, costs and decisions on important cases like transporting at stock level that won't interrupt production, loading-unloading and arranging warehousing processes effects the success of supply chain system. Especially present business models give more importance to "speed", therefore there is need to pay attention to transportation activities. There is need for adaptation of the most fast transportation options to supply chain with taking their costs into account.

Transportation physically moves products from where they are produced to where they are needed. This movement across space or distance adds value to products. This value add is often referred to as **place utility**. **Time utility** is created by warehousing and storing products until they are needed. Transportation is also a factor in time utility; it determines how fast and how consistently a product moves from one point to another. This is known as **time-in-transit** and *consistency of service*, respectively (Lambert, et al 2004).

As Lambert, et al (2004) mentioned, deregulation of the transportation industry in the late 1970s and early 1980s gave organizations many more options and increased the competition within and between transportation modes. Carriers become more creative, flexible, customer-oriented, and comparative in order to succeed. They can focus on negotiation of rates, terms, and services, with their overall attention directed toward getting the best transportation buy.

As Ghiani, et al(2005) explained, logistics system is made up of a set of *facilities* linked by *transportation services*. Facilities are sites where materials are processed, e.g. manufactured, stored, sorted, sold or consumed. They include manufacturing and assembly centers, warehouses, distribution centers (DCs), transshipment points, transportation terminals, retail outlets, mail sorting centers, garbage incinerators, dump sites, etc. Transportation services move materials between facilities using vehicles and equipment such as trucks, tractors, trailers, crews, pallets, containers, cases and trains.

### **2.3.1. Classification of Transportation Modes**

As Gourdin (2003) defines, transportation is a critical part of any global logistics effort because of the long distances that can separate a firm from its customers. Transportation services become in a large number of variants. There are five basic modes (ship, rail, truck, air and pipeline), which can be combined in several ways in order to obtain door-to-door services such as those provided, for example, by intermodal carriers and small shipment carriers.

Ship transportation is the cheapest transportation mode in long distances among all. But it has to be integrated with truck in order to perform door-to-door services. Recently within construction of high teu capacity vessels, the usage of ship transportation increases.

Rail transportation is inexpensive (especially for long-distance movements), relatively slow and quite unreliable. As a result, the railroad is a slow mover of raw materials (coal, chemicals, etc.) and of low-value finished products (paper, tinned food etc.). This is due mainly three reasons; convoys transporting freight have low priority compared to trains transporting passengers, direct train connections are quite rare, a convoy must include tens of cars in order to be worth operating.

In countries such as Austria, the People's Republic of China, and the former republics of the Soviet Union and Yugoslavia, rail is dominant mode of transport. In the United States, most of the freight (in dollar terms) once shipped by rail has been shifted to motor carriers. Some traffic has been lost to water and pipeline carriers, which compete with railroads for bulk commodities. (Lambert, et al 2004)

Trucks are used mainly for moving semi-finished and finished products. Road transportation can be *truckload* (TL) or *less-than-truckload* (LTL). A TL service moves a full load directly from its origin to its destination in a single trip. If shipments add up to much less than the vehicle capacity (LTL loads), it is more convenient to resort to several trucking services in conjunction with consolidation terminals rather than use direct shipments. As a result, LTL trucking is slower than TL trucking.

Air transportation is used along with road transportation in order to provide door-to-door services. While air transportation is in principle very fast, it is slowed down in practice by freight handling at airports. Consequently, air transportation is not competitive for short and medium haul shipments. In contrast, it is quite popular for the transportation of high-value products over long distances.

When the transportation mode determined, in selection of the carrier, a *shipper* must take two fundamental parameters into account: price (or cost) and transit time. The cost of a

shipper's operated transportation service is the sum of all costs associated with operating terminals and vehicles. The price of a *transportation service* is simply the rate charged by the carrier to the shipper. Air is the most expensive mode of transportation, followed by truck, rail, pipeline and ship. According to recent surveys, transportation by truck is approximately seven times more expensive than by train, which is four times more costly than by ship.

Within shifting freights from road to rail, the cost of transportation can be reduced and also there will be a great contribution to traffic congestion. As transportation is the most important activity in logistics and its cost is higher than the other activities within using railways instead of highways cost minimization in logistics can be achieved. By combining two inexpensive transportation modes (ship+rail), the shippers can achieve decreasing their costs while increasing their compability.

*Transit time* is the time a shipment takes to move between its origin to its destination. It is a random variable influenced by weather and traffic conditions. One must bear in mind that some modes (e.g. air) have to be used jointly with other modes (e.g. truck) to provide door-to-door transportation. The standard deviation and the coefficient of variation (standard deviation over average transit time) of the transit time are two measures of the reliability of a transportation service. (see Table 2.)

**Table 2. Reliability of the five basic modes of transportation expressed by the standard deviation and the coefficient of variation of the transit time.**

| Ranking | Standard deviation | Coefficient of variation |
|---------|--------------------|--------------------------|
| 1       | Pipeline           | Pipeline                 |
| 2       | Airplane           | Airplane                 |
| 3       | Truck              | Train                    |
| 4       | Train              | Truck                    |
| 5       | Ship               | Ship                     |

**Source:** Ghiani, et al 2005

### 2.3.2. Intermodal transportation

Important evolutions observed in the speed of transportation service and security cases in raw material and material cargoes that are shipped in containers. Merchandise is often consolidated into *pallets* or *containers* in order to protect it and facilitate handling at terminals. Common pallets sizes are 100X120 cm<sup>2</sup>. Containers may be refrigerated, ventilated, closed or with upper openings etc. Containers for transporting liquids have capacities between 14.000 and 20.000. The features of the most common container for transporting solid goods are given in Table 3.

**Table 3. Main features of the most common containers used for transporting solid goods**

| Type   | Size (m <sup>3</sup> ) | Tare (kg) | Capacity (kg) | Capacity (m <sup>3</sup> ) |
|--------|------------------------|-----------|---------------|----------------------------|
| ISO 20 | 5.899 x 2.352 x 2.388  | 2300      | 21 700        | 33.13                      |
| ISO 40 | 12.069 x 2.373 x 2.405 | 3850      | 26 630        | 67.8                       |

**Source:** Ghiani, et al 2005

From a small beginning in the mid-1950s, multi-modal form of transport through containers has become an integral part of international trade and commerce. Containerization of general cargo traffic has progressed steadily over the last twenty years, including a doubling of world port container traffic between 1990 and 1998 to reach 175 million TEUs. Worldwide total port container throughput had been reached over 270 million TEUs by 2005, i.e., a 55% increase over 1998. The growth of container traffic is fuelled by the fact that the shipping liner companies are using large 12,000-15,000 TEU ships, than compared to 5,000 TEU ships few years. Therefore, these companies are able to economize the overall transshipment cost, by using economies of scale, which is key in this business.<sup>10</sup>

For Baluch (2005), containerization is now the globally dominant transport system whereby standard containers are loaded onto container ships, trucks and freight train wagons. It eliminates the need to lift cargo off ships with cranes and slings or to move palletted break



bulk cargo from the quayside with forklifts. It lessens the damage, delays, and cargo pilferage that were so common in break bulk shipping of the past. The container system revolutionized and speeded up transport, largely replacing break bulk shipping because it integrates rail, road, canal and maritime modes.

The academic spotlight of container shipping was focused for many years on North America and Europe. From the beginnings of containerization in the mid-1960s, ports and container shipping in these areas dominated the academic scene. In the 1990s East Asia became a new centre of attention. This attention reflects in part the dominance of these regions in global trade flows and the diffusion of containerization along with the adjustments that had to be made by the shipping lines. Since the turn of the new century a new region has drawn attention. The evolving container shipping networks and changing status of ports in the Mediterranean basin have attracted the interest of scholars and practitioners because over the last decade this region too has undergone major expansion and restructuring (Gouveral, et al 2005).

Transportation is driven in containerization process in respect of "door-to-door transportation" principle. This process reveals transportation terms "intermodal" and "multimodal". This is also evaluated as an important factor that increase efficiency through supply chain. There are several terms defining the concept of intermodal transport. The terms "intermodal", "multimodal", "combined" and "through transport" are sometimes assumed to be the same and interchangeable.

Deveci, et al (2006) stated the European Conference of Ministers of Transport's (ECMT) definition for intermodal transport as "The movement of goods in one and the same loading unit or vehicle that uses successively several modes of transport without handling of the goods themselves in changing modes." A truly intermodal system requires unitary liability

of the intermodal operator. The ECMT definition requires that there is no handling of the goods/items during transport chain. This requirement rules out the possibility of performing any value adding activities such as third party logistics services in the terminals. Furthermore, it rules out the possibility of changing cargo-carrying equipment according to the possibilities and requirements of the different transport modes.

Using more than one mode of transportation can lead to transportation services having a reasonable trade-off between cost and transit time. Although there are in principle several combinations of the five basic modes of transportation, in practice only a few of them turn out to be convenient. The most frequent intermodal services are air-truck (*birdyback*) transportation, train-truck (*piggyback*) transportation, ship-truck (*fishyback*) transportation. Containers are the most common load units in intermodal transportation and can be moved in two ways: containers are loaded on a truck and the truck is then loaded onto a train, a ship or an airplane (*trailer on flatcar*); containers are loaded directly on a train, a ship or an airplane (*container on flatcar*).

United Nations Convention on Multimodal Transport defines multimodal transport as “The carriage of the goods by **at least two different modes of transport** on the basis of a **multimodal transport contract** from a place in one country at which goods are taken in charge by a **multimodal transport operator** to a place designated for delivery situated in a different country”. (Deveci, et al 2006)

Intermodal transportation network as a logistically linked system using two or more transport modes and permitting freight or people to be transferred between modes during a movement between an origin and a destination. The limit of intermodality are imposed to be factors of space, form, time, the number of modes and linkages and the type and

characteristic of the vehicles and terminals. Intermodality can be conceived as the transition from one mode of transportation to another.

The competition between the modes has tended to produce a transport system that is unintegrated and segmented. As a matter of fact, each mode has sought to exploit its own advantage in terms of service, cost, safety, reliability. The lack of integration between the modes has been accentuated by public policy that has frequently barred companies from owning firms in other modes. Within the last forty years major efforts have been made to integrate separate transport systems through intermodalism .

Intermodal transportation is rapidly gaining acceptance as an integral component of system approach to conducting business in an increasingly competitive and interdependent global economy. This system referred to as logistics management, involves the integration of Finance, Distribution, Production, Supplier functions to achieve efficient business activities.

The major objectives of intermodalism are to increase the speed of cargo distribution and reduce the amount of unproductive capital, whether in inflated inventory levels. The concept of intermodalism provides cargo handling, safe storage, quicker turnarounds of ships, rail wagons, trucks and cargoes and prevention of loss, contamination and pilferage. It also increases productivity in the ports and other nodal points, an efficient cost effective transport network, thereby promoting the growth of international trade.<sup>11</sup>

Intermodality enables economies of scale within a transportation system where modes are used in the most productive manner. Techniques for transferring freight from one mode to another have facilitated intermodal transfers. As Devenci, et al (2006) implied in transport there are often economies of scale, i.e. the unit price decreases with increasing volume, and there is economy in using a large means of transport as long as it can be filled with cargo. On the other hand, there are diseconomies in using oversized means of transport. Big

manufacturers have big potential in cost reduction once they learn to concentrate their flows on a few channels. By doing so, the cargo volume allows for a very high frequency for the waterborne transport. This again leads to flexibility in the transport system approaching the flexibility of road transport.

Production and customer driven need for an integrated transport chain has led to intermodalism. To offer a competitive intermodal transport solution means making the correct trade-offs between costs and performance and setting the right priorities for the service quality. In order to do this, one must know the market and plan for the future. There are some strong trends at present, supported by various EU and UNCTAD directives and policy statements on intermodality, rail and ports.

As Deveci, et al (2006) mentioned, some major trends in transportation and logistics, imposed by the shippers, are increasing demands for integration of modes along the logistics chain, changing service requirements from node-to-node transport to door-to-door transport services, increasing demand for customized solutions of transport supply (performance, organization), and increasing co-operation between individual transport modes (operators) and logistics chain organizers.

Intermodalism has been increasing both in the world and Türkiye due to the demand and supply side developments in transport industry. Türkiye has great potential in terms of intermodalism. Intermodal transportation owing to its privileged geographical position Europe, Central Asia (including Caspian sea countries ) and Middle eastern countries, Mediterranean, the black sea , the CIS countries and central Asia implies new intermodal networks leading to rising demand for intermodal transport.

The Mediterranean share of the world container traffic is increasing very quickly. Industrial activities have been accelerated in CIS countries and new transport corridors in the region

have been planned. It is obvious that transport infrastructure of Türkiye will gain importance with these developments in the region. Recent political, economic and technical developments have forced Türkiye to take further steps towards improving its transport infrastructure to benefit from its geographical position.<sup>12</sup>

These trends will influence the future transport systems. They will be governed by some major general economic developments such as; globalization of trade and transport, diversification of production and consumption, growing competition among economic regions in the world, growing congestion in and around main economic centers and growing concern for the environment and the use of energy by the transport sector.

As logistics activities become far more complex it will be hard for the firms to manage logistics activities indoor so they used to follow 3PL approach to minimize their logistics cost in order to benefit economies of scales.

#### **2.4.Third Party Logistics (3PL)**

In changing globalization process its important for the companies to respond customer demand fast, produce and serve products at requested quality. This can be achieved by managing procurement, production, manufacturing, marketing, logistics phases much more fast than ever. For quicker respond and serve innovative products to the market, the companies also should do their research and development (R&D) business properly and fast. In this respect it'll be better for a company to do its core business and invest on developing its products. (Akman, 2006)

For Lambert, et al (2004) , many organizations began to recognize that they could not effectively and efficiently “do it all” themselves and still remain competitive. They began to look to third-party specialists to perform activities that were not a part of their “core

competency.” This activity is known as **outsourcing**, in which an organization hires an outside organization to provide a good or service that it traditionally had provided itself, because this third party is an “expert” in efficiently providing this good or service, while the organization itself may not be. Outsourcing offers the opportunity for organizations to use the best logistics providers available to meet their needs.

Third Party Logistics (3PL) Approach depends on outsource of the logistics activities. There is a customer side, company side and the logistics company side. Customers are looking for supply chain integration through one-stop integrated logistics service providers and are therefore more likely to use a major 3PL. The industry will continue to see further consolidation as players want to be one-stop shops for their customers.<sup>13</sup>

As trade expands in many of the emerging economies, which get linked to a globalized market place, efficient production system, coupled with world class distribution system becomes a key competing factor. In an effort to maintain a competitive edge, large number of firms in the higher income countries of the world have outsourced manufacturing activities across the emerging economies. In this chain of activities, moving goods from production base to various retail outlets forms a critical link. To manage this entire chain of operations, a number of logistics service providers have emerged.<sup>14</sup>

Now, however, more and more manufacturers see this channel as an opportunity to reduce cost and improve customer service. Small to mid-size manufacturers cannot afford the investments necessary to develop a distribution network capable of competing on the global market for today's consumer. Instead, they are outsourcing the distribution of their products. Their action is fueling global growth in the area of 3PL providers.

Customer service in the world of 3PL must be responsive not only to the needs of clients, but also to those of customers of clients. To achieve this, 3PL systems must introduce a level of control above that of simply tracking a product in the warehouse.<sup>15</sup>

As Balachandran (2004) emphasizes, many organizations have found it economical to entrust the entire responsibility of logistics to specialized logistics companies. Logistics has developed as an important service business in recent times. Retailers like Wal-Mart, which procure goods from hundreds of suppliers all over the world, in preparation for the sales during Christmas, for example, may not be able to manage the logistics themselves and therefore, use third parties. Even if they do it themselves, they will have a separate division to manage it, as there is need for information and decisions that are totally different from that of procurement and retailing.

In Türkiye 3PL organisations newly developed and engineered. In this framework, Türkiye should increase the efficiency of this organisations and reengineer all. In worldwide “one stop shopping” which means to purchase all logistics activities from one logistics supplier also growing through 3PL approach.<sup>16</sup> Türkiye has to follow these trends. Therefore, logistics and its positioning in Türkiye is briefly mentioned below.

## **2.5 LOGISTICS In TÜRKİYE**

As Türkiye has a land bridge position both in East-West and South-North axes, economic developments in CIS, Central Asia and Caucasian, productivity increase in Türkiye in parallel with Southeastern Anatolia Project (GAP) and acceleration in the relations with the EU are considered. Türkiye has a great potential within the freight transport and logistics activities. Although the importance of freight transport and logistics services has been increasing among companies in Türkiye due to the accelerating international trade, the

number of the comprehensive studies within the freight transportation selection is negligible. (Tuna&Silan, 2002)

In Türkiye, there is a need to redesign of logistics and transportation infrastructure due to the products. The integration should be achieved between logistics organisations in order to minimize total costs in logistics. It is very important for Türkiye to construct its logistics infrastructure to benefit the opportunity of being a land bridge between Asia and Europe.

