NO.

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
GENERAL DIRECTORATE OF RAILWAYS, PORTS AND AIRPORTS CONSTRUCTION
MINISTRY OF TRANSPORT AND COMMUNICATION (DLH)

FINAL REPORT FOR THE STUDY ON THE NATIONWIDE PORT DEVELOPMENT MASTER PLAN IN THE REPUBLIC OF TURKEY (ULIMAP)

MAINREPORT VOLUME II

August 2000

THE OVERSEAS COASTAL AREA DEVELOPMENT
INSTITUTE OF JAPAN (OCDI)

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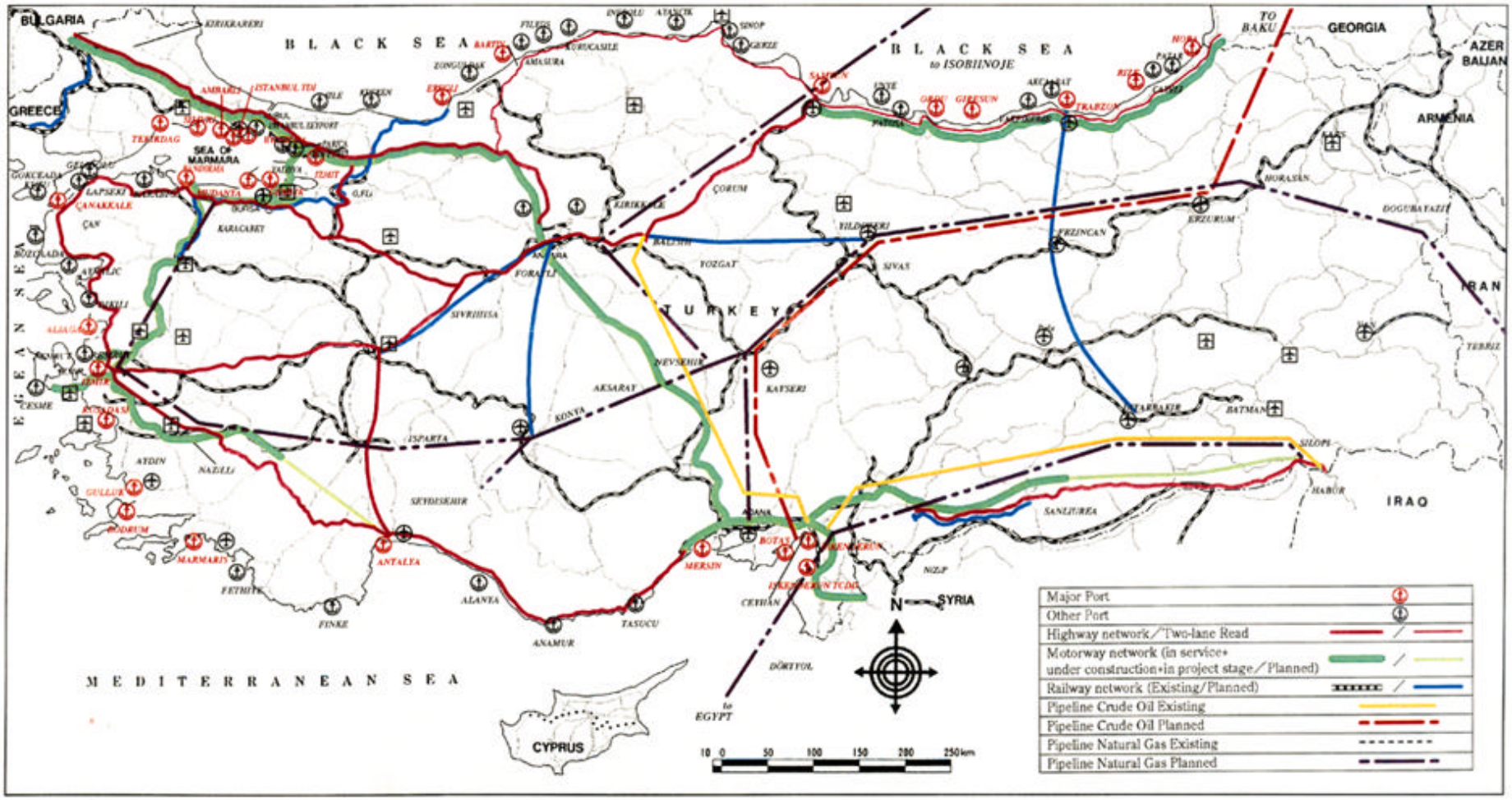
Location Map of Turkish Ports and the Surrounding countries

Source: Lloyd's Maritime Atlas of World Ports and Shipping Places



Turkish Ports and Transport Network

PREFACE

In response to a request from the Government of the Republic of Turkey, the Government of Japan decided to conduct a study on Nationwide Port Development Master Plan and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team headed by Mr. Yukio Nishida of the Overseas Coastal Area Development Institute of Japan (OCDI) to Turkey, three times between July 1999 and May 2000.

The team held discussions with the officials concerned of the Government of Turkey and conducted field surveys at the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to this project and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of Turkey for their close cooperation extended to theTeam.

August 2000

Kimio Fujita
President
Japan International Cooperation Agency

LETTER OF TRANSMITTAL

August 2000

Mr. Kimio Fujita
President
Japan International Cooperation Agency

Dear Mr. Fujita:

It is my great pleasure to submit herewith the Final Report of the Study on the Nationwide Port Development Master Plan in the Republic of Turkey.

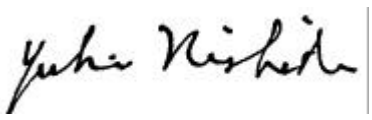
The study team of the Overseas Coastal Area Development Institute of Japan (OCDI) conducted surveys in the Republic of Turkey over the period between July 1999 and June 2000 as per the contract with the Japan International Cooperation Agency.

The findings of this study, which are compiled in this report, were fully discussed with the officials of the Ministry of Transport of the Turkish Government and other authorities concerned to formulate the Nationwide Port Development Master Plan in the Republic of Turkey for the period up to the year 2020.

On behalf of the study team, I would like to express my heartfelt appreciation to the Government of the Republic of Turkey, the Ministry of Transport and other authorities concerned for their diligent cooperation and assistance and for the heartfelt hospitality which they extended to the study team during our stay in the Republic of Turkey.

I am also greatly indebted to the Japan International Cooperation Agency, the Ministry of Foreign Affairs, the Ministry of Transport and the Embassy of Japan in Turkey for giving us valuable suggestions and assistance during the preparation of this report.

Yours faithfully,



Yukio Nishida
Team Leader for the Study
on Nationwide Port Development
Master Plan in the Republic of Turkey

ABBREVIATION LIST

A	AADT	Annual Average Daily Traffic
	AGV	Automated Guide Vehicle
B	BEC	Black Sea Economic Cooperation
	BOT	Build-Operate-Transfer Method
	BOTAS	Boru Hatlari Ire Perrol Tasima A.S. (Petroleum Pipeline Corporation)
	BSEC	Black Sea Economic Cooperation
C	CFS	Container Freight Station
	CIS	Commonwealth of Independent States
D	DHMI	State Airports Enterprises
	DLH	The General Directorate for Construction of Railways, Ports and Airports
	DOKAP	Eastern Black Sea Regional Development Plan
	DWT	Dead Weight Ton
E	EC	European Countries
	ECO	Economic Cooperation Organization
	EDI	Electronic Data Interchange
	EFTA	European Free Trade Association
	EIA	Environmental Impact Assessment
	E-Road	International European Road
	EU	European Union
F	FTZ	Free Trade Zone
G	GAP	South-eastern Anatolia Project
	G.C.	Gantry Crane
	GDH	General Directorate of Highway
	GDP	Gross Domestic Product
	GNP	Gross National Products
	GPS	Global Positioning System
	GRDP	Regional Gross Domestic Product
	GT	Gross Tone
H	HSR	High Specification Road
I	IMF	International Monetary Fund
	IT	Information Technology

L	LNG	Liquefied Natural Gas
	LPA	Local Port Authority
	LSR	Low Specification of Road
M	MAINS	The Maritime Information System (Singapore)
	MISC	Malaysia International Shipping Company
	MOT	Ministry of Transport
	MSR	Medium Specification of Road
N	NYK	Nippon Yusen Line
O	OECD	Organization for Economic Cooperation Development
	OHBC	Over Head Bridge Crane
	OIC	Organization of the Islamic Conference
	OIZ	Organized Industrial Zone
P	PA	Privatization Administration
	PHC	Privatization High Council
	PHS	Personal Handy phone System
	PMB	Port Management Body
	PMUMA	Prime Ministry Undersecretariat for Maritime Affairs
	P&O Ned	P&O Nedloyd
	PPA	Private Port Authority
	PPP	Purchasing Power Parity
	PSA	Port of Singapore Authority
Q	QGC	Quay Gantry Crane
R	RMG	Rail Mounted Gantry Crane
	Ro-Ro	Role-on Role-off
	RTG	Rubber Tire Gantry
S	SIS	State Institute of Statistics
	SPO	State Planning Organization
	SSIE	Small Scale Industrial Estates
T	TCDD	Turkish State Railways
	TDI. Inc. Co.	Turkish Maritime Operations Incorporated Company
	TEM	The North-South European Highway Project
	TEU	Twenty Foot Equivalent Unit
	TDB	Trade Development Board (Singapore)
	TL	Turkish Lira
	TPA	Turkish Port Authority
	TPAO	Turkish Petroleum Cooperation
	TTH	Trans-Turkish Highway

U	UASC	United Arab Shipping Company
	UN	United Kingdom
	UNCTAD	The United Nations Conference on Trade & Development
	UN/EDIFACT	United Nations Electronic Data Interchange for Administration, Commerce & Transport
	USA	United State of America
	USSR	Union of Soviet Socialist Republics
W	WTO	World Trade Organization

CONTENTS

Appendix for Chapter 10

LIST OF TABLES

PART2 Port Development Strategy

LIST OF FIGURES

PART2 Port Development Strategy

LIST OF TABLES IN APPENDICES

PART2 Port Development Strategy

LIST OF FIGURES IN APPENDICES

PART2 Port Development Strategy

PART 2

PORT DEVELOPMENT STRATEGY

Chapter 1 Introduction

1.1 Study Background

(1) The Republic of Turkey, which is encircled by the Black Sea, Marmara Sea, Aegean Sea and Mediterranean Sea, is located at a crossroads of the trade between Asia and Europe having borders with Greece, Bulgaria, Georgia, Armenia, Iran, Iraq and Syria. There are approximately 400 coastal facilities stretching along its coastal line of around 8,300 kilometers.

International cargo volume through Turkish ports has been increasing while domestic cargo volume has been decreasing. Cargo handling volume through the ports reached 155 million tons including container cargo of 1,347 thousand TEUs in 1998.

A cargo is being handled at small-scale ports that are managed and maintained by different bodies. Consequently, those ports are suffering from inefficient cargo handling operations due to various problems such as space constraint, deteriorated facilities and a lack of modernized operation systems. Thus, the ports are required to be developed to solve the present sufferings and meet the increasing demand for the future.

In addition, correcting the imbalance in regional development is one of the foremost social reforms targeted in the 7th Five-year Development Plan. Therefore, regional development plan related to the port development has to be taken into consideration.

(2) Considering the situation mentioned above, the Government of the Republic of Turkey (hereinafter referred to as 'GOT') requested the Government of Japan (hereinafter referred to as 'GOJ') to conduct a study for formulating a nationwide port development master plan (hereinafter referred to as 'the Study'). The scope of work for the Study was agreed upon between the General Directorate of Railways, Ports and Airports Construction, Ministry of Transport (DLH) of GOT and the Japan International Cooperation Agency (JICA), an official technical cooperation agency of GOJ.

1.2 Objectives of the Study

The objectives of the Study are as follows:

(1) To formulate the basic policies on port infrastructure development and port management and operation.

(2) To formulate the Nationwide Port Development Master Plan (ULIMAP) in Turkey, targeted toward the year 2020 including;
   1) long term improvement plan of port facilities (Nationwide/Regional)
   2) phased plan in selected strategic ports
   3) public investment plan
   4) port management and operation plan

(3) To strengthen institutional capacity of relevant organizations.

Chapter 2 Basic Understanding of the Study (ULIMAP)

2.1 Ultimate Objective and Expected Function of ULIMAP

(1) To provide DLH and other related organizations with a well-prepared nationwide master plan of port infrastructure development and port management for future development of the country including local area.

(2) To be a basic proposal for the official port development policy, which is to be established through positive discussions and coordination among the ministries and organizations concerned under the concept of overall transport policies of the country.

2.2 Basic Understanding on the Nature of Recommendations of ULIMAP

(1) The Study proposes the most appropriate policies and strategies after scrutinizing the existing available data and information. These policies and strategies might include ones, which would not necessarily be agreed by some organizations concerned.

(2) Considering the above mentioned objective and function of the Study, policies and strategies to be proposed in the Study should not be considered as the final conclusion of the port development policy. Therefore they are considered as the initial materials and recommendations to be discussed toward the official decision by the Government of Turkey.

2.3 Basic External/ Internal Conditions to be applied to ULIMAP

Under the Study framework agreed upon, detailed and thorough analyses on the basic conditions of the Study* can not be expected. In this sense, such preconditions of the Study should be assumed on a priori basis through discussions, rather than on the basis of broad and deep analyses on the subjects. This means that such general and basic situations are to be assumed as the background of the Study by selecting a likely scenario.

*(ex. international political position of the country, multi or bilateral relationship among/between the countries concerned, basic structure of political, institutional or cultural system of the country, etc.)

2.4 Efficient Implementation of ULIMAP

For securing effective use of available resources (term, staff input, budget and supports) given to the Study;

(1) Step-wised decision/agreement making system should be introduced through the course of the Study.

(2) The number of alternative cases to be developed and examined in the Study should be limited as much as possible.

(3) Discussions on major issues would be held timely and frequently. The Study Team submits a basic idea and related results of analyses to the meeting, which consists of DLH, the Study Team and organization related to the subjects. DLH makes the arrangement for the discussion.

2.5 Flexibility of ULIMAP

(1) The Master Plan should be reviewed timely against possible future contingencies.

(2) Therefore methods and components of the Study should be designed to secure easy modification of the Master Plan in future.

2.6 Control Factors of the Quality of ULIMAP Recommendations

It is important to know that the quality of proposals and reliability of forecasting works are substantially controlled by the input data and information available for the Study. In this context, approaching manner to the Study including forecasting methodology should be selected carefully considering the quality of available data and information.

2.7 Contents and Coverage of ULIMAP

(1) The Study describes the desirable future framework on port infrastructure development, port management and operation mainly from the viewpoint of port sector. Therefore one hundred percent coherency with the existing long-term development plans of other transport infrastructure may not be pursued in some occasions. The existing long-term development plans of other transport infrastructure, however, will be effectively taken into consideration in the sequence of the Study.

(2) In order to avoid any possible misunderstanding on the meaning of “port master plan”, it should be noted that the Study does not cover any detailed physical facility plans and engineering designs of the existing individual ports and new ports including expansion and rehabilitation of these ports. Instead, the Study analyzes overall port hierarchy in Turkey and approximate total development cost.

2.8 Consideration on ongoing Port Development Projects

As a basic condition of the Study, it is assumed that the various ongoing port related projects would be completed as originally scheduled. But the Team will be free to recommend the modification or rescheduling of any identified project, following the discussion between DLH and related agencies.

Chapter 3 Analysis of Future Trends Related to Port Development

3.1 Global Currents

In line with technological advances in electronics, communication, information etc, “globalization” is progressing in every field from manufacturing and services to agriculture and energy. People of the world have come to grasp the developing phenomena on real time, and they fairly perceive the global standards of property, services that they seek, or the roles of government. Consequently global currents have gained universality, and it has now become a primary factor to determine how the world of twenty-first century should be.

Globalization issues related to the future of port administration and development are introduced below:

3.1.1 Emergence of Global Competitive Society

Since the end of World War II, activities of private enterprises have expanded to areas beyond their home countries. Globalization means that competition is spreading around the globe. We are now entering an extremely difficult era, where only those enterprises that can afford to offer goods and services which meet global standards, or at even higher qualities, can hope to survive. If it is considered that each country depends on the activities of the people and various private enterprises, it could be said that the existence and development of each country itself has also entered the era of global competition. In the twenty-first century, the move towards globalization will unabatedly continue.

3.1.2 Changing Roles of the Public and Private Responsibilities

In the past, throughout the world, provisions of services that are indispensable for the well-being of citizens were completely responsibility of public organizations. Capability of the private sector, however, is being improved rapidly, and privatization, particularly in the fields of communication and transportation, is moving forward due to the outstanding improvement of the infrastructure. It is also the global current of the times that the private sector expands its area of activities in accordance with increasing capability.

The roles of public sector is also changing from that of providing services itself directly to that of establishing a propitious condition for the private sector to provide services. In the United States, which has historically promoted privatization, the central government has been fulfilling its duties by means of establishing a propitious condition for smooth operation of private sector activities. In the global sense as well, the public organization’s role of providing fields where the private sector could operate smoothly is not expected to undergo any changes.

3.1.3 Growing Awareness of the Scarcity of World's Natural Resources

In the past, many countries, such as the developed countries, wasted the natural resources and energy as if they were infinite. The energy crisis and the explosion of population growth, however, made people aware, for the first time, of the fact that the natural resources and energy available on earth are indeed limited. It is expected that global population will increase rapidly and the countries with plenty of natural resources will strengthen the effective policies to keep the natural resources in their hands. In this context, stable inflow of energy and natural resources will be one of the most important issues of each government in the twenty-first century.

3.1.4 Growing Awareness of Environmental Problems

People are becoming aware of such environmental problems as the deterioration of the surrounding natural environment, global warming or destruction of the ozone layer. The environment is not just a local problem but one of global concern. Some environmental issues may dominate the future of mankind. People's awareness of environmental problems is becoming more and more deep.

3.2 Basic Direction of Nationwide and Regional Development

3.2.1 Socio-Economic Characteristics of the Country

(1) Economic Situation

1) It is clearly observed that there exists great and wide disparity between the east and west in terms of GDP per capita distribution among the 80 provinces. When we compare the richest province of Kocaeli in the Marmara Region to the poorest one of Agri in the East Anatolia Region, the difference in GDP per capita is more than ten times.(See Figure 3.2.1)

2) Those Regions which face the Marmara Sea, the Aegean Sea and the Mediterranean Sea stand as economically advanced regions, while among the eastern regions, the Black Sea coastal areas show relatively higher GDP per capita than the inland areas. It is obvious that sea and port have a noticeable effect on the economic growth due to the fact that the coastal areas possess a great advantage in development through exchange with the outer world. On the other hand, the inland areas have far less access to the outer world; in addition, many of the neighboring countries remain unstable.

3) In terms of GDP by kind of economic activity, namely; agricultural, industrial and services sectors, the following can be pointed out.
   a) In the agricultural sector, there are several provinces that show high degree of production even in the eastern part of Turkey. (See Figure 3.2.2 & Table A.3.1)
   b) In the industrial sector, it is observed that a few advanced provinces converge at the western part of the country. (See Figure 3.2.3 & Table A.3.1)

c) When we see the share of agricultural and industrial sectors in each province, it can be said that industry oriented provinces, which are very few, are concentrated just in and around Marmara Region, while agriculture oriented areas cover a broader part of the country from the west to the east. (See Figure 3.2.4, 3.2.5 & Table A.3.2)

4) It is obvious that annual trade volume of Free Trade Zones is increasing rapidly. In fact, annual trade volume reached approximately 3.5 times last five years while the number of Free Trade Zones increased from 5 zones to 12 zones. Among these zones, Mersin, Aegean, Istanbul-Ataturk Airport and Istanbul are major Free Trade Zones. These zones have an advantage of vicinity to main transport facilities and large market. The activities of Free Trade Zone can contibute to ensure the sustainable nationwide/ regional development.

(2) Population

1) With regard to population, two features are seen. One is that there are three large Provinces with populations exceeding three million, namely; Istanbul, Ankara and Izmir. The other is that difference between the east and west can again be observed, although the difference is not so large compared with the case of economic disparity. (See Figure 3.2.6)

2) Comparatively speaking, the coastal areas are more densely populated than the inland areas. (See Figure 3.2.7)

(3) Transport (See Figure 3.2.8)

1) Road
Total length of highways reached 31,345 km in the early part of 1999, while that of motorways stood at 1,726 km.

2) Railway
The railway was extended up to 10,500 km at the end of 1997. Although there is a plan to extend the railway by 2,700 km, no new investment has been made.

3) Pipeline
Lengths of crude oil and natural gas pipelines are shown respectively as follows.

<u>Crude Oil</u>	
Iraq-Turkey	1,297km
Ceyhan-Kirikkale	448km
Batman-Dortyol	511km (Total 2,256km)
(Baku-Ceyhan Route	about 1,700km (Completion is expected in 2004))
<u>Natural Gas</u>	
Russian Federation-Turkey	842km

Izmit-Kdz. Eregli 209km
Burusa-Can Natural 208km (Total 1,259km)

3.2.2 Development Objectives

(1) Sustainable development of national economy

According to the SPO's projection, the GNP per capita in 2020 will range from US$ 6,400 to US$ 9,600 in 1992 prices, while the one in 1998 stood at US$ 3,160. The average annual growth rate between 2000 and 2020 will range between 4.7% and 5.9%.

(2) Regional balance

'Achieving regional balance' is one of the basic structural reform projects under the 7th Five-year Development Plan. The main objective of regional development is 'to achieve economically, socially, culturally and politically coherent development that would contribute to the strengthening of national unity.' The policy to realize regional balanced development and to reduce regional disparity will be pursued through the years to come.

3.2.3 Development Strategies

(1) From the viewpoint of making full use of national resources and securing sustainable development as a whole and regional balance as well, function of sea and port to promote economic development should be utilized to the maximum extent.

(2) Considering the limited accessibility of the inland areas to the neighboring regions and/or countries, exchange functions should be strengthened through a transport network development.

(3) An agglomeration or concentration of economic activities which derive from masses of people, production activities, transport infrastructure and so on, can be referred as an 'Axis of national land development'. The concept of the 'axis' should be introduced to this Master Plan Study. Judging from the fact that there are no comprehensive and multiple purpose land development plans in Turkey yet, the future 'axis' to be developed as well as the existing ones will serve as models to secure sustainable development of national land.

(4) Basic concept of "National Land Development Axis" is mentioned above. The "National Land Development Axes" are classified into two categories. One is existing and the other is desirable. According to the basic idea of "National Land Development Axis", the existing Axes are derived from Fig. 3.2.1, Fig. 3.2,6 and Fig. 3.2.8 of this Chapter 3. Consequently, Axis No.1 to Axis No.5 are existing ones. Characteristics of these Axes are shown in the Table 3.2.1.

The second paragraph of section 3.2.1 stresses that significant role which ports play in regional development and that sufficient transport systems that connect inland areas to coastal areas are necessary to secure sustainable regional development. Taking these facts into consideration, the desirable Axes are derived from Fig. 3.2.1, Fig. 3.2,6 and Fig. 3.2.8. Consequently, Axis No.6 to Axis No.9 are desirable ones. Characteristics of these Axes are also shown in Table 3.2.1.
Proposed 'axes' and their expected roles are as follows. (See Figure 3.2.9)

1) Europe-Asia Corridor Axis (Marmara - Ankara - Mersin Axis)
   As there is already a large degree of economic activity here, the axis will continue to be the driving force of the national economy. Further development of social overhead capital would be needed to cope with increased economic activities and environmental aspects.

2) Aegean –Black Sea Corridor Axis (Izmir - Ankara - Samsun Axis)
   The Axis has great development potential due to its proximity to the existing large municipalities. To realize this potential, further social overhead capital should be provided.

3) Aegean Sea Axis, and
4) Mediterranean Sea Axis
   As with the Marmara - Ankara - Mersin Axis, the two Axes are expected to play a leading role in stimulating the national economy. Taking advantage of their strategic location, the Axes are required to become more accessible to the outer world, especially to Europe and Asia.

5) Black Sea Axis
   The Axis is expected to develop close ties with Eastern Europe and the CIS countries and to guide economic progress of hinterlands in the inland areas. For this purpose, more social overhead capital is required.

6) GAP Axis (Southeast Anatolia Axis)
   As the huge-scale regional development project (GAP) is now underway, the Axis has tremendous potential since not only productivity in the region but access to neighboring areas will be increased. Transport network connected to the Mediterranean Sea and the Black Sea should be promoted.

7) Central Anatolia-East Anatolia Corridor Axis
   The Axis connects between the advanced region and less developed region. Accessibility to Ankara Municipality is required to be improved so that exchange among neighboring provinces could be promoted.

8) Black Sea-Southeast Anatolia Corridor Axis

Connecting between the central part of the East Anatolia Region and the Black Sea coastal areas (Trabzon etc.), the Axis is expected to develop international exchange through the Black Sea.

9) East Anatolia Frontier Sub-axis

This Axis connects the least developed areas and the Black Sea coastal areas (Hopa etc.). Strengthening of international relations through the Black Sea and the frontier with neighboring countries is expected.

3.2.4 Direction of Development

(1) Prerequisite

Following factors would be prerequisite for achieving sustainable development of national economy and regional balance mentioned in Section 3.2.2.

1) External factors

a) By 2020, political stability in the neighboring countries will be attained and present relations with them will be improved.
b) Sound international relations will be maintained due to the present omni-directional diplomatic policy.
c) Further economic development in East Europe and the CIS countries will be achieved.
d) Transport problems in the Danube Canal will be solved by realization of the Danube Corridor Development Plan.
e) Various pipeline projects including Baku-Ceyhan and Turkmenistan-Turkey-Europe pipelines will be implemented as planned.

2) Internal factors

a) In addition to the continuous implementation of the GAP Project, new regional development projects under study, such as the East Anatolia Region Project and the East Black Sea Region (DOKAP) Project will be realized in the future.
b) Employment share of agricultural sector in total employment will decrease drastically, while that of services sector will steadily increase.
c) More sophisticated sub-sectors in Turkish industry such as electronic equipment and automobile will become more competitive and replace traditional sub-sectors like textiles and clothing in terms of export growth, while industrial sector as a whole will maintain a high growth rate long into the future.

(2) Direction of Development (See Figure 3.2.10)

Under the condition of smooth progress of external relations with foreign countries in addition to changes in the domestic industrial structure, Turkey will take advantage of her geographically strategic position. The country, located at the crossroads of economically attractive centers, will continue to pursue a multi-dimensional foreign economic policy. Foreign trade volumes with EU as well as other OECD, East Europe,

CIS and Asian countries are expected to increase sharply. For reference, SPO projection of export and import per GNP is as follows.

SPO Projection (High Case):		1995	2000	2010	2020
Export/GNP (%)	12.8	14.4	16.3	18.9	
Import/GNP (%)	20.8	27.8	33.8	40.3	

In this sense, the ports, which are placed as center cores of the ‘Axes’, are required to be developed to cope with the increasing foreign trade volumes.

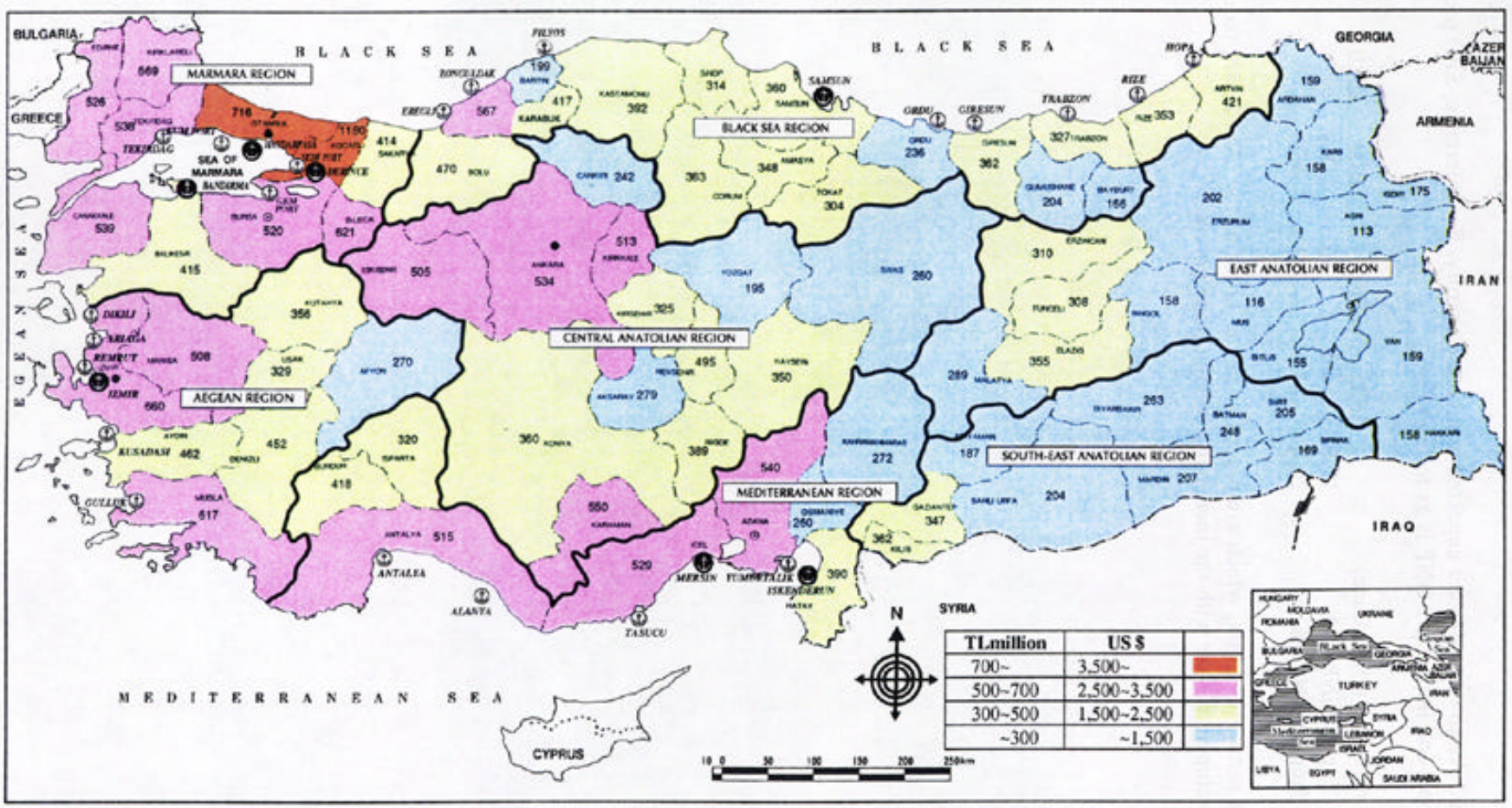


Figure 3.2.1 GDP Per Capita Distribution by Province (1997)

Figure 3.2.2 GDP of Agricultural Sector by Province (1997)

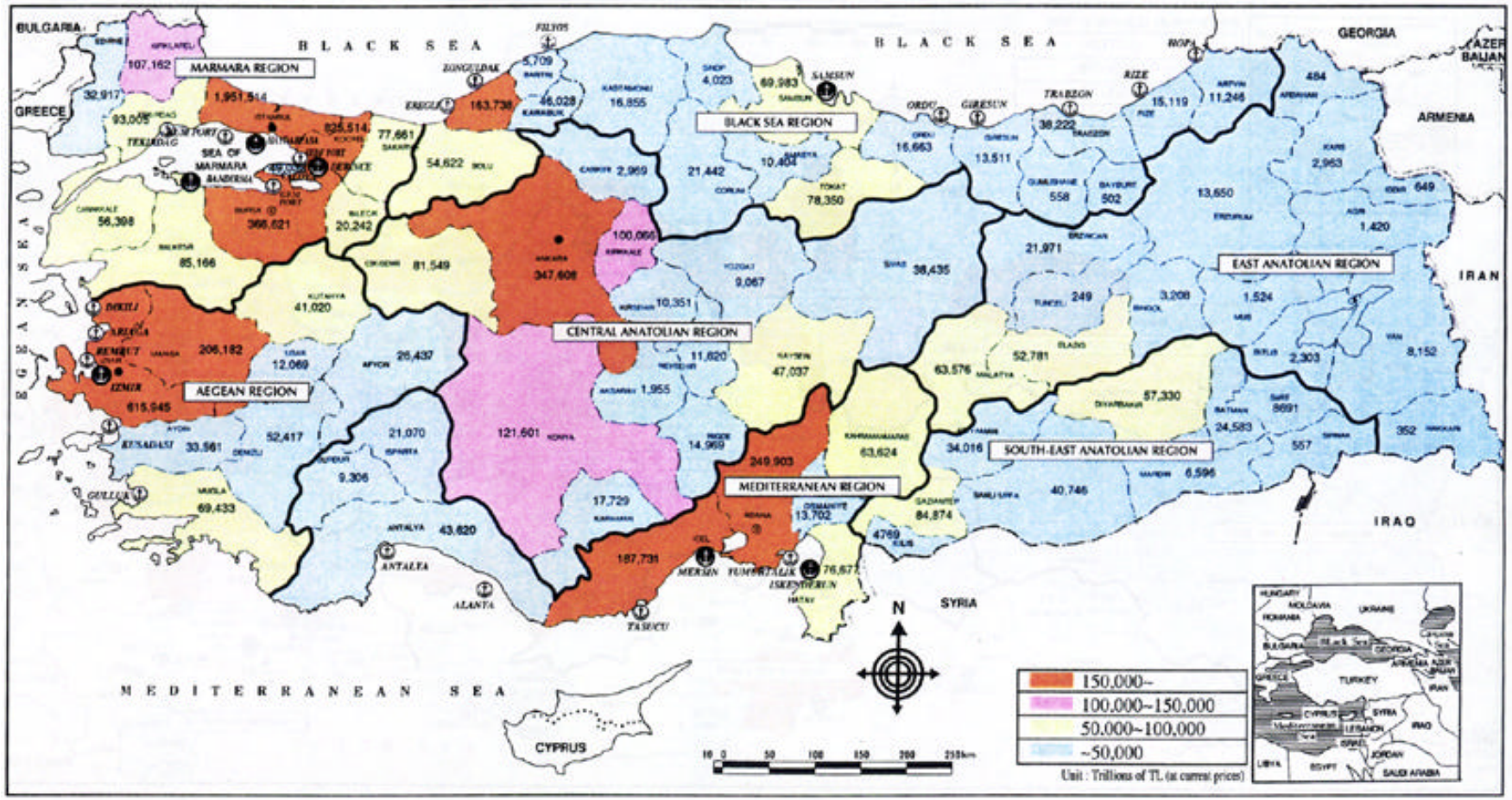


Figure 3.2.3 GDP of Industrial Sector by Province (1997)