There is an integration in logistics activities both in supply chain and distribution channels, but these activities have not been integrated yet in Türkiye. Despite that fact Türkiye has 23 billion dollars market value in international and domestic logistics.

In Türkiye mostly sea way transportation is used. About 86.3% of Türkiye's foreign trade has been performed by sea way. Ports' inadequate infrastructure within high sea way cargo volume is tried to be solved with privatization. Transit time problem still persist due to the current customs legislations.

On the other hand Turkish State Railways (TSR) keep on planning and programming cargo transportation in logistics according to sector's expectations. The regulation published in April 2005 that opens the state railways to private sector and the project regarding railway link via capillary network to trade zones are some of these plans and programs.

In cargo transport, road has 11.3% ratio in Türkiye's foreign trade. According to value road has 36.1% ratio, while arranging new transportation regulation authorization documents in road, some difficulties occur for cargo transporters. The response to this certificate of authority is that high financial capability is a must to get the authorization document.

The volume of road transportation is greater than the other modes. It is obvious that the road transportation has disadvantages like being far from economies of scale, excess



capacity, over capacity of the roads, damages, loss of national wealth and also increase of deaths. In this respect to invest on railways and use railway transportation to avoid the disadvantages of the road transportation become a must.

As per Kanalci's (2006) investigations, it is hard to say that air cargo is at the expected level. An air cargo facility near Ataturk Airport has been approved, but has not been constructed yet.

The academic spotlight of container shipping was focused for many years on North America and Europe. From the beginnings of containerization in the mid-1960s, ports and container shipping in these areas dominated the academic scene. In the 1990s East Asia became a new centre of attention. This attention reflects in part the dominance of these regions in global trade flows and the diffusion of containerization along with the adjustments that had to be made by the shipping lines. Since the turn of the new century a new region has drawn attention. The evolving container shipping networks and changing status of ports in the Mediterranean basin have attracted the interest of scholars and practitioners because over the last decade this region too has undergone major expansion and restructuring. (Gouveral, et al 2005)

The ports of Mediterranean basin have experienced significant growth in container traffic over the last decade. In the western Mediterranean two distinct types of port have emerged: the established ports of the northern part of the basin which serve a gateway function and a set of new ports in the south which act as transshipment hubs.

With a serious production field in the east, and a serious consumption field in the west, Türkiye can take a chance on being a logistics center besides the advantage of its geographical positioning exception. But geographical positioning is not sufficient for being a logistics center. To take this chance government's role is very important. The government

should invest on constructions that improve transportation and custom authorities. As Türkiye's ports' capacity (See table 4) is not yet enough to compete with its rivals, Türkiye has to pay more attention to its ports. Because sea way become the main transportation mode (the dominant one) in global arena and the other modes support it.

**Table 4.Characteristics and Capacities of the Turkish Ports**

| <i>PORT S</i>  | <b>Haydar<br/>pasa</b> | <b>Mersin</b> | <b>Izmir</b> | <b>Samsu<br/>n</b> | <b>Bandırm<br/>a</b> | <b>Derince</b> | <b>Isken<br/>Derun</b> | <i>TOTAL</i> |
|--|------------------------|---------------|--------------|--------------------|----------------------|----------------|------------------------|--------------|
| <i>Total<br/>Wharf<br/>Length<br/>(m)</i>  | 2,765                  | 4,605         | 2,959        | 1,756              | 2,788                | 1,092          | 1,426                  | ~<br>17.390  |
| <i>Port<br/>Area<br/>(*1000<br/>m<sup>2</sup>/sq.<br/>m.)</i>                    | 320                    | 994           | 902          | 588                | 246                  | 312            | 750                    | ~ 4.110      |
| <i>Max.<br/>Draug<br/>ht (m)</i>   | -12                    | -14.5         | -13          | -12                | -12                  | -15            | -12                    |              |
| <i>Numbe<br/>r of<br/>Worker<br/>s</i>   | 725                    | 1,098         | 505          | 274                | 248                  | 235            | 491                    | ~ 3.576      |
| <i>(Total<br/>Ship<br/>Receipt<br/>(Ship/<br/>Year)</i>                          | 2,651                  | 4,692         | 3,640        | 1,130              | 4,280                | 862            | 640                    | ~<br>17.890  |
| <i>Total<br/>Handli<br/>ng<br/>Capaci<br/>ty<br/>(*1000<br/>Tons<br/>/Year )</i> | 5,427                  | 6,131         | 6,419        | 2,380              | 2,771                | 2,288          | 3,247                  | ~<br>28.663  |
| <i>Total<br/>Wharf<br/>Capaci<br/>ty<br/>(*1000<br/>Tons<br/>/Year )</i>         | 8,558                  | 10,967        | 11,100       | 4,300              | 7,008                | 2,991          | 6,097                  | ~<br>51.000  |

|  |            |              |            |              |              |              |              |                 |
|--|------------|--------------|------------|--------------|--------------|--------------|--------------|-----------------|
| <i>Capacity of Container Wharf Equipment (*1000 Tons /Year )</i> | <b>354</b> | <b>319</b>   | <b>549</b> | <b>40</b>    | <b>40</b>    | <b>40</b>    | <b>20</b>    | <b>~ 1.362</b>  |
| <i>General Cargo Storage Capacity (*1000 Tons/ Year)</i>         | <b>689</b> | <b>8,500</b> | <b>884</b> | <b>6,866</b> | <b>2,013</b> | <b>2,984</b> | <b>9,286</b> | <b>~ 31.220</b> |
| <i>Container Storage Capacity (*1000 Tons / Year )</i>           | <b>269</b> | <b>371</b>   | <b>343</b> | <b>50</b>    | <b>50</b>    | <b>100</b>   | <b>146</b>   | <b>~ 1.330</b>  |

**Source:** <http://www.tcdd.gov.tr/liman/kapasite.htm>

When we analyze Türkiye with its geographical positioning, the road, sea and air transportation should be used more effectively and productive. Türkiye has high volumed container ports with an increasing container traffic annually. One of the biggest container ports of Türkiye is Izmir Port. The limps that had been faced in transportation system prevent development of a region that has rich sources and geopolitically appropriate for trade. Izmir, as the most secure port of West Anatolia, was being a trade center over decades. Izmir with its hinterland was the first container port with 847,926 TEUs cargo handling in 2006. As of the end of June 2007 438,697 TEUs handled. Izmir port approxiamately doubled its cargo handling capacity through 2000-2006. (see table 5)

As per future projections within the existing ports' capacity Türkiye cannot stay competitive in its region as the neighbor ports due to its ports' inadequate terminal capacities. Many

opportunities are available to increase logistics and transportation capability of Türkiye. Some of which are privatization of ports, construction of new ports. Both can be a solution, but also the hinterlands of the port areas must be taken into account.

Being aware of above projections, in near future within high scaled combined transportation, logistics villages will be constructed in Türkiye. The cargoes will be transported and warehoused in high scales. Türkiye's average market value in international and domestic logistics is approximately 23 billion dollars. When logistics companies and service providers' capacity taken into account, it's seen that logistics potential is between 7,4 and 11,8 billion dollars, market share is 2.5 billion and 4 billion dollars. One of the reasons of 25% market potential and limitation in share of logistics is low outsourcing in logistics services due to the fact that production companies still operate many activities that had been given in logistics definition. One of the main important case in sector is usage of information technologies (IT) due to the given services.

When we have look at logistics figures in Türkiye, we have faced with a logistics share which is not significant. For instance, 22% of Türkiye's biggest firms do not outsource any of the logistics activities shows the significance. The firms that operate in the market perform transportation and distribution services, despite outsourcing logistics services. Though the coordination is made by production co-operations and there is no added value. (Kanalci, 2006)

The doubling of Izmir Port's export cargo handling through 2000-2006 (241,301 in 2000, 424,472 in 2006 as seen in Table 5) is very important. However, due to cargo handling increase, the terminal become inadequate and port congestions become the biggest problems of Izmir Port recently. There are traffic bottlenecks through the cargo delivery roads, because

approximately 95% of transportation from Izmir Terminal is done by truck. Truck transportation causes road congestions around the port area.

Foreign trade is the most important tool to increase national income. Especially export increase reflects positively to the economies. With its high cargo handling capacity, Izmir Port is one of the logistics weapons of Türkiye. Investigations figure that Izmir ports' inadequacy will cause challenges in near future. As Izmir's high cargo handling capacity depends on its hinterland, also this situation will affect its hinterland negatively. In that sense a dry port application is proposed in Izmir to respond the cargo volume and serve also to the hinterland. In order to examine the place that the dry port will be constructed, first Izmir and its hinterland is investigated.

Table 5.Container Traffic

| PORTS      | YEARS | (LOADING)     |               |               |               | (UNLOADING)   |               |               |              | TOTAL UNIT     | TEU            |
|------------|-------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|--------------|----------------|----------------|
|            |       | 20            |               | 40            |               | 20            |               | 40            |              |                |                |
|            |       | FULL          | EMPTY         | FULL          | EMPTY         | FULL          | EMPTY         | FULL          | EMPTY        |                |                |
| HAYDARPAŞA | 2000  | 28,306        | 19,359        | 31,252        | 17,935        | 49,049        | 3,102         | 47,389        | 2,631        | 199,023        | 298,230        |
|            | 2001  | 26,838        | 6,754         | 35,635        | 4,058         | 30,121        | 4,771         | 25,359        | 12,978       | 146,514        | 224,544        |
|            | 2002  | 24,290        | 11,381        | 32,278        | 6,113         | 36,826        | 2,657         | 28,868        | 7,485        | 149,898        | 224,642        |
|            | 2003  | 27,334        | 10,916        | 30,442        | 9,045         | 37,026        | 3,915         | 37,276        | 5,875        | 161,829        | 244,467        |
|            | 2004  | 26,952        | 19,146        | 33,810        | 19,824        | 49,461        | 2,293         | 52,865        | 3,066        | 207,417        | 316,982        |
|            | 2005  | 31,785        | 21,380        | 36,165        | 19,786        | 56,422        | 2,726         | 53,928        | 4,279        | 226,471        | 340,629        |
|            | 2006  | 26,640        | 35,966        | 34,432        | 31,147        | 69,544        | 525           | 66,944        | 1,173        | 266,371        | 400,067        |
|            | 2007  | <b>11,002</b> | <b>21,917</b> | <b>18,056</b> | <b>15,627</b> | <b>36,981</b> | <b>124</b>    | <b>33,912</b> | <b>1,105</b> | <b>138,724</b> | <b>207,424</b> |
| MERSİN     | 2000  | 31,874        | 10,185        | 34,231        | 17,668        | 35,108        | 11,245        | 47,520        | 6,063        | 193,894        | 299,376        |
|            | 2001  | 36,889        | 4,619         | 38,970        | 9,175         | 26,512        | 19,778        | 38,275        | 14,858       | 189,076        | 290,354        |
|            | 2002  | 46,681        | 6,278         | 45,564        | 15,851        | 33,659        | 21,494        | 54,437        | 12,052       | 236,016        | 363,920        |
|            | 2003  | 62,213        | 7,836         | 55,865        | 24,588        | 39,592        | 30,958        | 67,176        | 15,627       | 303,855        | 467,111        |
|            | 2004  | 68,862        | 3,515         | 66,053        | 28,365        | 39,676        | 33,074        | 85,409        | 14,109       | 339,063        | 532,999        |
|            | 2005  | 79,936        | 5,470         | 67,712        | 38,775        | 50,868        | 35,729        | 94,295        | 11,361       | 384,146        | 596,289        |
|            | 2006  | 100,480       | 6,496         | 71,922        | 33,434        | 58,604        | 48,593        | 96,070        | 13,362       | 428,961        | 643,749        |
|            | 2007  | <b>30,869</b> | <b>1,153</b>  | <b>26,228</b> | <b>14,143</b> | <b>20,268</b> | <b>13,877</b> | <b>38,418</b> | <b>4,218</b> | <b>149,174</b> | <b>232,181</b> |
| İSKENDERUN | 2000  | 0             | 0             | 0             | 80            | 34            | 0             | 260           | 0            | 374            | 714            |
|            | 2001  | 1             | 0             | 0             | 0             | 9             | 0             | 9             | 1            | 20             | 30             |
|            | 2002  | 0             | 0             | 0             | 0             | 6             | 0             | 12            | 1            | 19             | 32             |
|            | 2003  | 1,036         | 0             | 0             | 0             | 593           | 0             | 58            | 0            | 1,687          | 1,745          |
|            | 2004  | 138           | 0             | 16            | 0             | 207           | 0             | 115           | 0            | 476            | 607            |
|            | 2005  | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0            | 0              | 0              |

|                 |             |           |          |           |          |           |          |           |            |            |            |
|-----------------|-------------|-----------|----------|-----------|----------|-----------|----------|-----------|------------|------------|------------|
|                 | 2006        | 26        | 0        | 0         | 0        | 26        | 0        | 0         | 0          | 52         | 52         |
|                 | <b>2007</b> | <b>21</b> | <b>0</b> | <b>0</b>  | <b>0</b> | <b>8</b>  | <b>0</b> | <b>18</b> | <b>266</b> | <b>313</b> | <b>597</b> |
| <b>SAMSUN</b>   | 2000        | 0         | 0        | 0         | 405      | 0         | 0        | 507       | 0          | 912        | 1,824      |
|                 | 2001        | 11        | 0        | 0         | 107      | 50        | 0        | 564       | 0          | 732        | 1,403      |
|                 | 2002        | 0         | 0        | 78        | 23       | 34        | 0        | 69        | 0          | 204        | 374        |
|                 | 2003        | 0         | 0        | 0         | 0        | 0         | 0        | 0         | 0          | 0          | 0          |
|                 | 2004        | 0         | 0        | 0         | 0        | 0         | 0        | 0         | 0          | 0          | 0          |
|                 | 2005        | 0         | 0        | 0         | 0        | 0         | 0        | 0         | 0          | 0          | 0          |
|                 | <b>2007</b> | <b>0</b>  | <b>0</b> | <b>0</b>  | <b>0</b> | <b>0</b>  | <b>0</b> | <b>0</b>  | <b>0</b>   | <b>0</b>   | <b>0</b>   |
| <b>DERİNCE</b>  | 2000        | 495       | 161      | 4         | 66       | 210       | 26       | 79        | 2          | 1,043      | 1,194      |
|                 | 2001        | 3         | 61       | 6         | 52       | 199       | 22       | 143       | 0          | 486        | 687        |
|                 | 2002        | 225       | 21       | 34        | 4        | 120       | 0        | 100       | 1          | 505        | 687        |
|                 | 2003        | 253       | 30       | 432       | 52       | 392       | 7        | 140       | 3          | 1,309      | 1,936      |
|                 | 2004        | 201       | 3        | 296       | 65       | 161       | 0        | 187       | 24         | 937        | 1,509      |
|                 | 2005        | 71        | 0        | 89        | 0        | 123       | 0        | 88        | 1          | 372        | 550        |
|                 | <b>2007</b> | <b>17</b> | <b>8</b> | <b>77</b> | <b>1</b> | <b>97</b> | <b>0</b> | <b>27</b> | <b>0</b>   | <b>227</b> | <b>332</b> |
| <b>BANDIRMA</b> | 2000        | 130       | 429      | 24        | 35       | 405       | 103      | 101       | 15         | 1,242      | 1,417      |
|                 | 2001        | 137       | 356      | 27        | 35       | 342       | 77       | 37        | 0          | 1,011      | 1,110      |
|                 | 2002        | 0         | 0        | 0         | 2        | 0         | 0        | 0         | 0          | 2          | 4          |
|                 | 2003        | 0         | 0        | 0         | 0        | 0         | 0        | 0         | 0          | 0          | 0          |
|                 | 2004        | 0         | 0        | 9         | 0        | 0         | 0        | 9         | 0          | 18         | 36         |
|                 | 2005        | 0         | 0        | 0         | 0        | 0         | 0        | 0         | 0          | 0          | 0          |
|                 | <b>2007</b> | <b>0</b>  | <b>0</b> | <b>0</b>  | <b>0</b> | <b>0</b>  | <b>0</b> | <b>0</b>  | <b>0</b>   | <b>0</b>   | <b>0</b>   |
| <b>İZMİR</b>    | 2000        | 93,749    | 5,348    | 63,424    | 7,678    | 29,090    | 58,479   | 42,932    | 27,921     | 328,621    | 470,576    |
|                 | 2001        | 101,409   | 4,573    | 70,728    | 3,176    | 24,498    | 72,693   | 32,242    | 37,956     | 347,275    | 491,377    |

|              |             |                |               |                |               |               |               |                |               |                |                |
|--------------|-------------|----------------|---------------|----------------|---------------|---------------|---------------|----------------|---------------|----------------|----------------|
|              | 2002        | 114,177        | 4,962         | 85,855         | 3,476         | 32,997        | 74,469        | 40,497         | 43,475        | 399,908        | 573,211        |
|              | 2003        | 130,341        | 4,625         | 104,417        | 4,728         | 38,577        | 92,790        | 51,983         | 56,103        | 483,564        | 700,795        |
|              | 2004        | 147,126        | 12,099        | 112,933        | 8,901         | 53,966        | 104,640       | 66,816         | 54,716        | 561,197        | 804,563        |
|              | 2005        | 152,624        | 3,358         | 111,466        | 8,605         | 49,861        | 104,216       | 66,759         | 50,329        | 547,218        | 784,377        |
|              | 2006        | 154,538        | 6,168         | 124,258        | 7,625         | 58,614        | 99,156        | 73,742         | 59,100        | 583,201        | 847,926        |
|              | <b>2007</b> | <b>82,589</b>  | <b>3,112</b>  | <b>59,582</b>  | <b>5,023</b>  | <b>32,167</b> | <b>52,897</b> | <b>37,436</b>  | <b>31,925</b> | <b>304,731</b> | <b>438,697</b> |
| <b>TOTAL</b> | 2000        | 154,554        | 35,482        | 128,935        | 43,867        | 113,896       | 72,955        | 138,788        | 36,632        | 725,109        | 1,073,331      |
|              | 2001        | 165,288        | 16,363        | 145,366        | 16,603        | 81,731        | 97,341        | 96,629         | 65,793        | 685,114        | 1,009,505      |
|              | 2002        | 185,373        | 22,642        | 163,809        | 25,469        | 103,642       | 98,620        | 123,983        | 63,014        | 786,552        | 1,162,870      |
|              | 2003        | 221,177        | 23,407        | 191,156        | 38,413        | 116,180       | 127,670       | 156,633        | 77,608        | 952,244        | 1,416,054      |
|              | 2004        | 243,279        | 34,763        | 213,117        | 57,155        | 143,471       | 140,007       | 205,401        | 71,915        | 1,109,108      | 1,656,696      |
|              | 2005        | 264,416        | 30,208        | 215,432        | 67,166        | 157,274       | 142,671       | 215,070        | 65,970        | 1,158,207      | 1,721,845      |
|              | 2006        | 281,717        | 48,656        | 230,645        | 72,224        | 186,957       | 148,287       | 236,871        | 73,653        | 1,279,010      | 1,892,403      |
|              | <b>2007</b> | <b>124,498</b> | <b>26,190</b> | <b>103,943</b> | <b>34,794</b> | <b>89,521</b> | <b>66,898</b> | <b>109,811</b> | <b>37,514</b> | <b>593,169</b> | <b>879,231</b> |

\*As of the end of JUNE 2007

Source: [www.tcdd.gov.tr/liman/konteyner.ht](http://www.tcdd.gov.tr/liman/konteyner.ht)



### **2.5.1.IZMIR and Its Hinterland**

Izmir, the third most populated metropole city of the Türkiye with a present population of over three million people, is located on the West coast of the country along the Aegean Sea. From Foca in the north to Kusadasi and Soke in the south, Sardis and Nazilli in the east, here's Izmir and its hinterland.<sup>17</sup>

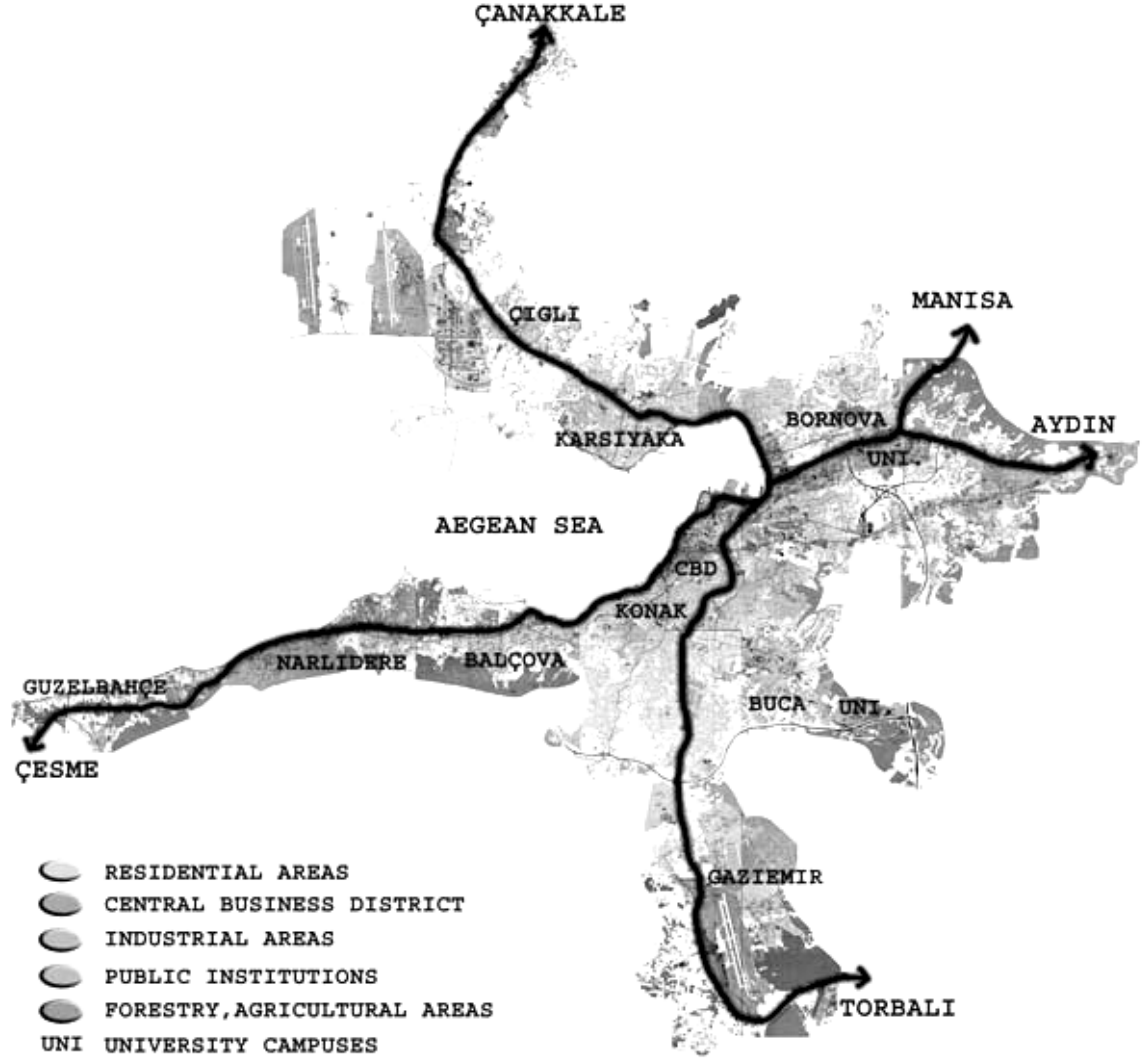
Izmir is composed of 9 metropolitan districts. These are Balçova, Bornova, Buca, Cigli, Gazimemir, Güzelbahçe, Karsiyaka, Konak and Narlıdere. Each district, and often also the neighborhoods within, possesses distinct features and a particular temperament.

From past to date, Izmir has always played a fundamental role in country's economy as being one of the trade centers of the country. The core city surrounding the Izmir Bay has also become an attraction center due to the international commercial seaport, productive agricultural areas in the hinterlands, and economical and industrial structure that is fed from this hinterland. Izmir has continuously outperformed the national average on most of the socio-economic growth indicators over the past decades on account of its strategic location and well developed economic foundation. Considering socio-economic development indicators such as urbanization rate (85%), rate of gross domestic product (7.30%), per capita GDP (\$2696), rate of agricultural workforce (28.54%), number of manufacturing workforce (94.341), literacy rate (92%), private car ownership for per 10.000 person (986) etc., Izmir is at the high level of development (3<sup>rd</sup> 81) against the other provinces (SPO, 2003).

32 % of the working population deals with trade. Industry is in third place with 23% and the service sector is first with 38%. The total labour force in proportion to the population is about 32%. It is estimated that the population of İzmir will be 4,300,000 in the year 2010.

In the last decades, the increasing investments within the city's wider region together with the ongoing industrial growth, financial and commercial restructuring have strengthened its economic power. Additionally, increasing number of tourism, housing, transportation and university investments have increased the economic power of Izmir at the national level. Much of the discussions above are also mainly constituted by the metropolitan area of Izmir where the 65 percent of the total population lives in the core city and much of the economic activities located in the metropolitan area. The core city of Izmir has undergone radical changes due to the rapid urbanization and population growth in the recent decades. Uncontrolled rapid development has led to many urban problems as well, such as, increased illegal housing settlements, poor infrastructure provision, urban sprawl, environmental pollution, transport congestion and urban segregation etc.

The urban growth of İzmir metropolitan area represents a linear pattern along the main four arterial roads which of two are parallel to the seacoast (see Appendix A, Map 1). However, especially in other two axes lying down to interiors of the city, partly a raveling out growth has been seen in the recent years. There has been an increasing decentralization of main urban activities and functions from the city center such as major industrial, commercial and residential activities. This also implies a decrease in the historical central business district (CBD) and inner city regions leading to a polycentric development within the each metropolitan district as the sub-centers.



Map1: Land Use Pattern of İzmir

Source: Created based on City Guide 2000, Greater Municipality of İzmir (Kompil & Çelik, 2006)

Many studies have pointed out that İzmir, which has a history of several thousand years, was one of the most dominant cities in the region in every age. The city was expanding to the sea on one side, and towards the castle on the other side. The length of the city coast was 1750m. In addition to this, there was an interior harbour of 1250m. İzmir has Türkiye's largest port after İstanbul. It is located in the Gulf of İzmir, by the Aegean Sea. It is the capita of İzmir Province.

The city that was formed after the early 19th century gradually increased its relationship with Anatolia. Aydın and Manisa were the two main cities in the hinterland. In addition to the railway lines of Aydın and Manisa proposals for the Canakkale and Cesme railways were made. For example the Canakkale line proposal included the operation rights of the mines and forests in a twenty kilometer belt on the left and right sides of the railway line. These rights would belong to the construction company.

Izmir continued to be the centre of this region towards the year 2000. But this time its hinterland region was not be the region of 17th, 18th and 19th centuries. İzmir had an hierarchical relationship with its hinterland, co-existing in a stable interdependent socio-economic and cultural balance. A balance which saw the city feed from it and feed it. The hinterland is no longer the relatively closed system and has entered into open relation with the outside system like Izmir itself. Izmir has again become a city that will exist not by itself but together with its region.

All the developments in transportation and industry pulled the city life into a different dimension. In spite of this Izmir is still a regional distribution and collection centre. <sup>18</sup>In the east, in the region of Kemalpaşa the industrial area is extending. On this site, the first organised industrial zone of Izmir has been developed and this region extends as far as the Aliaga industrial settlement. Alsancak to the north is the site of the recently enlarged harbour, whereas industry is concentrated in suburbs along the gulf to the northeast.<sup>19</sup>

The city has always had strong development potential, as its natural port and location are on the main trade routes between the East and West. The favorable location and the size of Izmir's hinterland has resulted in a metropolitan center where intra and inter-regional commercial activities and international trade is concentrated. Izmir urban area has an agglomeration of

wholesale and retail trade, banking and finance institutions, technical, administrative services and industry. The main regional functions of transportation, communication, education, health, tourism and recreational services are also located within the metropolitan area. <sup>20</sup>

## **2.5.2. IZMIR'S LOGISTICS INFRASTRUCTURE**

### ***IZMIR PORT***

The economic developments of the period organised the city of Izmir as an export harbour. The import goods that entered the city consisted mainly of clothing. The loading and unloading of the ships that came to Izmir which did not have a developed harbour created problems. In 1867 an agreement was signed to build a new harbour to replace the old harbour which was in a ruined stage. Although the harbour of Izmir was found to be favourable with respect to town planning and development techniques it was decided that the south entrance was not suitable for the entrance of the ships. Because of this, all the entrances were directed to the northern gate. An area in the port 3,245 m by 100 m was gained from the sea.

The areas created as a result of this filling were sold by the company and to increase the profit, plots were created parallel to the sea. Consequently, these areas were filled with buildings and a city structure contrary to the traditional street system of Izmir was created. The front sides of the streets running perpendicular to the sea was closed and the newly established I. and II. Kordon Streets prevented the Imbat breeze from entering the inner parts of the city. The developing city created a new transportation system as a result of the construction of the harbour. <sup>21</sup>

After World War I Izmir economy lost its importance and trade volume. And in the fire in 1922, the city and the port were destroyed and this had also effected Izmir's economy. In 1954 Izmir Port had moved at its recent place. In 1957 it has been assigned to TSR. As published on the

official gazette on 4th of July 2007, after privatization process, assignment of Izmir Port to Global-Hutchison Whampoa- Aegean Expoters' Association consortium has been approved and the port will be operated by the consortium.

Izmir Port faces the Aegean Sea and is situated at the pivotal point of the sea trade between Western Europe and North Africa. It has a vast agricultural and industrial hinterland, plays a substantial role not only assential core for the industry and agricultural trade in the Aegean Region but also as a vital function in the Turkish exports. Exports include agricultural products from its hinterland—chiefly tobacco, figs, cotton, and vegetables—as well as manufactures, carpets, and silk.<sup>22</sup>

The port has a vast agricultural and industrial hinterland. It is the port for the Aegean Region's industry and agriculture. The port plays a vital function in the country's exports. All different type of commodities and cargo groups are handled in the Port and port expansion studies are continued. The port is also connected with state railway and highway network.

Izmir port, having a modern container terminal, maintains all the services for general, dry and liquid bulk cargoes, Ro-Ro and cruises with its infrastructure and skilled manpower. Despite these features, Izmir Port do not have sufficient depth to enhance the trunk vessels berthage. This can be count as a disadvantage of the port. (see Table 6)

Izmir which has 549,000 container capacity, processed over 800,000 container in 2004. As per these figures Izmir is Türkiye's biggest conatiner export port. Izmir Port achieved half of the export cargo handling alone among other government ports and as per 2004 figures Izmir is the most profitable port with 81,5 million YTL profit. (Cicek, 2006)

**Table:6 Izmir Port's Capacities**

|                  | <i>Ships/Year</i> | <i>Berth Length (m)</i> | <i>Max. Depth (-m)</i> |
|------------------|-------------------|-------------------------|------------------------|
| <b>Dry Cargo</b> | 810               | 1,429                   | 7, 10.5                |
| <b>Container</b> | 1,500             | 1,050                   | 13                     |
| <b>Dry Bulk</b>  | 79                | 150                     | 10.5                   |
| <b>Passenger</b> | 1,246             | 330                     | 8, 10.5                |
| <b>Total</b>     | 3,635             | 2,959                   |                        |

| <i>Storage Area</i>         | <i>M<sup>2</sup></i> | <i>Capacity</i> |
|-----------------------------|----------------------|-----------------|
| <b>Open (Tons/Year)</b>     | 23,580               | 565,000         |
| <b>Closed (Tons/Year)</b>   | 24,678               | 394,848         |
| <b>Container (TEU/Year)</b> | 192,360              | 266,000         |

\*Source: Sector Report 2003, Port (Sektor Raporu 2003 Liman)

There are two steps of basic income calculation of ports. First, how many cargoes have been stuffed in fiscal year. (ton, m<sup>3</sup>, teu, etc.) Second one is the unit charge that the port authority will collect. Technically, the income per stuffed unit tone is based on the port's productivity.

Izmir Port exceeds its cargo handling capacity in last decade. For instance in 2004, the port exceeded its cargo handling capacity of 1,4 million tonnes with handling 5 million tonnes which is approximately 3 times greater than its capacity. Also trading volume of 12,5 was performed. 9 million tonnes of the trading volume was export and 3,5 million tonnes was import. This activities are 27% of the performed loading/discharging in ports that are under government. 9 million tonnes was equal to 43,7% of Türkiye's total.