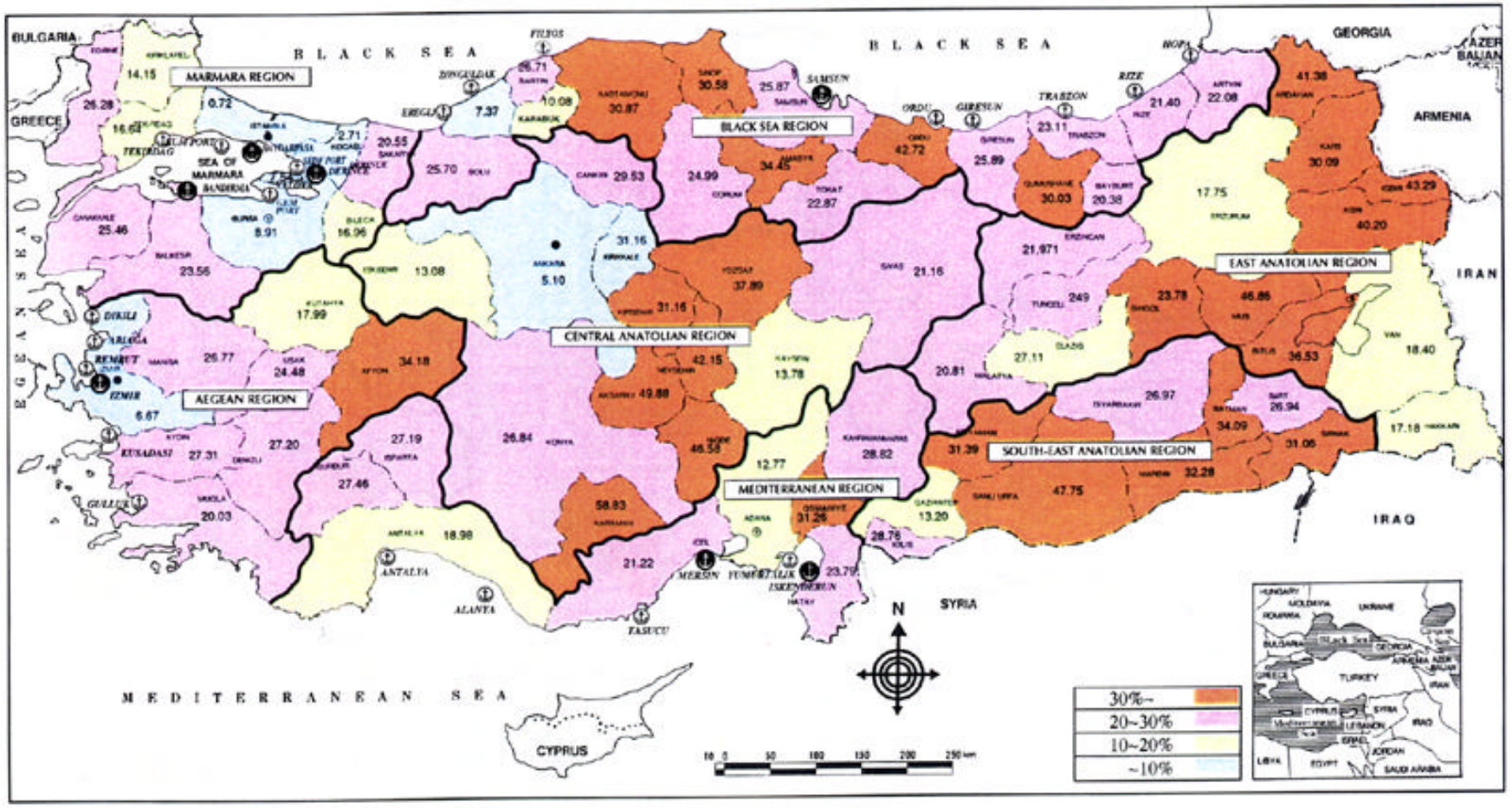


Figure 3.2.4 Share of GDP in Agricultural Sector by Province (1997)

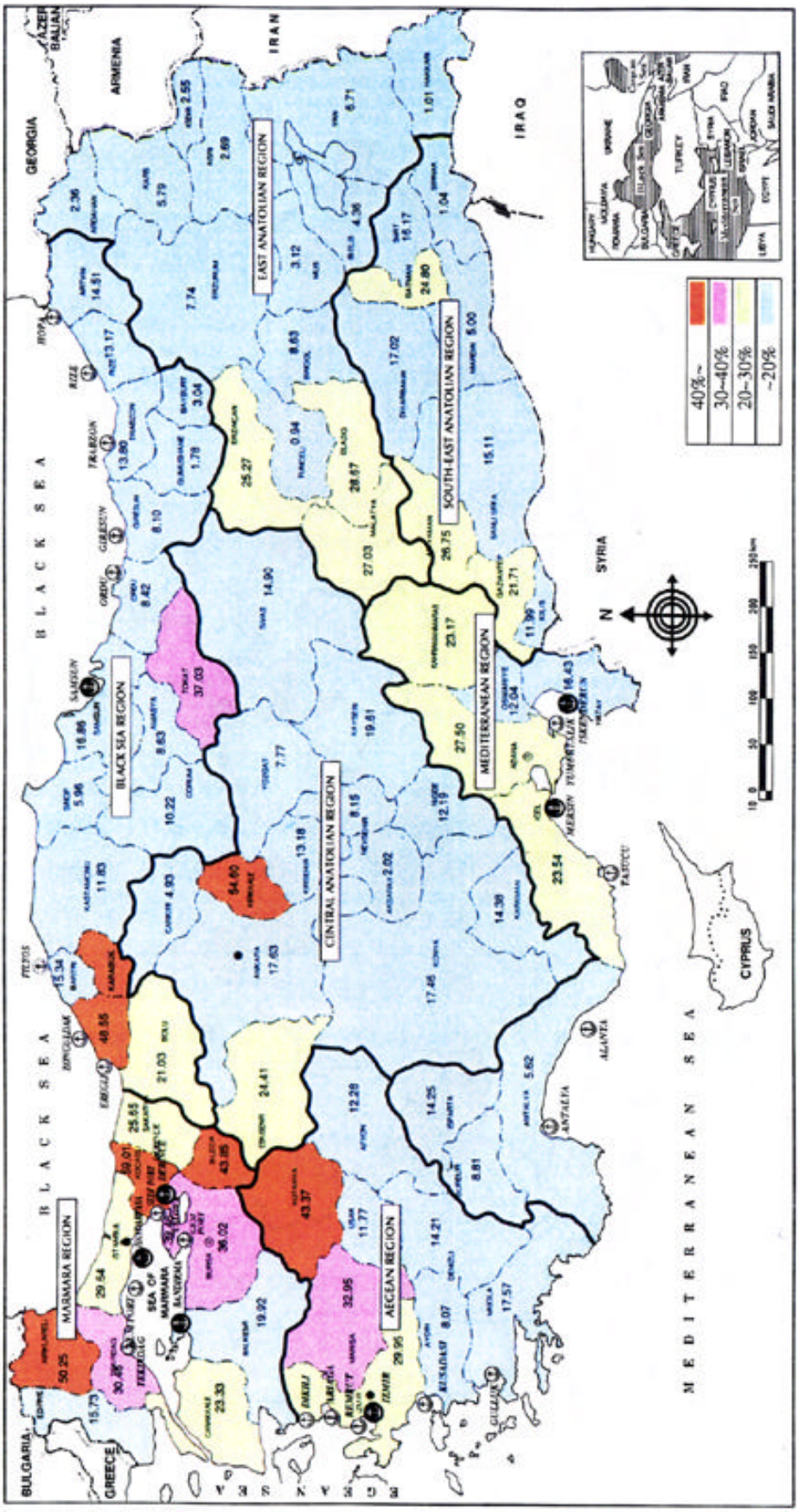


Figure 3.2.5 Share of GDP in Industrial Sector by Province (1997)

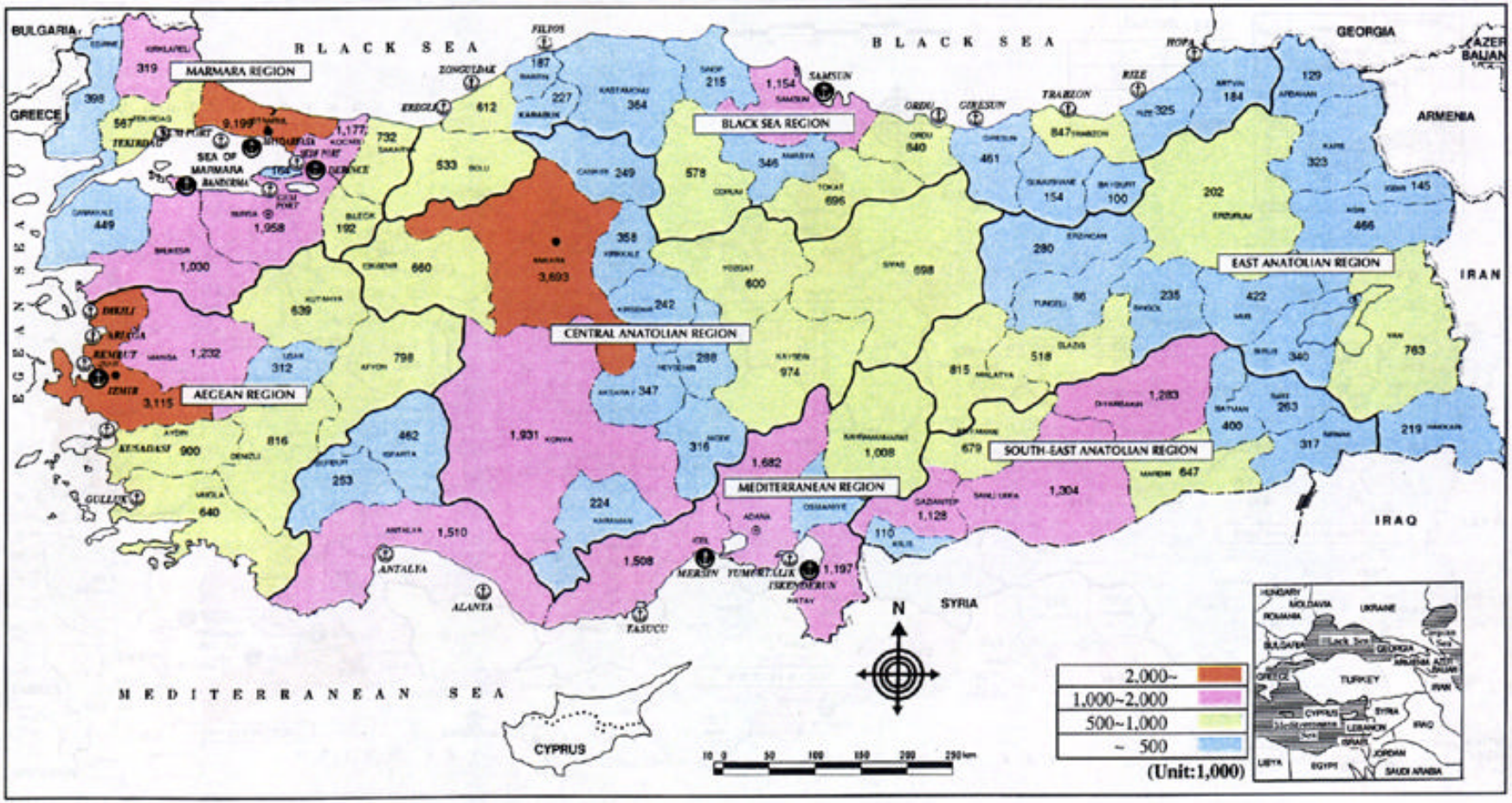


Figure 3.2.6 Population Distribution by Province (1997)

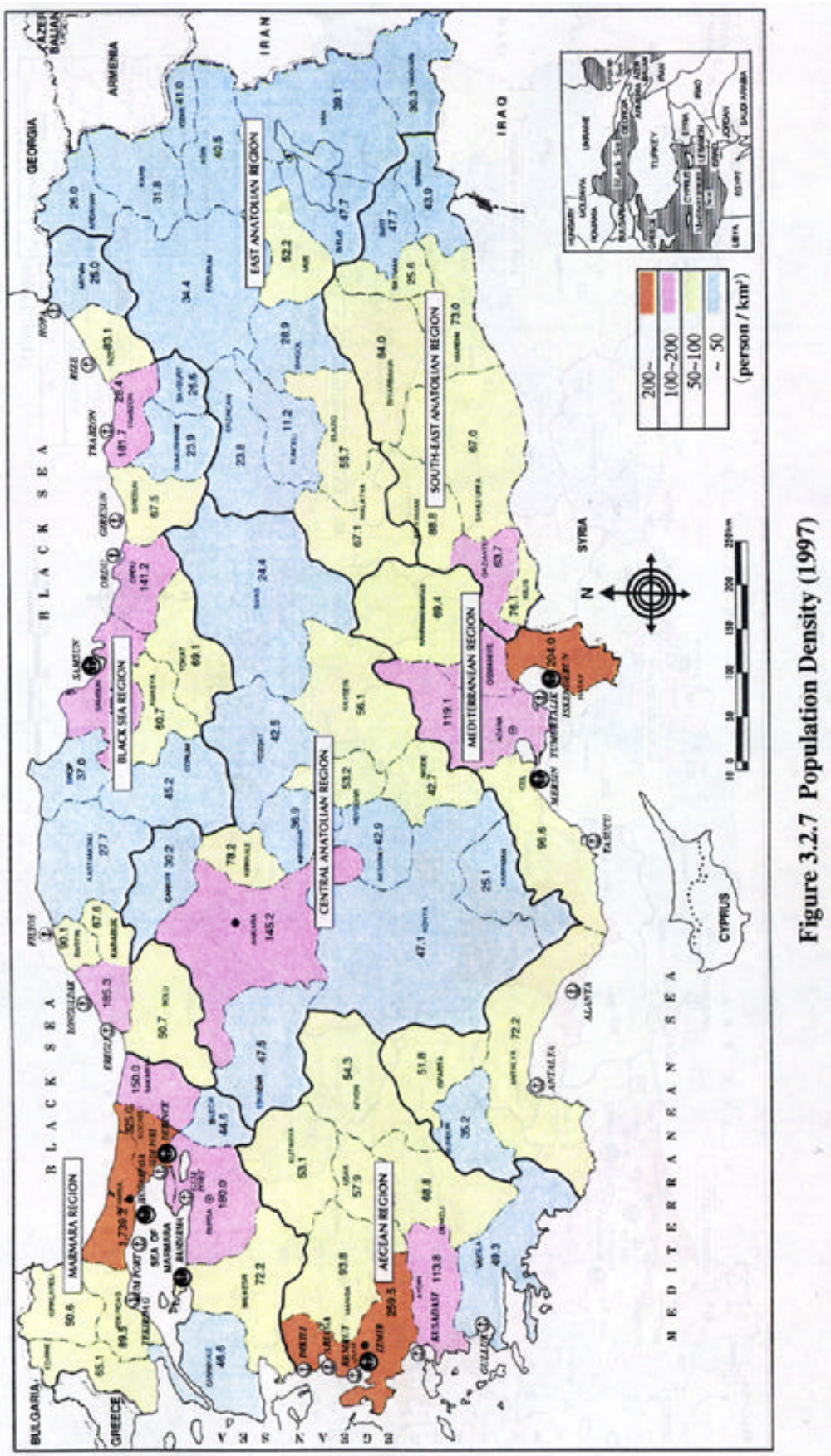


Figure 3.2.7 Population Density (1997)

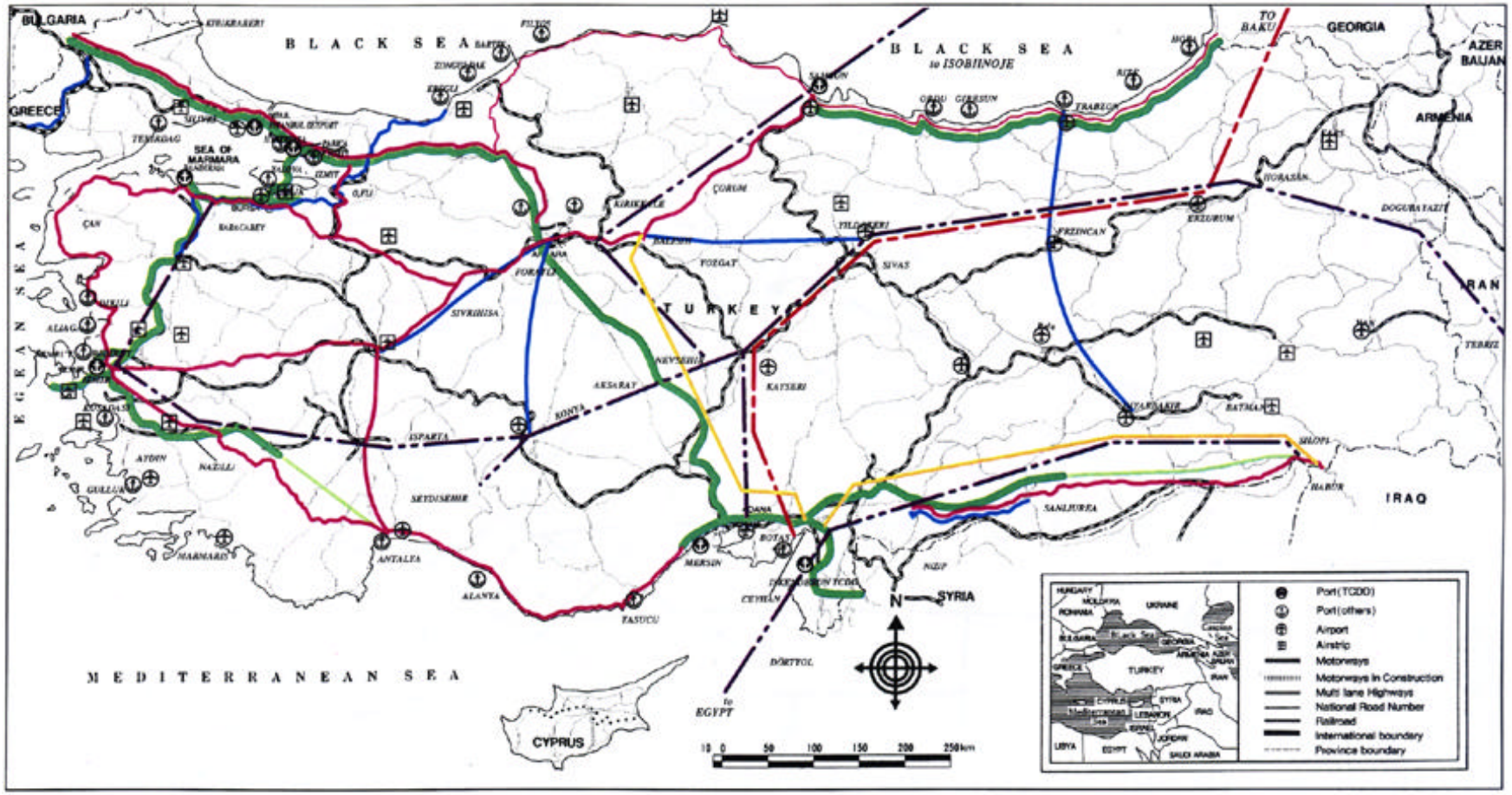


Figure 3.2.8 Existing and Planned Transport Network

Highway network / Oneway each	
Motorway network (in service+ under construction+In project stage / Planned)	
Railway network (Existing/Planned)	
Pipeline Crude Oil Existing	
Pipeline Crude Oil Planned	
Pipeline Natural Gas Existing	
Pipeline Natural Gas Planned	

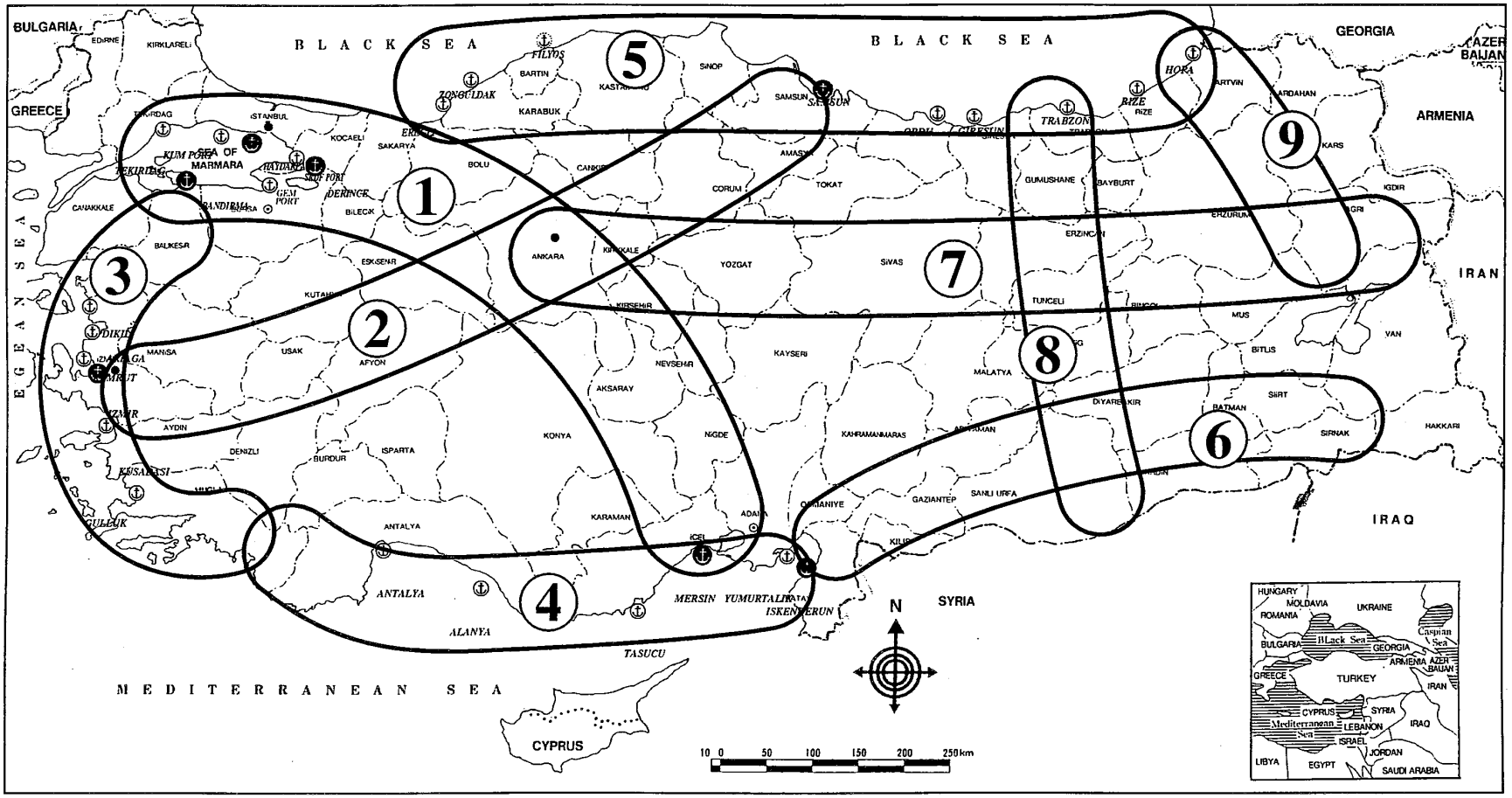


Figure 3.2.9 Axes of National Land Development

① Europe-Asia Corridor Axis
② Aegean-Black Sea Corridor Axis
③ Aegean Sea Axis
④ Mediterranean Sea Axis
⑤ Black Sea Axis
⑥ GAP Axis
⑦ Central Anatolia-East Anatolia Corridor Axis
⑧ Black Sea-Southeast Anatolia Corridor Axis
⑨ East Anatolia Frontier Sub-Axis

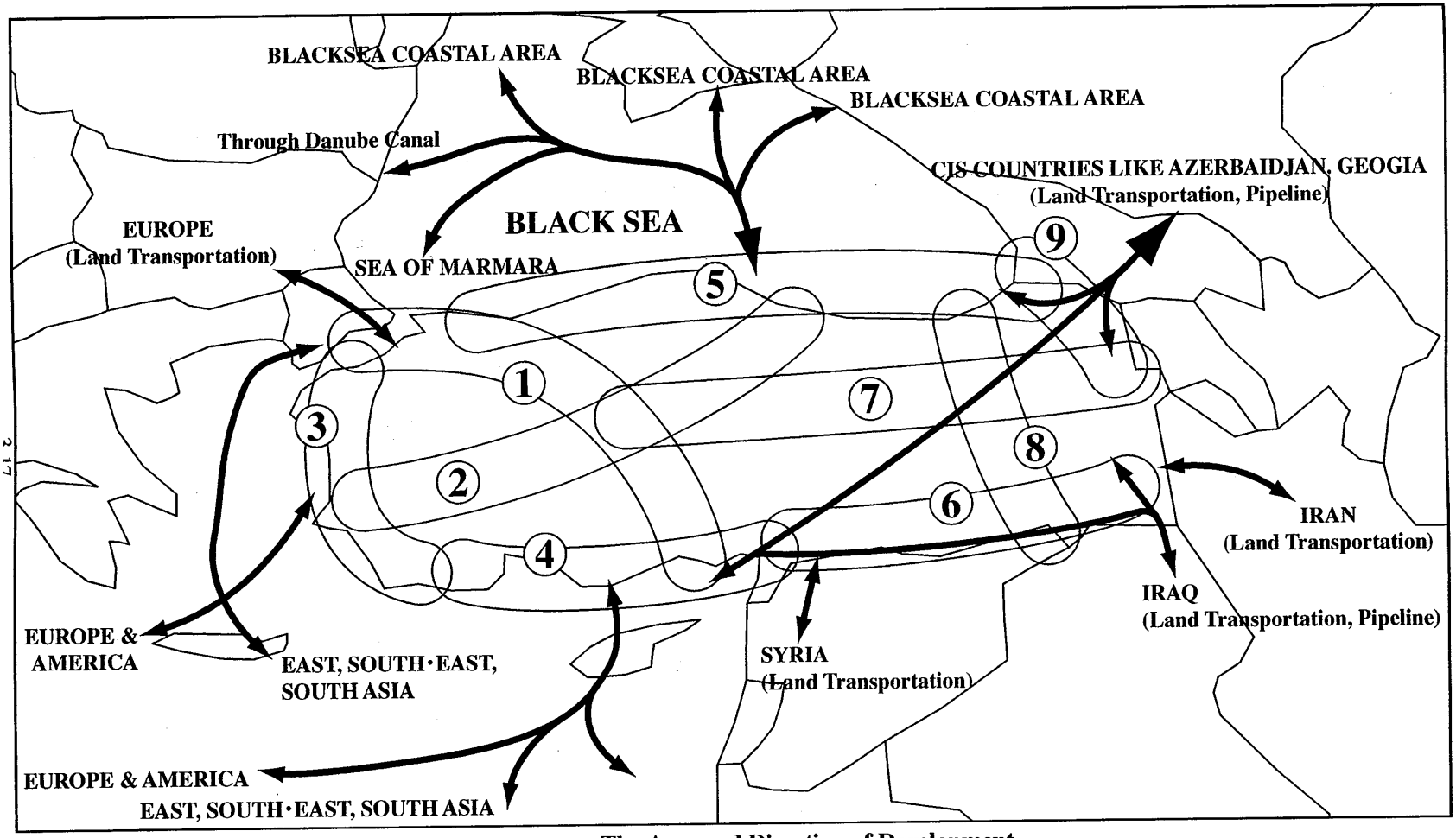


Figure 3.2.10 The Axes and Direction of Development

① Europe-Asia Corridor Axis
② Aegean-Black Sea Corridor Axis
③ Aegean Sea Axis
④ Mediterranean Sea Axis
⑤ Black Sea Axis
⑥ GAP Axis
⑦ Central Anatolia-East Anatolia Corridor Axis
⑧ Black Sea-Southeast Anatolia Corridor Axis
⑨ East Anatolia Frontier Sub-Axis

Table 3.2.1 Functions and Characteristics of National Land Development Axes

	Functions	Production	Transport	Direction of Infrastructure Development
Axis 1	* Driving force of national economy * Trunk Lane between the Middle East and Europe * Connecting the Marumara Sea and the Mediterranean Sea	* High	* Well developed	* Marumara Sea Area * West Mediterranean Area * Road between Ankara-Mersin * Environmental Aspects
Axis 2	* Supporting the development of the Black Sea Region * Connecting the Black sea and the Aegean Sea * Connecting the Black Sea and Ankara Metropolitan Area * Connecting the Aegean Sea and Ankara Metropolitan Area	* Partially high	* Partially well	* Road between Ankara-Samsun
Axis 3	* Driving force of national economy * Supporting the development of hinterland * Connecting Marumara Region and Western Med. Area	* High	* Well	* Aegean Sea Area * Road connecting to Axis 4 * Environmental Aspects
Axis 4	* Supporting the development of GAP Region * Supporting the development of East Anatolia Region * Supporting the development of hinterland * Connecting Marumara Region and Western Med. Area	* Partially high	* Partially well	* Mediterranean Area * Environmental Aspects
Axis 5	* Supporting the development of hinterland * Supporting the development of East Anatolia Region * Connecting East Anatolia Region and Marumara Region	* Middle	* Middle	* Black Sea Area * Coastal Road
Axis 6	* Supporting the development of East Anatolia Region * Connecting East Anatolia Region and the Med. Sea * Connecting Southeast Anatolia Region and the Med. Sea	* Low	* Insufficient	* GAP Project * Railway/ Road between East Anatolia - Axis 4
Axis 7	* Supporting the development of East Anatolia Region * Connecting East Anatolia Region and Ankara Metropolitan Area	* Low	* Insufficient	* Railway/ Road between Ankara - Boarder Area
Axis 8	* Supporting the development of East Anatolia Region * Connecting East Anatolia Region and the Black Sea	* Low	* Insufficient	* Railway/ Road between GAP - Black Sea
Axis 9	* Supporting the development of East Anatolia Region (Boarder Area) * Connecting East Anatolia Region (Boarder Area) and the Black Sea	* Low	* Insufficient	* Road between Boarder Area - Black Sea

3.3.3 Energy

The long-term primary energy development plans prepared by the Ministry of Energy and Natural Resources are summarized as follows.

Primary energy production of 28.8million tons of oil equivalent (mtoe) was realized in 1998. According to long-term programs of responsible utilities, 28.9, 47.3 and 70.2 mtoe total primary energy production is projected for 2000, 2010 and 2020 respectively with a 4.1% annual average growth rate.

Hard coal, lignite, hydraulic energy and geothermal energy production will increase. Hard coal production will be increased from2.2 million tons (mt) in 1999 to 4.8 mt in 2020. Lignite production will be increased more than three times and will reach 185 mt in 2020. Hydraulic production will be increased from 34.6TWh in 1999 to 97.5 TWh in 2020. Nuclear energy production will be added energy balance after the year 2008 and its production will be realized as 63.2TWh in 2020. At the same period both natural gas and oil production will be decreased and non-commercial source production will be stable.

Total primary energy demand (TPES) is expected to be as 76.2mtoe in 1999 and increase to 87.4 mtoe in 2000, 171.3 mtoe in 2010 and 298.4 mtoe in 2020 with 6.3% annual average growth rate.

The most significant change in the structure of Turkish fuel consumption has been the increase in electricity and natural gas consumption, and this change will continue for the future. While the share of electricity, natural gas and coal in TFC is increasing, oil's share is decreasing in1998-2020 period.

3.3.4 Tourism

There are remains of the successive peoples who have occupied Anatolia over the last l0,000 years, with more than 60,000 sites of historic interest, as well as the natural wonders of Pamukkale and Cappadocia. In spite of its obvious potential, Turkey accounts for only 2% of the world tourist market, but it is widely believed that it could increase its market share significantly.

Between 1983 and 1993, Turkey achieved an average growth rate of 18% in the volume of incoming tourist traffic and ranked first in growth among the 125 member countries of the World Tourist Organization. At the beginning of the 1990s Turkey hosted 5.4m visitors per year, earning US$3.3 billion and representing a global market share of 1.2%. In 1993 foreign tourism earnings reached US$4 billion and US$4.3 billion in 1994. The ministry of tourism expected to see 17 million visitors annually by 2000, producing expected earnings of US$13.8 billion.

The Germans traditionally visit Turkey in greater numbers than any other nation, although some of these are Turkish expatriates. In 1997, 2.3 million German tourists visited Turkey, a 12% increase on the previous year. From 1992 to 1997 visitors from Europe increased from 7.4m to nearly 10m, an increase of 35%. The UK and France supply the most European tourists to Turkey after Germany.

3.4 Transport

3.4.1 General

(1) Classification of Trade Area

Prior to analysis, trading partners of Turkey were classified by six areas such as Europe, Africa, America, Asia, Oceania and Others. Furthermore, Europe was divided into three sub-areas namely EU-countries, Other European countries and CIS countries. Asia was divided into Middle East countries and other Asian countries. Composition of each area is shown in Table 3.4.1.

Table 3.4.1 Composition of Trading Area

Area	Sub-Area	Countries
Ⅰ. Europe	1. EU	Italy, Germany, Spain, 12 other countries
	2. Other	Other twenty-one countries include Turkey Republic of Northern Cyprus.
	3. CIS	Russian Federation, Azerbaijan, Georgia, Eight other countries
Ⅱ. Africa		Algeria, Egypt, Tunisia, Libya, 51 other countries
Ⅲ. America		USA, Canada, 31 other countries
Ⅳ. Asia	1. Middle East	Israel, Saudi Arabia, Syria, Iran, Eighth other countries
	2. Other	Japan, China, Singapore, Hong Kong, 22 other countries
Ⅴ. Oceania		Australia, New Zealand, Fiji
Ⅵ. Others		Free Zone etc.

Source : SIS

(2) Trading Partners of Turkey

In Turkey, the transportation sector consists of sea, highway, railway, airway and pipeline transportation activities. In terms of domestic transportation share, highway accounted for more than 93% of the total transportation volume in ton/km basis in 1996.

Table 3.4.2, Table 3.4.3 show import and export share by transportation system in 1997. In terms of export volume of Turkey, 72.9% was by maritime lines followed by highway (26.2%), railway and others(0.6%) and Airline(0.4%). Highway accounted for 53.1% of total export value followed by maritime(39. 15%), Airline(7.1%) and railway and others(0.7%).

Table 3.4.2 Export Share of Trading Area by Transport System in 1997

Country	Transport system							
	Maritime Lines		Highway		Airlines		Railway and Other (*)	
	Volume(%)	Value(%)	Volume(%)	Value(%)	Volume(%)	Value(%)	Volume(%)	Value(%)
Turkey Total	**72.9**	**39.1**	**26.2**	**53.1**	**0.4**	**7.1**	**0.6**	**0.7**
Europe	**70.1**	**27.9**	**29.0**	**65.0**	**0.5**	**6.4**	**0.4**	**0.6**
EC countries	**76.9**	**28.2**	**22.3**	**64.3**	**0.5**	**7.3**	**0.3**	**0.1**
Italy	82.3	41.0	17.6	57.6	0.2	1.4	0.0	0.1
Spain	88.9	70.6	11.1	22.9	0.1	6.5	0.0	0.0
Germany	49.6	12.6	48.5	78.0	1.6	9.3	0.3	0.1
United Kingdom	83.1	44.8	16.0	47.9	0.9	7.3	0.0	0.0
France	69.1	25.0	30.2	66.9	0.7	8.0	0.0	0.1
Other countries	77.8	38.0	20.7	55.4	0.3	6.1	1.2	0.5
Other Europe countries	**62.0**	**24.4**	**36.5**	**70.1**	**0.9**	**5.0**	**0.7**	**0.4**
T.Rep.of Northern Cyprus	90.9	76.6	8.4	11.6	0.7	11.4	0.0	0.4
Norway	77.1	40.8	22.4	54.3	0.5	4.9	0.0	0.0
Romania	24.4	5.9	74.9	92.6	0.1	1.0	0.6	0.4
Switzerland	61.0	35.9	38.2	54.4	0.8	9.7	0.0	0.0
Bulgaria	23.9	8.7	69.5	87.5	0.1	0.6	6.5	3.2
Other countries	52.0	15.8	45.9	80.0	2.0	4.2	0.2	0.0
CIS countries	**49.9**	**28.7**	**49.2**	**64.6**	**0.5**	**4.2**	**0.4**	**2.5**
Russia	57.1	29.0	41.9	62.3	0.3	5.2	0.6	3.5
Ukraine	84.6	75.1	15.2	24.1	0.1	0.8	0.0	0.0
Azerbaijan	47.6	21.4	52.0	71.6	0.4	3.3	0.0	3.7
Georgia	36.6	21.7	63.2	76.1	0.2	2.1	0.0	0.0
Other countries	15.3	8.5	82.6	87.0	1.4	3.9	0.8	0.6
Africa	**93.6**	**89.6**	**6.2**	**6.1**	**0.2**	**4.2**	**0.0**	**0.1**
Algeria	94.6	95.5	5.4	3.6	0.1	0.8	—	—
Tunisia	92.3	86.4	7.5	10.6	0.2	3.0	—	—
Libya	95.6	96.0	4.4	4.0	0.0	0.0	0.0	0.0
Egypt	89.1	82.4	10.5	7.3	0.4	9.9	0.0	0.4
Other countries	96.2	87.9	3.3	7.1	0.4	5.0	0.0	0.0
America	**86.3**	**71.0**	**13.1**	**10.8**	**0.6**	**18.2**	**0.0**	**0.0**
U.S.A.	84.4	69.6	15.0	10.9	0.6	19.6	0.0	0.0
Canada	90.4	73.0	9.2	11.5	0.4	15.5	0.0	0.0
Other countries	96.0	82.7	3.7	9.6	0.3	7.6	0.0	0.0
Asia	**80.8**	**65.6**	**17.8**	**26.4**	**0.2**	**6.3**	**1.2**	**1.8**
Middle East countries	**75.1**	**53.4**	**22.5**	**36.6**	**0.2**	**7.3**	**2.2**	**2.8**
Israel	88.7	89.0	11.2	7.3	0.1	3.7	0.0	0.0
Saudi Arabia	74.6	50.5	25.1	42.0	0.3	7.2	0.0	0.3
U.A.E	95.2	66.4	4.4	7.2	0.3	26.3	0.0	0.0
Syria	23.9	12.0	52.9	67.4	0.2	0.5	23.0	20.1
Iran	43.2	11.3	53.7	84.9	0.1	0.7	3.0	3.0
Lebanon	88.3	84.3	11.6	11.0	0.1	4.7	0.0	0.0
Other countries	77.8	58.8	21.9	31.8	0.3	9.3	0.0	0.1
Other Asian countries	**88.0**	**86.5**	**11.8**	**8.9**	**0.2**	**4.6**	**0.0**	**0.0**
Singapore	89.1	88.3	10.9	10.2	0.0	1.5	0.0	0.0
Hong Kong	99.6	94.7	0.3	1.4	0.1	3.8	0.0	0.0
Malaysia	83.7	85.8	16.2	12.3	0.1	1.9	—	—
Thailand	85.6	85.4	14.3	12.7	0.1	1.9	0.0	0.0
Japan	74.0	72.4	24.0	10.4	1.9	17.0	0.0	0.1
China	67.4	67.2	32.5	24.5	0.1	8.3	—	—
Other countries	84.0	87.8	15.9	8.0	0.1	4.3	0.0	0.0
Oceania	**95.6**	**82.3**	**3.8**	**10.8**	**0.5**	**6.8**	**0.0**	**0.1**
Australia	95.4	81.7	4.1	11.4	0.5	6.9	0.0	0.0
New Zealand	96.9	86.4	2.4	7.1	0.7	6.4	0.0	0.1
Fiji	1.0	8.4	99.0	91.6	—	—	—	—
Others (Free Zone etc.)	**1.2**	**1.0**	**98.6**	**98.7**	**0.1**	**0.3**	**0.0**	**0.1**

Source : "Foreign Trade by Transport System, 1997" by State Institute of Statistics Prime Ministry Republic of Turkey (SIS)
Note : (*) Transportation by Railway, Post, Pipeline, Electrical energy and Moving vehicle by itself.

Table 3.4.3 Import Share of Trading Area by Transport System in 1997

Country	Transport system							
	Maritime Lines		Highway		Airlines		Railway and Other (*)	
	Volume(%)	Value(%)	Volume(%)	Value(%)	Volume(%)	Value(%)	Volume(%)	Value(%)
Turkey Total	**89.9**	**50.5**	**7.6**	**35.1**	**0.4**	**11.3**	**2.1**	**3.0**
Europe	**84.9**	**38.5**	**14.0**	**47.3**	**0.4**	**10.3**	**0.7**	**3.9**
EC countries	**79.9**	**34.7**	**18.8**	**51.8**	**0.7**	**11.8**	**0.6**	**1.8**
Germany	61.8	21.8	35.4	66.1	1.1	9.5	1.7	2.6
Netherlands	85.7	43.1	13.6	41.6	0.4	12.3	0.3	3.0
Italy	80.1	34.1	18.9	58.6	0.8	7.1	0.2	0.2
France	83.6	41.2	15.3	43.4	0.4	14.4	0.7	0.9
Belgium and Luxembourg	90.0	48.8	9.6	39.7	0.3	10.5	0.1	1.0
United Kingdom	85.0	35.7	13.9	45.3	0.8	18.3	0.2	0.7
Other countries	82.5	48.2	16.3	33.5	0.6	15.3	0.6	3.0
Other Europe countries	**81.5**	**38.2**	**15.4**	**46.9**	**0.5**	**10.7**	**2.5**	**4.1**
Romania	89.9	72.8	9.6	25.3	0.0	0.3	0.5	1.6
Bulgaria	73.5	54.0	18.6	29.1	0.1	0.3	7.9	16.6
Norway	97.3	82.5	2.6	11.5	0.1	5.9	0.0	0.0
Estonia	95.2	93.6	4.8	6.2	0.0	0.2	0.0	0.0
Switzerland	50.8	10.6	42.6	66.5	5.3	21.6	1.3	1.2
Other countries	74.9	39.8	23.4	50.4	1.1	5.7	0.6	4.1
CIS countries	**91.0**	**64.7**	**8.7**	**16.8**	**0.1**	**0.3**	**0.2**	**18.2**
Russia	92.1	58.5	7.7	11.7	0.1	0.3	0.0	29.4
Ukraine	93.1	89.4	6.5	10.3	0.2	0.1	0.3	0.2
Georgia	66.9	47.4	28.0	29.7	0.0	0.0	5.0	22.9
Kazakhstan	88.3	83.0	11.7	16.5	0.1	0.5	—	—
Belarus	85.0	50.2	15.0	48.2	0.0	1.6	0.0	0.0
Other countries	43.9	22.8	56.1	76.8	0.1	0.4	0.0	0.0
Africa	**99.1**	**97.2**	**0.6**	**2.5**	**0.3**	**0.2**	**0.0**	**0.0**
Algeria	99.9	99.9	0.1	0.1	0.0	0.0	—	—
Libya	100.0	99.7	0.0	0.3	0.0	0.0	—	—
Egypt	99.7	98.0	0.3	1.8	0.0	0.2	0.0	0.1
South Africa	97.1	94.2	1.1	4.0	1.8	1.8	—	—
Other countries	95.1	87.2	4.9	12.4	0.0	0.4	0.0	0.0
America	**93.8**	**57.9**	**5.4**	**11.3**	**0.8**	**30.2**	**0.0**	**0.7**
U.S.A.	93.9	51.5	5.1	11.6	0.9	36.0	0.1	0.9
Brazil	91.5	83.9	8.3	13.3	0.2	2.8	0.0	0.1
Argentina	93.0	90.0	4.5	6.8	2.4	3.2	—	—
Canada	99.2	74.4	0.7	6.0	0.1	19.5	0.0	0.1
Other countries	92.7	82.7	7.3	13.8	0.0	3.4	0.0	0.1
Asia	**95.3**	**77.9**	**4.0**	**14.3**	**0.4**	**7.3**	**0.4**	**0.5**
Middle East countries	**95.8**	**88.1**	**3.4**	**8.8**	**0.4**	**2.2**	**0.4**	**0.9**
Saudi Arabia	98.5	96.7	0.9	2.3	0.6	1.0	0.0	0.0
Iran	95.7	86.4	4.2	12.7	0.0	0.1	0.1	0.8
Syria	96.4	84.9	1.8	11.2	0.0	0.0	1.8	3.8
Other countries	83.6	76.3	15.2	14.5	1.2	9.0	0.1	0.3
Other Asian countries	**91.7**	**73.2**	**7.5**	**16.9**	**0.7**	**9.7**	**0.0**	**0.3**
China	91.8	76.7	7.9	19.3	0.2	3.7	0.0	0.3
India	95.9	79.2	3.8	10.7	0.3	10.0	0.0	0.0
Malaysia	97.9	89.3	2.0	6.9	0.1	3.7	0.0	0.1
Southern Korea	88.4	79.3	9.9	12.9	1.6	7.7	0.1	0.1
Japan	80.6	69.2	17.2	21.7	1.9	8.7	0.3	0.4
Thailand	92.3	74.2	7.5	20.1	0.1	5.6	0.0	0.0
Indonesia	90.2	83.9	9.7	14.0	0.2	2.1	0.0	0.0
Other countries	88.9	62.8	8.3	14.0	2.7	22.9	0.1	0.3
Oceania	**92.8**	**85.7**	**7.1**	**12.3**	**0.0**	**2.0**	**0.0**	**0.0**
Australia	92.9	87.8	7.1	10.4	0.0	1.8	0.0	0.0
New Zealand	82.7	76.5	16.7	20.8	0.6	2.7	—	—
Others (Free Zone etc.)	**60.2**	**34.9**	**3.4**	**43.9**	**0.0**	**0.8**	**36.4**	**20.4**

Source : "Foreign Trade by Transport System, 1997" by State Institute of Statistics Prime Ministry Republic of Turkey (SIS)
Note : (*) —Transportation by Railway, Post, Pipeline, Electrical energy and Moving vehicle by itself.

(3) Investment Share by Transportation Sector

Table 3.4.4 shows the historical trend of Turkey's investment in the transport system. Investment in the highway system far exceeded that of other transport systems in recent five years with share of 63.7%-72.6% of the total transportation investment. Maritime system received only 2.9% of the total investment. This indicates that government policy for transportation development has been dedicated to the highway system. However, it is one of the main aims in the transportation policies of national governments and EC platforms that the transportation of freight carried out by highways be shifted to alternative transportation such as railway and maritime systems. Thus, both systems have to be taken into consideration for well-balanced development. Additionally, railway and maritime modes cause less environmental pollution.

Table 3.4.4 Turkish Investment in Transport Systems

Year	Share of Transportation Sub-sector(%)				
	Highway	Airway	Railway	Maritime	Pipeline
1980	40.8	5.0	27.0	12.8	1.9
1981	47.2	6.7	14.5	8.7	1.2
1982	44.6	6.3	17.5	9.3	2.6
1983	43.5	6.6	17.6	11.7	1.1
1984	39.0	8.7	17.3	8.9	5.6
1985	28.4	16.2	13.2	9.0	7.7
1986	22.4	13.8	11.0	7.6	9.8
1987	23.3	9.3	11.6	8.1	14.1
1988	43.8	11.2	8.0	4.2	5.3
1989	59.1	3.1	10.4	3.7	5.0
1990	50.0	4.8	9.8	3.7	6.2
1991	59.1	2.2	7.5	3.3	4.9
1992	59.3	2.2	7.6	3.0	6.3
1993	77.7	8.9	7.0	2.8	3.6
1994	72.6	12.4	7.3	1.8	5.9
1995	68.6	10.2	9.9	2.8	8.4
1996	63.7	19.4	9.1	3.7	4.1
1997	72.2	12.4	8.0	3.8	3.7
1998	69.8	11.5	6.0	2.9	9.7

Source : TCDD, Planning Department

3.4.2 Sea Transport

(1) Turkey's Trade by Area

The most important area in terms of international trade volume/value for Turkey's in 1997 was Europe with shares of 50.1%/48.5% for export and 36.6%/48.7% for import. As to distribution by sub-area, EU countries accounted for 37.6%/33.7% of the total export volume/value and 15.5%/35.1% for import, similarly Other European countries were 6.3%/4.9% and 4.1%/4.l%, and CIS countries were 6.2%9.8% and 16.9%/9.5% respectively.

Asia was also an important area with the share of international trade next to European country. Rate of trade volume/value accounted for 31.1%/23.6g% for export and 23.0%/26.4% for import(See Table 3.4.5).

(2) Major Trading Partners of Turkey

Major trading partners of Turkey in terms of export volume were Italy(11.2%), USA(8. 1 %), Spain(7.7%) and Israel(5.2%), while for export value, USA(3.4.8%), UK(6.6%), Germany (6.5%) and Russia(5.8%) were the main partners. As for import volume, Russia(10.4%), Saudi Arabia(8.7%), USA(8.l%), Algeria(6.1%) and Ukraine(5.7%) are the major countries, while USA(9.1%), Germany(7.l%), Italy(6.2%), Japan(5.8%) and Russia(5.2%) were the main countries in terms of import value(See Table 3.4.5).

Table 3.4.5 Maritime Trade Share of Export/Import by Trade Area, 1997

Export			Import		
Country/Area	Volume(%)	Value(%)	Country/Area	Volume(%)	Value(%)
Turkey Total	**100.0**	**100.0**	**Turkey Total**	**100.0**	**100.0**
Europe	**50.1**	**48.5**	**Europe**	**36.6**	**48.7**
EC countries	**37.6**	**33.7**	**EC countries**	**15.5**	**35.1**
Italy	11.2	5.5	Germany	2.2	7.1
Spain	7.7	3.0	Netherlands	2.5	2.6
Germany	3.5	6.5	Italy	2.4	6.2
United Kingdom (UK)	3.4	6.6	France	1.9	5.0
France	2.3	2.8	Belgium and Luxembourg	1.6	2.4
Other countries	9.5	9.2	United Kingdom	1.5	4.0
			Other countries	3.5	7.8
Other Europe countries	**6.3**	**4.9**	**Other Europe countries**	**4.1**	**4.1**
T.Rep.of Northern Cyprus	2.6	1.7	Romania	1.7	1.2
Norway	1.2	0.4	Bulgaria	1.0	0.9
Romania	0.3	0.2	Norway	0.4	0.6
Switzerland	0.6	1.1	Estonia	0.3	0.1
Bulgaria	0.2	0.1	Switzerland	0.2	0.5
Other countries	1.3	1.4	Other countries	0.6	0.8
CIS countries	**6.2**	**9.8**	**CIS countries**	**16.9**	**9.5**
Russia	3.0	5.8	Russia	10.4	5.2
Ukraine	1.3	2.5	Ukraine	5.7	3.3
Azerbaijan	1.0	0.7	Georgia	0.2	0.1
Georgia	0.6	0.4	Kazakhstan	0.3	0.6
Other countries	0.3	0.5	Belarus	0.2	0.1
			Other countries	0.1	0.2
Africa	**8.1**	**10.8**	**Africa**	**18.9**	**8.7**
Algeria	2.8	2.9	Algeria	6.1	3.1
Tunisia	0.9	1.0	Libya	4.9	2.2
Libya	0.8	1.7	Egypt	3.6	1.6
Egypt	1.7	2.4	South Africa	3.1	0.7
Other countries	1.9	2.6	Other countries	1.2	1.1
America	**10.3**	**16.4**	**America**	**14.4**	**12.9**
U.S.A.	8.1	13.8	U.S.A.	8.1	9.1
Canada	0.6	0.8	Brazil	2.6	1.1
Other countries	1.6	1.8	Argentina	1.5	0.9
			Canada	1.4	0.9
			Other countries	0.8	0.8
Asia	**31.1**	**23.6**	**Asia**	**23.0**	**26.4**
Middle East countries	**16.2**	**12.1**	**Middle East countries**	**20.1**	**9.5**
Israel	5.2	3.4	Saudi Arabia	8.7	4.0
Saudi Arabia	3.6	2.6	Iran	5.6	2.3
U.A.E	1.9	1.7	Syria	4.1	1.6
Syria	0.4	0.3	Other countries	1.7	1.6
Iran	0.8	0.3			
Lebanon	1.3	1.6			
Other countries	2.9	2.1			
Other Asian countries	**15.0**	**11.5**	**Other Asian countries**	**2.9**	**16.9**
Singapore	5.5	3.2	China	0.9	2.5
Hong Kong	3.4	2.2	India	0.5	1.0
Malaysia	1.0	1.1	Malaysia	0.4	1.0
Thailand	0.9	0.5	Southern Korea	0.3	3.5
Japan	0.7	1.0	Japan	0.2	5.8
China	0.4	0.3	Thailand	0.2	0.4
Other countries	3.1	3.2	Indonesia	0.1	0.5
			Other countries	0.2	2.3
Oceania	**0.3**	**0.6**	**Oceania**	**3.9**	**1.9**
Australia	0.2	0.5	Australia	3.9	1.6
New Zealand	0.0	0.1	New Zealand	0.0	0.3
Fiji	0.0	0.0			
Others (Free Zone etc.)	**0.1**	**0.1**	**Others (Free Zone etc.)**	**3.2**	**1.4**

Source : "Foreign Trade by Transport System, 1997" by State Institute of Statistics Prime Ministry Republic of Turkey

Note : (*) Transportation by Railway, Post, Pipeline, Electrical energy and Moving vehicle by itself.

(3) Volume Share by Trading Area

Europe had a share of 50.l% of the total export volume, up from 43.2% in 1993 while Asia dropped to 31.1% from 44.2% in the same period. In imports, Africa ranked third with their share increasing 18.9% in 1997 from 8.1% in 1993. Europe and Asia ranked first and second in imports, the same in exports but their shares of the total volume were smaller, namely, 36.6% and 23.0% in 1997(See Table 3.4.6, Figure 3.4.1, Table 3.4.7, Figure3.4.2).

Table 3.4.6 Export Volume Share by Trade Area from 1993-1997

(Unit : %)

Area	1993	1994	1995	1996	1997
Turkey Total	100.0	100.0	100.0	100.0	100.0
Others (Free Zone etc.)	0.2	0.0	0.1	0.1	0.1
Oceania	0.1	0.1	0.2	0.2	0.3
Asia	44.2	42.0	35.9	31.7	31.1
America	5.5	8.9	7.1	7.3	10.3
Africa	6.9	11.0	9.4	9.6	8.1
Europe	43.2	38.0	47.3	51.1	50.1

Source : “Foreign Trade by Transport System, 1997” by State Institute of Statistics Prime Ministry Republic of Turkey (SIS)

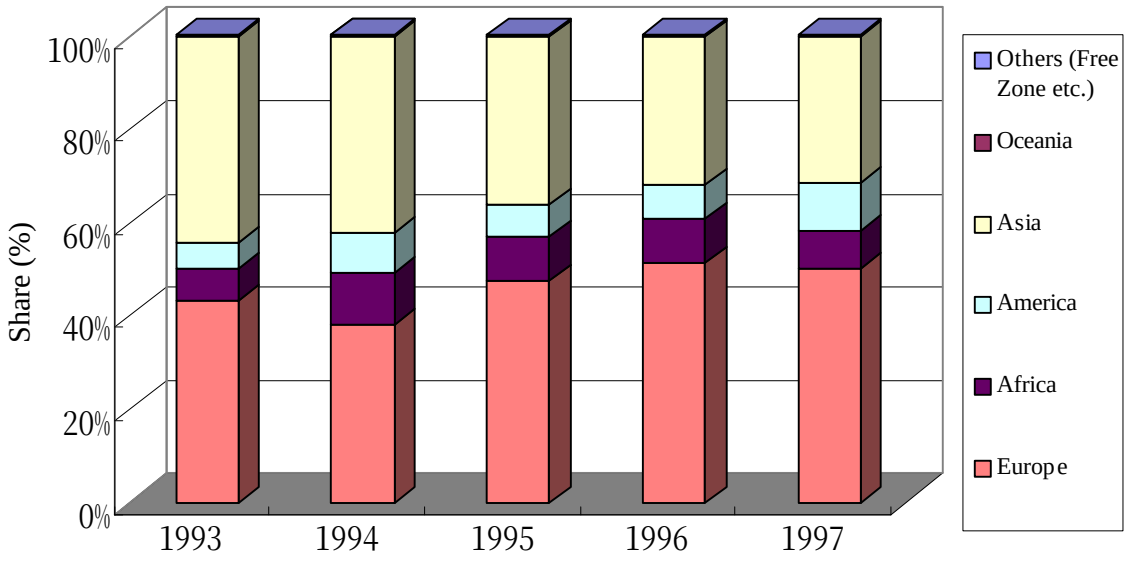


Figure 3.4.1 Trend of Share of Export Volume

Table 3.4.7 Import Volume Share by Trade Area from 1993-12997

(Unit : %)

Area	1993	1994	1995	1996	1997
Turkey Total	100.0	100.0	100.0	100.0	100.0
Others (Free Zone etc.)	0.0	0.1	0.2	0.3	3.2
Oceania	3.7	6.1	4.1	3.1	3.9
Asia	37.6	39.0	31.9	27.6	23.0
America	13.6	12.5	13.4	13.8	14.4
Africa	8.1	12.6	15.9	19.9	18.9
Europe	37.0	29.7	34.5	35.3	36.6

Source : “Foreign Trade by Transport System, 1997” by State Institute of Statistics Prime Ministry Republic of Turkey (SIS)

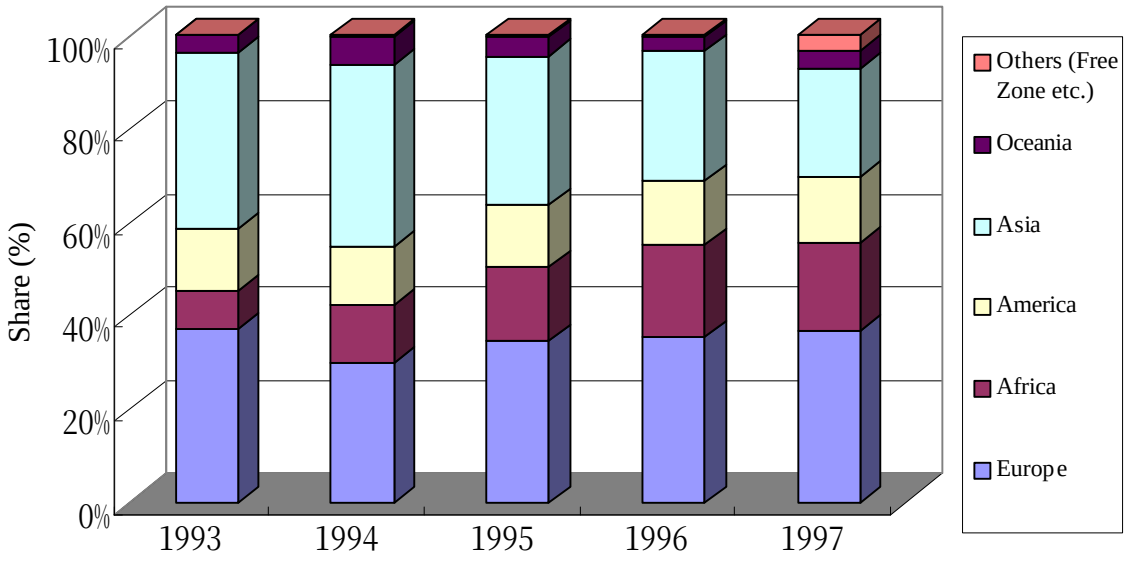


Figure 3.4.2 Trend of Share of Import Volume

(4) Container Shipping Route

1) Container Shipping Route Through the Mediterranean Sea

Table 3.4.8 shows ten major shipping operators/groups which have been operating through the Mediterranean sea route. Almost all lines are calling Japanese ports initially and are also calling Taiwanese ports, Hong Kong, Singapore, Jeddah, Port Said and Mediterranean sea ports. Mega-carrier of Maersk/Sea-Land is calling only two ports in the Mediterranean sea, Gioia-Tauro and Algeciras, on the way to America with 4,000TEUs～6,000TEUs class container vessels.

In terms of calling Turkish ports, direct container service by mother ship is not operated except for CMA(BEN) Line which is calling directly Mersin port with 1,600～2,200TEUs class full container vessels. Turkish Cargo(Nissin)Line and NYK(conventional service) is calling Turkish ports such as Istanbul, Mersin, Izmir, Derince and other ports with monthly and twice monthly service.

2) Feeder Service to Turkish Ports.

The majority of international container trade in Turkey has been depending on the feeder service mainly from Damietta and Gioia-Tauro. Some of the major shipping operators engaged in AsianEast Mediterranean-Black Sea trade have their own or joint feeder network to Turkish ports. Turkish shipping company has also been operating as feeder service with 500～1,000TEUs class container vessels.

Broad feeder service network from Gioia-Tauro to East Mediterranean ports including Turkish ports is in operation. EvergreennL. Triestino and UASC(Summit) are also using Gioia-Tauro as hub-port of feeder services to East Mediterranean ports.

Table 3.4.8 Container Shipping Route through Mediterranean Sea

Shipping Company	Frequency	Rotation		Service Vessel		
				Name	TEUs	DWT
APL / Hyundai / Yang Ming	Weekly	Busan	Barcelona	Hyundai Infinity	2,800	36,100
		Kobe	Fos / Marseilles	Hyundai Majesty	2,808	34,900
		Nagoya	Jeddah	Hyundai nobility	2,800	3,600
		Singapore	Singapore	Ming Dynasty;	2,908	34,900
		Port Kelang	Hong Kong	Ming Fidelity	2,808	34,900
		Jeddah	Keelung	Ming Trusty	2,808	34,900
		Genoa	Busan	NOL amber	2,314	38,541
				NOL Crystal	2,308	37,746
CMA(BEN)	Weekly	Nagoya	**Mersin**			
		Kobe	Alexandria			
		Hakata	Port Kelang	1600～2200 TEUs x 9		
		North Chain Ports	North Chain Ports			
		Port Kelang	Kawasaki			
		Malta	Nagoya			
CMA (BEN) / Norasia (NMC)	Weekly	Japanese Ports	Barcelona	CGM PASCAL	2,900	49,238
		Busan	Fos / Marseilles	NORASIA MALT	2,987	41,719
		Keelung	Genoa	NORASIA SHAN	3,500	41,460
		Hong Kong	Napoli	NORASIA SHARJ	2,852	41,570
		Jakarta	Damietta	NORASIA SINGA	3,066	41,460
		Singapore	Singapore	VILLE DE CAPEI	3,538	42,300
		Port Kelang	Keelung	VILLE DE LIBRA	3,538	42,673
		Colombo	Kaohsiung	VILLE DE SAGIT	3,538	49,238
		Jeddah	Busan			
		Malta	Japanese Ports			
CMA	Feeder service from Damietta to : Algiers, Tunis, Oran, Benghazi, Casablanca, Koper, Piraeus, Lattakia, **Istanbul,** Alexandria, Port Said, Odessa, Constanza, **Mersin,** Salonoca, Beirut, **Izmir,** Tartous, Limassol, **Gemlik,** Varna, **Trabzon,** Valencia, Livorno					
Norasia	Feeder service to : Venice, Anocona, Trieste, Koper, **Gemlik, Istanbul, Izmir,** Piraeus, Salonica, Alexandria, Beirut, **Mersin,** Port Said, Lattakia, Limmasol, Tunis, Valencia					
Evergreen / L.Triestino (Senwa)	Weekly	PNW	Barcelona	Ever Gaining	3,428	53,240
		Japanese Port	Valencia	Ever Gallant	3,428	53,274
		Kaohsiung	Trieste	Ever Garland	3,428	53,240
		Hong Kong	Suez	Ever General	3,428	53,240
		Singapore	Jeddah	Ever Given	3,428	53,240
		Port Kelang	Singapore	Ever Glamour	3,428	53,240
		Colombo	Laem Chabang	Ever Gleeful	3,428	53,274
		Jeddah	Hong Kong	Ever Glowing	3,428	53,274
		Suez	Kaohsiung	Ever Golden	2,728	43,401
		Gioia Tauro	Osaka	Ever Goods	3,428	53,240
		Genova	Tokyo	Ever Grace	2,728	43,198
		Marseilles / Fos	PNW	Ever Grope	3,428	53,240
Evergreen	Feeder service from Jeddah to Aqaba. from Gioia Tauro to : Salerno. Civitavecchia, La Spezia, Leghorn, Napoli, Ancona, Ravenna, Tunis, Limassol, Alexandria, Port Said, Piraeus, **Istanbul, Mersin,** Thessaloniki, Izmer, Beirut, Odessa, Constanza, Varna, Ilichevsk From Marseilles / Fos to Casablanca, from Valencia to : Las Palmas, Tenerife					
L.Triestino	Feeder service from Gioia Tauro to : Limassol, Piraeus, Beirut, Alexandria, Beirut, Lattakia, **Istan Izmir,** Salerno, Napoli, Tripoli, Benghazi, Tunis, Sfax from Genoba to : Benice, Koper, Ancona					
Hapag / MISC / NYK / OOCL / P&O Ned	Weekly	Busan	La Spezia (3)	Bunga Raya Dua	3,482	47,858
		Kobe	Barcelona	Bunga Raya Satu	3,842	47,858
		Nagoya	Fos / Marseilles	Nedlloyd Africa	3,568	47,157
		Yokohama	Damietta	Nedlloyd America	3,568	47,042
		Hong Kong	Singapore	Nedlloyd Asia	3,568	46,985
		Singapore (1)	Hong Kong	Nedlloyd Europe	3,568	47,157
		Port Kelang	Busan	Nedlloyd Oceania	3,568	46,985
		Damietta (2)				
NYK	Feeder service from : (1) Tokyo and Shimizu Feeder service to : (2) Piraeus, **Istanbul, Izmir, Mersin,** Salonica, Lattalkia, Beirut (3) Genoa, Casablanca					
P&O Ned	Feeder service to : (2) Alexandria, Port Said, Port Suez, Tunis, Valletta (3) Valencia by MISC, Feeder service to Valencia, Salonica, by P&O					
NYK	Feeder service to : (3) Alexandria, Lattakia, **Istanbul, Izmir,** Piraeus, Limassol, **Mersin,** Port said					

(Continued)

Shipping Company	Frequency	Rotation		Service Vessel Name	TEUs	DWT
Maersk/Sea-Land	Weekly	Yokohama	Charleston	Dagmar Maersk	4,322	62,700
		Shimizu	Algeciras	Dorthe Maersk	4,322	62,700
		Kobe	Gioia Tauro	Dragore Maersk	4,322	62,700
		Kaoshiung	Jeddah	Grete Maersk	3,932	61,500
		HongKong	Salalah	Kirsten Maersk	6,000	90,456
		Singapore	Dubai/Jebel Ali	Kund Maersk	6,000	90,456
		Port Kelang	Port Kelang	Majestic Maersk	4,297	60,640
		Colombo	Singapore	Regina Maersk	6,000	90,456
		Salalah	Yantian	Sl Champion	4,062	52,425
		(1)Gioia Tauro	Hongkong	Sl Comet	4,062	59,840
		(2)Algeciras	Long Beach	Sl Eagle	4,062	52,425
		Halifax	Tacoma	Sl Intrepid	4,062	52,425
		NewYork	Yokohama	Sl Lightning	4,062	59,840
		Norfolk		Sl Meteor	4,062	59,840
Maersk/Sea-Land	Feeder service to: (1)Naples, **Istanbul**, Tunis, Palermo, **Izmir**, Ilyichevsk, Alexandria, Genoa, Legh Marsaxlokk, Triest, Venice, Ancona, Koper, Salonica, Varna, Mersin, Beirut, Catania, Salerno, Novorossiysk, **Gemlik**, Oran, Algiers, Ashdod, Haifa, Heraklio Limassol, Thessaloniki, Constanza, Port Said					
	Feeder service to: (2)Barcelona, Valencia, Fos/Marseilles, Genoa, Leghorn, Lisbon, Leixoes, Las Palmas, Tenerife, Casablanca, Agadir, Vigo, Tanger, Melilla					
MSC(MSC Agencies)		Yokohama	Piraeus			
		Osaka	La Spezia			
			Valencia			
	Feeder service from Piraeus to: Alexandria, Salonika, Beirut, **Istanbul**, **Mersin**, **Gemlik**, Constan **Izmir**, Limassol, Ashdod, Ancona, Haifa, Revenna, Venice, Trieste					
	Feeder service from La Spezia to: Tripoli, Casablanca					
NYK	2 sailing	Ohgishima	Hongkong			
(Conventional Service)	a month	Kinuura	Singapore			
		Kimitsu	Jeddah			
		Wakayama	**Istanbul**			
		Yokohama	Benghazi			
		Nagoya	Tartous			
		Kobe	Rotterdam			
		Busan	Antwerp and Res Sea/Mediterranean/Europe ports subject			
		Keelung	to inducement			
Turkish Cargo(Nissin)		Yokohama	**Izmir**	General A.F. Cebesoy		
		Kobe	**Derince**	General Kazim Orbay		
		Famagusta	**Istanbul**	General R. Gumuspala		
		Mersin	**Other Turkish Ports**	General Z. Dogan		
UASC(Summit)		Yokohama	Gioia Tauro			
		Nagoya				
		Kobe				
		Hakata				
	Freeder service from Gioia Tauro to : Alexandria, Tripoli, Benghazi Port Said, Beirut, Lattakia, **Mersin**, **Izmir**, Limassol, Salerno, Venice, La Spezia, Genoa, Livorno, Koper, M Fos/Marseilles, Tunis, Skikda, Valencia, Madrid, Barcelona, Tenerife, Las Palma Biza, Casablanca, Leixoes, Lisbon, Algiers, Oran					
UASC(Summit)	Weekly	Dubai	Genoa	Al Ihsa'a	2,111	35,615
MIX Service		Khor Fakkan	Fos	Al Manakh	2,111	35,615
		Mumbai	Valencia	Al Mirqab	2,111	35,615
		Nhava Sheva	Gioia Tauro	Al Wajba	2,111	35,615
		Dubai	Al Dekhaila	Dubai	2,111	35,615
		Jeddah	Port Said	Khaled Ibn Al Walee	2,111	35,615
		Port Said	Aqaba	Qatari Ibn Al Fuja'a	2,111	35,615
		Al Dekhaila	Jeddah			
		Gioia Tauro	Dubai			

3) Container Flow in East Mediterranean Sea

Table 3.4.9 shows container now in East Mediterranean/Black Sea region in the period 1990-1997. Total container volume in this region had reached 5.8million TEUs in 1997 with an average annual growth rate of 14.1%. OECD countries, consisting of Turkey and Greece, accounted for 2.1mi11ion TEUs with an average annual growth rate of 14.3% in the same period. Middle East countries, which experienced growth of 15.5% in the same period, had reached 3.5mi11ion TEUs. Share of container volume of OECD Countries, CIS countries and Middle East countries were 36.7%, 3.6% and 59.7% respectively. Turkey, second place next to Egypt-Med., had reached 1.2million TEUs with an average annual growth rate of 19.0%.