In order to increase port productivity, the service quality has to be raised; frequent calls to other ports from the port and to provide the shortest transit times. As Kisi, et al (1998) emphasized, it is obvious that within the integration of ports to modern railway transportation system and use of electronic data interchange (EDI) and management information systems (MIS) in modern operating, the ports will gain competitive advantage.

## *IZMIR RAILWAYS*

In 19th century Izmir has a portion of 45% on export volume and and 20% import volume. Therefore in second half of 19th century, the railway transportation in the city received more attention. At past, definitely with the construction and operation of the Izmir-Aydın Railways and Izmir-Kasaba Railways lines, the socio-economic life has been changed radically. Railways were a socio-economic birth for West Anatolia.

Before Republic of Türkiye, the railways were constructed and operated by foreigners due to the capitulations that had been given by Ottoman Empire. Railways were a very important issue in fist years of the Republic. Mustafa Kemal Atatürk was concerned so much with the railways. In First Economic Congress that held in Izmir the statement of roads was itemized as follows:

“We have left all the appropriate bridge construction and execution issues of all roads, railways, port, canals and vessels vacation that serve for the public to our government and public works and economy specialists. By determining the style that is useful for only public and country as quick as possible, immediate act must be taken and the construction of railways has to be fulfilled all over the country with modern transportation equipments like a cobweb at minimum time as possible.” (Atilla, 2002)

Izmir-Aydın and Izmir-Kasaba (Turgutlu) railways have been designed to connect Izmir’s hinterland to Izmir Port. Within two lines , Izmir had an important role in export. In 1869 within the construction of Kordonboyu quay, Alsancak Station directly connected through Alsancak Port. Alsancak Station was designed as a facility for warehousing , maintaining and repair, controlling and customs clearence point of the goods before port enterance. The railways were



constructed for faster distribution due to increased raw material and product requirement and this increased Izmir's foreign trade volume and current port became inadequate. (Cicek, 2006)

The most appropriate global transportation mode on roads is railway transportation. In this respect integration of sea way transportation via railways at ports has great importance. We have witnessed the first operation in integration of railway and sea way transportation during 1860s in Aegean Region. Izmir Port has strong connections with its hinterland. By the integration of two different transportation modes, in the following years the export volume of Izmir port has increased four times greater.

On the other hand, when transportation modes have been analyzed, recently in Türkiye, the road transportation has 95% share among all. However, the transportation modes have a balance in share, despite the system, quality and quantity of the road transportation in developed countries. The specialists emphasize that the railway transportation must be at least 20% in share.

The criteria, which define the productivity of a port are, location, security, sufficiency and connections that provide a good transportation network in reach. The railway and port connection and the importance of the modern railway operations lie under container transportation.

Recently in Türkiye a wagon is capable of carrying 35-50 containers in different sizes, in other words 70-80 TEU. It is impossible to carry such volumes only via road transportation. When we have taken the low capacity use of railways into consideration, in order to use this capacity more efficiently the coordination and organization of railway - sea way transportation at ports has to be ensured.

The most important problem at ports is congestion. The port that has congestion problem will have difficulties among its rivals as less call of the vessels. Within increase the time that a vessel spend at a port and the costs, the freights will increase and this will effect on the selling prices of the final consumers. Besides, environment pollution and excess capacity are the problems that the congestions cause.

It is not possible to compete with the developed countries that use railways effectively in recent tough global arena. In Türkiye all the ports that have railway connections are under authority of TSR, which is a government corporation. Railway connections at remaining Turkish ports used inefficiently, therefore the use of this mode can be count as nil. At first, it can be thought as in hinterland connection of the ports that are under authority of TSR, railway use has an important role, however in practice the data figure the opposite. For instance in Izmir port, which has the greatest export volume among the other ports, the use of railway transportation is about 1% when road transportation figures 99%.

Railway transportation is an alternative to the other transportation modes. When high volume and heavy tonnage cargoes are subject to transportation the railway transportation is the cheapest transportation mode. The advantages of railway transportation can be stated as follows; environmentally friendly transportation mode, safer than the other transportation modes, diminishes the road congestions, opposite to the other transportation modes, generally has the fix price guarantee in long-term, when there are restrictions in road transportation in international transition, as railway transportation is preference of transit countries, it has right of way, despite it has long transit time than the other modes it has stable voyage period, it is appropriate for carrying heavy tonnage and top-heavy cargoes.

Despite above advantages the railway transportation also has disadvantages as follows; in some delivery places the transit times take more than road and seaway transportation, especially in Türkiye the delivery takes more time, in door-to-door transport in Europe in most places there is a line to the inside of the factories, however in Türkiye there are few examples. (e.g. Eregli Demir Celik, BSH Profilo Cerkezkoy etc), in door-to-door transport in most places train can come to the nearest station, there is a need for road transportation till the delivery address. (Canci&Erdal, 2003)

As railway transportation has an advantage to carry more than one container at a time it has been preferred more than road transportation in developed countries. In conclusion railway transportation provides below outcomes

- Friendly to the nature in recent global heating
- Will decrease the gas usage which will less Türkiye's dependence to the petrol providers
- Also this will decrease our huge petrol consumption in transportation
- Within effective railway transportation SMEs foreign trade volume will increase while their transportation costs decrease.
- Road accidents will decrease

In order to gain and sustain a competitive advantage against all the competitors in the world, the railway infrastructure should be planned effectively. It is the most important part of combined transportation.

The activity volume and speed of railway network is obvious in a port. As seaway transportation is cheaper and growing annually, it is important to provide a railway network that can best serve to the seaway cargo volume. In order to use Izmir's hinterland effectively, the

railway connection has to be constructed according to the distribution lines such as organized industrial zones and free zones.

As published on website of the ministry of transportation<sup>23</sup>, concerning Türkiye's transport activities, the use of road transportation at 94 % in 2002 has resulted in; 400.000 traffic accidents 3.000 deaths, ten thousands of injured and disable people.

Also in the website it has been published that the use of railway transport was 3%, maritime transport was 0,4%, and air transport was 2,6% in 2002. These figures has shown that a strategy should be implemented which would provide the necessary balance between transport sub-sectors by way of shifting this intense traffic of our road transport through maritime and railway transport.

In 2003, ministry of transport started bloc train administration in Türkiye. Described as an implementation which enables the freight transport activity without waiting between departure and arrival stations, significant amount of time savings have been achieved. For example, the transport duration between Soma-Erzurum has decreased from 15 days to 3 days. In addition, the amount of freight transport increased 20 %, while the revenues increased 26 %. Costs have also declined significantly.

Considered as the heart of contemporary freight transport and improving the combined transport by integrating into all transport modes, logistic villages are being constructed in Türkiye. As the first phase, the construction of 6 logistic villages are planned namely as Istanbul Halkali, Izmit Kosekoy, Kayseri Bogazkopru, Samsun Gelemen, Eskisehir and Balikesir. This projects figure that there is a need for logistics villages or dry ports emphasized in this thesis.

Aiming at providing economic and secure transport and transferring the production and raw material dispatching of fabrics, firms and organised industry zones, in co-ordination with relevant institutions/organisations, the government has launched junction lines. As a good example of this co-ordination, Adana Concrete and Manisa Organised Industry built their own junction lines. In 302 iltisak lines which were built up to now; 55% of total freight transport in 2004 and 64% of total freight transport in 2005 were performed.

Both to support door-to-door transport and combined transport and within the framework of co-operation with private sector, the construction of approximately 100 km junction lines per year is planned as published on the website of the ministry of transport. Accordingly; Private sector dynamism, competition, more qualified service, a new area of activity will be achieved in Türkiye's railways.

When we have a look at the recent developments in the Mediterranean, whose ports have been experiencing growth rates significantly higher than those of the northern range, has given rise to some conjecture that this may be producing a northern expansion of the hinterlands of Mediterranean ports. The growing competitiveness of these ports along with new services that link them with world markets are seen to offer possibilities for them to compete in markets of central European Union (EU) with their rivals, ports such as Le Havre, Antwerp, Rotterdam, Bremen and Hamburg. In order to compete with these ports, in Türkiye the hinterland connections should be linked through dry ports, as Turkish ports have congestion problems. In this respect the dry concept will be explained below.

### 3.DRY PORT

Inland terminals often called as a dry port. However, an inland terminal has to fulfil the following three conditions to obtain status as a dry port: 1)The terminal should have direct connection to a seaport either by rail or by road 2)The terminal should have a high capacity traffic mode and 3) The terminal should offer the same types of facilities as can be found in a seaport.

In order to obtain these conditions it should be possible to make the customs clearance in the dry port. In this way the goods can be made ready for overseas travel in the dry port. This way save time and money, because the goods then can be loaded directly onto the ship. When the capacity of a seaport is increased because of the extra available areas at the dry port, it can also have the positive consequence that larger ships can call the port and in this way increase the productivity.<sup>24</sup>

According to Roso (2006), with ever-increasing maritime containerized transport, and the doubling of the size of container ships, over the last ten years, efficient seaport terminals and inland access are essential for the functioning of the entire transportation chain. The rationale behind the dry port concept is that, as an advanced intermodal terminal, it can increase the use of rail by shifting freight volumes from road, consequently decreasing the amount of road traffic in seaport cities and thereby reducing the environmental impact. In addition to the general benefits to the environment and the quality of life from shifting flows from road to rail, the dry port concept above all offers seaports the possibility to increase their throughput without physical expansion at the site.

Also, for competitive intermodal transport, scheduled and reliable high-capacity transportation to and from the seaport is necessary. In addition, shippers and carriers increasingly rate seaports by their accessibility, for example the frequency of inland transport services and transit times, or because of the public's demands for more environmentally friendly transport. To benefit from the opening up of new markets, seaports need to improve their access to areas outside their traditional hinterland.

Today, seaports compete not only on tariffs and transshipment capability, but also in the quality of inland access. This competition requires seaports to focus on transport links, on the demand for services in its traditional hinterland, and on development in areas outside their immediate market. Moreover, the quality of the access to a dry port and the quality of the road-rail interface also determines the dry port's performance. Rail operators benefit from distant dry ports simply by the movement of containers from road to rail, which increases the scale of their business. From the shippers' perspective, a well-implemented distant dry port offers a greater range of logistics services in the dry port area. For environmentally conscious shippers, a dry port gives the option of using rail rather than road, thus reducing the environmental impact of their products.

A dry port is located away from a seaport, providing facility for cross-border trade in close vicinity of production/consumption in hinterland, with linkages to gateway ports. It is a common user facility, for handling and temporary storage of import/export, laden/empty containers, for clearance by customs for home consumption, warehousing, onward transit, or export. It is generally on/off-dock facility close to servicing port, helping decongest port by shifting cargo and customs-related activities are done outside the port. Also set up inland for

linkage to a regional rail-linked dry port and to gateway port(s) by road. For instance in India, only 40 dry ports are close to seaports; all others are – 137 – inland.

The vision for the dry port is to strengthen and enhance the efficiency of sustainable and environmentally transport of all cargo, by land and by sea. It has the same administrative, customs, and cargo receipt functions as a seaport, and is designed to receive containers, etc., and then to distribute cargo using various means of transport. Containers and combi-units are sent from the port on to the dry port at the transport centre. Standard procedures can be optimized so environmental impact is minimized.<sup>25</sup>

### **3.1. Advantages of the Dry Ports**

As Roso has shown in Figure 3a, conventional hinterland transport is based on numerous links by road and only a few by rail. As per Roso, the dry port concept is based on a seaport directly connected by rail to inland intermodal terminals, where shippers can leave and/or collect their goods in intermodal loading units as if directly at the seaport.

Dry ports are divided into close, mid range, and distant a seaport and all three types of dry ports are presented in Figure 3b. The main reason for implementing a distant dry port is that the distance and size of the flow make rail viable from a transport-cost perspective. Benefits from distant dry ports also derive from the modal shift from road to rail, resulting in reduced congestion at the seaport gates and seaport surroundings. Since one train in Europe can substitute 40 trucks, the external environmental effects along the route are reduced. Apart from environmental benefits, a distant dry port also brings a competitive advantage to a seaport since it expands the seaport's hinterland by offering shippers low cost and high quality services.



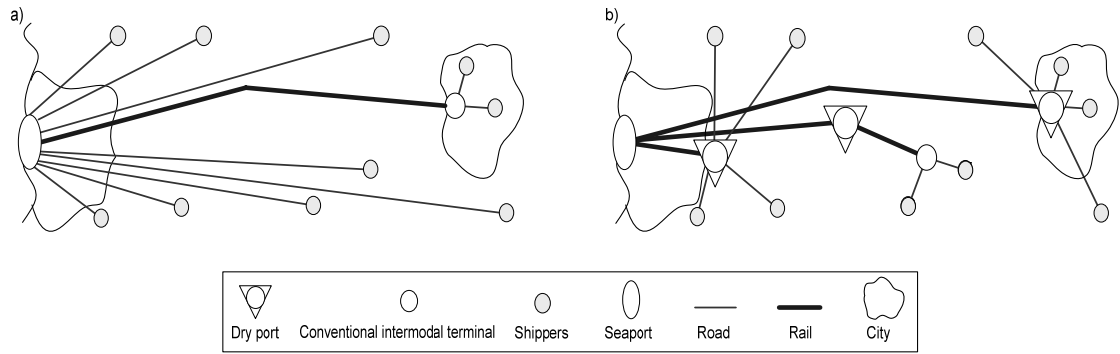


Figure 3. Comparison of a) conventional hinterland transport and b) an implemented dry port concept (close, midrange, and distant dry port)

Handling cargo containers at spacious inland facilities can cut the time freighters spend in port and speed the flow of the goods between ships and the land transportation system of trucks and trains. The idea is to move the time consuming sorting of containers inland, away from congested seaports. When a ship is delayed in port, the owner is losing money. An inland port could also speed the flow cargo between ships and major land transportation networks, which would carry goods to the rest of the country. Furthermore a modern inland port takes this process further by connecting the sea port with the inland port with high capacity canal or railway links, including customs and other services at the inland location, and make things clearer, include the words inland port in the name of the facility.

In the dry ports, large goods' flows can shift freight volumes from road to more energy efficient traffic modes that are less harmful to the environment. In addition a dry port can relieve seaport cities from some of the congestion, make goods handling more efficient and facilitate improved logistics solutions for shippers in the port's hinterland.<sup>26</sup>

Establishing dry ports would allow shippers to undertake consolidation and distribution activities as well as export/import procedures at inland locations that are at relatively short distances from factories and farms. Completing necessary documentation and procedures at these facilities could help reduce congestion and delays at border crossings and ports, thereby reducing transaction costs for exporters and importers. This is particularly important for landlocked countries, and is consistent with the objectives of the Almaty Programme of Action.

The development of a network of dry ports as load centres, also has the potential to promote traffic on railways rather than roads, which could have significant environmental benefits. This insight has been one of the major driving forces European policy makers' support of the development of dry ports. For example, Swiss and German estimates of the external costs of freight transport by road show them to be about four times higher than those of rail transport. Increasingly, energy costs have emerged as another important factor encouraging the movement towards rail transport.

Dry port helps take seaport and gateway to inland center where action is. They facilitate and promote growth inland locations, clustering of economic activities, special economic zones (SEZs), etc. It is essential that seaports and dry ports; constantly improve efficiency and productivity through entire supply chain, enhance capacity for intermodal transfers and transit, expedite programmed road and rail connectivity projects for ports.

Dry ports offer a customs station destined to handle imports and exports. Therefore, they can become an important storage and distribution centre of goods to the whole country and to the international market as well. They represent a good option for companies that need both promptness and low cost in their commercial transactions.

Reduction in transaction costs remains paramount necessity; optimize productivity through entire logistics chain – at ports, inland terminals, during transit, simplify pre-carriage, post-carriage documentation and procedures, implement EDI for full interconnectivity among different stakeholders, service providers, and regulatory authorities. The success of dry ports in this regard will be conditional upon several factors, including choosing locations that are close to existing or potential production or consumption centres, international demand for local goods, support from national governments and partnerships between local government and business.

The focus is reducing transport costs. This vision could provide a focus for the development of growth centres away from coastal areas. It creates the opportunity for the same economic stimulus seen at seaports to be harnessed to encourage economic growth at inland locations by acting as a focus for industrial manufacturing and agricultural processing. Promoting dry ports may ultimately be one of several important instruments in this respect.

While there may be some natural geographical reallocation of resources from coastal regions as manufacturers take advantage of the new inland facilities, tangible new contributions to growth could arise both directly via reduced transaction costs, particularly for exporters (leading to greater export competitiveness), and indirectly via productivity gains as producers organize their manufacturing and distribution more efficiently. Ultimately, dry ports could potentially act as “growth poles” similar to seaports, which could lead to increased employment, higher living standards and improvements in geographic income distribution. This may also have the added benefit of mitigating population migration towards coastal areas.