Table 3.4.10 shows container handling volume by container ports in this region. Container volume handled in Istanbul region grew by 25.2% in the period of 1990-1997, but it still short of that of Damietta and Port Said of Egypt-Med. Istanbul region ports handling mainly Turkish captive cargoes, however, have advantages in port management over those Egyptian ports which are mainly handling volatile transshipment containers.

Table 3.4.9 Container Flower in East Mediterranean/Black Sea Region

(Unit : thousand TEUs)

Country	1985	1990	1991	1992	1993	1994	1995	1996	1997	A.A.G.R.**
Greece	208.0	480.0	548.8	648.3	696.2	735.4	819.1	833.2	923.2	
Turkey	114.5	355.9	396.4	456.6	577.2	602.6	745.2	969.7	1,202.0	19.0
OECD Countries	322.5	835.9	945.2	1,104.9	1,273.4	1,338.0	1,564.3	1,802.9	2,125.2	14.3
Bulgaria	35.0	28.3	32.7	19.5	15.0	39.9	45.6	51.1	51.5	
Romania	37.5	28.5	46.3	50.2	33.0	41.3	68.6	86.3	95.0	
USSR-Black Sea	84.1	141.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Ukraine	0.0	0.0	102.6	74.1	69.5	41.0	39.4	61.1	61.0	
Ex-Centrally Planned	156.6	198.6	181.6	143.8	117.5	122.2	153.6	198.5	207.5	0.6
Cyprus	197.3	384.3	323.5	351.9	414.1	372.2	373.2	564.0	442.9	
Syria	84.7	67.3	82.8	92.6	100.0	135.0	132.2	153.1	160.0	
Lebanon	26.6	0.0	131.2	194.1	210.0	229.9	254.3	280.0	290.0	
Israel-W	295.6	459.3	493.9	598.9	665.0	736.1	871.7	919.8	987.9	
Egypt-Med.	158.0	350.1	575.7	644.8	921.5	934.6	1,043.4	1,468.2	1,571.0	
Other countries	762.2	1,261.0	1,607.1	1,882.3	2,310.6	2,407.8	2,674.8	3,385.1	3,451.8	15.5
Total	1,241.3	2,295.5	2,733.9	3,131.0	3,701.5	3,868.0	4,392.7	5,386.5	5,784.5	14.1
Percentage										
OECD Countries	26.0	36.4	34.6	35.3	34.4	34.6	35.6	33.5	36.7	
Ex-Centrally Planned	12.6	8.7	6.6	4.6	3.2	3.2	3.5	3.7	3.6	
Other countries	61.4	54.9	58.8	60.1	62.4	62.2	60.9	62.8	59.7	
(Turkey)	*9.2*	*15.5*	*14.5*	*14.6*	*15.6*	*15.6*	*17.0*	*18.0*	*20.8*	
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	

Source : Ocean Shipping Consultants Ltd.

Note : * = preliminary, ** = Average annual growth rate in the period of 1990-1997

Table 3.4.10 Container Volume Handling at Major Ports in East Mediterranean/Black Sea Region

(Unit : thousand TEUs)

Port	1985	1990	1991	1992	1993	1994	1995	1996	1997	A.A.G.R.**
Tessaloniki	11.1	53.8	85.9	133.6	166.2	173.7	211.2	237.2	234.2	23.4
Piraeus	196.9	426.2	462.7	511.5	525.0	555.5	600.1	586.0	675.0	6.8
Bourgas					9.2	15.3	19.1	21.5	20.0	21.4
Varna	35.0	28.3	32.7	19.5	5.8	24.6	26.5	29.6	31.5	1.5
Constantza	37.5	28.5	46.3	50.2	33.0	41.3	68.6	86.3	95.0	18.8
Haydarpasa	**23.2**	**111.7**	**143.0**	**177.6**	**232.4**	**179.7**	**256.6**	**329.1**	**316.8**	16.1
Kumport								**15.5**	**115.0**	
Gemport					**5.1**	**14.3**	**15.2**	**36.1**	**48.0**	
Gebze							**14.2**	**44.0**	**60.0**	
(Istanbul region)	**23.2**	**111.7**	**143.0**	**177.6**	**237.5**	**194.0**	**286.0**	**424.7**	**539.8**	25.2
Izmir	**12.5**	**122.5**	**143.1**	**162.5**	**212.9**	**268.9**	**302.2**	**345.9**	**372.4**	17.2
Mersin	**68.3**	**107.5**	**102.8**	**105.8**	**116.8**	**131.5**	**147.6**	**181.5**	**272.4**	14.2
Limassol	122.4	273.8	228.6	218.3	220.8	266.2	265.7	398.6	257.9	-0.9
Larnaca	74.9	110.5	94.9	133.6	193.3	106.0	107.5	165.4	185.0	7.6
Lattakia	84.7	67.3	82.8	92.6	100.0	135.0	132.2	153.1	160.0	13.2
Beirut	26.6		131.2	194.1	210.0	229.9	254.3	280.0	290.0	14.1
Ashdod	120.0	173.8	175.6	213.9	250.0	305.0	346.3	369.0	398.5	12.6
Haifa	152.1	285.5	318.3	385.0	415.0	431.1	525.4	550.8	589.4	10.9
Damietta		97.6	251.7	323.8	492.8	520.2	570.4	585.9	596.0	29.5
Alexandria	130.0	197.7	263.9	204.1	257.8	284.4	233.0	520.0	530.0	15.1
Port Said	28.0	54.8	60.1	116.9	170.9	130.0	240.0	362.3	445.0	34.9
Total	1,123.2	2,251.2	2,766.6	3,220.6	3,845.5	4,006.6	4,622.1	5,722.5	6,231.9	15.7
Share of Turkish Port	9.3	15.2	14.1	13.8	14.7	14.8	15.9	16.6	19.0	

Source : Ocean Shipping Consultants Ltd.
Note : * = preliminary, ** = Average annual growth rate in the period of 1990-1997

4) Container Demand Forecast in East Mediterranean/Black Sea Region

Ocean Shipping Consultants is a maritime consultant on international containerization. Container demand forecast in East Mediterranean/Black Sea region was conducted and accompanying report was issued in 1998. Container demand forecast in this region is useful for this Study. Demand forecasts to 2010 are shown in Table 3.4.11. In addition, projection of 2020 is conducted by the Study Team using same average annual growth rate in the period of 2005-2010.

Total container demand in East Mediterranean/Black Sea region at 2020 is forecast to reach 2l.8million TEUs consisting of import/export of 16.0mi11ion TEUs and transshipment of 5.8million TEUs. This is an increase of more than four times the volume in 1996. Turkey accounts for 5.2million TEUs, which is handled as import/export, and this an increase of more than five times of the volume handled in 1996.

Table 3.4.11 Container Demand Forecast in East Mediterranean/Black Sea Region

(Unit: thousand TEUs)

	1996	1997	1998	1999	2000	2005	2010	2020
Greece								
Import / Export	710.1	778.2	857.2	915.0	948.1	1,235.7	1,544.7	2,413.8
Transshipment	123.1	145.0	255.0	297.2	310.2	415.0	480.0	642.1
Total	833.2	923.2	1,112.2	1,212.2	1,258.3	1,650.7	2,024.7	3,056.0
Turkey								
Import / Export	969.7	1,202.0	1,373.6	1,478.8	1,641.7	2,140.6	2,877.6	5,200.2
Total	969.7	1,202.0	1,373.6	1,478.8	1,641.7	2,140.6	2,877.6	5,200.2
Bulgaria								
Import / Export	51.1	51.5	59.4	65.9	74.4	104.4	142.7	266.6
Total	51.1	51.5	59.4	65.9	74.4	104.4	142.7	266.6
Romania								
Import / Export	86.3	95.0	108.0	119.3	131.8	179.5	243.4	447.5
Total	86.3	95.0	108.0	119.3	131.8	179.5	243.4	447.5
Ukraine								
Import / Export	61.1	61.0	66.6	70.9	76.0	102.9	137.7	246.6
Total	61.1	61.0	66.6	70.9	76.0	102.9	137.7	246.6
Cyprus								
Import / Export	259.0	198.1	251.2	281.3	299.2	334.2	381.7	497.9
Transshipment	305.0	244.8	197.3	195.3	187.1	510.6	790.9	1,897.6
Total	564.0	442.9	448.5	476.6	486.3	844.8	1,172.6	2,395.5
Syria								
Import / Export	153.1	160.0	176.1	195.8	237.2	321.1	391.2	580.7
Total	153.1	160.0	176.1	195.8	237.2	321.1	391.2	580.7
Lebanon								
Import / Export	280.0	290.0	354.8	361.8	382.4	420.0	452.6	525.6
Total	280.0	290.0	354.8	361.8	382.4	420.0	452.6	525.6
Israel - West								
Import / Export	919.8	987.9	1,124.5	1,271.6	1,400.4	1,786.3	2,294.0	3,783.3
Transshipment			22.0	60.0	75.0	120.0	180.0	405.0
Total	919.8	987.9	1,146.5	1,331.6	1,475.4	1,906.3	2,474.0	4,188.3
Egypt								
Import / Export	487.4	505.8	625.1	732.4	819.4	1,100.0	1,342.0	1,997.4
Transshipment	980.8	1,065.2	1,100.0	1,195.0	1,315.0	1,480.0	1,850.0	2,890.6
Total	1,468.2	1,571.0	1,725.1	1,927.4	2,134.4	2,580.0	3,192.0	4,888.1
Total East Mediterranean / Black sea								
Import / Export	3,977.6	4,329.5	4,996.5	5,492.8	6,010.6	7,724.7	9,807.6	15,959.7
Transshipment	1,408.9	1,455.0	1,574.3	1,747.5	1,887.3	2,525.6	3,300.9	5,835.4
Total	5,386.5	5,784.5	6,570.8	7,240.3	7,897.9	10,250.3	13,108.5	21,795.0
Percentage								
Import / Export	73.8	74.8	76.0	75.9	76.1	75.4	74.8	73.2
Transshipment	26.2	25.2	24.0	24.1	23.9	24.6	25.2	26.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source : Ocean Shipping Consultants Ltd., Figure in 2020 is computed by Study Team using the same average annual growth rate in the period of 2005 - 2010

5) Container Flow by Route

The container share by route is roughly estimated using the data of trading value by country and transportation mode share by country in 1997. The container traffic is categorized into five routes, European Route, American Route, Black Sea Route Asian Route and Mediterranean Route. The container share by each route is shown in Table 3.4.12

Table 3.4.12 Current Container Share by Route

Route	Export (%)	Import (%)
European Route	26	29
American Route	21	23
Black Sea Route	16	3
Asian Route	11	24
Mediterranean Route	26	21

Source: Prepared by the Study Team

The Mediterranean and European Routes with shares of 26% each of export are the busiest routes. The American Route was also important with approximately one forth of the traffic. In import container share by route, four routes except for Black Sea route were almost same level at around twenty percent. As to Black Sea Route, almost of sea-lane service have been made by Ro-Ro lines such as Derince-Constanza and Ilichevsk, Zonguldak-Novorossisk, Samusun.Ilichevsk, and so on.

6) Ro-Ro Line Service

The most important point in the Ro-Ro operation is how to connect port area to cargo depots in the shortest time. That means the operation is deeply concerned with land transportation. Ro-Ro transportation service can greatly facilitate the cargo movement on land since no intermediate handling and storage is required there. And its system can shorten the cargo handling time because every unit can move by its own wheels.

Ro-Ro service in Turkey, which began in 1977 on the Italy line, has been steadily expanding until recently on mostly Italy line and Black Sea line. There are six regular Ro-Ro lines between Turkish ports and Eastern European countries/CIS countries(Black Sea line) as of 1998. Haydarpasa-Trieste Line has been the most prosperous line(See Table 3.4.13, Table 3.4.14).

Table 3.4.13 Existing Ro-Ro Line Surrounding Turkey

Ro - Ro line	Aver. Trailer Capacity	Frequency	Shipping Charge ($) (round trip)	Voyage Duration (hour)
Haydarpasa - Trieste	130	Everyday	1,750	
Tekirdag - Triyeste		Wednesday - Saturday		
Cesme - Triyeste	120	2 days a week	1,650	60
Cesme - Bari	35	4 days a week	1,400	45
Cesme - Brindisi	70	7 days a week	1,400	40
Derince - Kostence	60	Temporary	875	22
Derince - Ilicevsk	42	(2 voyages a week)	1,150	30
Zonguldak - Skadovsk	33	4 days a week	900	22
Zonguldak - Yevpatoria	42	(2 voyages a week)	900	14
Zonguldak - Novorosiisk	65	4 days a week	1,200	26
Samson - Novorosiisk	60	7 days a week	1,400	14
Samson - Ilicevsk	35	Temporary	1,300	25
Trabzon - Soci	15	6 days a week	2,500	13
Mersin - Magosa	20	6 days a week	1,030	8
Patras - Bari	100	7 days a week	980	12
Patras - Ancona	100	7 days a week	1,630	18
Varna - Ilicevsk	108	1 voyage per 4 days	850	20
Burgaz - Novorosiisk	40	4 days a week	1,550	36
Burgaz - Poti	40	2 days a week	2,550	48
Vidin - Passau	49	2 days a week		6
Baku - Turkmenbasi	25	7 days a week	1,080	20
Calais - Dover	60	7 days a week	610	90

Source : Chamber of Shipping in Istanbul

Table 3.4.14 Ro-Ro Service in 1998

(Unit : number)

Lines	Number of Transported Vehicles		
	Turkish	Foreign	Total
Haydarpasa - Trieste	38,561	1,741	40,302
Cesme - Trieste	5,256	44	5,300
Cesme - Bar / Br / Anc.	769	249	1,018
Samson - Novorosiisk	15,540	853	16,393
Samson - Ilicevsk	72	765	837
Zonguldak - Ukraine	1,979	269	2,248
Zonguldak - Novorosiisk	527	88	615
Trabzon - Soci	2,776	5	2,781
Derince - Ilicevsk	763	429	1,192
Derince - Kostence	1,073	2	1,075
TOTAL	22,730	2,411	25,141

Source : Chamber of Shipping in Istanbul

Note : Except for Zonguldak - Yevpotariya and Tekirdag - Trieste line

3.4.3 Road Transportation

(1) Road Network

In 1999, the total length of road in Turkey was 385,672kms consisting of 1,749kms of motorway, 31,388kms of state road, 29,535kms of provincial road and 323,000kms of village road. The average annual growth of motorway development was 13.41% in the period of 1992-1999 while that of state road was 0.02%(See Table 3.4.15).

Table 3.4.15 Length of Turkey's Road Network

(Unit : Km)

Years	Motorways ①	State Roads ②	Provincial Roads ③	Sub Total ④=①+②+③	Village Roads ⑤	Total ⑥=④+⑤
1950	—	24,306	22,774	47,080	—	47,080
1960	—	26,711	34,831	61,542	—	61,542
1970	—	35,016	24,437	59,453	76,957	136,410
1980	27	31,976	28,785	60,788	172,413	233,201
1981	27	31,888	28,824	60,739	268,817	329,556
1982	27	31,953	29,001	60,981	234,145	295,126
1983	61	31,210	28,087	59,358	243,350	302,708
1984	81	30,982	28,130	59,193	251,209	310,402
1985	81	30,997	28,305	59,383	257,508	316,891
1986	95	30,986	28,153	59,234	261,558	320,792
1987	115	31,062	27,853	59,030	269,154	328,184
1988	138	30,999	27,852	58,989	271,511	330,500
1989	160	31,048	27,504	58,712	297,579	356,291
1990	281	31,149	27,979	59,409	308,597	368,006
1991	387	31,261	27,960	59,608	308,602	368,210
1992	757	31,343	28,499	60,599	326,522	387,121
1993	1,070	31,424	28,346	60,840	327,253	388,093
1994	1,167	31,389	28,443	60,999	320,029	381,028
1995	1,246	31,422	28,577	61,245	320,055	381,300
1996	1,514	31,412	28,813	61,739	320,001	381,740
1997	1,528	31,320	29,516	62,364	319,448	381,812
1998	1,726	31,345	29,540	62,611	319,218	381,829
1999	1,749	31,388	29,535	62,672	323,000	385,672
G.R.*	13.41	0.02	0.51	0.48	—	—

Source : General Directorate of Highways Maintenance Division
General Directorate of Rural Service

Note : * = The average annual growth rate in The period from 1992 - 1999

(2) International Trade by Highway

General Directorate of Highway(GDH), which is responsible for construction and maintenance of national highways, classify national highways into three categories in order to decide the development priority. The three categories are as follows:

High specification road(HSR):
separated two lanes on each side with more than twelve meter width of lane, with sufficient geometrical structure, more than two layers paved structure

Medium specification road (MSR):
considerable geometrical structure, eight-twelve meter width of lane, with surface treatment

Low specification road (LSR):
eight meter and under width of lane, insufficient surface treatment or stabilized paved

According to the classification above, HSR accounted for 28.5% of total length of national highway, followed by MSR (30.3%) and LSR (4l.2%). DGH intends to upgrade its roads to the extent possible.

1) Trans-Turkish Highway (TTH)

Trams-Turkish Highway (TTH), which forms a trunk of a major highway network from the border of Bulgaria to Syria, Iran and Iraq via Istanbul and Ankara, had reached 3,200km in 1996. TTH showed the share of around 30% of total traffic by truck in Turkey. Average daily traffic value increase by a 100,000 vehicles in surrounding major cities such as Istanbul, Izmir, Ankara and Adana. Heavy Vehicle Mixed Ratio at these areas was ranged from 30%-60% and reached 70% at the border. Existing TTH has been damaged because of rapid increase of heavy traffic and lack of traffic capacity(despite its standing as an important international trunk connecting between Europe, the Middle East and West Asia). Hence, GDH will increase maintenance and expand this highway to meet the traffic demand(See Figure 3.4.3).

2) Trams-European North-South Motorway (TEM)

Trans-European North-South Motorway(TEM) Project has been started with the support of the European Economic Commission and the participation of eleven European countries. Its portion within Turkey follows the Kapikule, Istanbul, Ankara, A skate route and reaches Trabzon on the Black Sea, Gurbulak in the east, Izmir and the Aegean Sea in the west, and the Yayladag and Cizre border gates in the south and southeast. Total length of TEM Project is planned to reach 5,897km, although only a stretch of 950km is in operation, and another 105km in the TEM Project under construction. The share of motorway and highway is 50% each (See Table 3.4.16, Figure 3.4.4, Figure 3.4.5, Figure 3.4.6).

Table 3.4.16 TEM Project Development in Turkey (as of 1999)

(Unit : Km)

№*	Route	In operation	Under Constructio	Planned	Total
1	Kapikule - Gerede	579	47		626
2	Gerede - Konya	193	33		226
3	Konya - Aksaray			225	225
4	Aksaray - Tarsus			247	247
5	Tarsus - Mersin			52	52
6	Tarsus - Toprakkale	60			60
7	Toprakkale - Cizre	118	25	503	646
8	Toprakkale - Yayladagi			184	184
9	Izmir - Afyon			331	331
10	Afyon - Konya			222	222
11	Konya - Aksaray			141	141
12	Afyon - Ankara			252	252
13	Ankara - Askale			821	821
14	Askale - Gurbulak			389	389
15	Trabzon - Askale			247	247
16	Gerede - Sarp			887	887
Total		950	105	4,842	5,879

Source : GDH

Note : *- Refer to "Route No." on Figure 3.4.5

3) International European Road (E-Road)

E-Road is the European International Network. European Economic Commission, of which Turkey is a member, encourages the improvement of highways that connect member countries. E-Road Project has twelve routes including planned project in Turkey. This route is next in important to the TTH route. E-Road route almost overlaps TEM routes except for a few routes such as Afyon-Konya-Aksaray(See Figure 3.4.7).

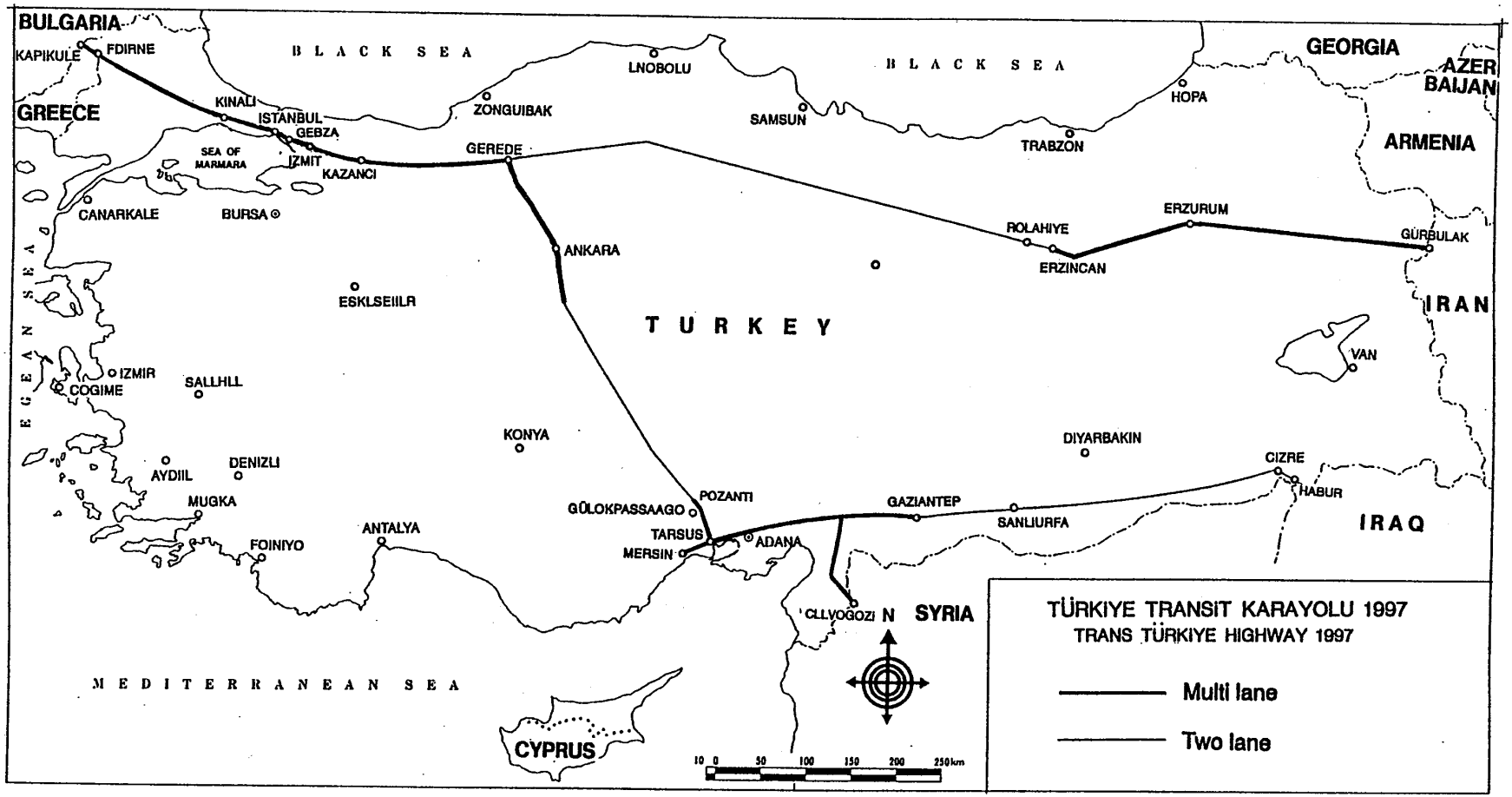


Figure 3.4.3 TTH Network in Turkey

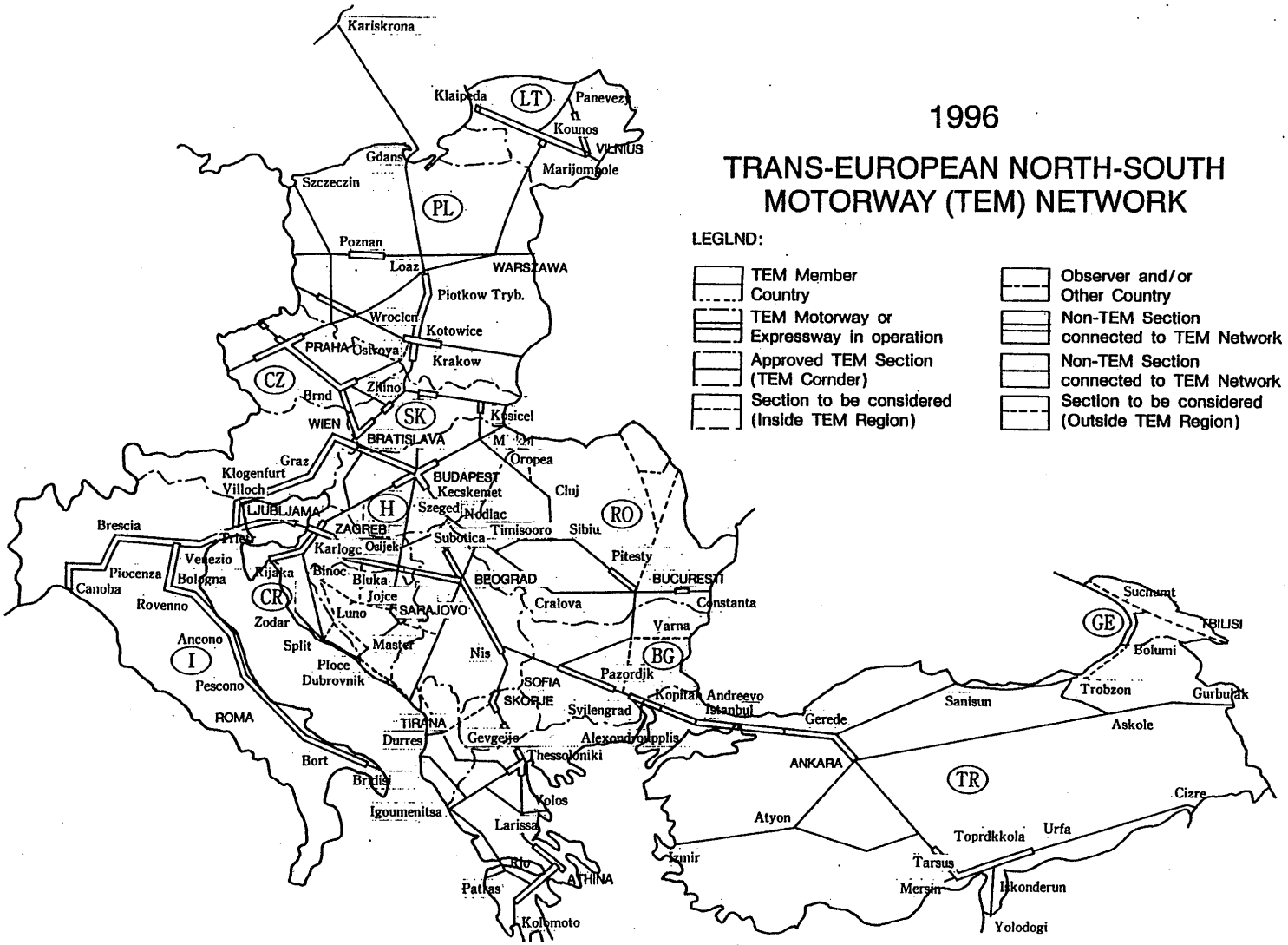


Figure 3.4.4 TEM Network through Europe and Turkey

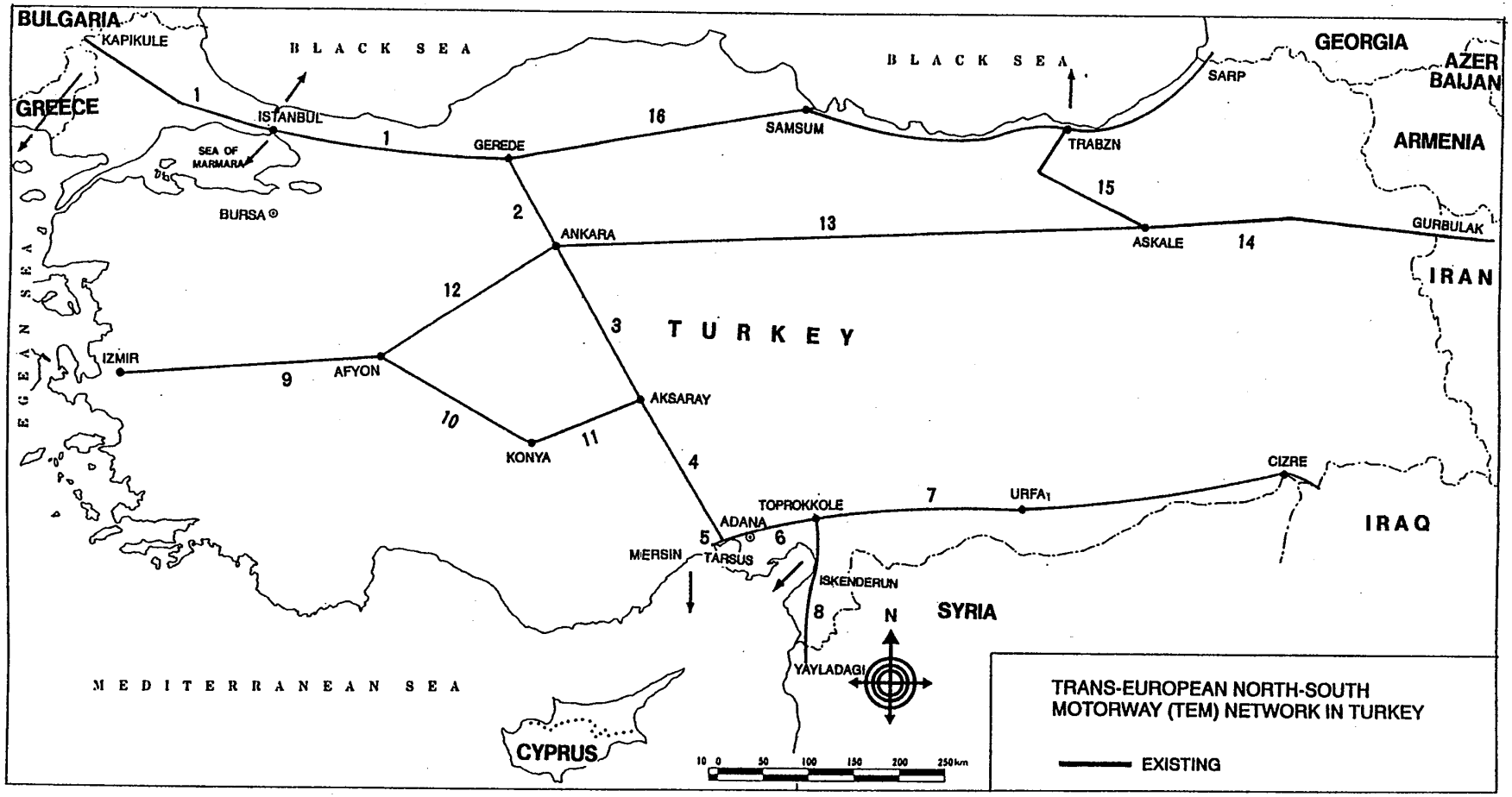
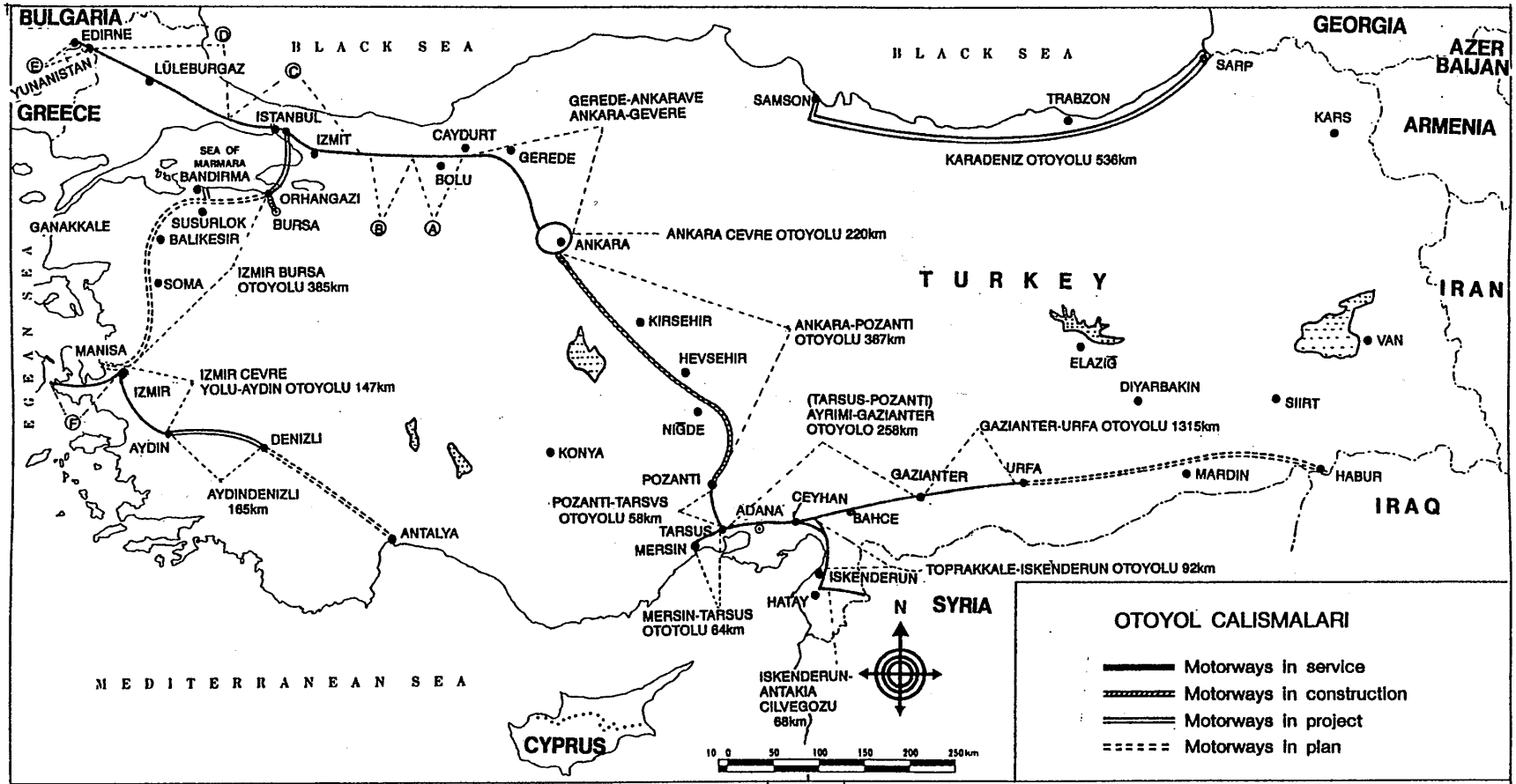