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One advantage of the dry ports is that the goods can be warehoused in their facilities and cleared as needed, thus postponing the payment of import duties and local taxes by the importer until the products are needed. The dry port has some benefits, such as: the reduction of operating costs and more flexibility in commercial transactions; the financing of ICMS (value-added Tax on Sales and Services), through a longer term for the payment of generated tax. If the custom clearance is done in the dry port instead of in the seaport, plenty of time can be saved. In this way the container does not have to be re-opened and controlled at the seaport, but can be transshipped to the ship right away.

### **3.2.DRY PORT SAMPLES**

As per UNESCAP's (2006) report, approximately 200 dry ports were located in Europe in 2005, providing important logistic services to industry and trade. In the United States of America, there are approximately 370 major inland container depots, and at least 200 smaller ones. Yet, in the ESCAP region less than 100 facilities exist, despite differences in geographical and population sizes, suggesting that, at first sight, Asia may be under supplied.

In Asia, much of the discrepancy may be explained by the different purposes for which dry ports have usually been constructed. In many countries, dry ports have been used primarily as a tool to relieve seaport congestion rather than to promote hinterland development. Seaport container throughput therefore is a good predictor of the number of dry ports in many Asian countries – more effective than output measures such as GDP, for example. In the ESCAP region

there is approximately one dry port per million twenty-foot equivalent unit (TEU) of containers handled at a country's seaport.

However, this does not reflect the situation across all countries in Asia. For example, in several Central Asian countries there are a number of dry ports where container handling capacity already exists, but many of these facilities are currently underused and in need of modernization. In addition, in India there is much more frequent use of Inland Container Depots (ICDs), approximately one per 140,000 TEU containers handled at seaports.

In Europe and the United States, by contrast, container throughput at seaports is a poor predictor of the number of dry ports in a country, which suggests that, particularly in Europe, both production and consumption centres are important, and that cargo moving through a European seaport typically serves several European countries rather than a single country. The size, output and density of cities (as well as logistic issues) in Europe are also considerably more important in determining the quantity and location of dry ports. For example, there is approximately one dry port for each city with an output exceeding US\$ 2.5 billion and where that city services a wider region with output typically around US\$ 30-50 billion. Where gross domestic product (GDP) and population density are very high, dry ports tend to be larger and generally located around 10,000 km<sup>2</sup> apart.

### **3.2.1. EUROPE**

In the European Union, there is considerable variation in the average size of dry ports (typically 40,000 to 1.9 million TEU throughput per year), land area (typically 30-200 hectares), number of firms (typically 25-100) and overall employment (approximately 7,000 to around 37,000 people).

Highly urbanized countries tend to have more dry ports, but of smaller size – for example in Spain there are 23 dry ports, in Belgium 9, in Switzerland 4, and Slovenia 3.

Even the smallest countries in the European Union tend to have at least one dry port. The rules governing the operation of the common market make dry port operation relatively straightforward, meaning they often service an area that crosses national borders, thereby facilitating optimal location choices without having to consider international access risks.

For historical reasons, most dry ports in Europe are located in city centers, which demands an effective and safe goods transport with a minimum of environmental strain. Simultaneously the ports of Europe demands space and facilities for loading, unloading, storage, terminals, etc. in order to ensure the keeping of high quality and growth with the growing traffic and amount of cargo in question. Traditionally extending the port areas with filling docks and dam new sea areas solves the space problem.

The increasing problem with transporting goods to and from the port through the city has together with the expensive costs of establishing new docks etc. created conditions to establish hinterland terminals or dry ports, which almost can handle all of the port related activities (including customs clearance, track and trace, storage, maintenance, registration etc). According to a research report made by the United Nations (UN), the potential development of an inland intermodal facility into a dry port can additionally lead to an increased development in the nearby area.

For instance, Dry Port Dunkerque (DPD), (see Appendix B, Picture 1), the new on-dock intermodal terminal in the Port of Dunkirk has now been commissioned, the product of an €8.2 million investment programme undertaken jointly by the Port of Dunkirk Authority (PAD), its

container terminal operator and the French rail track authority (RFF). DPD boasts four 300m tracks and two 40 tonne widespan. The tracks are due to be extended in due course, allowing DPD to hold or (un)load four 90 TEU trains simultaneously.<sup>27</sup>

Recently, in France two new intermodal rail terminals have opened. The first is in Bayonne, close to the Spanish border on the Atlantic side. It is utilised exclusively by Novatrans, which has been able to improve services, notably for northeast France (Lille) and German traffic. The second is located at Lomme, near Lille, and is used by Novatrans and CNC Transports, which have set up a common ad hoc terminal operating company, Nord-Pas-de-Calais terminal.

P&O Trans European's new multimodal logistics centre in Doncaster, UK, became fully operational in the middle of last month. The multi-user warehouse is the first in a series of P&O Trans European sites that are being established to provide new rail-road solutions in the UK.

Global chemicals distributor Brenntag AG is to invest US \$15 millions in a new Spanish logistics centre, "La Isla," in Dos Hermanas near Seville. The centre will be used to supply industrial and speciality chemicals as well as water treatment products to customers in southern Spain, the Algarve, the Canary Islands and North Africa....

The Bilbao Port Authority participates with 7% in the dry port of Azuqueca de Henares, situated in the area called the "Henares Industrial Corridor", one of the main development centres between Madrid and Guadalajara. It also participates in the Madrid dry port, in Coslada, with 11.5% and in the promotion society for starting up a dry port in Villafría, in Burgos. The greatest amount of traffic is with the Azuqueca de Henares dry port, which moves four trains a week – return trip – between this industrial estate and the Port of Bilbao.<sup>28</sup>

### 3.2.2. ASIA

Mitsui OSK Lines (MOL) has signed a letter of intent to participate in the Qianhaiwan Logistics Park project in Mawan, western Shenzhen, China. The new facilities are being developed by Shenzhen West Logistics Co, a subsidiary of Shenzhen Investment Holding Corporation (SIHC). The contenders include Maersk Group, Nigai Nitto of Japan, Atkins Spence (Sri Lanka), Concor and Central Warehousing Company (both India). Most of the bidders have applied together with a local partner. Ten terminal operators have pre-qualified to submit financial proposals for the management and operation of the Birgunj Dry Port (BDP) in Nepal, following the call for offers from the regulatory agency, the Nepal Intermodal Transport Development Board.<sup>29</sup>

The city of Manzhouli in Inner Mongolia is still China's top inland port of entry in terms of imports and exports, trade volume and the amount of tax paid to the state, a position it has held in recent years. Statistics show Manzhouli has handled 40 million tons of goods over the past 10 years, with foreign trade worth 5.1 billion US dollars, topping all the ports of entry in the country.<sup>30</sup>

Alashankou Port is also one of the dry ports of China-and expected to be the biggest inland port in China. But currently, the most important factor impacting cargo handled at Alashankou Port was transportation, so to improve the transportation, capacity of railway was the urgent problem for the Port to solve.<sup>31</sup>

Lahore Dry Port was the first Dry Port established in Pakistan, Constructed and managed by Pakistan Railways since 1973. At present, there are six Dry Ports running under the management of Pakistan Railways. Lahore Dry Port (established in 1973), Karachi Dry Port (established in



1974), Quetta Dry Port (established in 1984), Peshawar Dry Port (established in 1986), Multan Dry Port (established in 1988), Rawalpindi Dry Port (established in 1990).<sup>32</sup>

The loading and earnings of Dry Ports during the last four years were as under:

**Table 7. Loadings/Earnings of Dry Ports**

| Financial Year | Loadings(Tons) | Earnings (Rs)* |
|----------------|----------------|----------------|
| 2000-2001      | 14,936         | 224.77 Million |
| 2001-2002      | 16,788         | 252.14 Million |
| 2002-2003      | 19,144         | 307.03 Million |
| 2003-2004      | 28,376         | 453.07 Million |

**Source:** <http://pakrail.com/lhrdryport05101.asp>, 2007.08.15, 13:13

**\*Rs:** Nepalese Rupees (the currency of Nepal)

The other dry port, Sialkot Dry Port Trust (SDPT) has been established to provide doorstep facilities of custom clearance, rebate and one window operation to the exporters/importers of the region. Its strategic location, being the junction point of Sialkot, Gujrat and Gujranwala, made it the best suitable site. The unprecedented success of SDPT inspired the businessmen and exporters else where in Pakistan to establish other dry ports in the private sector. It has made tremendous progress and within few years it has proved itself as one of the busiest dry ports in the country.

Basically, it is an export oriented dry port handling 94% exports and 4% imports. Since its commissioning exports have increased by 15 times. This is evident from the fact that in the year 1986-87 it handled 7721 tons cargo with a value of Rs. 1.8 billion and a few exporters whereas, in the year 2003-2004 it handled 43,370 export consignments weighing 74,343 tons having a value of Rs.38,376 billions and involving thousand of exporters. It has generated employment

for thousand of people directly or indirectly. It also provides in house facilities free of cost to Customs, Clearing and forwarding agents, government agencies, banks and NLC.

It has established its own Bonded Transport Cell, which can undoubtedly, be ranked amongst the leading carriers of bonded goods in the private sector which has facilitated fast transportation of cargo. Last but not the least, it has facilitated the collection of voluntary fund under "Sialkot City Development Programme" from the exporters in accordance with the invoice value of their exports consignments. These funds have been utilized for widening and beautification of old roads/roundabouts and construction of drains. All these developments/renovations have transformed the entire outlook of Sialkot City.<sup>33</sup>

### **3.2.3. AFRICA**

The container terminal at City Deep is purported to be the largest "dry port" in the world, with some 60 % of cargo that arrives through the port of Durban arriving in Johannesburg. The City Deep area has been declared an IDZ (industrial development zone) by the Gauteng government, as part of the Blue IQ Project.<sup>34</sup>

Johannesburg is the commercial capital of Africa, accounting for up to 1/5th of South Africa's GDP. Johannesburg is home to the busiest airport in Africa, the largest dry port (a port not on a body of water) in the world, Africa's largest stock exchange, and the aforementioned tallest building in Africa, the 50-story, 731 foot tall Carlton Centre. <sup>35</sup>

Isaka Dry Port (see Appendix B, Picture 2) is an Inland container terminal, which acquired the dry port status since 1999. The conversion of Isaka into a dry port means that all the customs documentation may be done at Isaka instead of Dar es Salaam Port. Importers can now accomplish all the necessary documentation and take delivery of their cargo at Isaka, practically

eliminating the necessity to travel to Dar es Salaam for Port and Customs clearance. As such, Isaka provides a convenient interface for traffic to Rwanda and North Eastern Democratic Republic of Congo.

Isaka Dry Port has utilizes for assured security and safety of cargo, faster and convenient customs clearance, preferential wagon allocation, faster transit time, low transport costs, reduced demurrage charges and overall efficiency and cost-effectiveness. In order to enjoy the conveniences of Isaka Dry Port, simply indicate 'Isaka' as the 'Place of Delivery' on the 'Thru Bills of Lading' or similar 'combined transport document'.

Isaka Dry Port handles both containerized and general dry cargo. It has a holding ground of 11.04 hectares, of which 12350sq.m. is paved and can handle 13,000 TEUS per annum. In addition, there are two transit sheds with storage capacity of 7,000mt each and can handle 42583mt of loose cargo per annum. The Yard is served by two railway sidings with a capacity for 22 wagons at a time. In addition to the above, there are also private storage facilities at Isaka Dry Port. The facilities include a covered warehouse with capacity of 12,000mt. of loose cargo, an open Shed with capacity of 8000mt. of loose cargo, WFP warehouse with capacity to handle 200,000mt. of bagged cargo.

Cargo handing equipment at Isaka Dry Port includes a coles crane with lifting capacity of 35 metrictonnes, two container stackers for 20' and 40' containers, four forklifts with the following capacities: 1 Unit of 6 tones, 1 unit of 5 tones, 2 units of 3 tones each, one shunting tractor which can pull eight loaded wagons at a time, mobile workshop. Isaka Dry Port is linked to the rest of the world by telephone and fax. There is also a radio call facility. In addition, Isaka is linked to the computer network of the railtracker Advance Cargo Information System (ACIS). It is also

linked to the Internet. Customers may obtain instant location of their consignments and other information via this facility.<sup>36</sup>

### **3.2.4. AMERICA**

Several manufacturers and technology companies established in Brazil, that rely on imported components, are increasingly using dry ports (inland customs clearance posts) to cut import costs and better manage the time of delivery and production. One advantage of the dry ports is that the goods can be warehoused in their facilities and cleared as needed, thus postponing the payment of import duties and local taxes by the importer until the products are needed.

The Dry Port has some benefits, such as: the reduction of operating costs and more flexibility in commercial transactions; the financing of ICMS (value-added Tax on Sales and Services), through a longer term for the payment of generated tax. It has the customs clearance, warehousing, unloading and maintenance of containers for approximately 30% of the rates currently charged in the ports of Santos, Rio de Janeiro and Vitória, the storage of commodities in transit; the process of paperwork in 24 hours, including clearance.

The Middle-West Dry port offers additional advantages and facilities that can promote the reduction of costs and develop the competition for international business. Dry ports imported components are dispatched with greater efficiency. This guarantees timely deliveries and avoids the interruption of production caused by lack of components. The number of dry ports in Brazil has increased since 1994. Nowadays there are more than fifty in the whole country. The "Dry Port São Paulo" (see Appendix B, Picture 3), operator of one of the dry ports, said that the number of clients they serve per month is more than 700.

The São Paulo Dry Port (see Appendix B, Picture 4) is a bonded warehouse with complete infrastructure, counting on services of import and export cargos warehousing, movement, unitization and de-unitization. Located in Guarulhos, Brazil, State of São Paulo, it has an area of 1,600,000 m<sup>2</sup>, offers the highest capacity in the market, and is in a constant expansion process.<sup>37</sup>

Goiás is also one of the dry ports in Brazil which offers customs station destined to handle imports and exports. Therefore, Goiás has become an important storage and distribution center of goods to the whole country and to the international market as well. It represents the best option for companies that need both promptness and low cost in their commercial transactions.

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Also an inland customs station has been inaugurated in Brasília at the Pólo JK in Santa Maria. The aim is to reduce the cost of foreign trade and increase the trade of products from the Center-West region. The dry port will be operated by group LogServe – Logistics, Services and Administration, winner of a tender carried out by the Revenue Service in 2002. The company would invest a total of R\$9 million, of which R\$5 million will be spent on construction of the 25,000 meter customs area.

As per Rogério Rosso, secretary of the Federal District's Agency for Economic and Foreign Trade Development, the dry port would facilitate the organization of import and export consortiums. "This initiative will consolidate the Federal District as a great distributor of goods and services at the national and international level," he said. In addition, the dry-port will help reduce the high concentration of cargo at coastal ports.<sup>39</sup>

The first industrial dry port in the country, located in Betim Granbel Dry Port's operations will be subject to the inward processing relief procedure, applying the suspension system. In its

facilities, storage, exhibition, demonstration and operational tests, industrialization or maintenance and repair activities are also permitted. The final product may be exported without paying taxes, or nationalized. In the latter case, only the taxes on imported materials will be levied. Advantages for companies operating in the dry port, apart from the tax suspension, are reduction of logistics' costs and acceleration of the export process.<sup>40</sup>

### **3.2.5. AUSTRALIA**

Port Botany is a suburb in south-eastern Sydney, in the state of New South Wales, Australia. Port Botany is located 12km south east of the Sydney central business district and is in the local government area of the City of Randwick. Port Botany is a major commercial area that is serviced by road and rail networks, together with Sydney's nearby international and domestic airports. The two Container Terminal facilities are complemented by a bulk liquids facility and an adjacent bulk liquids storage and distribution complex.<sup>41</sup>

### **3.3. DRY PORT PROJECTS**

As announced by Chairman, Secretary Pakistan Railways, Ejaz Ahmad Qureshi, the government had planned the establishment of a modern dry port at Azakhel, district Nowshera. The construction on the project would start shortly. After reviewing the situation, the chairman Pakistan Railways, agreed with the proposal that till the construction of Azakhel dry port, the government should provide all kind of facilities in the existing dry port.<sup>42</sup>

In People's Daily's news that had been published on, 5th of July 2006, Associated Press of Pakistan (APP) news agency reported that the Sust dry port near Pakistan- China border would bolster bilateral commerce to new levels, the state-run. "This landmark project is poised to impart further depth and strength to Pakistan-China economic and political ties as well as help

expand Pakistan's commerce linkages with the regional countries including Central Asia states," Musharraf was quoted as saying while inaugurating the facility. The port, jointly built by Pakistan and China in the northern Pakistani border city Sust, is situated about 3,300 meters above the sea level. The dry port has the capacity to handle 40 Chinese containers a day and this would be increased to 400 containers per day in the future, according to the APP report.