Figure 3.4.5 TEM Network in Turkey



Ⓐ	GÜMUSOVA - GEREVE OTOYOLO 117km	Ⓔ	KAPIKORE EDIRNE OTOYOLU 20km
Ⓑ	KAZANCI - GÜMUSOVA OTOYOLO 38km	Ⓕ	IZMIR - URLA CESME OTOYOLU 98km
Ⓒ	KINALI - SAKARYA OTOYOLO 62km		
Ⓓ	EDIRNE - KINARI OTOYOLO 152km		

Figure 3.4.6 Motorway Network in Turkey

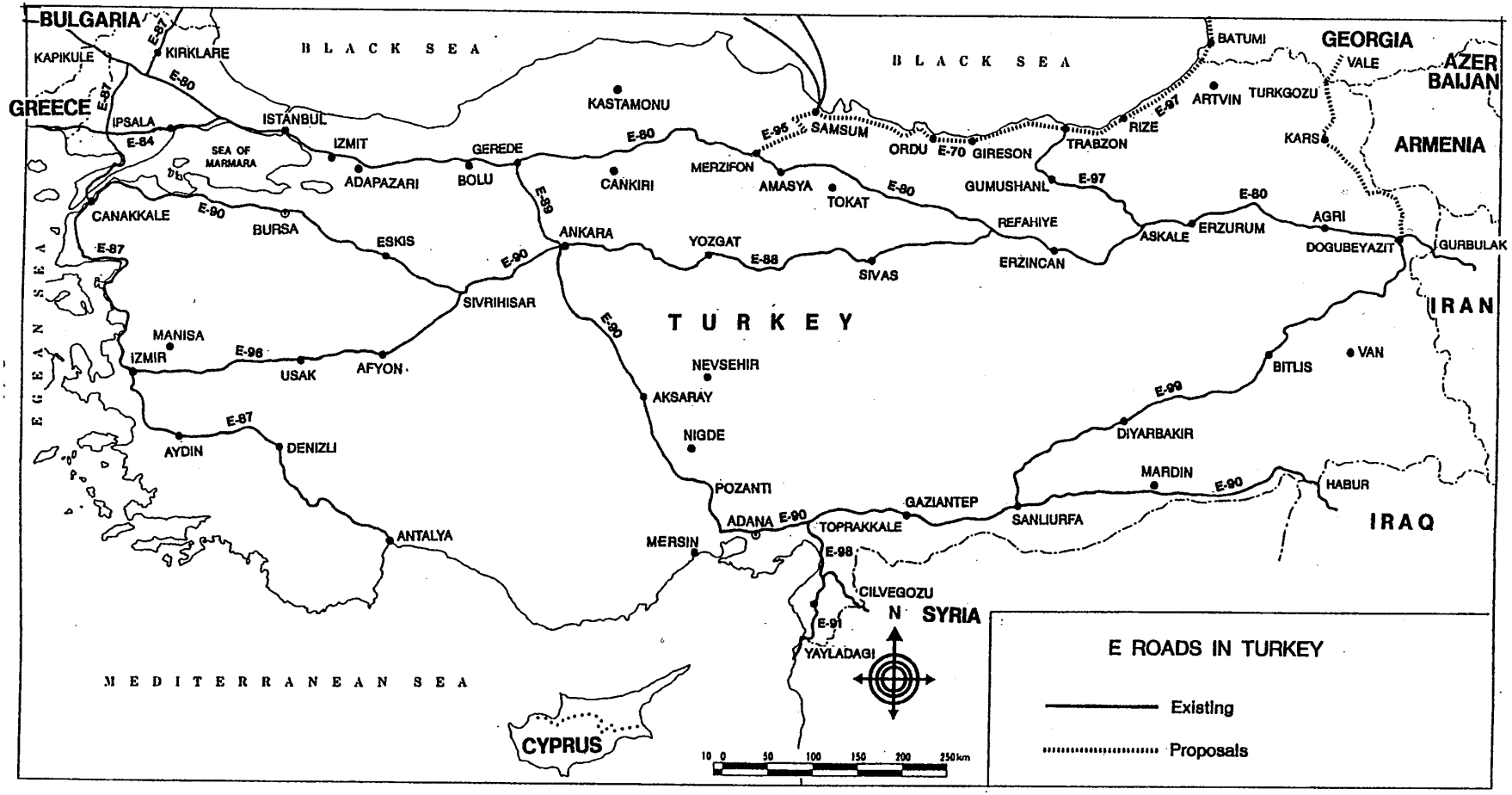


Figure 3.4.7 E-Road Network in Turkey

4) Trading Partners

Generally, EU countries have been Turkey's major trading partner by highway transport. The share of EU countries in terms of export/import volume was 57.6%/43.4% in 1997, while the value of export/import was 56.5%/75.5%. CIS countries, where economies had been sluggish, had a share. of 17.0%/19.2% of export/import volume and its value of export/import was 16.3%/3.6%.

Germany had the most significant share of Turkey's exports and imports among the EU countries with the share of 9.4%, 29.4% of volume/value of export and 14.8%/31.0% import(Sea Table 3.4.17).

Table 3.4.17 Highway Trade Share of Export/Import in 1997

Export			Import		
Country/Area	Volume(%)	Value(%)	Country/Area	Volume(%)	Value(%)
Turkey Total	**100.0**	**100.0**	**Turkey Total**	**100.0**	**100.0**
Europe	**57.6**	**83.1**	**Europe**	**71.8**	**86.2**
EC countries	**30.4**	**56.5**	**EC countries**	**43.4**	**75.5**
Italy	6.7	5.7	Germany	14.8	31.0
Spain	2.7	0.7	Netherlands	4.8	3.6
Germany	9.4	29.4	Italy	6.6	15.3
United Kingdom(UK)	1.8	5.2	France	4.1	7.5
France	2.8	5.6	Belgium and Luxembourg	2.0	2.8
Other countries	7.0	9.9	United Kingdom (UK)	2.8	7.3
			Other countries	8.3	7.8
Other Europe countries	**10.3**	**10.4**	**Other Europe countries**	**9.3**	**7.2**
T.Rep.of Northern Cyprus	0.7	0.2	Romania	2.1	0.6
Norway	1.0	0.4	Bulgaria	3.1	0.7
Romania	2.7	2.4	Norway	0.1	0.1
Switzerland	1.1	1.2	Estonia	0.2	0.0
Bulgaria	1.7	1.1	Switzerland	1.5	4.3
Other countries	3.1	5.1	Other countries	2.3	1.5
CIS countries	**17.0**	**16.3**	**CIS countries**	**19.2**	**3.6**
Russia	6.2	9.2	Russia	10.3	1.5
Ukraine	0.6	0.6	Ukraine	4.7	0.6
Azerbaijan	3.2	1.6	Georgia	1.2	0.1
Georgia	2.8	0.9	Kazakhstan	0.5	0.2
Other countries	4.2	3.9	Belarus	0.4	0.1
			Other countries	2.2	1.1
Africa	**1.5**	**0.5**	**Africa**	**1.3**	**0.3**
America	**4.4**	**1.8**	**America**	**9.7**	**3.6**
Asia	**19.1**	**7.0**	**Asia**	**11.4**	**7.0**
Middle East countries	**13.5**	**6.1**	**Middle East countries**	**8.5**	**1.4**
Israel	1.8	0.2	Saudi Arabia	0.9	0.1
Saudi Arabia	3.4	1.6	Iran	2.9	0.5
U.A.E	0.2	0.1	Syria	0.9	0.3
Syria	2.6	1.3	Other countries	3.7	0.5
Iran	2.6	1.9			
Lebanon	0.5	0.2			
Other countries	2.3	0.8			
Other Asian countries	**5.6**	**0.9**	**Other Asian countries**	**2.9**	**5.6**
Oceania	**0.0**	**0.1**	**Oceania**	**3.6**	**0.4**
Others (Free Zone etc.)	**17.4**	**7.5**	**Others (Free Zone etc.)**	**2.1**	**2.5**

Source : "Foreign Trade by Transport System, 1997" by State Institute of Statistics Prime Ministry Republic of Turkey
Note : (*) Transportation by Railway, Post, Pipeline, Electrical energy and Moving vehicle by itself.

(3) Highway Development Related to the Major Ports

1) Heavy Traffic Congestion at the Bosphorus Bridges and Istanbul Region

Road traffic in Turkey is generally smooth thanks to its well developed road network, except for the Istanbul Region and particularly the Bosphorus Bridges. The Bosphorus Bridges connecting between the east end of Thrace and west end of Anatolia, which have long been major industrial regions in this country from the early days, suffer from congestion. The average daily traffic (ADT) volume is 183 thousand cars per day on the first Bosphorus Bridge and 3.49 thousand cars per day on the second Bosphorus Bridge in 1996. The construction of the Bosphorus Railroad Tube Tunnel is expected to relieve congestion around that area.

2) Surrounding the Major City Regions such as lzmir and Mersin

The traffic surrounding lzmir and Mersin is predicted to be congested in the near future due to the increase of cars and trucks transporting cargo mainly from/to the hinterland of those cities. Izmir and its hinterland has big potential of manufacturing industries and Mersin is located close to Adana which is the largest city in the southeastern area of Turkey. In this region, GAP has been implementing a huge national project to reinvigorate regional economies. A lot of products will be generated from these regions and a great portion of them handled at ports. Therefore, a sufficient transport network is expected to be developed to meet the regional demand.

3) Major Trunk Related to Major Ports

From a viewpoint of port activities, major routes such as Istanbul to Mersin via Ankara, Izmir to Samsun via Ankara, Antarya to lzmir and Ankara via Afyon, Filyos to Ankara, Mersin to GAP region via Adana and Trabzon to GAP region have to be developed in order to evacuate the cargoes from/to ports to/from each hinterland smoothly.

4) Touristic Roads

In Turkey, a total of 2,500km of touristic roads have been completed up to the present. Especially, the roads to the famous tourist spots from Antalya are important for tourism because Antalya has many piers for cruising vessels. Thus, the roads from Antalya to Istanbul via lzmir or Ankara are expected to be developed for passengers using Foreign cruising vessels. Well conditioned roads are needed to attract tourists on board the foreign cruising vessels(Sea Figure 3.4.8).

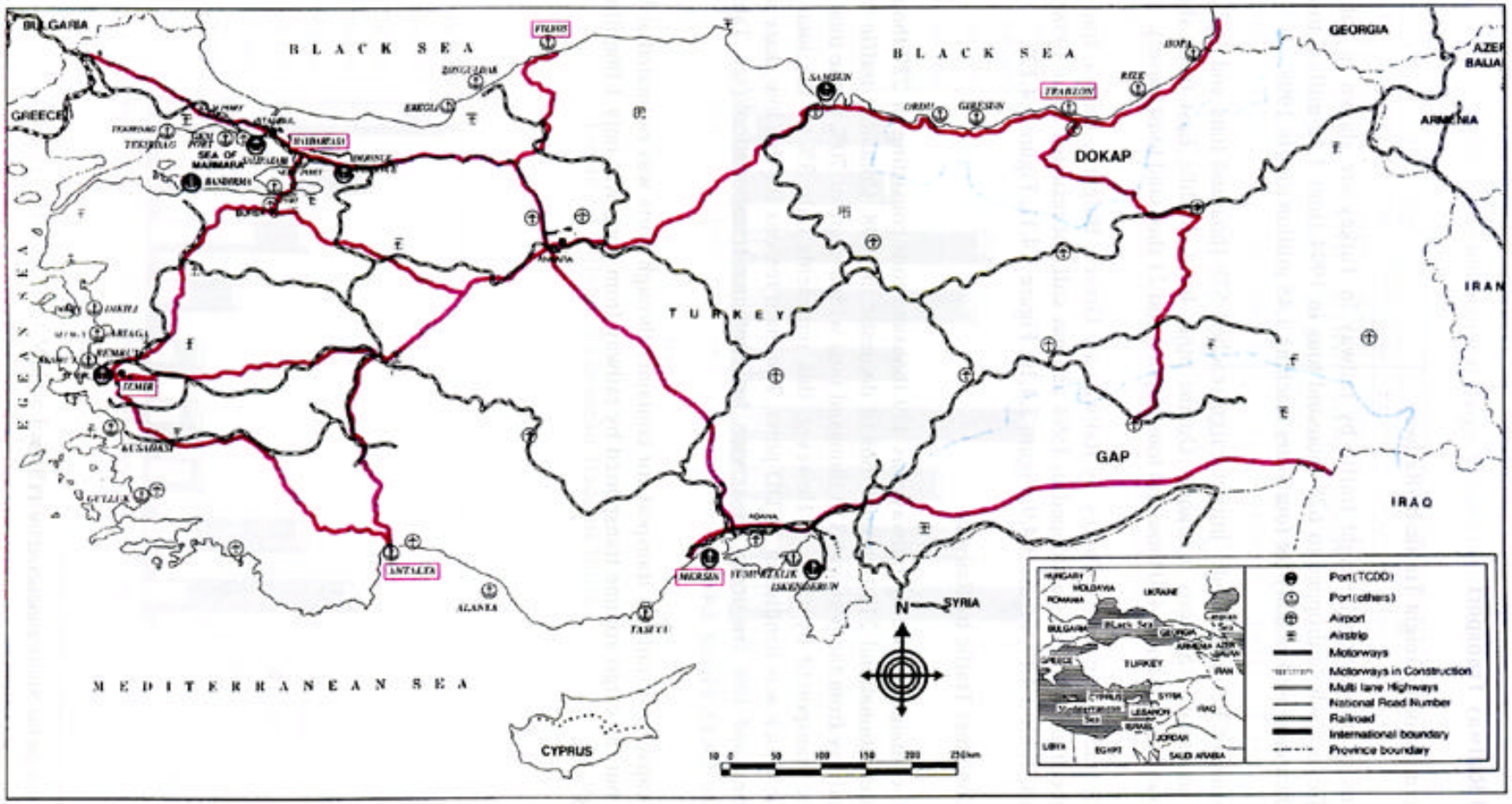


Figure 3.4.8 Major Trunk Related to Major Ports

3.4.4 Railway Transport

(1) International Freight Traffic by Railway

Trends in international freight traffic by railway in Turkey are shown in Table 3.4.21. Traffic as a whole dropped to 628 thousand tons in 1994 from 3.42 million tons in 1990 but then increased steadily for four years reaching 1.45 million tons in 1998.

In terms of European trade, import cargo reached 678 thousand tons and 162 thousands tons in export, 182 tons in transit. On the other hand, Middle East trade showed 117 thousand tons(export), 470 thousand tons(import) and 21 thousand tons(transit).

Major trading partners of Turkey by Railway are Greece, Bulgaria, Russia, Iran and Syria but the trade with Russia stopped in 1994 and has still not resumed as of 1998(See Table 3.4.18, Table 3.4.19, Figure 3.4.9, Figure 3.4.10, Figure 3.4.11, Figure 3.4.12).

(2) Container Traffic by Railway

Total container traffic by railway was 439 thousand tons consisting of 227 thousand tons of international and 212 thousand tons of domestic in 1998. Container traffic transported by railway from the port was 310 thousand tons with a share of 70% to the total container traffic transported by railway. However, this represents only 3% of the total container traffic which was handled at TCDD ports. The main reasons for this low share are lack of wagons and low frequency of service for container transportation[1)](see Table 3.4.20, Figure 3.4.13, Figure 3.4.14).

The capacity of railway transport for container through ports was estimated at 9.1million tons but the cargo volume transported by railway from ports was only 1.06million tons in 1998[1)].

[1)] Based on the Study conducted by TCDD

Table 3.4.18 International Cargo Volume by Railway

(Unit : tons)

Year	European Trade				Middle East Trade				Total
	Export	Import	Transit	Sub - Total	Export	Import	Transit	Sub - Total	
1990	60,000	379,000	24,000	463,000	750,000	82,000	25,000	857,000	1,320,000
1991	11,000	423,000	19,000	453,000	503,000	126,000	12,000	641,000	1,094,000
1992	104,000	600,000	25,000	729,000	315,000	128,000	13,000	456,000	1,185,000
1993	114,000	555,700	10,351	680,051	121,193	116,059	6,399	243,651	923,702
1994	99,637	382,121	5,140	486,898	75,613	60,995	4,934	141,542	628,440
1995	101,945	747,386	4,355	853,686	93,420	32,584	12,811	138,815	992,501
1996	119,596	468,307	1,791	589,694	128,708	13,093	8,180	149,981	739,675
1997	127,999	523,969	936	652,904	142,635	298,656	17,838	459,129	1,112,033
1998	161,830	677,948	182	839,960	116,863	469,508	21,082	607,453	1,447,413

Source : TCDD

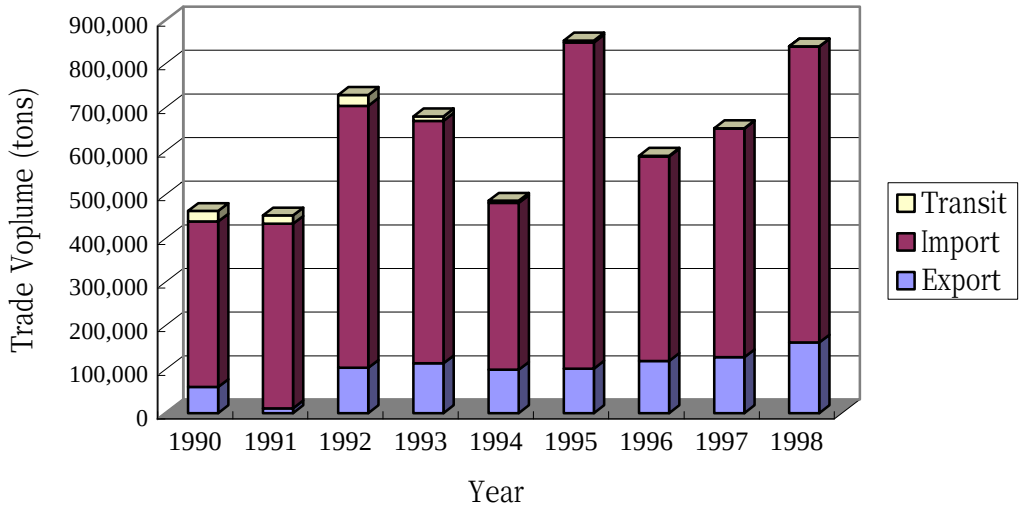


Figure 3.4.9 Trend of European Trade by Railway

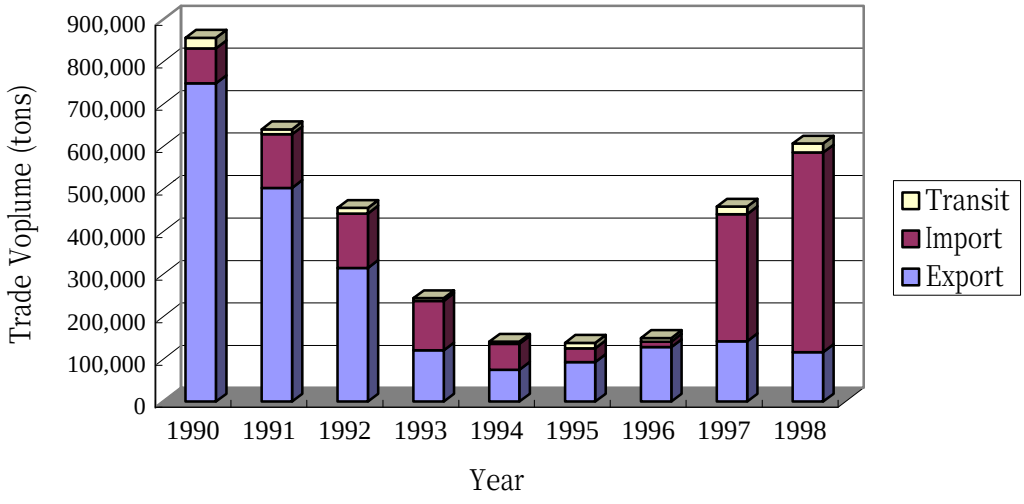


Figure 3.4.10 Trend of Middle East Trade by Railway

Table 3.4.19 International Cargo Volume by Major Trading Partners by Railway

(Unit : tons)

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Greece										
Export	n.a.	1,443	6,582	2,599	n.a.	2,174	628	214	147	198
Import	n.a.	10,371	2,532	1,524	n.a.		1,974	98	486	1,576
Total		11,814	9,114	4,123		2,174	2,602	312	633	1,774
Bulgaria										
Export	n.a.	23,608	70,449	28,966	n.a.	25,244	20,893	24,141	32,473	38,396
Import	n.a.	135,766	232,797	371,252	n.a.	170,603	609,507	310,482	310,469	396,981
Total		159,374	303,246	400,218		195,847	630,400	334,623	342,942	435,377
Russia										
Export	109,813	24,449	46,250	46,177	12,856	0	0	0	0	0
Import	56,265	25,783	88,210	64,578	19,007	0	0	0	0	0
Total	166,078	50,232	134,460	110,755	31,863	0	0	0	0	0
Iran*1										
Export	451,926	526,089	182,524	87,340	18,255	9,043	9,720	23,004	26,732	39,645
Import	11,949	43,525	7,534	8,195	9,821	7,571	9,239	9,617	233,002	330,356
Total	463,875	569,614	190,058	95,535	28,076	16,614	18,959	32,621	259,734	370,001
Syria										
Export	184,736	199,875	274,034	181,119	90,082	66,570	83,700	105,704	115,903	77,218
Import	2,247	12,277	29,892	55,568	87,240	53,424	23,345	4,286	65,654	139,152
Total	186,983	212,152	303,926	236,687	177,322	119,994	107,045	109,990	181,557	216,370
Total										
Export	746,475	775,464	580,109	346,201	121,193	103,031	114,941	153,063	175,255	155,457
Import	70,461	227,722	360,965	501,117	116,068	231,598	644,065	324,483	609,611	868,065
Total	816,936	1,003,186	941,074	847,318	237,261	334,629	759,006	477,546	784,866	1,023,522

Source : TCDD

Note : All figures except container volume, *1 : Include cargo volume for Turkmenistan

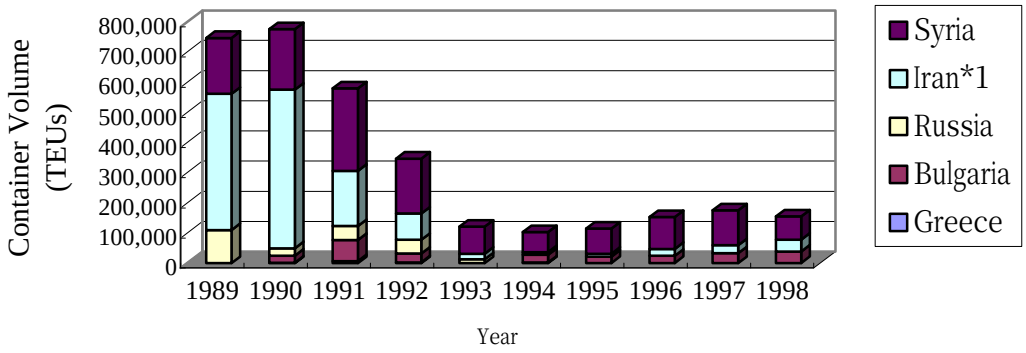


Figure 3.4.11 Trend of Export Cargo Volume by Major Trading Partners by Railway

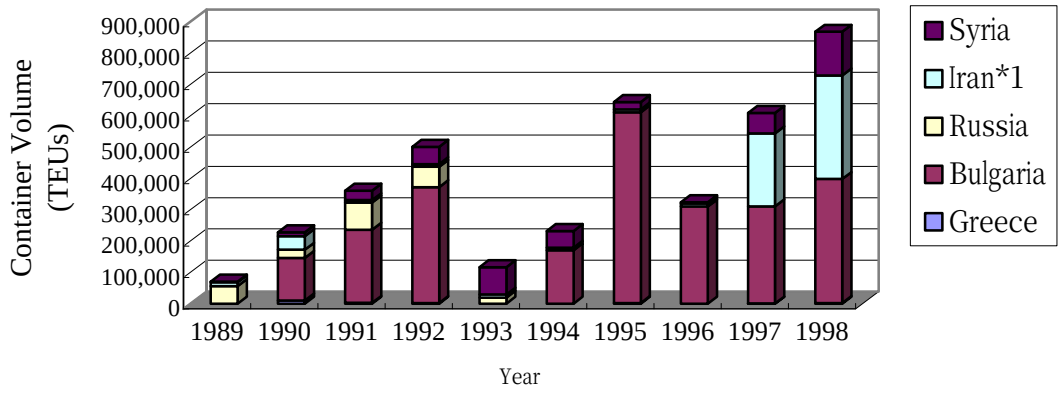


Figure 3.4.12 Trend of Import Cargo Volume by Major Trading Partners by Railway

Table 3.4.20 Container Traffic by Railway

Year	Export		Import		Total		Domestic
	TEUs	tons	TEUs	tons	TEUs	tons	tons
1990	1,155	12,760	1,217	29,290	2,372	42,050	
1991	1,729	21,723	2,185	46,392	3,914	68,115	
1992	3,442	23,334	4,173	54,768	7,615	78,102	
1993	6,424	23,140	6,886	118,466	13,310	141,606	
1994	4,914	44,265	4,910	74,604	9,824	118,869	
1995	5,707	40,892	5,876	90,836	11,583	131,728	44,490
1996	5,788	36,211	6,700	97,682	12,488	133,893	93,372
1997	7,898	74,701	7,632	114,499	15,530	189,200	66,342
1998	8,411	106,747	7,450	120,282	15,861	227,029	212,121

Source : TCDD

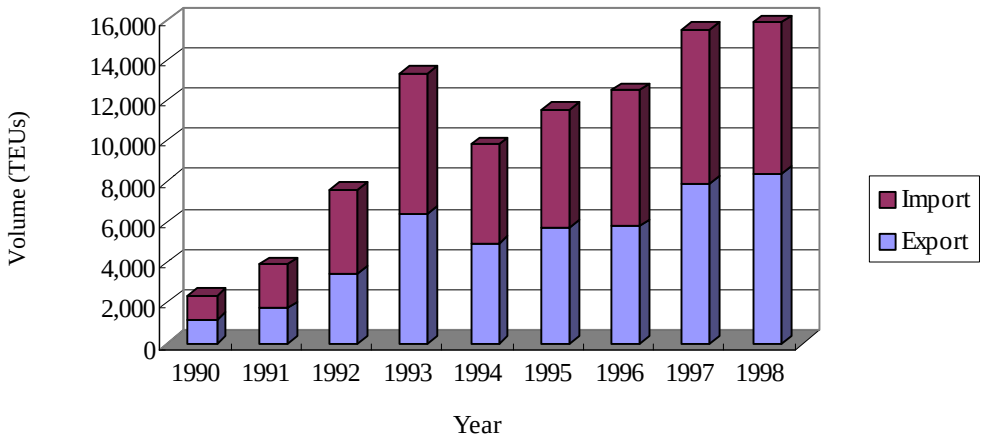


Figure 3.4.13 Trend of International Container Traffic by Railway

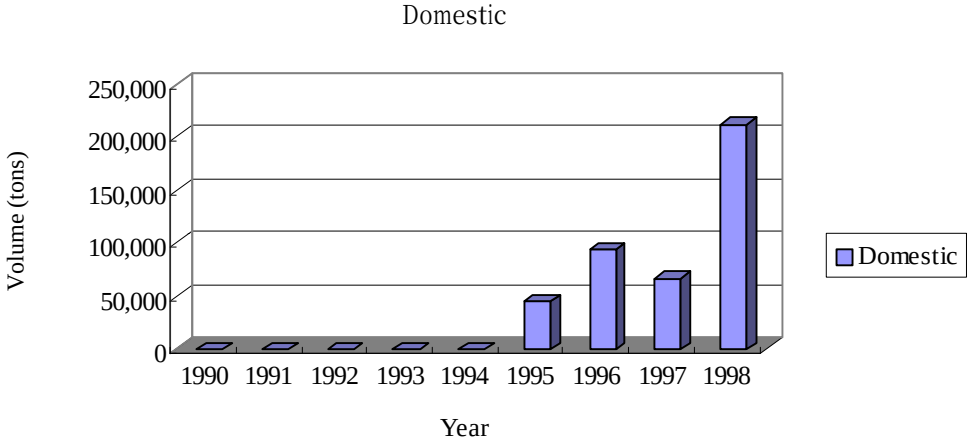


Figure 3.4.14 Trend of Domestic Container Traffic by Railway

(3) Railway Development Related to Port Development

The railway in Turkey had reached a length of about 8,000km by the 1950s, but railway construction subsequently development has fell off, as priority was given to highway development to cope with motorization. And in 1998, only by 6.0% of the government national transport budget was allocated to railway only 6.0% of the compared with 69.8% for highway.

On the other hand, railway operation system has not been conducted in a way as to adapt to meet the market demand. According to the study conducted by TCDD, cargo volume through ports transported by railway was 38% of railway's capacity to total cargo volume handled at ports in 1998. Consequently, railway transport is not used sufficiently for cargo transportation through ports.

After this, cargo volume through ports will be estimated including rapid growth of container cargo. For high-value cargo such as containers both a faster mode and sufficient frequency service of transport are usually preferred. Thus, the railway development related to ports is required to meet the container demand so as to smoothly evacuate port traffic to/from the hinterland. Another important element of container transportation by railway is door-to-door service which required good coordination with other modes.

(4) Bosphorus Tube Tunnel

Istanbul is the largest city in Turkey with a population of more than nine million in 1997, and has historically, been the country's economic and industrial center. In 1997, 22.8% of Turkey's GDP was created in, Istanbul, which is spread out over two continents.

Existing traffic level between the Asian side and the European side is causing many delays in the daily life of those living or working Istanbul. Traffic jams, accidents, polluted air and excessive noise are serious problems.

The Bosphorus bridges were intended to create an efficient and economic transportation link in the region but traffic has been heavily congested due to industrial and private transportation vehicles. Traffic congestion created by these links has also reduced the efficiency of the public transportation systems Such as buses. High capacity public transportation systems to satisfy the transportation needs of Istanbul have not been effectively implemented.

Turkey's government has decided that a railway transportation system crossing the Bosphorus strait by tube tunnel would be the most effective way to solve the problem. In addition, this project includes a railway line which will go through the existing busiest route on the surface such as Halkali and Yedikule on the European side and Sogutlucesme and Gebze on the Asian side so as to increase the capacity of the existing transportation system, modernize the existing Commuter Railway Line on both sides of the Bosphorus. This project will be expected to relieve congestion traffic on and around the Bosphorus bridges. General characteristics of this project are shown in Table 3.4.21.

Table 3.4.21 General Characteristic on the Bosphorus Tube Tunnel and Surface Metro

Item	Description
Total length of line	76.3 km
Length of line (surface)	63.0 km
Length and structural type of tube tunnel	1.8 km, Sunken tube
Length of tube tunnel alignment	13.3 km
Number of trucks	2 at tube tunnel and approach, 3 at other section
Number of Station	41 (4 underground, 37 surface)
Length of station	180 m (minimum)
Capacity (one way)	75,000 (passenger / hr / one way)
Maximum grade	0.18 %
Maximum speed	100 km / hr
Number of vehicles	544 (Year 2005), 672 (Year 2015)
Headway	2 min - 10 min

Source : DLH

3.4.5 Other Transport

(1) Pipeline Transport

1) Existing Pipeline

Four crude oil pipelines, one main pipeline and two transmission pipelines for LNG are found in Turkey. Table 3.4.22 shows the feature of the existing crude oil and natural gas pipeline, while Figure 3.4.15 shows the route of each pipeline.

Table 3.4.22 Existing Crude Oil and Natural Gas Pipeline

Pipeline Name	Throughput	Capacity	Diameter	Length
Crude Oil Pipeline	(million tons)	(million tons	(inch)	(km)
1. Iraq - Turkey crude Oil Pipeline	37.4 *1	70.9	46-40	1,297
2. Ceyhan - Kirikkale Crude Oil Pipeline	3.2	5.0	24	448
3. Batman - Dortyol Crude Oil Pipeline	2.4	3.5	18	511
Natural Gas Pipeline	(million tons)			
1. Russian Federation - Turkey Natural Gas Pipeline		—	36-30-24	842.0
2. Izmit - Karadeniz Eregli Natural Gas Pipeline	10,236	—	24-18-16	209
3. Bursa - Can Natural Gas Pipeline		—	24-16-8	208
4. Marmara - Ereglisi LNG Import Terminal	—	—	—	—

Source : BOTAS

Note : *1, under the United Nation's resolution for embargo relief

2) Development Plan

In the beginning of the 1990s, the collapse of the Former Soviet Union created new economic conditions while introducing profound geopolitical change. The enormous reserves of crude oil and natural gas in the Caspian Basin appears to be the most significant one to be evaluated.

Considering the proximity of Turkey to the Region, BOTAS has been carrying on studies regarding crude oil and natural gas pipeline project aiming at the transportation of these resources to Turkey. This project will not only meet Turkey's own demand but also deliver the Region's resources to the world market. Turkey and the countries in the Region will enjoy the economic, political and social advantages of this project. As of November 1999, the Pipeline Agreement will be signed between the Government of Turkey and the Government of Azerbaizidjan as the pipeline route through Turkey to Ceyhan. Other planned pipeline projects are referred to in Table 3.4.26, and the route of each pipeline is shown in Figure 3.4.16.

Table 3.4.23 Planned Crude Oil and Natural Gas Pipeline

Pipeline Name	Capacity	Start Operation
Crude Oil Pipeline		
1. Baku - Ceyhan Crude Oil Pipeline	45million tons	2004
3. Ceyhan - Samsun Crude Oil Pipeline		
Natural Gas Pipeline		
1. Eastern Anatolia Natural Gas Main Transmission Pipeline		
2. Turkmenistan - Turkey - Europe Natural Gas Pipeline	30billion tons	
3. Russian Fed. - Black Sea - Turkey Natural Gas Pipeline	500million m^3	2000
	16billion m^3	2007
4. Egypt - Turkey Natural Gas Pipeline	—	
5. Iraq - Turkey Natural Gas Pipeline		
6. Can - Canakkale Natural Gas Pipeline		
7 Karacabey - Izmir Natural Gas Pipeline		

Source : BOTAS

(2) Inland Waterway Transport

1) General

Inland waterway transport is the oldest kind of transport. One of its merits is that it's a natural means of transport. The other transport means are considerably expensive. The other advantage of the inland waterway transport is that it is a relatively simple, energy-efficient and ecologically friendly. bland waterway transport is a very important way of transport not only in Eastern Europe but also in the west.

From its spring to its estuary into the Black Sea, the length of Danube is 2,900Km and its drainage area is 816,974km^2. For smaller ships and punts, Danube is navigable from Ulm[1)] but for commercial ships it is navigable from Regensburg[2)] which lies 2,379km from its estuary. The whole length of its navigable part from Ulm to Splina[3)] is 2,588km.

The Commission of the European Communities, consisting of the Governments of Slovakia, Hungary, Romania and Bulgaria, conducted the study for the Danube Corridor Development in 1996. The essential points of the study are summarized as follows.

[1)] Located at about 70km Southern east from Stuttgart in Germany
[2)] Located at about 170km eastern north from Ulm
[3)] Located near the estuary of Danube beside the Black Sea

2) Past and Present Condition

① Traffic Volume

Traffic volume of the Danube river in the four concerned countries has been decreasing substantially since the end of eighties. According to Danube Commission figures, total traffic volume dropped from 76.7million tons in 1989 to 2l.5millions tons in 1994(See Table 3.4.24).

Table 3.4.24 Total Port Traffic

(Unit : thousand tons)

Country	1989	1993	1994
Slovak Republic	15,746	3,634	2,213
Hungary	17,776	4,914	2,130
Romania	35,534	14,536	14,586
Bulgaria	7,675	2,556	2,566
Total	76,731	25,640	21,495
Index	100	33	28

Source : Danube Commission Statistics

② Commodities

As far as commodities are concerned, major commodities of river traffic were crude minerals(basically sand and gravel dredged in the Danube river), iron ore, solid fuels,

industrial products and miscellaneous. From 1989 to 1994, river transport demand decreased systematically for each commodity except for miscellaneous. Miscellaneous includes general cargo such as fruits, vegetables, food, sugar, tobacco, chemicals and other unidentified products. Transport demand for this group of commodities increased drastically by almost 80% during the same period.

3) Traffic Forecasts

Table 3.4.25 shows the forecasts for the nine groups of commodities. The commodity group divided into two categories such as Bulk cargo and Conventional cargo are normally suitable for combined transport in containers and Ro-Ro etc. Increasing transport demand for processed goods, metals, oilseeds, nuts, fats and oils, processed Food products, beverages and tobacco indicates the diversification of industries along the Danube(mainly in Hungary and Slovak Republic at the present time) and the evaluation of consumer needs and requirements. The share of Conventional cargo has been forecasted to increase to 26% in 2015 from 19% in 1994 while Bulk cargo will decrease to 74% from 80% in the same period.

In this sense, it will be necessary to realize port investment in order to develop a container and Ro-Ro terminal.

Table 3.4.25 Traffic Forecast by Commodities

(Unit : thousand tons)

№	Commodity	1994	%	2000	2005	2015	%
	Bulk cargo						
Ⅰ.	Iron ore	4,044	19	6,815	6,815	6,815	22
Ⅱ.	Non ferrous ore	1,122	5	1,080	1,080	1,080	3
Ⅲ.	Crude minerals	7,197	33	3,810	3,810	3,810	12
Ⅳ.	Construction materials	483	2	540	630	830	3
Ⅴ.	Solid fuels	2,944	14	6,445	6,445	6,445	21
Ⅵ.	Crude oil, refined products	1,505	7	2,010	2,575	4,210	13
	Sub - total	17,295	80	20,700	21,355	23,190	74
Ⅶ.	Agricultural products	956	4	1,115	1,335	1,735	6
Ⅷ.	Industrial products	2,014	9	2,585	2,585	2,585	8
Ⅸ.	Miscellaneous	1,230	6	1,740	2,175	3,620	12
	Sub - total	4,200	20	5,440	6,095	7,940	26
	Total	21,495	100	26,140	27,450	31,130	99
	Index	100		122	128	145	

Source : Commission of the European Communities

Chapter 4 Cargo and Passenger Traffic in 2020

4.1 Socio-economic Framework in 2020

(1) Population

The State Institute of Statistics (SIS) has carried out the projection of future population in Turkey. According to the study, it is estimated that population of Turkey will become 82 million in 2020. Yearly increase rates and other detailed conditions are summarized in Table 4.1.1 and 4.1.2.

Table 4.1.1 Midperiod Indices for Five-Year Time Periods

Unit:thousand

	1997- 2002	2002- 2007	2007- 2012	2012- 2017	2017- 2022
POPULATION SIZE	64,783	69,321	73,641	77,723	81,554
YEARLY BIRTHS	1,338	1,334	1,330	1,325	1,319
YEARLY DEATHS	412	447	491	533	580
NET YEARLY MIGRANTS	0	0	0	0	0

Source: SIS

Table 4.1.2 Yearly Rates per Thousand Population

Unit:‰

	1997- 2002	2002- 2007	2007- 2012	2012- 2017	2017- 2022
GRF=BIRTHS/FEM(15-44)	84.2	78.3	74.6	71.9	70.4
BIRTH RATE	20.7	19.2	18.1	17.0	16.2
DEATH RATE	6.4	6.5	6.7	6.9	7.1
NATURAL INCREASE	14.3	12.8	11.4	10.2	9.1
NET MIGRATION	0.0	0.0	0.0	0.0	0.0
POP. INCREASE	14.3	12.8	11.4	10.2	9.1

Source: SIS

(2) GDP and Sectorial Growth

The State Planning Organization (SPO) has studied the long term development policy on national economy; "The Turkish Economy 2020". According to the study, the socio-economic framework toward the year 2020 is summarized as follows.

In this study, two different scenarios have been adopted; low growth and high growth. The first one means Turkish economy will grow realized only at historical speed. The second one means structural transformation of the national economy will be realized at an accelerated speed. In other words, it means the target of the economic policy such as "Five Year Development Plan" prepared by the government will be achieved.

Table 4.1.3 Annual Growth Rate of GDP and Each Sector

Unit:%

YEAR	HIGH GROWTH			
	GDP	AGRICULTURE	INDUSTRY	SERVICES
1999-2000	4.2	1.5	2.9	5.4
2001-2005	5.7	1.5	6.3	6.2
2006-2010	6.0	1.5	6.4	6.5
2011-2015	6.4	1.6	6.5	7.0
2016-2020	6.6	1.6	6.8	7.0
YEAR	LOW GROWTH			
	GDP	AGRICULTURE	INDUSTRY	SERVICES
1999-2000	3.9	1.0	2.8	5.1
2001-2005	3.7	1.0	2.7	4.6
2006-2010	4.0	1.0	2.5	5.0
2011-2015	4.5	1.2	2.3	5.7
2016-2020	5.1	1.3	2.2	6.3

Source: SPO

4.2 Methodology of Demand Forecast

(1) Flow Chart of Demand Forecast

The flow chart of demand forecast is shown in Figure 4.2.1. First, the scenarios have been examined according to the international relation and the regional development plan. Then, the socioeconomic framework in 2020 is set up as mentioned in section 4.1.

In this study, two different methodologies have been adopted for the demand forecast; macroscopic and microscopic. Macroscopic forecast projects the traffic, which controls total volume, by using main economic indices such as GDP or population as independent variables. Microscopic forecast projects traffic by each commodity. It is conducted by using indices which have a close relation with each commodity.

After the projection by two methodologies, the nationwide cargo traffic is obtained through a crosscheck both results. Adding the transit cargo to above results, the forecast of cargo and passenger traffic in ports is projected as an end output.

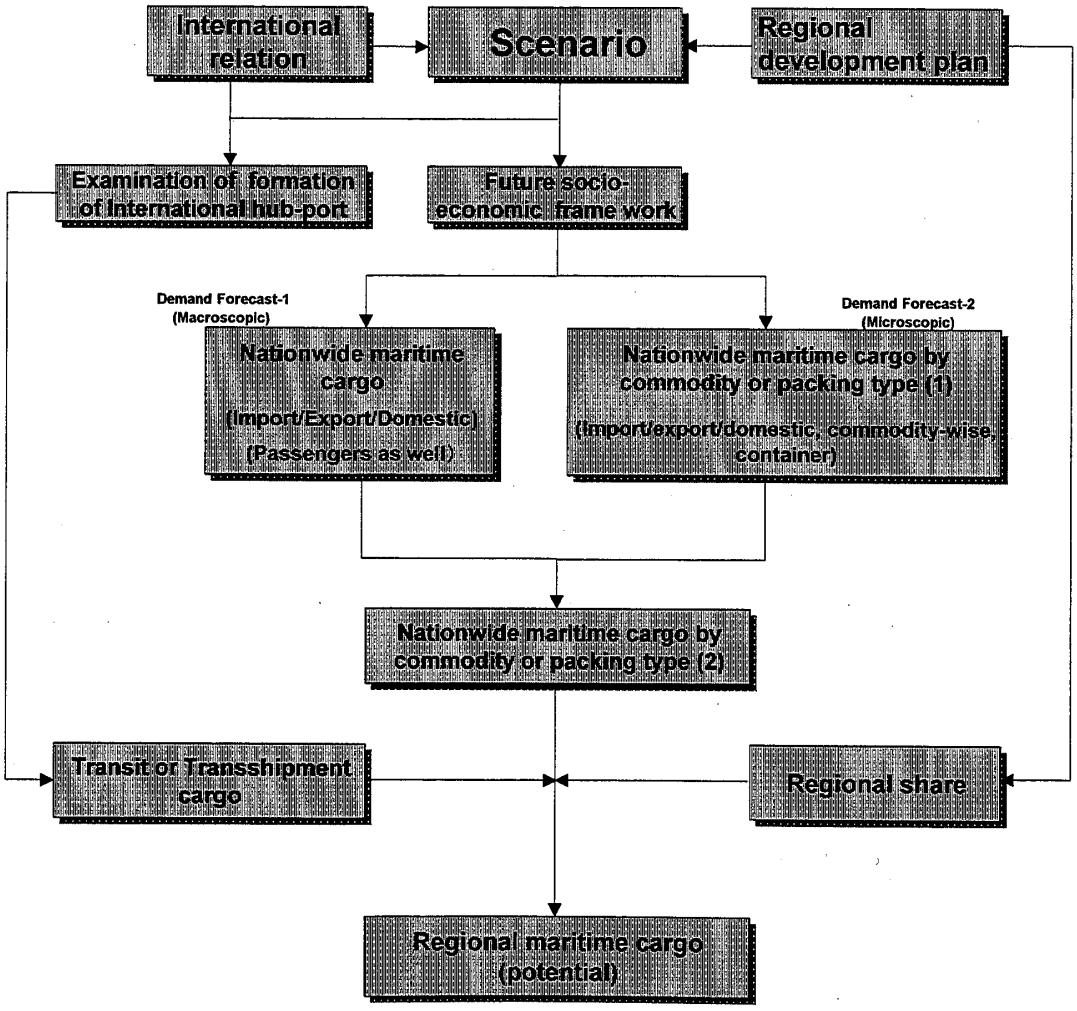
(2) Methodology of Demand Forecast

Adopted methodologies and independent variables are summarized in Table 4.2.1. In principle, the regression analysis between traffic and socioeconomic indices is adopted.

In case of the macroscopic forecast, GDP of Turkey is used as an independent variable in import cargo, domestic cargo and departing citizen projection. On the other hand, GDP of major trading partner countries such as OECD countries is used in export cargo and

arriving foreigner projection. In OECD countries, the increase of GDP means a rise of GDP per capita because of small growth in population. Population of Turkey and population of Istanbul are used in domestic passenger and City Line passenger projection respectively.

In case of the micro forecast, regression analysis is also adopted using indices which have a close relation with each commodity. However, when a close relation is not found between traffic and a certain indicator, assumption from past trend is to be adopted. Concerning the primary energy resources such as crude oil and LNG, Ministry of Energy and Natural Resources (MENR) has planned the import volume. Accordingly, these volumes are regarded as given conditions.



Source: JICA Study Team for ULIMAP

Figure 4.2.1 Flow Chart of Demand Forecast

Table 4.2.1 Methodologies of Analysis

RA: Regression Analysis

Traffic (y)					Method	Independent Variable (x)	Equation	R2	Term
Macro Forecast	Cargo		a)Export.		RA	GDP of OECD Countries	y = 3,294.45 x – 38,249,082.30+Grain	0.93	`89-`98
			b)Import		RA	GDP of Turkey	y = 125,032,918.32 Ln(x) – 1,370,546,480.58	0.98	`89-`98
			c)Domestic.		RA	GDP of Turkey	y = 23,991,437.85 Ln(x) – 239,856,464.06	0.81	`91-`98
	Passenger	1)Int'l	Departure		RA	GDP of Turkey	y = 700,494.01 Ln(x) – 7,731,440.00	0.78	`89-`97
			Arrival		RA	GDP of OECD Countries	y = 79.58x - 264,298.14d - 597,569.77 (d: dummy for `91)	0.95	`89-`97
			of which, cruising		Rate of Excursionist against international passenger			—	—
		2)Domestic			Proportion to population of Turkey (x)		$y_n = y_{n-1} * x_n / x_{n-1}$	—	—
		3)City Line (Preliminary)			Proportion to population of Istanbul (x)		$y_n = y_{n-1} * x_n / x_{n-1}$	—	—
					Total Cost (Fare and Time) Modal Split Model-----(Impact of Railway Project)			—	—
Micro Forecast	General Cargo			Ex.	RA	GDP of OECD Countries	y = 2,535.44 x – 30,917,305.24	0.85	`89-`98
				Im.	RA	GDP of Turkey	y = 45,973,174.80 Ln(x) – 505,155,856.13	0.93	`89-`98
				Do.	RA	GDP of Turkey	y = 5,025,155.51 Ln(x) – 54,916,781.32	0.72	`91-`98
	Dry Bulk	1)Grain		Ex.	Assumption from Past Trend (Domestic Pro.-Consumption)			—	—
				Im.	Proportion to industrial production (x)		$y_n = y_{n-1} * x_n / x_{n-1}$	—	—
				Do.	Assumption from Past Trend			—	—
		2)Ore		Ex.	RA	GDP of Major Trading Partner C.	y = 440.35 x – 4,948,545.92	0.71	`89-`98
				Im.	RA	Industrial production	y = 240.27 x – 2,448,592.10	0.83	`89-`98
				Do.	Assumption from industrial production (x)		y = 38.65 x + 623,334.68	—	—
		3)Hard coal		Ex.	Primary Energy Balance Prepared by MENR			—	—
				Im.	RA	Industrial production	y = 460.28 x – 4,439,025.43	0.88	`89-`98
				Do.	Assumption from Past Trend			—	—
	Liquid Bulk	4)Crude oil		Ex.	Primary Energy Balance Prepared by MENR (Ministry of Energy and Natural Resources)			—	—
				Im.	Primary Energy Balance Prepared by MENR			—	—
				Do.	Assumption from industrial production (x)		y = 175.56 x – 295,256.94	—	—
		5)Petroleum Products		Ex.	Assumption from Past Trend			—	—
				Im.	RA	Industrial production	y = 8,807,626.28 Ln(x) – 85,898,618.55	0.69	`89-`98
				Do.	RA	Industrial production	y = 11,789,899.68 Ln(x) – 104,073,680.64	0.85	`91-`98
		6)LNG		Ex.	Primary Energy Balance Prepared by MENR			—	—
				Im.	Primary Energy Balance Prepared by MENR			—	—
				Do.	RA	Industrial production	y = 308,312.56 Ln(x) – 2,563,615.41	0.78	`91-`98
		7)Other liquids		Ex.	Assumption from Past Trend			—	—
				Im.	Proportion to Industrial production (x)		$y_n = y_{n-1} * x_n / x_{n-1}$	—	—
				Do.	Assumption from Past Trend			—	—
	Timber			Ex.	Assumption from Past Trend			—	—
				Im.	Proportion to Industrial production (x)		$y_n = y_{n-1} * x_n / x_{n-1}$	—	—
				Do.	Assumption from Past Trend			—	—

Source: JICA Study Team for ULIMAP

4.3 Cargo and Passenger Traffic in 2020

4.3.1 Cargo Traffic in 2020

(1) International Cargo

1) Cross Check of the Results

Table 4.3.1 shows a comparison of cargo traffic obtained by the macro forecast and micro forecast described in section 4.2. The traffic of the micro forecast falls between the high case and low case traffic of the macro forecast. Herein, the results of micro forecast will be adopted as a final traffic of nationwide international cargo.

Table 4.3.1 Cross Check of the Results

Unit: tons

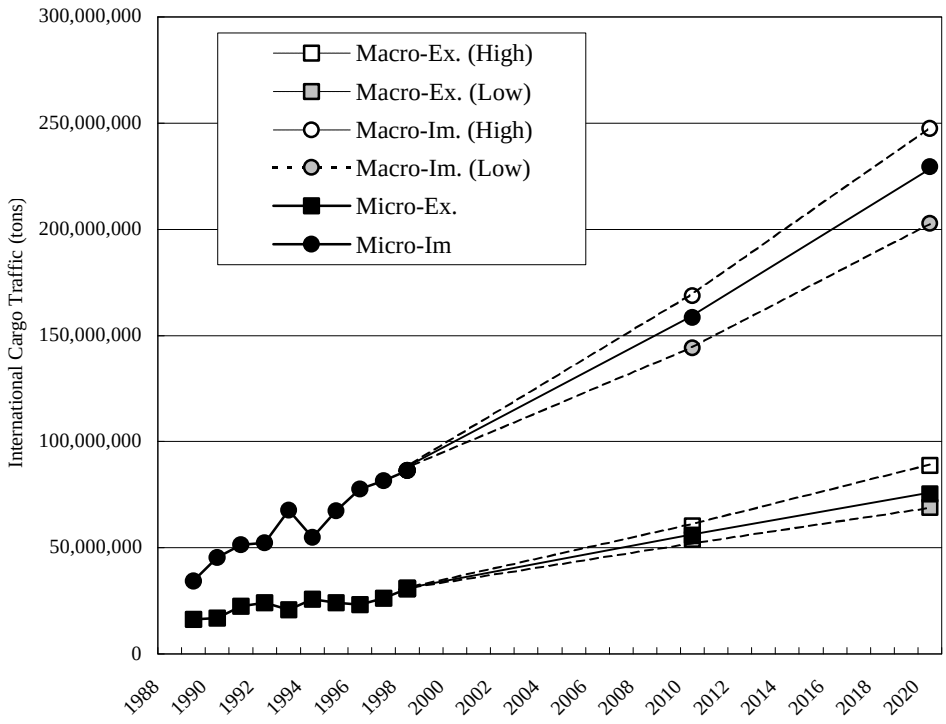
		1998		2010		2020	
Macro Forecast							
Total	High	117,153,476	1.0	229,000,000	2.0	336,000,000	2.9
	Low	117,153,476	1.0	198,000,000	1.7	272,000,000	2.3
Export	High	30,831,931	1.0	60,000,000	2.0	89,000,000	2.9
	Low	30,831,931	1.0	54,000,000	1.8	69,000,000	2.2
Import	High	86,321,545	1.0	169,000,000	2.0	247,000,000	2.9
	Low	86,321,545	1.0	144,000,000	1.7	203,000,000	2.3
Micro Forecast							
Total		117,153,476	1.0	217,000,000	1.8	308,000,000	2.6
Export		30,831,931	1.0	56,000,000	1.8	75,000,000	2.4
Import		86,321,545	1.0	161,000,000	1.9	233,000,000	2.7

Note. In addition, following transit cargo will be realized.

1) Iraq-Turkey Crude Oil Pipe Line: It is expected 70.9 million tons of crude oil will be transferred with the lifting of the embargo imposed on Iraq.

2) Baku-Ceyhan Crude Oil Pipe Line Project: It is estimated 45 million tons of crude oil will be transferred in the first stage.

Source: JICA Study Team for ULIMP



Source: JICA Study Team for ULIMAP

Figure 4.3.1 Cross Check of the Results

2) International Cargo Traffic by Commodity

Table 4.3.2 shows a forecast of nationwide international cargo traffic by commodity. In 2020, international cargo traffic will reach 308 millions tons except for transit cargo, which becomes 2.6 times as much as current traffic. In particular, general cargo and cargoes related to the primary energy resources show relatively high increase rates.

Table 4.3.2 International Cargo Traffic by Commodity

Unit: tons

		1998		2010		2020	
Micro Forecast							
Total		117,153,476	1.0	217,000,000	1.8	308,000,000	2.6
Export		30,831,931	1.0	56,000,000	1.8	75,000,000	2.4
Import		86,321,545	1.0	161,000,000	1.9	233,000,000	2.7
General Cargo	Total	50,784,650	1.0	95,000,000	1.9	137,000,000	2.7
	Export	18,971,673	1.0	39,000,000	2.0	55,000,000	2.9
	Import	31,812,977	1.0	56,000,000	1.8	82,000,000	2.6
Dry Bulk	Total	27,761,199	1.0	49,000,000	1.7	75,000,000	2.7
	Export	7,071,665	1.0	12,000,000	1.7	15,000,000	2.1
	Import	20,689,534	1.0	37,000,000	1.7	60,000,000	2.9
Grain	Total	6,376,189	1.0	10,000,000	1.5	12,000,000	1.9
	Export	3,181,212	1.0	5,000,000	1.6	5,000,000	1.6
	Import	3,194,977	1.0	5,000,000	1.5	7,000,000	2.3
Ore	Total	10,263,191	1.0	18,000,000	1.7	28,000,000	2.7
	Export	3,861,659	1.0	7,000,000	1.8	10,000,000	2.6
	Import	6,401,532	1.0	11,000,000	1.7	18,000,000	2.8
Hard Coal	Total	11,121,819	1.0	21,000,000	1.9	35,000,000	3.1
	Export	28,794	1.0	0	0.0	0	0.0
	Import	11,093,025	1.0	21,000,000	1.9	35,000,000	3.1
Liquid Bulk	Total	37,439,806	1.0	71,000,000	1.9	93,000,000	2.5
	Export	4,775,270	1.0	5,000,000	1.0	5,000,000	1.0
	Import	32,664,536	1.0	66,000,000	2.0	88,000,000	2.7
Crude Oil	Total	20,670,236	1.0	31,000,000	1.5	46,000,000	2.2
	Export	313,219	1.0	0	0.0	0	0.0
	Import	20,357,017	1.0	31,000,000	1.5	46,000,000	2.3
LNG	Total	5,498,967	1.0	22,000,000	4.1	24,000,000	4.4
	Export	46,506	1.0	0	0.0	0	0.0
	Import	5,452,461	1.0	22,000,000	4.1	24,000,000	4.4
Oil Products	Total	9,340,010	1.0	15,000,000	1.6	19,000,000	2.0
	Export	4,181,472	1.0	5,000,000	1.2	5,000,000	1.2
	Import	5,158,538	1.0	10,000,000	2.0	14,000,000	2.7
Other Liquid	Total	1,930,593	1.0	3,000,000	1.4	4,000,000	2.2
	Export	234,073	1.0	0	0.0	0	0.0
	Import	1,696,520	1.0	3,000,000	1.6	4,000,000	2.5
Timber	Total	1,167,821	1.0	2,000,000	1.6	3,000,000	2.5
	Export	13,323	1.0	0	0.0	0	0.0
	Import	1,154,498	1.0	2,000,000	1.6	3,000,000	2.5

Note. 1. In addition, following transit cargo will be realized.

1) Iraq-Turkey Crude Oil Pipe Line: It is expected 70.9 million ton of crude oil wiil be transferred with the lifting of the embargo imposed on Iraq.

2) Baku-Ceyhan Crude Oil Pipe Line Project: It is estimated 45 million tons of crude oil will be transfered in the first stage.

2. Figures have been rounded off.

Source: JICA Study Team for ULIMAP

(2) Domestic cargo

1) Cross Check of the Results

Table 4.3.3 shows a comparison of cargo traffic obtained by the macro forecast and micro forecast described in section 4.2. The traffic of the micro forecast falls between the high case and low case traffic of macro forecast. Herein, the results of micro forecast will be adopted as a final traffic of nationwide domestic cargo.

2) Domestic Cargo by commodity

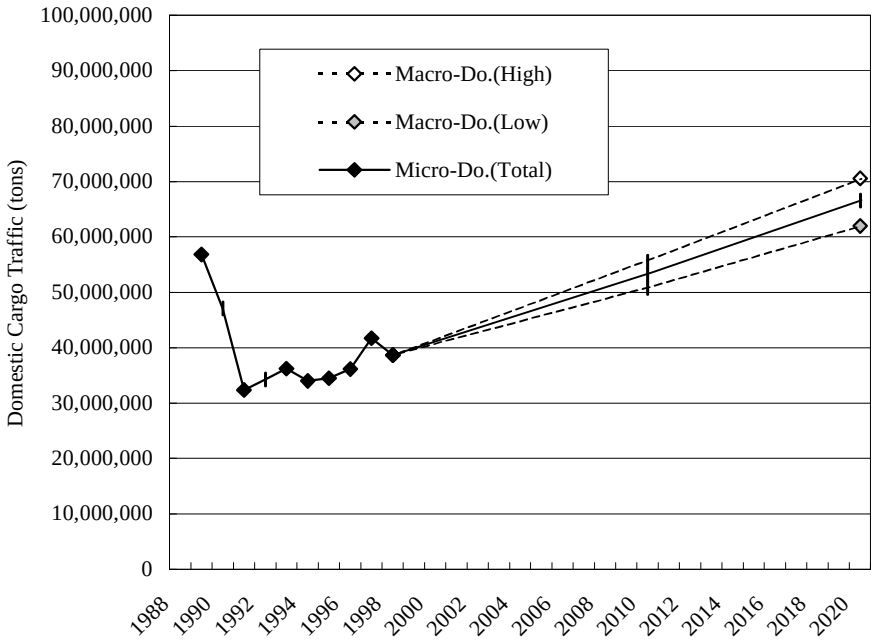
Table 4.3.3 shows a forecast of domestic cargo traffic by commodity. In 2020, nationwide domestic cargo traffic will reach 67 million tons, 1.7 times greater than current traffic. Sustainable increase will be expected not only in general cargo but also in bulk cargoes with the development of industries.

Table 4.3.3 Cross Check of the Results

Unit: tons

		1998		2010		2020	
Macro							
Total	Ma-Do.(High)	38,715,210	1.0	55,482,000	1.4	70,590,000	1.8
	Ma-Do.(Low)	38,715,210	1.0	50,767,000	1.3	62,014,000	1.6
Micro							
Total		38,715,210	1.0	53,129,000	1.4	66,584,000	1.7

Source: JICA Study Team for ULIMAP



Source: JICA Study Team for ULIMAP

Figure 4.3.2 Cross Check of the Results

Table 4.3.4 Domestic Cargo Traffic by Commodity

Unit: tons

	1998		2010		2020	
Micro						
Total	38,715,210	1.0	53,129,000	1.4	66,584,000	1.7
General Cargo	11,178,056	1.0	14,898,000	1.3	17,086,000	1.5
Ind. Prod.	5,025,644	1.0	7,898,000	1.6	10,086,000	2.0
Agri. Prod.	1,845	1.0	0	0.0	0	0.0
Other G.C.	6,150,567	1.0	7,000,000	1.1	7,000,000	1.1
Dry Bulk	2,893,290	1.0	3,700,000	1.3	4,700,000	1.6
Grain	542,783	1.0	700,000	1.3	700,000	1.3
Ore	1,745,228	1.0	3,000,000	1.7	4,000,000	2.3
Hard Coal	605,279	1.0	0	0.0	0	0.0
Liquid Bulk	24,608,434	1.0	34,530,000	1.4	44,798,000	1.8
Crude Oil	5,672,948	1.0	9,000,000	1.6	14,000,000	2.5
LNG	682,187	1.0	799,000	1.2	934,000	1.4
Oil Products	18,140,864	1.0	24,531,000	1.4	29,664,000	1.6
Other Liquid	112,435	1.0	200,000	1.8	200,000	1.8
Timber	35,430	1.0	0	0.0	0	0.0

Note. Figures have been rouded off.

Source: JICA Study Team for ULIMAP

(3) Forecast of Cargo Traffic in ports by Region

1) Regional Share

Port hinterlands are formed according to land transportation cost, characteristics of ports and cargoes, commercial customs for logistics and other relational factors. The most significant one is the cost of land transportation, especially for the general cargo, and it mainly depends on the distance from the port.

From this point of view, seven regions of this country are re-organized into four regions as port hinterlands; Marmara, Aegean, Mediterranean(herein after Medcoast), Black Sea region. Detailed hinterlands of ports and its GDP, which has a close relation with general cargo traffic, are shown in Table 4.3.6. The regional share for the general cargo is assumed taking the current share of cargo and GDP into account.

In case of bulk cargo, on the other hand, the commercial customs and the location of major industrial plants or refineries have a great influence on cargo traffic movement as well as land transportation cost. Accordingly, the regional share of bulk cargo is assumed by the consideration of current cargo share and the trend of location of the industrial plants or refineries.

2) Cargo Traffic by Region in 2020

Table 4.3.7 shows the traffic of cargo and its regional share in 1998, which are also mentioned in Progress report Chapter 6. Table 4.3.8, 4.3.9 show the forecasts of cargo traffic in ports by region in 2010, 2020 respectively.