Chinese economic growth has fueled demand for metals to construct bridges, buildings and cars, driving prices of iron ore and coal to records. At the same time, a dearth of investment in commodity terminals has caused bottlenecks at ports, forcing vessels to lie idle outside harbors, pushing up global shipping rates.

"If China doesn't address the shortfall in investments in dry-bulk ports, the country's economic expansion would ultimately be affected," said Neil Davies, an analyst at Drewry Shipping Consultants in London. Commodity terminals have been partly ignored as "container ports have been China's top priority because they handle high-value exports."

The China Ports and Harbor Association declined to give details of shipping delays at the country's ports when contacted by Bloomberg. New berths at Chinese ports and management improvements have helped to ease congestion, according to Macquarie Bank.<sup>43</sup>

India has been involved in developing an extensive dry port network, mostly linking interior centers with gateways, through, low cost terminals on modular pattern; increasingly rail-borne intermodal traffic, set up speedily, equipped with simple system and practices; active involvement of stakeholders-trade and industry, customs, ports, airports, shipping lines, airlines, railways, roads, customs brokers, transport operators.

As per the future estimates made by various organizations, growth of container handling at indian ports are likely to increase. Thus as an effect, the share of intermodal facilities handling the container traffic is also likely to increase in future. The existing container penetration at indian ports is 65%, which would expectedly grow beyond 80% by 2021, thus holding huge potential for intermodal facilities.

In India currently, the logistics movement of export-import (EXIM) cargo faces considerable problems due to high level of inefficiency in the management and movement of EXIM cargo in the country. The proposed dry port project is borne out of the need to improve the total logistic chain of movement of goods for domestic and international trade emanating in the northern hinterland of India. The proposed dry port shall function as an entrepôt for the landlocked states of north India for EXIM cargo being transacted with the gateway ports of western India. Since the state of Rajasthan is geographically located between these port states, and the north Indian states, a large multi-modal logistic/transfer facility in Rajasthan, makes eminent business sense and potentially cater to the requirements of north Indian region.

Demand and market assessment for the project has revealed that the proposed facility would be able to cater to about 10 percent of total EXIM traffic generated from the north Indian hinterland, and in the first year of operation would handle approximately 50,000 TEUs. The proposed facility shall have a rail link connecting the facility with the western gateway ports of India.

The major infrastructure required for moving goods from one place to another in India involve the active roles of roads, road freight industry, railways, ports & shipping all of which are either managed or regulated primarily by the government. Studies reveal that in India the total logistics costs constitute nearly 10 percent of the national GNP out of which nearly 40 percent is



due to transportation alone. In the US, the estimates show that the cost is around 6 percent of the GNP.

The location of the proposed Dry Port is strategic in terms of catering to the surplus demand of hub ICD, Tuglakabad, which is likely to reach its capacity by 2001 end, as against the growing EXIM cargo in the region. The proposed facility is located close to the National Highway - 8 on Delhi - Jaipur route. Further, introducing a rail connector, would give the Dry Port an access to the unexplored Delhi- Ahmedabad broad gauge railway line; and in due course, on implementation of National Capital Region's proposed rail link to Rewari, on Delhi-Mumbai main line also. The proposed Dry Port is well connected to the north and west India by road, and is in close proximity to the major producers of north India.

Given the nature and volume of cargo projection for the facility, and the nature of competing facilities in the northern hinterland to the proposed Dry Port, it is important to note that the facility be developed in a modular form. Since the entire facility would be a private sector led initiative, positioning of the facility becomes a critical component. The proposed facility is expected to cater to 10% of the total EXIM cargo demand of the north Indian hinterland. <sup>44</sup>

In Sweden there is also a dry port project which is handled by a Phd student, Violetta Roso. The hypothesis of the project is, a well implemented dry port concept can mean increased use of energy efficient traffic modes, less road traffic in port cities, more efficient freight handling in ports as well as more efficient logistics solutions for shippers. Because between the hub and the smaller terminals there are relatively large goods flows being concentrated and traffic modes more than trucks are needed. This is mainly concerns the railroad, but in mid-Europe shipping on interior waterways are also of interest.

The study will mainly have technologic, economic and environmental perspective and will focus on the design and implementation processes of the new transport networks to be able to identify elements important for companies planning to use similar systems. The application involves inventory and categorisation of applications in Sweden and abroad, development of the concept to other traffic modes as well as analysis of potential dry port applications. The main actors, e.g. the Port of Göteborg, Green Cargo, Rail Combi, BK Tåg and Celexor have already shown interest for this study.<sup>45</sup>

In Egypt there is a dryport project in tenth of Ramadan city. The dry port project is located at zone 6 Robbikki Road , tenth of Ramadan city on an area of 250,000 m<sup>2</sup> , east of the ( Port said - Cairo ) desert road , 55 km from Cairo and 160 km from Port said port. It serves investors of the tenth of Ramadan City, Cairo and surrounding new cities. The project also serves imported and exported shipments to and from all Egyptian ports ( port said - Damietta - Alexandria - The Red Sea )

The project area is currently established, in its first phase, on an area of 12 feddans (50,000m<sup>2</sup> ) i.e equals 1/5 th of the planned area which is 250,000 m<sup>2</sup>. The remaining area is currently under preparation in anticipation of forth coming expansions, with the view to construct numerous warehouses and yards so as to serve handling of imported and exported containers and cargo .

Dry port services are mentioned as; shipping agency services, receiving full and empty containers and storing there of in designated yards, loading empty containers with Egyptian exports in the port or transporting thereof to the factories for stuffing and transporting to all Egyptians ports and storing imports and exports in high standard warehouses. Storing general cargo in warehouses for stuffing containers, storing and release of cargo fully or partially.<sup>46</sup>

There is another dry port project in Nigeria, Africa. Isiala-Ngwa ICD, Abia State, will create up to 100,000 jobs when completed. The project site with a 50,000 TEU (containers) port facility, would serve Aba, Onitsha, Enugu, Ebonyi, Imo, Delta and Benue states. The government had earlier performed the ground breaking of Kano and Jos ICDs, otherwise known as dry ports. The government expected the Isiala-Ngwa ICD to be ready for business within 30 months.

One of the features of the port was that it would receive containerised cargo by rail from Port Harcourt. The modernisation of the railway into standard gauge had commenced from Lagos to Kano line, while that of Port Harcourt to Jos and to Maiduguri line would soon take off, with Isiala-Ngwa ICD benefiting from this. Agriculture and other export cargo will similarly be transported to the seaports also by rail. By and large, Isiala-Ngwa will serve the South-East zone, parts of South-South and North Central zones.

The purpose of setting up the dry port was to bring goods closer to the owners. The South-East as the heart of commerce of Nigeria and Aba being the focal point, and assured the minister that the state government would ensure the smooth take-off as well as the realisation of the aims and objectives of the project. The idea behind the establishment of the dry port was to save importers the trouble of traveling to the coast for their business transactions. ICD was first introduced in the country in 1979. Another ICD was established in Kaduna but that the two ICDs were plagued with several problems which led to their closure. After their demise, the managers of the Kano/Kaduna ICDs appealed to the federal government to resuscitate them and the matter was referred to the Shippers' Council, thus marking the beginning of the involvement of the Council in the promotion of ICDs as a component transport infrastructure for hinterland shippers.<sup>47</sup>

There is also a dry port project of Integrating Logistics Centre Networks in Baltic Sea Region which is financed by European Union. The main tasks were to finalise “Financial and legal aspects of ports and logistics centres networks”, “Technical and logistics aspects of ports and logistics centres networks” and the feasibility study on “The Network Operation of Hinterland Hubs (Dry Port Concept) to Improve and Modernise Ports Connections to the Hinterland and to Improve Networking”.

In the case studies questionnaires and interviews had been made. Concerning the feasibility study on hinterland terminals network operation- dry port concept- the testing of the Baltic Sea dry ports were made and prefeasibility study of dry port functions in the Baltic Sea Region has been investigated. A lot of useful information for the feasibility study was received from the questionnaires and interviews with the transport operators. The study has shown that 81,5% of the transport operators have a positive and neutral attitude towards the dry port concept in the Baltic Sea Region where 33% of them strongly agree with this idea. In common this shows that there is a basis present in the Baltic Sea Region, for developing the concept of dry ports. Furthermore this shows that only a very small percentage is against the idea of introducing the concept of dry ports.<sup>48</sup>

After dry port investigations worldwide, in this thesis a dry port in Izmir is proposed as an opportunity to decrease port congestions and logistics costs while increasing the foreign trade volume.

### 3.4. DRY PORT APPLICATION TO IZMIR

Due to the congestion of Izmir Port and its terminal, there is a need for a dry port which is near to the industrial and free trade zones. In this study, two pilot areas has been determined as logistics centers-dry ports. One is near to Izmir Ataturk Organized Industrial Zone (IAOIZ) and the other one is near to the Aegean Free Zone (AFZ).

In the dry port approach, IAOIZ's and AFZ's foreign trade volume, Izmir's logistics infrastructure (especially the railway lines) and the effect of the dry port to Izmir's foreign trade volume have been investigated.

Before analyzing foreign trade volume of the zones, some articles and publications will be mentioned. As per marble companies, domestic rail freight is as expensive as to tranship the containers to China. Therefore the marble companies request railway. Road transport of one container of commodity from Denizli to either Izmir or Mersin Port is charged for 500-550 YTL. Same commodity is arrived to China for USD 415 (606 YTL).

The representatives of marble sector mentioned that their highest cost is transportation, therefore they request railway line. Adnan Tunca, the manger of Denizli Station explained that a 20 tonned container transhipped from the centre of Denizli to Izmir Port via railway for 230 YTL. This figure shows that railway transportation is 50% cheaper than road transportation in short distances.

The chairman of Marble Operators Association Samet Tunay Gunduz requested the reengineering of current railway lines. He also added that if the railway transportation will achieved, Türkiye can be the second marble exporter in the world. Türkiye is now the fifth marble producer and exporter.<sup>49</sup>

It's obvious that the railways are not used as effectively as it had been in past. But recently, the ministry of transport design new projects. For instance in 2006, construction of Aliaga-Menemen railway lines was performed. The aim of the lines was to connect Nemrut industrial zones with Nemrut Gulf.<sup>50</sup> Another project is connection line of Kemalpaşa Organized Industrial Zone (KOIZ). The aim of the project is to connect KOIZ, which has 270 firms to current Manisa-Turgutlu and Izmir-Kemalpaşa to serve intensive freight transportation.<sup>51</sup>

As mentioned above, two areas are proposed for the dry port. One is an area near to Izmir Atatürk Organized Industrial Zone (IAOIZ) and the other is an area near to Aegean Free Zone (AFZ). Below the zones and their characteristics are mentioned.

#### **Izmir Atatürk Organized Industrial Zone (IAOIZ)**

IAOIZ (see Appendix A, Map 2) is one of the largest and most modern organized industrial zones in Türkiye. It started operating in 1990. Zone is located on the northwest of Izmir, in Cigli district. It is 25 km to city center, 35 km to Adnan Menderes Airport and 20 km to Alsancak Harbor (see Appendix A, Map 3).

Zone's total area is 7.500.000 m<sup>2</sup>. 485 factories manufacture where 30.000 people are employed. 200 companies are exporters and there are 20 companies of direct foreign investment. In 2 years' time, the number of companies in the Zone will reach about 600 and the number of employees about 50.000. The companies in the Zone are mainly active in machinery, textile, ready-made garments, food, plastics, chemicals, metal, automotive related industry, electric and electronic sectors. The annual turnover of the Zone is approximately 3 billion, the export is 1,5 billion and the import is around 700million U.S. Dollars.<sup>52</sup>

### **Aegean Free Zone (AFZ)**

AFZ (See Appendix A, Map 4) opened in 1990 and is the first production-based modern Free Zone in Türkiye. AFZ is located in Izmir—Türkiye's 3rd largest city and number 1 exporting seaport on 550 acres (220 hectares) with excellent multi-transport access to Europe and the entire region. It is 15 km to Alsancak Harbor.

AFZ is being developed and operated by ESBAS, which is majority owned by EAC International, a private sector USA company. The Zone attracts more foreign direct investment than any of the other 19 Free Zones in Türkiye and employs more than 14,000 workers (over 33% of Türkiye's total Free Zone employment).

Companies can lease ready to use factory buildings or build their own facilities on leased infrastructure-ready sites. Some of the other important benefits of the Aegean Free Zone are: a state of the art infrastructure; the availability of abundant, young, low cost labor—that is also well educated and skilled; and a variety of extremely attractive financial incentives.<sup>53</sup>

The Aegean Free Zone is currently home to 302 Companies, 14,000 workers and generates more than \$4 billion annually in international trade. It is projected on present performance that ESBAS will grow to 500 companies, 30,000 employees and an annual trade volume of over \$5 billion USD, within the next 10 years.

In addition to recent expansions by Hugo Boss, Vestel, and Akzo Nobel new companies to the Zone include Temamed (Italy), Mopisan (Türkiye) to name just a few. As the global marketplace continues to mature, The Aegean Free Zone will become, more and more, "The Place to Be" for international businesses in order for them to penetrate the world's highest potential growth

markets in Eastern Europe, Russia, the Middle East, North Africa and Central Asia. <sup>54</sup> Turkish Free Zones hit a record 23,8 billion USD in total trade in 2006. <sup>55</sup>

AFZ is the second biggest free trade zone after Istanbul Deri. AFZ was performed the trade volume of approximately 17% among other free zones in 2006. Also in first six months of 2007 AFZ achieved approximately 18% trade volume among all (see table 8).

In dry ports' selection, the foreign trade volume of the area (the cargoes to be loaded/unloaded), the proximity (both to the zones and hinterland) and the connectivity to the railway lines are taken into account. The reason is, to decrease the transportation costs of the companies and to maintain a linkage between the trade zones and hinterland of Izmir. As transportation cost of railway is lower than transportation cost of the road, road transportation thought to be used in short distances (e.g. from IAOIZ/AFZ to dry ports) and the railway will be used in longer distances (e.g. from hinterland to the dry port, from dry port to Izmir port).

Railways thought to be dominant transportation mode on land so, in dry project, the lines of the railways are important. The railway connections should be two lined. Increasing the standards and within high qualified tracks and their facilities, electrification, signalization and automation, the dry ports can be connected to the sea ports effectively.

In dry port near IAOIZ, the proximity to Aliaga Nemrut Port, Dikili and Candarli Ports are taken into account (as hinterland connection- see Appendix A-Map 5 ). Though Aliaga Nemrut still operates for bulk and petrol delivery, Candarli and Dikili are potential container ports that can be constructed and operated in near future. Also projects of ministry and transportaion are taken into consideration for future projections of dry ports.



In dry port region near to AFZ, the proximity to Adnan Menderes Airport is taken into account. In that dry port, air cargo can also be handled within railway connection between dry port and the airport. AFZ's foreign trade volume is increasing annually, which is a determinant issue in dry port selection. (see Table 8).