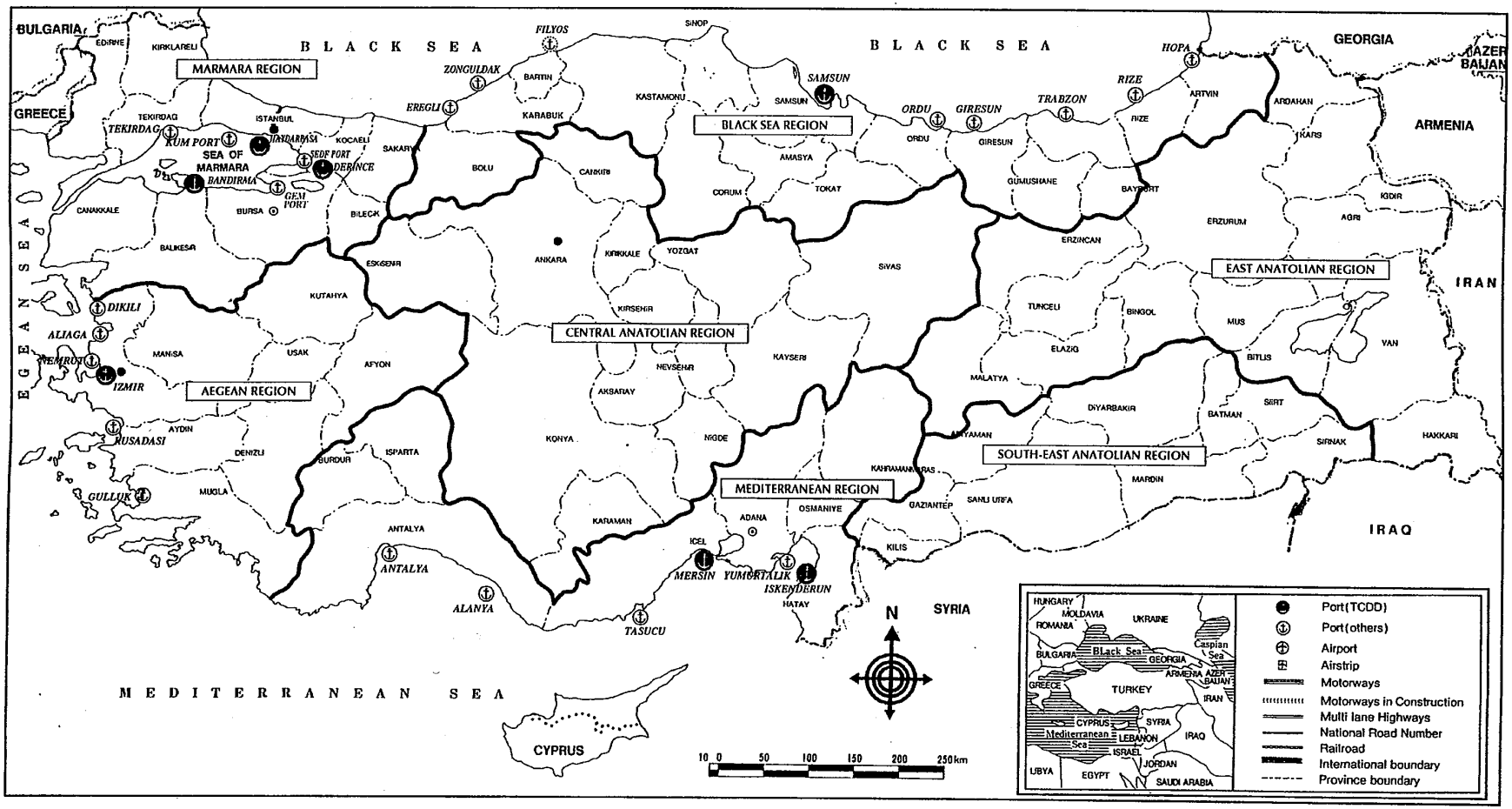


Figure 4.3.3 Regions and Provinces of Turkey

Table 4.3.5 Actual Population and GDP of each Region

REGION	AREA		POPULATION			GDP				GDP/CAPITA
	AREA (km2)	SHARE %	(1997)	SHARE %	GROWTH % *1	(at current prices in millions of TL)	SHARE %	H % *2	GROWTH % *3	(at cur. pri. in mil. of TL/ ind.)
Marmara region	72,495	9.3	16,186,673	25.7	2.8	10,942,220,761	37.9	5.4	9.3	676
Aegean region	90,197	11.5	8,452,087	13.4	1.5	4,408,194,578	15.3	4.4	6.0	522
Black sea region	115,430	14.8	7,843,966	12.5	-0.5	2,788,334,664	9.7	3.4	6.7	355
Mediterranean region	90,348	11.6	8,058,311	12.8	1.9	3,591,591,818	12.5	4.7	6.8	446
Centr. anat. region	189,326	24.2	10,580,657	16.8	0.9	4,449,124,999	15.4	3.4	5.0	420
South-east region	76,938	9.8	6,128,973	9.7	2.4	1,502,491,803	5.2	3.9	8.1	245
East anatolian region	146,627	18.8	5,614,907	8.9	0.7	1,153,924,513	4.0	1.9	4.0	206
TURKEY	781,361	100.0	62,865,574	100.0	1.5	28,835,883,136	100.0	4.4	7.3	459

note. *1: Annual average growth rate (1990-1997)
note. *2: Annual average growth rate (1988-1997) at 1987 prices
note. *3: Annual average growth rate (1995-1997) at 1987 prices
Source: JICA Study team for ULIMAP

Table 4.3.6 GDP Share of Port Hinterlands by Region

REGION	Port Hinterland	GDP SHARE %
Marmara region	(Marmara region+Centr. anat. Region/4)	41.8
Aegean region	(Aegean region+Centr. anat. Region/4) +(BURDUR+ISPARTA+ANTALYA*1/2)	21.4
Black sea region	(Black sea region+Centr. anat. Region/4+East anatolian region/2)	15.5
Mediterranean region	(Mediterranean region+Centr. anat. Region/4+East anatolian region/2+South-east region)-(BURDUR+ISPARTA+ANTALYA*1/2)	21.3

Source: JICA Study team for ULIMAP

Table 4.3.7 Forecast of Cargo Traffic in Ports by Region (1998)

Unit: Thousand tons

		1998													
		International						Domestic						Grand Total	
		Export		Import		Total		Loading		Unloading		Total			
Cargo	**Grand Total**	**30,832**	**100.0%**	**86,322**	**100.0%**	**117,153**	**100.0%**	**17,186**	**100.0%**	**21,529**	**100.0%**	**38,715**	**100.0%**	**155,869**	**100.0%**
	Marmara	8,034	26.1%	35,580	41.2%	43,615	37.2%	5,836	34.0%	14,262	66.2%	20,098	51.9%	63,713	40.9%
	Aegean	10,872	35.3%	22,914	26.5%	33,787	28.8%	6,824	39.7%	1,453	6.8%	8,277	21.4%	42,064	27.0%
	Medcoast	10,598	34.4%	17,852	20.7%	28,450	24.3%	2,882	16.8%	3,454	16.0%	6,336	16.4%	34,787	22.3%
	Black Sea	1,327	4.3%	9,943	11.5%	11,269	9.6%	1,645	9.6%	2,361	11.0%	4,005	10.3%	15,275	9.8%
General Cargo	**Total**	**18,972**	**100.0%**	**31,813**	**99.9%**	**50,785**	**99.9%**	**3,363**	**100.0%**	**7,815**	**100.0%**	**11,178**	**100.0%**	**61,963**	**100.0%**
	Marmara	5,805	30.6%	15,970	50.2%	21,775	42.9%	810	24.1%	6,469	82.8%	7,279	65.1%	29,055	46.9%
	Aegean	6,982	36.8%	7,826	24.6%	14,808	29.2%	1,376	40.9%	417	5.3%	1,792	16.0%	16,600	26.8%
	Medcoast	5,160	27.2%	5,758	18.1%	10,918	21.5%	414	12.3%	369	4.7%	783	7.0%	11,702	18.9%
	Black Sea	1,024	5.4%	2,227	7.0%	3,251	6.4%	763	22.7%	561	7.2%	1,324	11.8%	4,576	7.4%
Dry Bulk	**Total**	**7,072**	**100.0%**	**20,690**	**100.0%**	**27,761**	**100.0%**	**1,476**	**100.0%**	**1,418**	**100.0%**	**2,893**	**100.0%**	**30,654**	**100.0%**
	Marmara	1,740	24.6%	5,174	25.0%	6,914	24.9%	172	11.7%	260	18.3%	432	14.9%	7,346	24.0%
	Aegean	1,634	23.1%	2,235	10.8%	3,869	13.9%	208	14.1%	141	9.9%	348	12.0%	4,217	13.8%
	Medcoast	3,403	48.1%	5,995	29.0%	9,398	33.9%	220	14.9%	110	7.8%	330	11.4%	9,728	31.7%
	Black Sea	295	4.2%	7,285	35.2%	7,580	27.3%	876	59.4%	907	64.0%	1,783	61.6%	9,363	30.5%
Grain	**Total**	**3,181**	**100.0%**	**3,195**	**100.0%**	**6,376**	**100.0%**	**275**	**100.0%**	**267**	**100.0%**	**543**	**100.0%**	**6,919**	**100.0%**
	Marmara	446	14.0%	1,116	34.9%	1,562	24.5%	59	21.4%	38	14.2%	97	17.9%	1,659	24.0%
	Aegean	70	2.2%	695	21.8%	766	12.0%	40	14.6%	99	37.1%	140	25.7%	905	13.1%
	Medcoast	2,628	82.6%	949	29.7%	3,578	56.1%	148	53.9%	9	3.4%	158	29.0%	3,735	54.0%
	Black Sea	36	1.1%	435	13.6%	471	7.4%	28	10.1%	121	45.2%	149	27.4%	619	9.0%
Ore	**Total**	**3,862**	**100.0%**	**6,402**	**100.0%**	**10,263**	**100.0%**	**900**	**100.0%**	**845**	**100.0%**	**1,745**	**100.0%**	**12,008**	**100.0%**
	Marmara	1,285	33.3%	1,037	16.2%	2,323	22.6%	113	12.5%	186	22.0%	298	17.1%	2,621	21.8%
	Aegean	1,558	40.3%	286	4.5%	1,843	18.0%	131	14.5%	4	0.5%	135	7.8%	1,979	16.5%
	Medcoast	773	20.0%	898	14.0%	1,671	16.3%	29	3.3%	94	11.2%	124	7.1%	1,795	14.9%
	Black Sea	246	6.4%	4,180	65.3%	4,426	43.1%	627	69.7%	560	66.3%	1,188	68.1%	5,614	46.7%
Hard Coal	**Total**	**29**	**100.0%**	**11,093**	**100.0%**	**11,122**	**100.0%**	**300**	**100.0%**	**305**	**100.0%**	**605**	**100.0%**	**11,727**	**100.0%**
	Marmara	8	28.8%	3,021	27.2%	3,029	27.2%	1	0.2%	36	11.8%	37	6.1%	3,066	26.1%
	Aegean	6	19.1%	1,254	11.3%	1,260	11.3%	37	12.2%	37	12.1%	73	12.1%	1,333	11.4%
	Medcoast	2	5.2%	4,148	37.4%	4,149	37.3%	42	13.9%	7	2.1%	48	8.0%	4,198	35.8%
	Black Sea	13	46.8%	2,670	24.1%	2,684	24.1%	221	73.6%	226	73.9%	447	73.8%	3,130	26.7%
Liquid Bulk	**Total**	**4,775**	**100.0%**	**32,665**	**100.0%**	**37,440**	**100.0%**	**12,343**	**100.0%**	**12,265**	**100.0%**	**24,608**	**100.0%**	**62,048**	**100.0%**
	Marmara	489	10.2%	13,605	41.6%	14,093	37.6%	4,852	39.3%	7,533	61.4%	12,386	50.3%	26,479	42.7%
	Aegean	2,257	47.3%	12,808	39.2%	15,066	40.2%	5,239	42.4%	895	7.3%	6,134	24.9%	21,200	34.2%
	Medcoast	2,024	42.4%	6,065	18.6%	8,090	21.6%	2,248	18.2%	2,975	24.3%	5,223	21.2%	13,313	21.5%
	Black Sea	5	0.1%	186	0.6%	191	0.5%	3	0.0%	861	7.0%	865	3.5%	1,056	1.7%
Crude Oil	**Total**	**313**	**100.0%**	**20,357**	**100.0%**	**20,670**	**100.0%**	**2,810**	**100.0%**	**2,863**	**100.0%**	**5,673**	**100.0%**	**26,343**	**100.0%**
	Marmara	162	51.8%	7,258	35.7%	7,420	35.9%	8	0.3%	1,508	52.7%	1,516	26.7%	8,936	33.9%
	Aegean	151	48.2%	9,965	49.0%	10,116	48.9%	1,450	51.6%	739	25.8%	2,188	38.6%	12,305	46.7%
	Medcoast	0	0.0%	3,134	15.4%	3,134	15.2%	1,352	48.1%	617	21.5%	1,969	34.7%	5,103	19.4%
	Black Sea	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
LNG	**Total**	**47**	**100.0%**	**5,452**	**100.0%**	**5,499**	**100.0%**	**334**	**100.0%**	**348**	**100.0%**	**682**	**100.0%**	**6,181**	**100.0%**
	Marmara	4	7.8%	3,836	70.4%	3,840	69.8%	299	89.6%	294	84.6%	594	87.0%	4,434	71.7%
	Aegean	21	46.1%	936	17.2%	958	17.4%	21	6.4%	0	0.0%	21	3.1%	979	15.8%
	Medcoast	21	46.1%	662	12.1%	683	12.4%	14	4.1%	1	0.2%	14	2.1%	697	11.3%
	Black Sea	0	0.0%	18	0.3%	18	0.3%	0	0.0%	53	15.3%	53	7.8%	71	1.2%
Oil Products	**Total**	**4,181**	**100.0%**	**5,159**	**100.0%**	**9,340**	**100.0%**	**9,149**	**100.0%**	**8,992**	**100.0%**	**18,141**	**100.0%**	**27,481**	**100.0%**
	Marmara	251	6.0%	1,959	38.0%	2,210	23.7%	4,518	49.4%	5,686	63.2%	10,203	56.2%	12,413	45.2%
	Aegean	2,047	49.0%	1,627	31.5%	3,673	39.3%	3,748	41.0%	155	1.7%	3,904	21.5%	7,577	27.6%
	Medcoast	1,880	45.0%	1,470	28.5%	3,350	35.9%	881	9.6%	2,342	26.0%	3,223	17.8%	6,572	23.9%
	Black Sea	4	0.1%	103	2.0%	107	1.1%	3	0.0%	808	9.0%	811	4.5%	918	3.3%
Other Liquid	**Total**	**234**	**100.0%**	**1,697**	**100.0%**	**1,931**	**100.0%**	**49**	**100.0%**	**63**	**100.0%**	**112**	**100.0%**	**2,043**	**100.0%**
	Marmara	72	30.8%	552	32.5%	624	32.3%	27	55.8%	46	72.6%	73	65.2%	697	34.1%
	Aegean	38	16.2%	280	16.5%	318	16.5%	19	39.6%	1	2.1%	21	18.5%	339	16.6%
	Medcoast	123	52.7%	800	47.1%	923	47.8%	1	3.0%	16	25.3%	17	15.6%	941	46.0%
	Black Sea	1	0.3%	65	3.8%	66	3.4%	1	1.6%	0	0.0%	1	0.7%	66	3.3%
Timber	**Total**	**13**	**100.0%**	**1,154**	**100.0%**	**1,168**	**100.0%**	**4**	**100.0%**	**32**	**100.0%**	**35**	**100.0%**	**1,203**	**100.0%**
	Marmara	0	3.7%	831	72.0%	832	71.2%	1	25.6%	0	0.0%	1	2.8%	833	69.2%
	Aegean	0	0.0%	45	3.9%	45	3.9%	1	23.1%	1	2.2%	2	4.5%	47	3.9%
	Medcoast	11	81.3%	33	2.9%	44	3.8%	0	0.0%	0	0.0%	0	0.0%	44	3.6%
	Black Sea	2	15.0%	245	21.2%	247	21.2%	2	51.4%	31	97.8%	33	92.8%	280	23.3%

Note. 1.In addition, transit cargo of 1,347 thousand tons, of which crude oil accounts for 98.9%, is realized.
2. Figures have been rounded off.

Source: Prepared by JICA Study Team for ULIMAP based on the data from PUMA and TCDD

Table 4.3.8 Forecast of Cargo Traffic in Ports by Region (2010)

Unit: Thousand tons

		2010													
		International						Domestic						Grand Total	
		Export		Import		Total		Loading		Unloading		Total			
Cargo Grand	**Total**	**56,000**	**100.0%**	**161,000**	**100.0%**	**217,000**	**100.0%**	**26,565**	**100.0%**	**26,565**	**100.0%**	**53,129**	**100.0%**	**270,129**	**100.0%**
	Marmara	14,800	26.4%	64,900	40.3%	79,700	36.7%	8,507	32.0%	16,863	63.5%	25,371	47.8%	105,071	38.9%
	Aegean	20,400	36.4%	46,575	28.9%	66,975	30.9%	10,633	40.0%	1,938	7.3%	12,571	23.7%	79,546	29.4%
	Medcoast	18,200	32.5%	31,400	19.5%	49,600	22.9%	4,700	17.7%	4,748	17.9%	9,448	17.8%	59,048	21.9%
	Black Sea	2,600	4.6%	18,125	11.3%	20,725	9.6%	2,724	10.3%	3,015	11.4%	5,739	10.8%	26,464	9.8%
General Cargo	**Total**	**39,000**	**100.0%**	**56,000**	**100.0%**	**95,000**	**100.0%**	**7,449**	**100.0%**	**7,449**	**100.0%**	**14,898**	**100.0%**	**109,898**	**100.0%**
	Marmara	11,700	30.0%	28,000	50.0%	39,700	41.8%	1,862	25.0%	6,145	82.5%	8,008	53.8%	47,708	43.4%
	Aegean	14,625	37.5%	14,000	25.0%	28,625	30.1%	2,980	40.0%	372	5.0%	3,352	22.5%	31,977	29.1%
	Medcoast	10,725	27.5%	9,800	17.5%	20,525	21.6%	931	12.5%	372	5.0%	1,304	8.8%	21,829	19.9%
	Black Sea	1,950	5.0%	4,200	7.5%	6,150	6.5%	1,676	22.5%	559	7.5%	2,235	15.0%	8,385	7.6%
Dry Bulk	**Total**	**12,000**	**100.0%**	**37,000**	**100.0%**	**49,000**	**100.0%**	**1,850**	**100.0%**	**1,850**	**100.0%**	**3,700**	**100.0%**	**52,700**	**100.0%**
	Marmara	2,850	23.8%	9,425	25.5%	12,275	25.1%	258	13.9%	390	21.1%	648	17.5%	12,923	24.5%
	Aegean	3,275	27.3%	3,775	10.2%	7,050	14.4%	278	15.0%	131	7.1%	409	11.0%	7,459	14.2%
	Medcoast	5,225	43.5%	10,775	29.1%	16,000	32.7%	268	14.5%	159	8.6%	426	11.5%	16,426	31.2%
	Black Sea	650	5.4%	13,025	35.2%	13,675	27.9%	1,048	56.6%	1,170	63.2%	2,218	59.9%	15,893	30.2%
Grain	**Total**	**5,000**	**100.0%**	**5,000**	**100.0%**	**10,000**	**100.0%**	**350**	**100.0%**	**350**	**100.0%**	**700**	**100.0%**	**10,700**	**100.0%**
	Marmara	750	15.0%	2,000	40.0%	2,750	27.5%	70	20.0%	53	15.0%	123	17.5%	2,873	26.8%
	Aegean	125	2.5%	1,125	22.5%	1,250	12.5%	53	15.0%	131	37.5%	184	26.3%	1,434	13.4%
	Medcoast	4,000	80.0%	1,250	25.0%	5,250	52.5%	193	55.0%	9	2.5%	201	28.8%	5,451	50.9%
	Black Sea	125	2.5%	625	12.5%	750	7.5%	35	10.0%	158	45.0%	193	27.5%	943	8.8%
Ore	**Total**	**7,000**	**100.0%**	**11,000**	**100.0%**	**18,000**	**100.0%**	**1,500**	**100.0%**	**1,500**	**100.0%**	**3,000**	**100.0%**	**21,000**	**100.0%**
	Marmara	2,100	30.0%	1,650	15.0%	3,750	20.8%	188	12.5%	338	22.5%	525	17.5%	4,275	20.4%
	Aegean	3,150	45.0%	550	5.0%	3,700	20.6%	225	15.0%	0	0.0%	225	7.5%	3,925	18.7%
	Medcoast	1,225	17.5%	1,650	15.0%	2,875	16.0%	75	5.0%	150	10.0%	225	7.5%	3,100	14.8%
	Black Sea	525	7.5%	7,150	65.0%	7,675	42.6%	1,013	67.5%	1,013	67.5%	2,025	67.5%	9,700	46.2%
Hard Coal	**Total**	**0**	**0.0%**	**21,000**	**100.0%**	**21,000**	**100.0%**	**0**	**0.0%**	**0**	**100.0%**	**0**	**0.0%**	**21,000**	**100.0%**
	Marmara	0	0.0%	5,775	27.5%	5,775	27.5%	0	0.0%	0	10.0%	0	0.0%	5,775	27.5%
	Aegean	0	0.0%	2,100	10.0%	2,100	10.0%	0	0.0%	0	12.5%	0	0.0%	2,100	10.0%
	Medcoast	0	0.0%	7,875	37.5%	7,875	37.5%	0	0.0%	0	2.5%	0	0.0%	7,875	37.5%
	Black Sea	0	0.0%	5,250	25.0%	5,250	25.0%	0	0.0%	0	75.0%	0	0.0%	5,250	25.0%
Liquid Bulk	**Total**	**5,000**	**100.0%**	**66,000**	**100.0%**	**71,000**	**100.0%**	**17,265**	**100.0%**	**17,265**	**100.0%**	**34,530**	**100.0%**	**105,530**	**100.0%**
	Marmara	250	5.0%	26,075	39.5%	26,325	37.1%	6,388	37.0%	10,328	59.8%	16,716	48.4%	43,041	40.8%
	Aegean	2,500	50.0%	28,750	43.6%	31,250	44.0%	7,376	42.7%	1,434	8.3%	8,810	25.5%	40,060	38.0%
	Medcoast	2,250	45.0%	10,775	16.3%	13,025	18.3%	3,502	20.3%	4,216	24.4%	7,718	22.4%	20,743	19.7%
	Black Sea	0	0.0%	400	0.6%	400	0.6%	0	0.0%	1,286	7.5%	1,286	3.7%	1,686	1.6%
Crude Oil	**Total**	**0**	**0.0%**	**31,000**	**100.0%**	**31,000**	**100.0%**	**4,500**	**100.0%**	**4,500**	**100.0%**	**9,000**	**100.0%**	**40,000**	**100.0%**
	Marmara	0	0.0%	10,850	35.0%	10,850	35.0%	0	0.0%	2,250	50.0%	2,250	25.0%	13,100	32.8%
	Aegean	0	0.0%	15,500	50.0%	15,500	50.0%	2,250	50.0%	1,125	25.0%	3,375	37.5%	18,875	47.2%
	Medcoast	0	0.0%	4,650	15.0%	4,650	15.0%	2,250	50.0%	1,125	25.0%	3,375	37.5%	8,025	20.1%
	Black Sea	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
LNG	**Total**	**0**	**0.0%**	**22,000**	**100.0%**	**22,000**	**100.0%**	**400**	**100.0%**	**400**	**100.0%**	**799**	**100.0%**	**22,799**	**100.0%**
	Marmara	0	0.0%	11,000	50.0%	11,000	50.0%	200	50.0%	340	85.0%	539	67.5%	11,539	50.6%
	Aegean	0	0.0%	8,800	40.0%	8,800	40.0%	180	45.0%	0	0.0%	180	22.5%	8,980	39.4%
	Medcoast	0	0.0%	2,200	10.0%	2,200	10.0%	20	5.0%	0	0.0%	20	2.5%	2,220	9.7%
	Black Sea	0	0.0%	0		0	0.0%	0	0.0%	60	15.0%	60	7.5%	60	0.3%
Oil Products	**Total**	**5,000**	**100.0%**	**10,000**	**100.0%**	**15,000**	**100.0%**	**12,266**	**100.0%**	**12,266**	**100.0%**	**24,531**	**100.0%**	**39,531**	**100.0%**
	Marmara	250	5.0%	3,250	32.5%	3,500	23.3%	6,133	50.0%	7,666	62.5%	13,799	56.3%	17,299	43.8%
	Aegean	2,500	50.0%	4,000	40.0%	6,500	43.3%	4,906	40.0%	307	2.5%	5,213	21.3%	11,713	29.6%
	Medcoast	2,250	45.0%	2,500	25.0%	4,750	31.7%	1,227	10.0%	3,066	25.0%	4,293	17.5%	9,043	22.9%
	Black Sea	0	0.0%	250	2.5%	250	1.7%	0	0.0%	1,227	10.0%	1,227	5.0%	1,477	3.7%
Other Liquid	**Total**	**0**	**0.0%**	**3,000**	**100.0%**	**3,000**	**100.0%**	**100**	**100.0%**	**100**	**100.0%**	**200**	**100.0%**	**3,200**	**100.0%**
	Marmara	0	0.0%	975	32.5%	975	32.5%	55	55.0%	73	72.5%	128	63.8%	1,103	34.5%
	Aegean	0	0.0%	450	15.0%	450	15.0%	40	40.0%	3	2.5%	43	21.3%	493	15.4%
	Medcoast	0	0.0%	1,425	47.5%	1,425	47.5%	5	5.0%	25	25.0%	30	15.0%	1,455	45.5%
	Black Sea	0	0.0%	150	5.0%	150	5.0%	0	0.0%	0	0.0%	0	0.0%	150	4.7%
Timber	**Total**	**0**	**0.0%**	**2,000**	**100.0%**	**2,000**	**100.0%**	**0**	**0.0%**	**0**	**0.0%**	**0**	**0.0%**	**2,000**	**100.0%**
	Marmara	0	0.0%	1,400	70.0%	1,400	70.0%	0	0.0%	0	0.0%	0	0.0%	1,400	70.0%
	Aegean	0	0.0%	50	2.5%	50	2.5%	0	0.0%	0	0.0%	0	0.0%	50	2.5%
	Medcoast	0	0.0%	50	2.5%	50	2.5%	0	0.0%	0	0.0%	0	0.0%	50	2.5%
	Black Sea	0	0.0%	500	25.0%	500	25.0%	0	0.0%	0	0.0%	0	0.0%	500	25.0%

Note. 1. In addition, following transit cargo will be realized.

1) Iraq-Turkey Crude Oil Pipe Line: It is expected 70.9 million tons of crude oil will be transferred with the lifting of the embargo imposed on Iraq.

2) Baku-Ceyhan Crude Oil Pipe Line Project: It is estimated 45 million tons of crude oil will be transferred in the first stage.

2. Figures have been rounded off

Source: JICA Study Team for ULIMAP

Table 4.3.9 Forecast of Cargo Traffic in Ports by Region (2020)

Unit: Thousand tons

		2020												
		International						Domestic						Grand Total
		Export		Import		Total		Loading		Unloading		Total		
Cargo Grand	**Total**	**75,000**	**100.0%**	**233,000**	**100.0%**	**308,000**	**100.0%**	**33,292**	**100.0%**	**33,292**	**100.0%**	**66,584**	**100.0%**	**374,584**	**100.0%**
	Marmara	20,250	27.0%	90,125	38.7%	110,375	35.8%	10,160	30.5%	20,790	62.4%	30,950	46.5%	141,325	37.7%
	Aegean	26,875	35.8%	66,400	28.5%	93,275	30.3%	13,453	40.4%	2,682	8.1%	16,134	24.2%	109,409	29.2%
	Medcoast	22,875	30.5%	45,650	19.6%	68,525	22.2%	6,372	19.1%	6,119	18.4%	12,491	18.8%	81,016	21.6%
	Black Sea	5,000	6.7%	30,825	13.2%	35,825	11.6%	3,307	9.9%	3,701	11.1%	7,009	10.5%	42,834	11.4%
General Cargo	**Total**	**55,000**	**100.0%**	**82,000**	**100.0%**	**137,000**	**100.0%**	**8,543**	**100.0%**	**8,543**	**100.0%**	**17,086**	**100.0%**	**154,086**	**100.0%**
	Marmara	16,500	30.0%	38,950	47.5%	55,450	40.5%	2,136	25.0%	7,048	82.5%	9,184	53.8%	64,634	41.9%
	Aegean	19,250	35.0%	20,500	25.0%	39,750	29.0%	3,417	40.0%	427	5.0%	3,844	22.5%	43,594	28.3%
	Medcoast	15,125	27.5%	14,350	17.5%	29,475	21.5%	1,068	12.5%	427	5.0%	1,495	8.8%	30,970	20.1%
	Black Sea	4,125	7.5%	8,200	10.0%	12,325	9.0%	1,922	22.5%	641	7.5%	2,563	15.0%	14,888	9.7%
Dry Bulk	**Total**	**15,000**	**100.0%**	**60,000**	**100.0%**	**75,000**	**100.0%**	**2,350**	**100.0%**	**2,350**	**100.0%**	**4,700**	**100.0%**	**79,700**	**100%**
	Marmara	3,500	23.3%	15,475	25.8%	18,975	25.3%	320	13.6%	503	21.4%	823	17.5%	19,798	24.8%
	Aegean	5,125	34.2%	5,975	10.0%	11,100	14.8%	353	15.0%	131	5.6%	484	10.3%	11,584	14.5%
	Medcoast	5,500	36.7%	17,225	28.7%	22,725	30.3%	293	12.4%	209	8.9%	501	10.7%	23,226	29.1%
	Black Sea	875	5.8%	21,325	35.5%	22,200	29.6%	1,385	58.9%	1,508	64.1%	2,893	61.5%	25,093	31.5%
Grain	**Total**	**5,000**	**100.0%**	**7,000**	**100.0%**	**12,000**	**100.0%**	**350**	**100.0%**	**350**	**100.0%**	**700**	**100.0%**	**12,700**	**100%**
	Marmara	750	15.0%	3,150	45.0%	3,900	32.5%	70	20.0%	53	15.0%	123	17.5%	4,023	31.7%
	Aegean	125	2.5%	1,575	22.5%	1,700	14.2%	53	15.0%	131	37.5%	184	26.3%	1,884	14.8%
	Medcoast	4,000	80.0%	1,400	20.0%	5,400	45.0%	193	55.0%	9	2.5%	201	28.8%	5,601	44.1%
	Black Sea	125	2.5%	875	12.5%	1,000	8.3%	35	10.0%	158	45.0%	193	27.5%	1,193	9.4%
Ore	**Total**	**10,000**	**100.0%**	**18,000**	**100.0%**	**28,000**	**100.0%**	**2,000**	**100.0%**	**2,000**	**100.0%**	**4,000**	**100.0%**	**32,000**	**100.0%**
	Marmara	2,750	27.5%	2,700	15.0%	5,450	19.5%	250	12.5%	450	22.5%	700	17.5%	6,150	19.2%
	Aegean	5,000	50.0%	900	5.0%	5,900	21.1%	300	15.0%	0	0.0%	300	7.5%	6,200	19.4%
	Medcoast	1,500	15.0%	2,700	15.0%	4,200	15.0%	100	5.0%	200	10.0%	300	7.5%	4,500	14.1%
	Black Sea	750	7.5%	11,700	65.0%	12,450	44.5%	1,350	67.5%	1,350	67.5%	2,700	67.5%	15,150	47.3%
Hard Coal	**Total**	**0**	**0.0%**	**35,000**	**100.0%**	**35,000**	**100.0%**	**0**	**0.0%**	**0**	**100.0%**	**0**	**0.0%**	**35,000**	**100.0%**
	Marmara	0	0.0%	9,625	27.5%	9,625	27.5%	0	0.0%	0	10.0%	0	0.0%	9,625	27.5%
	Aegean	0	0.0%	3,500	10.0%	3,500	10.0%	0	0.0%	0	12.5%	0	0.0%	3,500	10.0%
	Medcoast	0	0.0%	13,125	37.5%	13,125	37.5%	0	0.0%	0	2.5%	0	0.0%	13,125	37.5%
	Black Sea	0	0.0%	8,750	25.0%	8,750	25.0%	0	0.0%	0	75.0%	0	0.0%	8,750	25.0%
Liquid Bulk	**Total**	**5,000**	**100.0%**	**88,000**	**100.0%**	**93,000**	**100.0%**	**22,399**	**100.0%**	**22,399**	**100.0%**	**44,798**	**100.0%**	**137,798**	**100.0%**
	Marmara	250	5.0%	33,600	38.2%	33,850	36.4%	7,705	34.4%	13,239	59.1%	20,944	46.8%	54,794	39.8%
	Aegean	2,500	50.0%	39,850	45.3%	42,350	45.5%	9,683	43.2%	2,123	9.5%	11,806	26.4%	54,156	39.3%
	Medcoast	2,250	45.0%	14,000	15.9%	16,250	17.5%	5,012	22.4%	5,483	24.5%	10,495	23.4%	26,745	19.4%
	Black Sea	0	0.0%	550	0.6%	550	0.6%	0	0.0%	1,553	6.9%	1,553	3.5%	2,103	1.5%
Crude Oil	**Total**	**0**	**0.0%**	**46,000**	**100.0%**	**46,000**	**100.0%**	**7,000**	**100.0%**	**7,000**	**100.0%**	**14,000**	**100.0%**	**60,000**	**100.0%**
	Marmara	0	0.0%	16,100	35.0%	16,100	35.0%	0	0.0%	3,500	50.0%	3,500	25.0%	19,600	32.7%
	Aegean	0	0.0%	23,000	50.0%	23,000	50.0%	3,500	50.0%	1,750	25.0%	5,250	37.5%	28,250	47.1%
	Medcoast	0	0.0%	6,900	15.0%	6,900	15.0%	3,500	50.0%	1,750	25.0%	5,250	37.5%	12,150	20.3%
	Black Sea	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
LNG	**Total**	**0**	**0.0%**	**24,000**	**100.0%**	**24,000**	**100.0%**	**467**	**100.0%**	**467**	**100.0%**	**934**	**100.0%**	**24,934**	**100.0%**
	Marmara	0	0.0%	12,000	50.0%	12,000	50.0%	234	50.0%	397	85.0%	630	67.5%	12,630	50.7%
	Aegean	0	0.0%	9,600	40.0%	9,600	40.0%	210	45.0%	0	0.0%	210	22.5%	9,810	39.3%
	Medcoast	0	0.0%	2,400	10.0%	2,400	10.0%	23	5.0%	0	0.0%	23	2.5%	2,423	9.7%
	Black Sea	0	0.0%	0	0.0%	0	0.0%	0	0.0%	70	15.0%	70	7.5%	70	0.3%
Oil Products	**Total**	**5,000**	**100.0%**	**14,000**	**100.0%**	**19,000**	**100.0%**	**14,832**	**100.0%**	**14,832**	**100.0%**	**29,664**	**100.0%**	**48,664**	**100.0%**
	Marmara	250	5.0%	4,200	30.0%	4,450	23.4%	7,416	50.0%	9,270	62.5%	16,686	56.3%	21,136	43.4%
	Aegean	2,500	50.0%	6,650	47.5%	9,150	48.2%	5,933	40.0%	371	2.5%	6,304	21.3%	15,454	31.8%
	Medcoast	2,250	45.0%	2,800	20.0%	5,050	26.6%	1,483	10.0%	3,708	25.0%	5,191	17.5%	10,241	21.0%
	Black Sea	0	0.0%	350	2.5%	350	1.8%	0	0.0%	1,483	10.0%	1,483	5.0%	1,833	3.8%
Other Liquid	**Total**	**0**	**0.0%**	**4,000**	**100.0%**	**4,000**	**100.0%**	**100**	**100.0%**	**100**	**100.0%**	**200**	**100.0%**	**4,200**	**100.0%**
	Marmara	0	0.0%	1,300	32.5%	1,300	32.5%	55	55.0%	73	72.5%	128	63.8%	1,428	34.0%
	Aegean	0	0.0%	600	15.0%	600	15.0%	40	40.0%	3	2.5%	43	21.3%	643	15.3%
	Medcoast	0	0.0%	1,900	47.5%	1,900	47.5%	5	5.0%	25	25.0%	30	15.0%	1,930	46.0%
	Black Sea	0	0.0%	200	5.0%	200	5.0%	0	0.0%	0	0.0%	0	0.0%	200	4.8%
Timber	**Total**	**0**	**0.0%**	**3,000**	**100.0%**	**3,000**	**100.0%**	**0**	**0.0%**	**0**	**0.0%**	**0**	**0.0%**	**3,000**	**100.0%**
	Marmara	0	0.0%	2,100	70.0%	2,100	70.0%	0	0.0%	0	0.0%	0	0.0%	2,100	70.0%
	Aegean	0	0.0%	75	2.5%	75	2.5%	0	0.0%	0	0.0%	0	0.0%	75	2.5%
	Medcoast	0	0.0%	75	2.5%	75	2.5%	0	0.0%	0	0.0%	0	0.0%	75	2.5%
	Black Sea	0	0.0%	750	25.0%	750	25.0%	0	0.0%	0	0.0%	0	0.0%	750	25.0%

Note. In addition, following transit cargo will be realized.