Table 8. ANNUAL TRADE VOLUME AS PER FREE ZONES (1000 USD \$)

| REGIONS              | 2004       | 2005       | %<br>2005-2004 | 2006       | %<br>2006-2005 | 2006 (I-VI) | 2007 (I-VI) | %<br>2007-<br>2006 |
|----------------------|------------|------------|----------------|------------|----------------|-------------|-------------|--------------------|
| IST-DERİ             | 5,891,331  | 6,591,374  | 11.9           | 6,952,940  | 5.5            | 3,414,802   | 3,060,928   | -10.4              |
| AEGEAN               | 3,241,026  | 3,766,021  | 16.2           | 4,001,498  | 6.3            | 1,999,727   | 2,155,825   | 7.8                |
| IST-AHL              | 3,723,087  | 3,454,024  | -7.2           | 3,220,486  | -6.8           | 1,516,471   | 1,675,611   | 10.5               |
| IST. TRAKYA          | 1,689,566  | 2,209,771  | 30.8           | 2,444,484  | 10.6           | 1,212,150   | 1,128,256   | -6.9               |
| MERSİN               | 2,720,016  | 2,128,181  | -21.8          | 1,884,005  | -11.5          | 882,300     | 1,127,065   | 27.7               |
| BURSA                | 2,223,382  | 2,262,270  | 1.7            | 1,933,293  | -14.5          | 1,059,704   | 836,149     | -21.1              |
| EUROPE(IST)          | 907,080    | 1,084,377  | 19.5           | 1,333,360  | 23.0           | 634,657     | 713,016     | 12.3               |
| KAYSERİ              | 297,566    | 362,405    | 21.8           | 520,142    | 43.5           | 225,589     | 316,865     | 40.5               |
| ANTALYA              | 457,498    | 505,262    | 10.4           | 550,719    | 9.0            | 275,093     | 230,095     | -16.4              |
| MENEMEN              | 309,161    | 314,865    | 1.8            | 383,072    | 21.7           | 176,287     | 216,970     | 23.1               |
| KOCAELİ              | 122,725    | 182,730    | 48.9           | 254,808    | 39.4           | 104,635     | 196,568     | 87.9               |
| SAMSUN               | 85,621     | 58,638     | -31.5          | 54,593     | -6.9           | 29,786      | 62,596      | 110.2              |
| ADANA-<br>YUMURTALIK | 70,214     | 84,885     | 20.9           | 77,110     | -9.2           | 42,054      | 52,576      | 25.0               |
| DENİZLİ              | 138,545    | 169,278    | 22.2           | 65,900     | -61.1          | 33,087      | 44,661      | 35.0               |
| GAZİANTEP            | 156,898    | 132,432    | -15.6          | 93,910     | -29.1          | 56,150      | 35,272      | -37.2              |
| TUBİTAK-MAM TEK.     | 12,341     | 14,842     | 20.3           | 30,414     | 104.9          | 11,203      | 17,266      | 54.1               |
| TRABZON              | 15,316     | 15,514     | 1.3            | 13,587     | -12.4          | 6,435       | 15,450      | 140.1              |
| RİZE                 | 38,736     | 20,824     | -46.2          | 7,955      | -61.8          | 4,174       | 4,721       | 13.1               |
| MARDİN               | 10,211     | 5,134      | -49.7          | 1,751      | -65.9          | 1,566       | 57          | -96.4              |
| E. ANATOLIA          | 82         | -          | -              | -          | -              | -           | -           | -                  |
| TOTAL                | 22,110,402 | 23,362,826 | 5.7            | 23,824,029 | 1.9740866      | 11,685,867  | 11,889,946  | 1.7                |

Source: [http://www.dtm.gov.tr/dtmadmin/upload/SB/ABliskilerDb/sb\\_hacim.xls](http://www.dtm.gov.tr/dtmadmin/upload/SB/ABliskilerDb/sb_hacim.xls)

The characteristics of the proposed dry port can be basically explained as follows. The dry port will be designed as both a closed facility (warehouse) and an outdoor container yard. Also there will be a truck terminal in the dry port. The reason for a truck terminal is to handle the cargo traffic. Because the cargoes that need to be warehoused and stuffed (which are uncontainerized) will be loaded on the trucks and transported from/to the dry port.

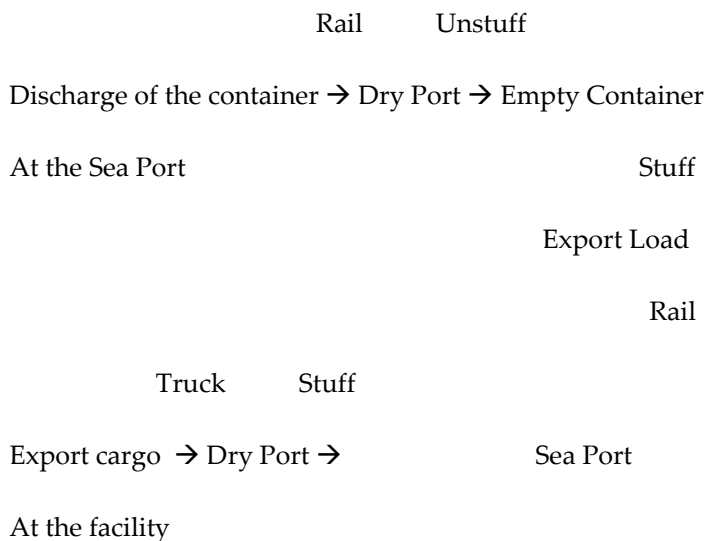
The main characteristics of the dry port will be its railway connection to free and/or industrial zones and especially to the sea port. The cargoes can be shipped to dry port both via railway network (if can be constructed) or via truck from the facilities. But the shipment via dry port to sea port designed to be made via railway due to road congestions on the way to the sea port.

Proposed dry port areas (IAOIZ and AFZ) are on the way to highways and railways. Therefore both truck and train modes can be used. Also the areas can be a good linkage between hinterland and Izmir Port. As truck transportation is 3 times higher than by rail, by effective railway usage cost of the shipper will be reduced. In order to support railway transportation, also there will be waggons, waggon fork lifts, cranes in the dry port.

The proposed dry port will be well equipped with high technology. All the IT systems will be available in the port for control. There will be a barcoding system in the entrance and the exit of the dry port. The purpose of the barcoding is stock control. For instance when a container enter to the dry port its container number will be read by the the barcode readers. The system will save the system, whether the container is empty or full when it enter to the dry port (or exit the port). This process can be made by hand terminals. Then the container will be count in stock and all the necessary informations (e.g, where to be warehoused and when it will leave the dry port etc.) will be inserted to the system. As the schedule for the container will be designed the container will be stored in the appropriate place.

Also when an uncontainerized cargo arrived to the dry port it will be sent directly to the warehouse after its informations entered to the system. This control will be made for proper arrangements. The aim of the dry port is to handle all the logistics activities. The only thing that the shippers will do is to send their cargoes and check out the period that their cargo experiencing in the dry port via cargo tracking systems.

**Figure 6:** The Process in the Dry Port



Several combinations can be made to explain the dry port traffic. For instance a container can either discharged at the sea port and arrive to dry port to be kept or unstuffed, or arrived from the facility to be warehoused and then transhipped to sea port via railway connection. As understood from the explanationse the dry port is designed both for export and import cargo handling.

In the dry port application, the main services will be transportation (rail and truck), warehousing, customer service, barcoding and also other value added services such as stuffing/unstuffing, packaging; labeling etc. Also customs clearence can be made before seaport

entrance. The aim of this application is to provide one-stop-shopping which means to provide all services from one service provider at the same time in the literature.

One important feature of the IT systems in the dry port is the intergration of e-logistics applications to the shippers e-business infrastructure(if available). In the lights of future projections the integration of e-logistics and e-business infrastructure will save time. Also this will maintain tendency in business relationship.

In the dry port all the services before loading and unloading will be given. The containers will be stuffed/unstuffed, all the custom formalities services will be given. The containers will be ready on the waggons to be loaded on the vessels or the locomotives will be ready to carry unloaded containers. This also minimize the operation time in the ports. The port will only serve to the vessel operations, the cranes only load containers to the vessels and unload containers from the vessels.

Within this application the idle waiting time of the vessels can be reduced and the port can be used much more effectively, as all the operational process will be done in the dry port. The operational process of the vessel will be reduced. Within minimizing the operational process, the cost of the ship owners will be reduced, which will in future cause frequent calls of the vessels.

In Izmir there are a few facilities near to the Alsancak port that operate for only cargo stuffing and unstuffing. The area of the facilities have capacity of approximately 1200 TEUs. 90 containers can be stuffed or unstuffed at the same time. The stuffing area is concrete. Sometimes the facilities faced with the difficulties due to their inadequate container capacity. The trucks

had to stop somewhere near to the facilities. This causes extra cost such as 'truck waiting time' freight that the customers complain to pay.

The goods arrived from Denizli, Afyon, Balıkesir, Burdur, Aydın, Antalya and Canakkale. The routes are on the way of the proposed dry port areas. Therefore, the proposed dry ports can compete with the stuffing areas, as they will be constructed on the ways that the goods pass.

The administration of the stuffing areas are not professional. The work flow at the entrance is handled by the gate staff which forward the truck drivers to the places they can stop. One of the facility that have railway connection to port can achieve cost minimization besides others.

The stuffing volumes of these facilities show that a dry port application become a need for Izmir and its hinterland. In this respect a questionnaire has been designed and the outcomes are discussed in the methodology.

#### **4. METHODOLOGY**

This field of study was restricted only to the users of Izmir Port in Türkiye. Izmir is an important trade center of Türkiye with its hinterland. Izmir Port is one of the biggest container port in Türkiye with 847,926 TEU container handling capacity in 2006. As per 2006 figures Izmir is the biggest export port of Türkiye. Its capacity increases annually and due to its terminal capacity cannot cover this increase. The main objective of this study is to explore how a proposed dry port effects to Izmir's economy.

As Izmir Port's capacity increases annually and its terminal capacity cannot cover this increase, the main objective of this study is to explore how a proposed dry port effects to Izmir's foreign trade by handling the over capacity of Izmir Port. Therefore there is a need for marketing

research to analyze whether the dry port is suitable for Izmir and has the ability to increase Izmir's foreign trade volume.

There is a need for marketing research, therefore a quantitative research method applied. A questionnaire was designed to evaluate the shippers response to the logistics costs and the dry port. With taking the speed of e-mail surveys into consideration, the questionnaires sent via e-mail to the shippers. In order to expand the sample size also personal interviews were made. Questionnaire design and gathering the e-mail address of the shippers than analyzing the data took about 4 months.

Sample size determined by applying non-probability sampling technique, as the technique depend on the personal judgment of the researcher rather than chance to select sample elements. The most appropriate non-probability for the survey is "convenience sampling" which attempts to obtain a sample of convenient elements. The selection of sampling units is left primarily to the interviewer. Often, respondents are selected because they happen to be in the right place at the right time.

Convenience sampling is the least expensive and least time consuming of all sampling techniques. The sampling units are accessible, easy to measure, and cooperative. In spite of these advantages, this form of sampling has serious limitations. Many potential sources of selection bias are present, including respondent self-selection. Convenience samples are not representative of any definable population. Hence, it is not theoretically meaningful to generalize to any population from a convenience sample, and convenience samples are not appropriate for marketing research projects involving population inferences. Convenience samples are not recommended for descriptive or casual research, but they can be used in exploratory research for generating ideas, insights, or hypotheses. Convenience samples can be used for focus groups, pretesting questionnaires or pilot studies. Even in these cases, caution should be exercised in interpreting the results.

I have prepared a questionnaire to evaluate the responds to the dry port. At the top of the questionnaire, the definition of the dry port has been made and the aim of the survey has been mentioned. The questionnaire is consist of 10 questions (See Appendix C) and the hypotheses are stated below. 5 point “agreement scale” used which of 1 “strongly disagree” and 5 “strongly agree” to evaluate the outcomes. Respondents specify their level of agreement to the statement by selecting ‘Strongly Disagree’ , ‘Disagree’ , ‘Neither Agree Nor Disagree’ , ‘Agree’ , ‘Strongly Agree’.

The data collected are “ordinal”. They have an inherent order or sequence. In responded data, the difference between agree and strongly agree is not the same as between agreeing and being undecided (neither agree nor disagree).

Consequently questionnaires were conducted to 137 shippers of leading companies in different sectors. As a result 27 %( 37 shippers) response rate was achieved. Among 37 respondents 8 shippers operate in textile, 12 in machinery and spare parts, 1 in metal, 14 in food and beverages, 3 in wooden products and furniture, 5 in marble and 1 in packing. Some of the shippers operate in more than one sector.

The transportation modes that the shippers prefer, also investigated by the questionnaire. 91% of the shippers use seaway+road transportation. Accordingly, 92% of the respondents agree on the idea that if they can be able to use railway transportation with sea way transportation their logistics cost will decrease.

The most valuable data after research result is that approximately 87% of the shippers agree about the traffic and port congestion in Izmir Port. Another significance is that approximately



80% of the shippers agree on the dry port to be near to their facility. Also about 80% of the shippers agree that the dry port can cover their all logistics needs.

The received data from the questionnaire is analyzed in the Statistical Package for Social Sciences (SPSS). Firstly descriptive statistics (See Appendix D, Table 1) has been analyzed. All mean scores are over 3, which is the neutral point. This shows that the shippers have a positive respond to the dry port questionnaire.

### **Hypothesis**

*H<sub>0</sub>*: Logistics activities do not have an important share in in total costs of the shippers.

*H<sub>1</sub>*: Logistics activities have an important share in in total costs of the shippers.

In order to analyze the hypothesis one sample test (see Appendix D Tables 2-3) for question 1 has been applied. The mean of question 1 is 4,1351 which is slightly higher than test value 3. The mean difference 1,1351. The t value is 7,287 with 36 degrees of freedom reveals a significant difference (significance 0,000). As p value (0.000) is less than 0.05 *H<sub>0</sub>* hypothesis 'rejected'. Questionnaire results show that logistics activities have an important share in total costs of the shippers.

*H<sub>2</sub>*: There is a great significance between decrease in the logistics costs and increase in foreign trade volume.

*H<sub>3</sub>*: There is no significance between logistics costs and increase in foreign trade volume.

The mean in logistics costs share in total costs is 4,1351 whereas the decrease of logistics costs will increase foreign trade volume is 3,7838. The significance analyzed in paired samples test

(see Appendix D Tables 4-5-6). As per SPSS results t value is 1,924 with 36 degrees of freedom is significant at 0,062. As the p value 0,062 is greater than  $\alpha$  value 0,05,  $H_2$  hypothesis is 'accepted' which means that the decrease in the logistics costs increase foreign trade volume.

$H_4$  : The dry port will decrease logistics costs.

$H_5$  : The dry port will not decrease logistics costs.

The mean for Q3 is 3,9459 whereas Q10 is 3,9730. The significance analyzed in paired samples test (see Appendix D, Tables 7-8-9 ). As per SPSS results t value is -0,141 with 36 degrees of freedom is significant at 0,889. As the p value 0,889 is greater than  $\alpha$  value 0,05,  $H_4$  hypothesis 'accepted' which means that the dry port will decrease logistics costs.

As per below tested hypothesis, it is obvious that logistics costs have an important share in shippers total costs and related to this result the other hypothesis proof that decrease of logistics costs will increase foreign trade volume. Consequently, the last hypothesis results show that dry port will decrease logistics costs. Here there is a relationship between hypothesis results. As above tested, decrease of logistics costs will increase foreign trade volume and accordingly we can say that the dry port will increase the foreign trade volume as analyzed that the dry port will decrease logistics costs.

## 5. CONCLUSION

Figures exhibit that the cargo volume of Izmir port increases annually and due to that fact, the congestions also increase. In the short-run, a dry port will become a must or an important need for Izmir. As per perceived trade volume in near future, Izmir Port cannot respond to the cargo traffic alone. If loading and discharging operations can be scheduled between sea port (Izmir Port) and dry port than the volume can be covered.

As per questionnaire results, the shippers respond positively to the dry port. In the shippers thought logistics activities have an important share in their total costs and they believe in decrease of the logistics costs will increase their foreign trade volume. Observations of the stuffing areas show that the shippers need an inland terminal. Because the shippers achieve decreasing their logistics costs with using these stuffing areas. This is also proof with the positive respond of the shippers to the hypothesis that the dry port will decrease the shippers logistics cost.

Also some of the investigated articles and presses support the idea of railway usage. Shippers thought that, if railway link can be constructed to the ports, the transportation costs can be minimized. Accoringly in shippers opinion their export volume will increse and Türkiye can be the dominant player of some goods (e.g. marble) by achieving low logistics costs.

When also the woldwide application of the dry ports taken into account it is obvious that the dry ports achieved increasing foreign trade volume. There are still dry port projects still under construction or discussion as the worldwide trade volume is increasing.

In the lights of all above the dry port that will be constructed in Izmir will increase the foreign trade volume as its infrastructure is sufficient for efficient dry port application. The further

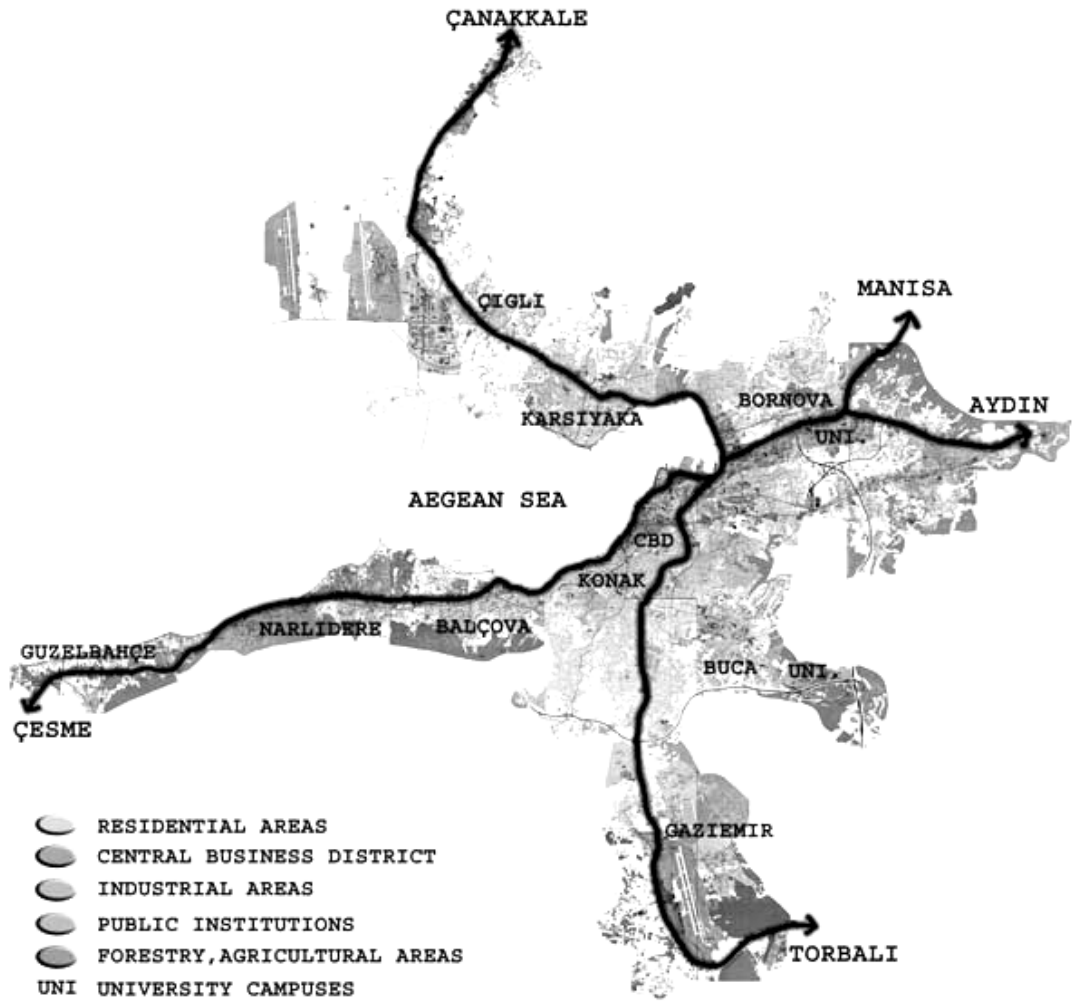
analyze can be made on investment turnover for the construction of the dry port and propose other areas for a dry port in Izmir's hinterland. Besides its benefits to the shippers the dry port will also effect positively to the economy by export and employment increase.

Consequently, Izmir has to use its logistics infrastructure as an opportunity to being a logistics center in its region. If the dry ports constructed properly and port can be used effectively Izmir can benefit competitive advantage of being a logistics city in this global arena.

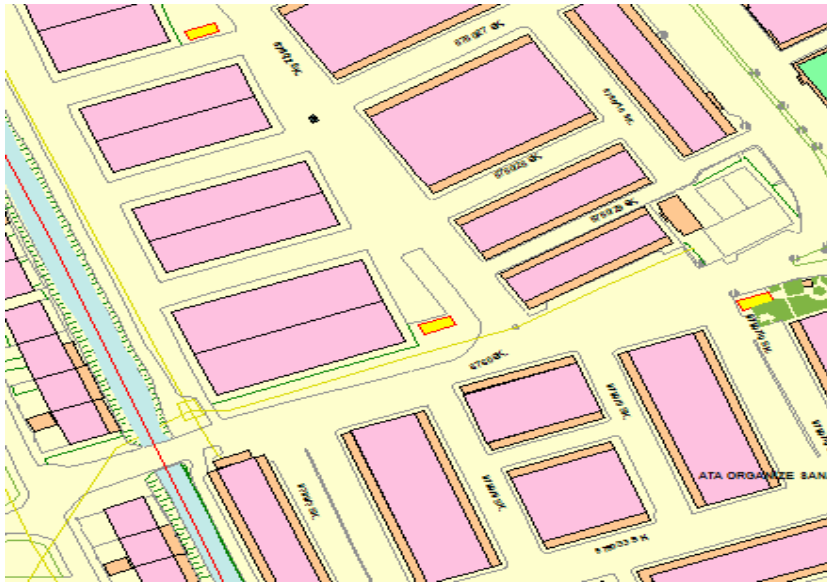
APPENDIX A

MAPS

Map 1: Land Use Pattern of Izmir

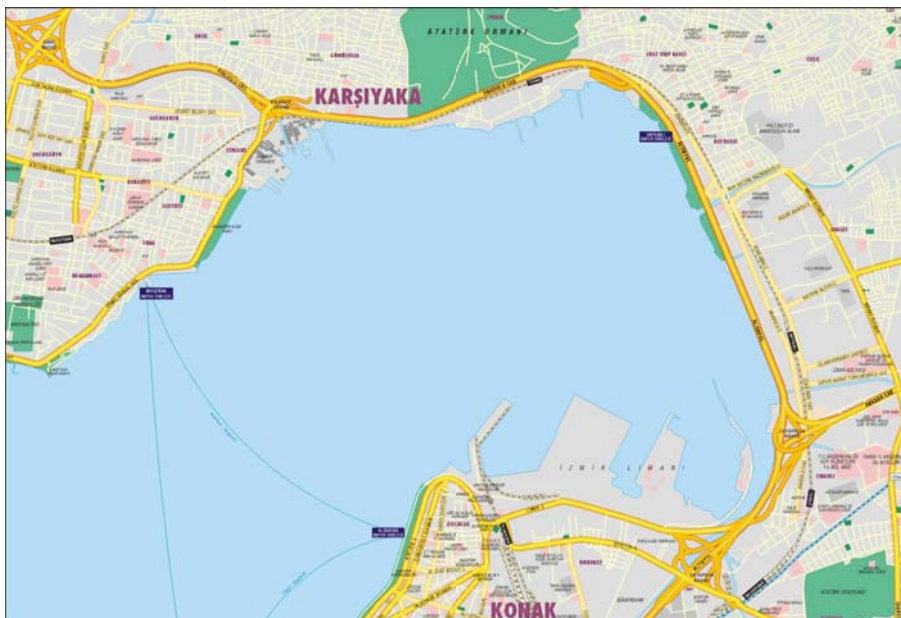


**Map 2:** Ataturk Industrial Organized Zone



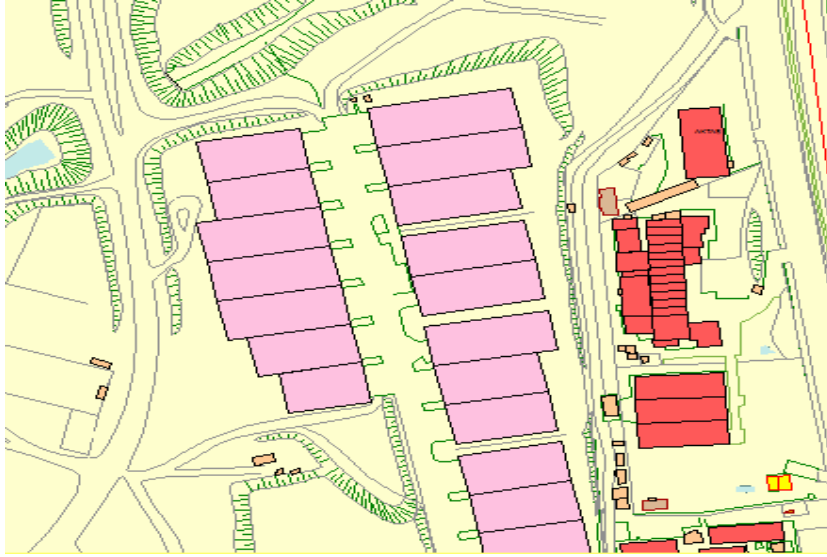
Source: [www.izmir.bel.tr](http://www.izmir.bel.tr)

**Map 3:** Ataturk Industrial Organized Zone- Izmir Port



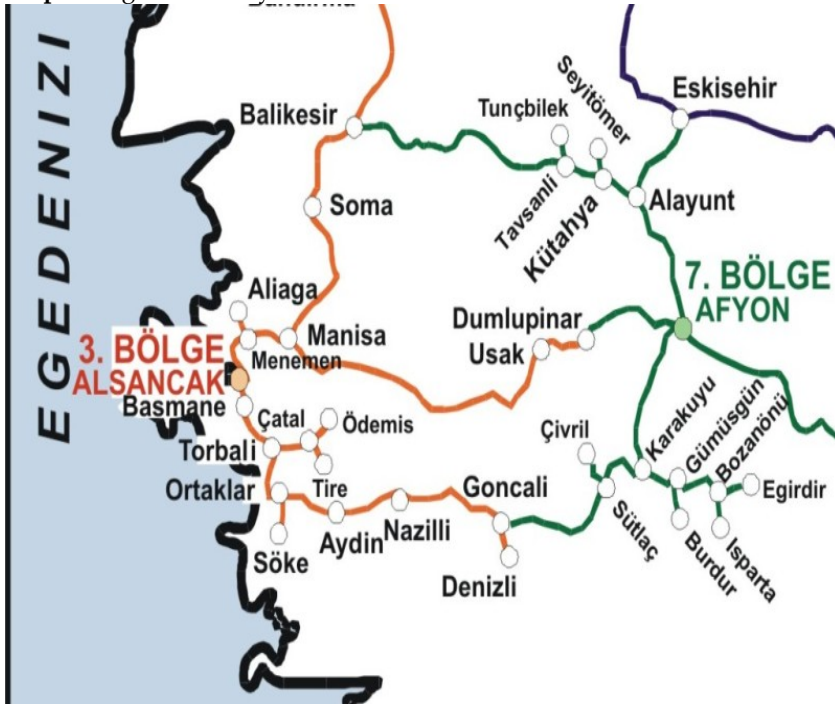
Source: <http://www.izmir.gen.tr/harita.aspx>

Map 4: Aegean Free Zone



Source: [www.izmir.bel.tr](http://www.izmir.bel.tr)

Map 5: Aegean Railway Lines



Source: <http://www.tcdd.gov.tr/genel/harita.jpg>

## APPENDIX B

### PICTURES

**Picture 1:** Dunkerque Dry Port



**Picture 2:** Isaka Dry Port



Source: <http://www.trctz.com/isakaa.htm>, 2007.08.15,13:10



**Picture 3:** Dry Port São Paulo



**Source:** <http://www.dryport.com.br/eng/index.php>, 2007.03.25, 11:06

**Picture 4:** Warehouse in Dry Port São Paulo



**Source:** <http://www.dryport.com.br/eng/index.php>, 2007.03.25, 11:06

## APPENDIX C

### Dry Port Questionnaire

A dry port project has been designed as an alternative solution to port congestion in Izmir Port. Briefly, a dry port is an inland terminal far away from the sea port but linked via railway to the sea port. Logistics activities such as customs, stuffing, warehousing etc is available in the dry port. Below questionnaire is designed in order to evaluate the efficiency of the dry port.

#### Sector

- Foods and beverages and tobacco
- Textile and textile products, leather
- Marble, stones
- Machinery, spare parts
- Wooden products, furniture, chemical material

#### STATEMENTS

|    |   | 1 | 2 | 3 | 4 | 5 |
|----|---|---|---|---|---|---|
| 1  | Logistics activities (transportation, warehousing, etc.) have an important share in my total costs.   |   |   |   |   |   |
| 2  | Decrease of logistics costs will increase my export/import volume.  |   |   |   |   |   |
| 3  | Obtaining logistics services from one provider either saves time or maintain cost advantage.  |   |   |   |   |   |
| 4  | I use seaway+truck as transportation modes.   |   |   |   |   |   |
| 5  | Using seaway+rail as a transportation mode decreases my transportation costs.   |   |   |   |   |   |
| 6  | In spite of time advantage of truck on long distances, railway has cost advantage and is more friendly to the environment.                              |   |   |   |   |   |
| 7  | The dry port should be near to my facility.   |   |   |   |   |   |
| 8  | Scheduled to load system that enables my cargo loaded on train to be shipped to the sea port from dry port via rail, provides cost and time advantages. |   |   |   |   |   |
| 9  | I have faced with traffic and port congestions while I was loading my cargo through Alsancak Port.  |   |   |   |   |   |
| 10 | The dry port respond to my logistics need as it can provide all logistics activities at the same time.  |   |   |   |   |   |

APPENDIX D

SPSS RESULTS

Table 1: Descriptive Statistics

|                    | N  | Minimum | Maximum | Mean   | Std. Deviation |
|--------------------|----|---------|---------|--------|----------------|
| Q1                 | 37 | 1,00    | 5,00    | 4,1351 | ,94757         |
| Q2                 | 37 | 1,00    | 5,00    | 3,7838 | 1,18169        |
| Q3                 | 37 | 1,00    | 5,00    | 3,9459 | 1,05267        |
| Q4                 | 37 | 1,00    | 5,00    | 4,2703 | ,87078         |
| Q5                 | 37 | ,00     | 5,00    | 3,7297 | 1,28341        |
| Q6                 | 37 | 2,00    | 5,00    | 3,9189 | ,89376         |
| Q7                 | 37 | ,00     | 5,00    | 4,0270 | 1,16634        |
| Q8                 | 37 | ,00     | 5,00    | 3,9730 | 1,23573        |
| Q9                 | 37 | 1,00    | 5,00    | 4,3243 | 1,08151        |
| Q10                | 37 | ,00     | 5,00    | 3,9730 | 1,04047        |
| Valid N (listwise) | 37 |         |         |        |                |

Table 2: One-Sample Statistics

|    | N  | Mean   | Std. Deviation | Std. Error Mean |
|----|----|--------|----------------|-----------------|
| Q1 | 37 | 4,1351 | ,94757         | ,15578          |

Table 3: One-Sample Test

|    | Test Value = 3 |    |                 |                 |   |        |
|----|----------------|----|-----------------|-----------------|---|--------|
|    | t              | df | Sig. (2-tailed) | Mean Difference | 95% Confidence Interval of the Difference |        |
|    |                |    |                 |                 | Lower                                     | Upper  |
| Q1 | 7,287          | 36 | ,000            | 1,1351          | ,8192                                     | 1,4511 |

**Table 4: Paired Samples Statistics**

|        |    | Mean   | N  | Std. Deviation | Std. Error Mean |
|--------|----|--------|----|----------------|-----------------|
| Pair 1 | Q1 | 4,1351 | 37 | ,94757         | ,15578          |
|        | Q2 | 3,7838 | 37 | 1,18169        | ,19427          |

**Table 5: Paired Samples Correlations**

|        |         | N  | Correlation | Sig. |
|--------|---------|----|-------------|------|
| Pair 1 | Q1 & Q2 | 37 | ,473        | ,003 |

**Table 6: Paired Samples Test**

|        |         | Paired Differences |                |                 |   | t     | df    | Sig. (2-tailed) |      |
|--------|---------|--------------------|----------------|-----------------|---|-------|-------|-----------------|------|
|        |         | Mean               | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference |       |       |                 |      |
|        |         |                    |                |                 | Lower                                     | Upper |       |                 |      |
| Pair 1 | Q1 – Q2 | ,3514              | 1,11096        | ,18264          | -,0191                                    | ,7218 | 1,924 | 36              | ,062 |

**Table 7: Paired Samples Statistics**

|        |     | Mean   | N  | Std. Deviation | Std. Error Mean |
|--------|-----|--------|----|----------------|-----------------|
| Pair 1 | Q3  | 3,9459 | 37 | 1,05267        | ,17306          |
|        | Q10 | 3,9730 | 37 | 1,04047        | ,17105          |

**Table 8: Paired Samples Correlations**

|        |          | N  | Correlation | Sig. |
|--------|----------|----|-------------|------|
| Pair 1 | Q3 & Q10 | 37 | ,379        | ,021 |

**Table 9: Paired Samples Test**

|        |          | Paired Differences |                |                 |   |       | t     | df | Sig. (2-tailed) |
|--------|----------|--------------------|----------------|-----------------|---|-------|-------|----|-----------------|
|        |          | Mean               | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference |       |       |    |                 |
|        |          |                    |                |                 | Lower                                     | Upper |       |    |                 |
| Pair 1 | Q3 – Q10 | -,0270             | 1,16634        | ,19175          | -,4159                                    | ,3619 | -,141 | 36 | ,889            |

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