1) Iraq-Turkey Crude Oil Pipe Line: It is expected 70.9 million tons of crude oil will be transferred with the lifting of the embargo imposed on Iraq.

2) Baku-Ceyhan Crude Oil Pipe Line Project: It is estimated 45 million tons of crude oil will be transferred in the first stage.

2. Figures have been rounded off

Source: JICA Study Team for ULIMAP

4.3.2 Container Traffic in 2020

(1) Methodology of Demand Forecast

In this country, container traffic has increased continuously and remarkably. It has reached 1,347 thousand TEUs and annual average growth rate achieved 26.6% for the past ten years. Container transportation has become a global standard for the international trade nowadays. Therefore, formulation of strategy on container traffic is the key to the development of sophisticated industry to which Turkey has been orienting.

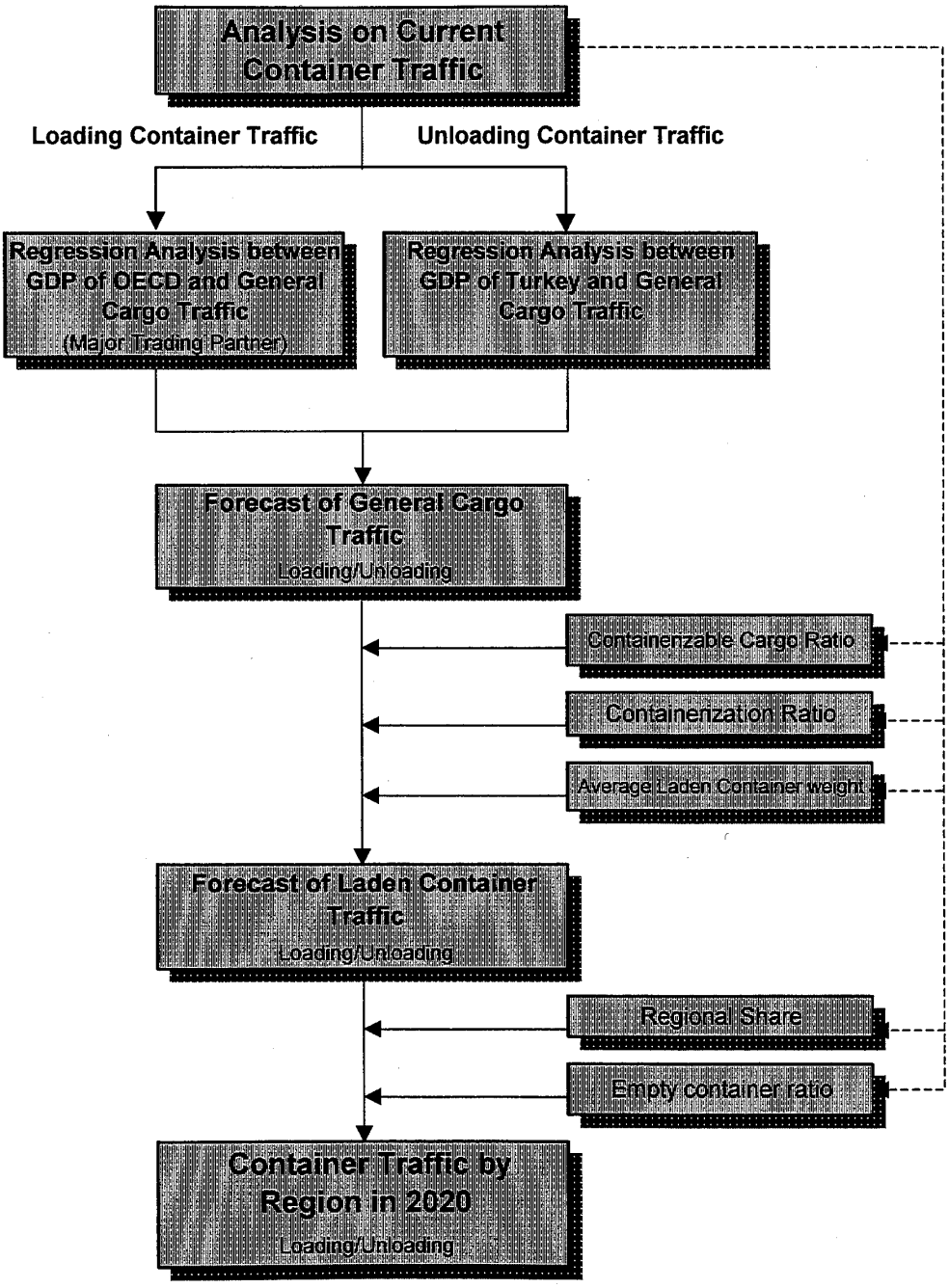
Figure 4.3.5 shows a flow chart of container demand forecast. In general terms, methodology can be divided into two flows; loading traffic and unloading traffic. Both of them are almost the same except for the independent variable of regression analysis for the general cargo. First, we estimate the future general cargo traffic through the regression analysis with GDP.

Then, the forecast of nationwide laden container traffic can be obtained by multiplying containerizable cargo ratio, containerization ratio and reciprocal of average laden container weight. Where, containerizable cargo ratio means the share of containerizable general cargo against the total of general cargo, containerization ratio means the share of containerized general cargo against containerizable general cargo. Finally, the forecast of container traffic by region can be obtained trough the examination of regional share and empty container ratio. Detailed data are shown in Table 4.3.11~4.3.18.

The rate of containerization for the target year is forecast by using the logistic curve expressed as the following formula of which parameters are obtained through the regression analysis.

$$\mathbf{Pt = Pm / \{ 1 + C^{(t - t_0)}\}}$$

where;
- Pt : The rate of containerization in **t** year (%)
- Pm : Ultimate value of containerization rate (90%)
- C : Parameter (0.779, 0.730 for loading, unloading respectively)
- t : Year (Here, t = 0 in 1992)
- t_0 : Year in which the rate of containerization reached 50%
  (-1.572, 2.163 for loading, unloading respectively. Here, t = 0 in 1992)
- R2' : 0.790, 0.953 for loading, unloading respectively



Source: JICA Study Team for ULIMAP

Figure 4.3.5 Flow Chart of Container Demand Forecast

(2) Container Traffic by Region in 2020

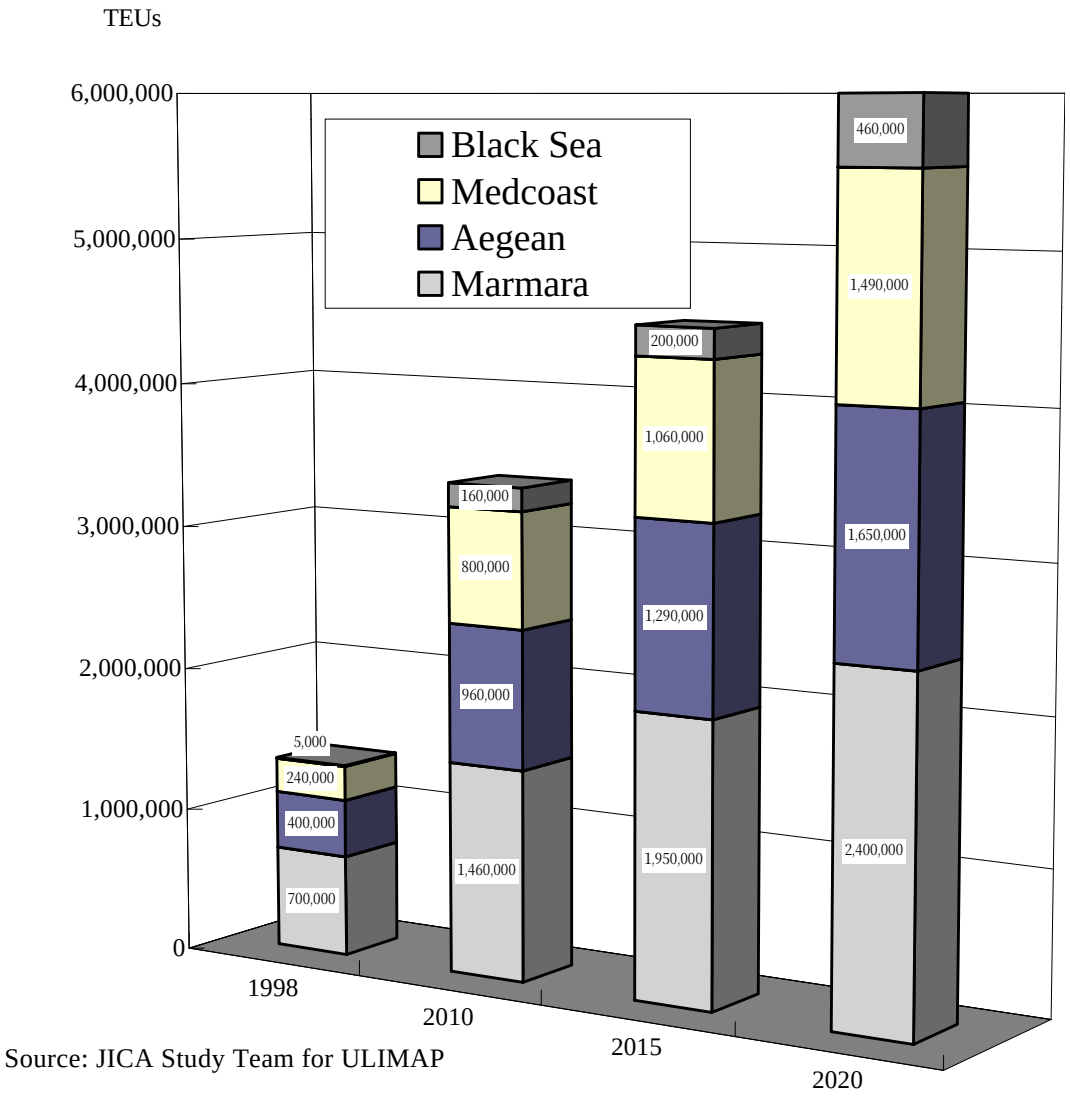
Table 4.3.10 shows a forecast of container traffic by region. In 2020, nationwide container traffic will reach 6 million TEUs, which is 4.5 times as much as current traffic. Marmara, Aegean, Medcoast, Black Sea region account for 40.0, 27.5, 24.8, 7.7% of total traffic respectively.

Table 4.3.10 Container Traffic by Region in 2020

Unit: TEUs

Year			Marmara	Aegean	Medcoast	Black Sea	Total
1998	Actual	Total	700,000	400,000	240,000	5,000	1,345,000
2010	Ave.	Total	1,460,000	960,000	800,000	160,000	3,380,000
2015	Ave.	Total	1,950,000	1,290,000	1,060,000	200,000	4,500,000
2020	Ave.	Total	2,400,000	1,650,000	1,490,000	460,000	6,000,000

Source: JICA Study Team for ULIMAP



Source: JICA Study Team for ULIMAP

Figure 4.3.6 Container Traffic by Region in 2020

Table 4.3.11 Analysis on Current Container Traffic (loading)

Unit: tons

YEAR	LOADING TRAFFIC General Cargo*1 (1)	Container (2)	General Cargo Total (3)=(1)+(2)	Ratio*2 (4)	Containerizable Cargo (5)=(2)/(4)	Ratio*3 (6)=(5)/(3)	GDP of Turkey (Billion TL at 1987 Prices)	GDP of OECD (Billion US$ at 1990 Exchange Rates)
1989	8,511,831	859,723	9,371,554	37.1%	2,319,205	24.7%	76,498	16,533
1990	9,697,677	1,741,708	11,439,385	42.6%	4,088,613	35.7%	83,578	16,941
1991	10,598,578	2,020,741	12,619,319	48.2%	4,192,242	33.2%	84,353	17,068
1992	11,134,033	2,252,674	13,386,707	53.7%	4,194,393	31.3%	89,401	17,355
1993	11,008,376	2,694,280	13,702,656	59.0%	4,570,166	33.4%	96,590	17,512
1994	14,017,616	3,508,477	17,526,093	63.8%	5,498,160	31.4%	91,321	18,003
1995	12,635,063	3,828,174	16,463,237	68.2%	5,613,896	34.1%	97,888	18,400
1996	11,325,239	4,414,046	15,739,285	72.0%	6,126,875	38.9%	104,745	18,924
1997	12,991,546	5,537,772	18,529,318	75.4%	7,348,190	39.7%	112,631	19,476
1998	12,913,016	6,058,657	18,971,673	78.2%	7,750,791	40.9%	115,768	20,002 *4

Note. *1: Except for Container
*2: Containerization Ratio (Share of Containerized cargo against Containerizable cargo); Estimated by the data from TCDD
*3: Containerizable Cargo Ratio (Share of Containerizable cargo against total General cargo)
*4: Estimated
Source: JICA Study Team for ULIMAP

Table 4.3.12 Forecast of Laden Container Traffic (loading)

Unit: tons

	GDP of OECD (1)	General Cargo Total (2)*5	Ratio*3 (3)	Ratio*2 (4)	tons/TEU(laden) (5)	Laden TEUs (6)=(2)*(3)*(4)/(5)
2010 Ave.	27,403	39,000,000	50%	89.3%	13.9	1,250,000
2015 Ave.	30,479	46,000,000	55%	89.8%	13.9	1,630,000
2020 Ave.	33,899	55,000,000	60%	89.9%	13.9	2,130,000

Note. *5: (2)=2,535.4*(1)-30,917,305.2 (R2=0.85)
Source: JICA Study Team for ULIMAP

Table 4.3.13 Regional Share and Empty Container Ratio (loading)

	Marmara	Aegean	Medcoast	Black Sea	Total	Remarks
Regional Share (7)						
2010	37.5%	37.5%	22.5%	2.5%	100.0%	(2015)
2020	35.0%	35.0%	25.0%	5.0%	100.0%	
Empty Con. Ratio(8)						
2010	35.0%	10.0%	25.0%	55.0%		(2015)
2020	35.0%	10.0%	25.0%	55.0%		

Source: JICA Study Team for ULIMAP

Table 4.3.14 Regional Container Traffic by Region in 2020 (loading)

Regional Container Traffic (loading)=Laden Container(6)Regional Share(7)/(1-Empty Container Ratio(8))

Unit: TEUs

	Marmara	Aegean	Medcoast	Black Sea	Total	Remarks
2010 Ave.	720,000	520,000	380,000	70,000	1,690,000	
2015 Ave.	960,000	700,000	500,000	90,000	2,250,000	*
2020 Ave.	1,170,000	850,000	730,000	250,000	3,000,000	*

Note. * : Total traffic is taken from import traffic, regional share is estimated by above equation.
Source: JICA Study Team for ULIMAP

Table 4.3.15 Analysis on Current Container Traffic (unloading)

Unit: tons

YEAR	UNLOADING TRAFFIC General Cargo*1 (1)	Container (2)	General Cargo Total (3)=(1)+(2)	Ratio*2 (4)	Containerizable Cargo (5)=(2)/(4)	Ratio*3 (6)=(5)/(3)	GDP of Turkey (Billion TL at 1987 Prices)	GDP of OECD countries (Billion US$at 1990 Exchange Rates)
1989	12,802,544	678,730	13,481,274	10.5%	6,483,688	48.1%	76,498	16532.52
1990	14,311,317	1,508,934	15,820,251	14.7%	10,277,064	65.0%	83,578	16941.12
1991	15,882,816	1,568,538	17,451,354	20.2%	7,779,190	44.6%	84,353	17068.31
1992	15,011,071	2,055,094	17,066,165	27.0%	7,623,440	44.7%	89,401	17355.13
1993	21,377,823	2,780,971	24,158,794	34.9%	7,969,017	33.0%	96,590	17512.25
1994	14,372,544	2,171,810	16,544,354	43.6%	4,985,824	30.1%	91,321	18003.04
1995	19,950,556	3,494,739	23,445,295	52.3%	6,678,232	28.5%	97,888	18399.87
1996	20,706,794	4,659,318	25,366,112	60.6%	7,693,236	30.3%	104,745	18924.16
1997	23,942,768	6,252,955	30,195,723	67.8%	9,227,753	30.6%	112,631	19476.06
1998	24,794,391	7,018,586	31,812,977	73.7%	9,526,386	29.9%	115,768	20001.91 *4

Note. *1 *1: Except for Container
*2: Containerization Ratio (Share of Containerized cargo against Containerizable cargo); Estimated by the data from TCDD
*3: Containerizable Cargo Ratio (Share of Containerizable cargo against total General cargo)
*4: Estimated

Source: JICA Study Team for ULIMAP

Table 4.3.16 Forecast of Laden Container Traffic (unloading)

Unit: tons

	GDP of Turkey (1)	General Cargo Total (2)*5	Ratio*3 (3)	Ratio*2 (4)	tons/TEU(laden) (5)	Laden TEUs (6)=(2)*(3)*(4)/(5)
2010 Ave.	201,258	56,000,000	30.0%	89.8%	13.3	1,130,000
2015 Ave.	262,413	68,000,000	35.0%	90.0%	13.3	1,610,000
2020 Ave.	348,690	82,000,000	40.0%	90.0%	13.3	2,220,000

Note. *5: (2)=45,973,174.8*Ln(1)-505,155,856.1 (R2=0.93)

Source: JICA Study Team for ULIMAP

Table 4.3.17 Regional Share and Empty Container Ratio (unloading)

	Marmara	Aegean	Medcoast	Black Sea	Total	Remarks
Regional Share (7)						
2010	52.5%	20.0%	22.5%	5.0%	100.0%	(2015)
2020	50.0%	20.0%	22.5%	7.5%	100.0%	
Empty Con. Ratio(8)						
2010	15.0%	45.0%	35.0%	25.0%		(2015)
2020	10.0%	45.0%	35.0%	20.0%		

Source: JICA Study Team for ULIMAP

Table 4.3.18 Regional Container Traffic by Region in 2020 (unloading)

Regional Container Traffic (unloading)=Laden Container(6)*Regional Share(7)/(1-Empty Container Ratio(8))

Unit: TEUs

	Marmara	Aegean	Medcoast	Black Sea	Total	Remarks
2010 Ave.	740,000	440,000	420,000	90,000	1,690,000 *	
2015 Ave.	990,000	590,000	560,000	110,000	2,250,000	
2020 Ave.	1,230,000	800,000	760,000	210,000	3,000,000	

Note. * : Total traffic is taken from export traffic, regional share is estimated by above equation.

Source: JICA Study Team for ULIMAP

4.3.3 Passenger Traffic in 2020

(1) Points of View

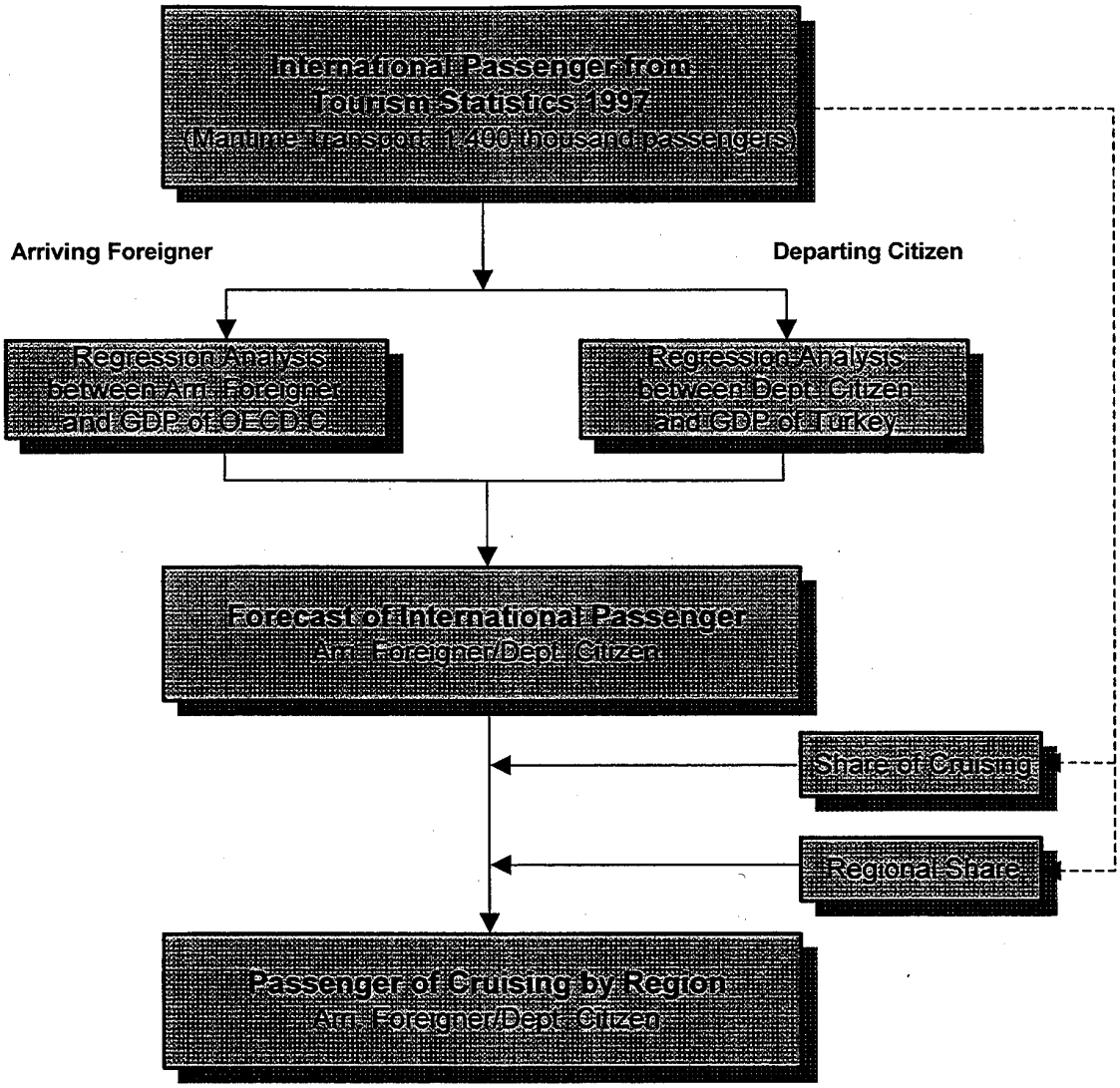
Methodology of passenger forecast is already mentioned in section 4.2.
In this section, following two topics are mainly examined.

- Cruising passengers
- Impact of railway tunnel project on maritime passenger in Istanbul (preliminary)

1) Cruising Passengers
According to the "Complete Guide to Cruising & cruise Ship 2000" written by Douglas Ward, worldwide traffic of cruising passenger has reached 8.5 million and achieved average annual growth rate of 8.3% from1990 to 1998.

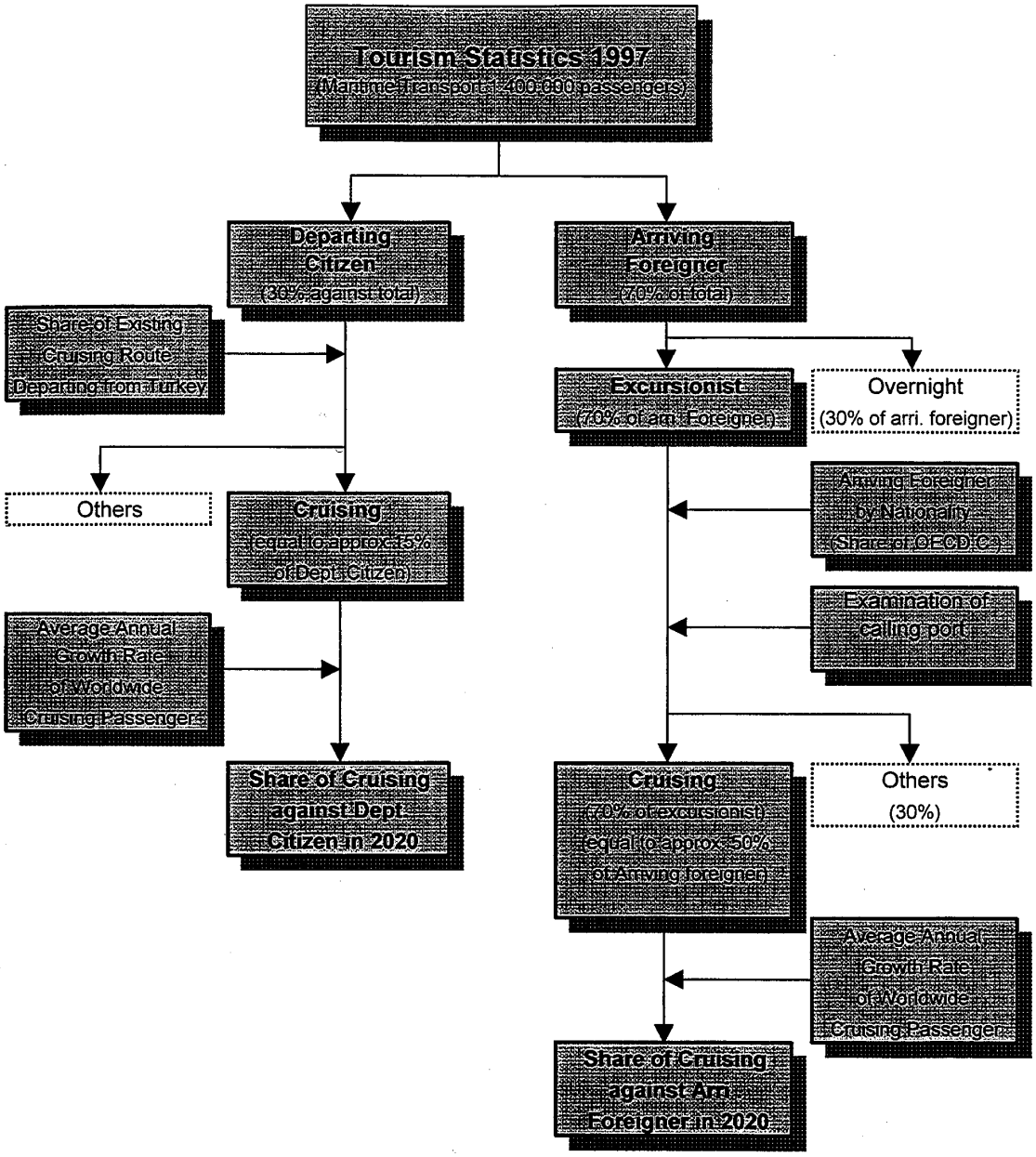
As mentioned in section 1.2, Turkey has a great potential of tourism development with over 60,000 historic sites. Most tourism agencies in Japan also regard the Aegean Sea especially as a suitable cruising site. Accordingly, it is expected that the number of cruising passengers will increase remarkably in this country. Therefore, it is dispensable to formulate an extensive strategy on the cruising market for the tourism development

Figure 4.3.7 shows a flowchart of cruising passengers forecast. Unfortunately detailed data of cruising passengers was not obtained from organizations concerned. Therefore, the cruising traffic is estimated from tourism statistics under a certain assumption showed in Figure 4.3.8.



Source: JICA Study Team for ULIMAP

Figure 4.3.7 Flow Chart of of Cruising Passenger Forecast



Source: JICA Study Team for ULIMAP

Figure 4.3.8 Estimation of Share of Cruising against International Passenger

2) Impact of Railway Tunnel Project on City Line Passenger in Istanbul (Preliminary)

In Istanbul, there are two bridges over the Turkish Strait through which approximately 300 thousand vehicles go across per day. Both bridges, however, are always heavily congested during rush hours.

It is estimated 600 thousand passengers go across everyday with an average of two passengers per vehicle. On the other hand, maritime City Line has 175 thousand passengers per day who go across the Strait in 1997. Therefore, maritime City Line still performs a significant role in public transportation inside the city of Istanbul.

For a long time, railway tunnel project across the Strait has been planed in order to improve the congestion over both bridges and the environment of inner Istanbul. The construction schedule has been settled lately. After the completion of this project, the maritime City Line in Istanbul will likely lose most of its passengers. Accordingly, the impact of this railway project on the passenger of City Line in Istanbul has to be examined.

Figure 4.3.9 shows the flowchart of forecast of City Line passenger. The share of maritime passenger against railway passenger is estimated by Total Cost (fare and time) Modal Split Model. The outline of this model is as follows. The choice of transportation mode depends on passenger's property, passenger's sense of values and characteristics of service of each transportation mode. However, it is difficult to express all of them metrically. Accordingly, fare and time are used as main factor for the choice of transportation mode. Unfortunately final railway fare hasn't been decided yet, therefore projection of impact was conducted as a preliminary analysis.

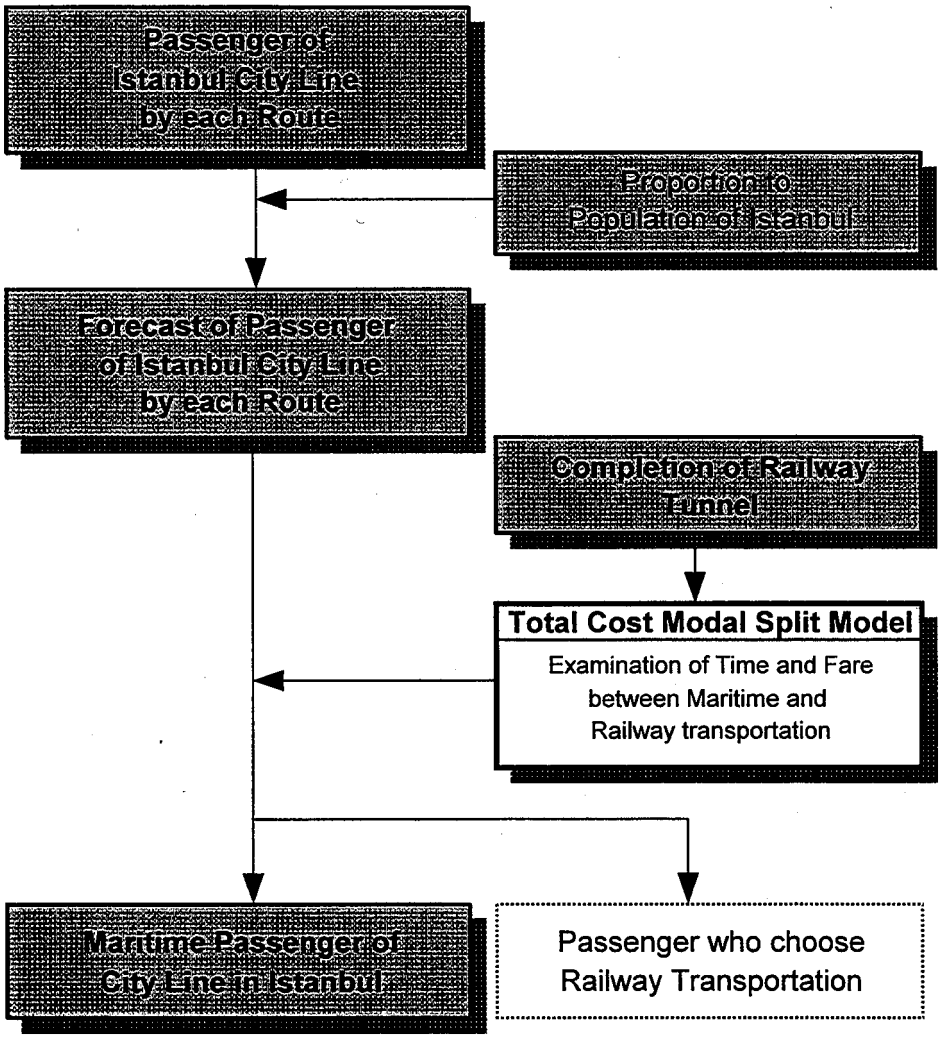


Figure 4.3.9 Flow Chart of Forecast of City Line Passenger in Istanbul

Box 4.3.1 Conceptual Explanation of Total Cost Modal Split Model

Table B-1 Times and Fares of Ferry and Railway Across Turkish Strait (Sample)

	Time	Fare
Ferry -F	T_F	F_F
Railway -R	T_R	F_R

Critical Value for Time(V_C)=(F_R-F_F)/(T_F-T_R)

Note. Vc: Critical Value for Time (Vc) means a boundary of transportation mode choice. In other words, those who regard Vc as **reasonable** value choose railway mode, those who regard Vc as **unreasonable** value choose ferry mode.

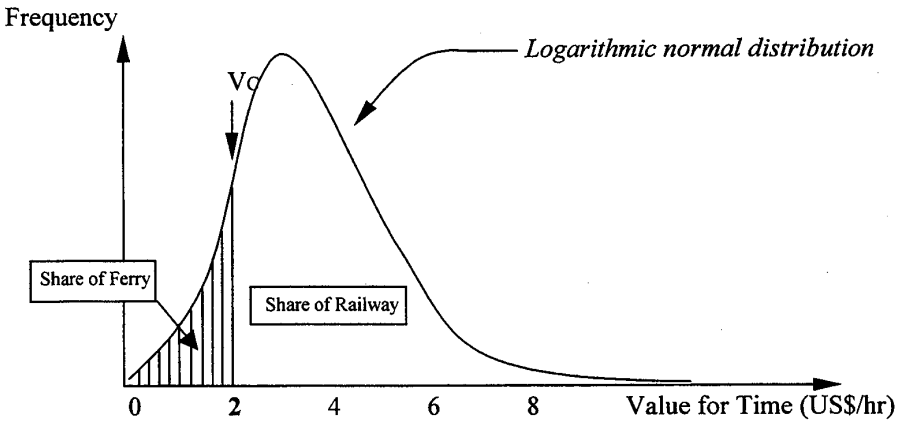


Figure B-1 Share of Ferry in Total cost Modal split Model

Source: JICA Study Team for ULIMAP

(2) Passenger Traffic in2020

1) International Passenger

Table 4.3.19 shows forecast of passenger traffic in ports. In 2020, nationwide international passenger will reach 3.3 million, which is 2.4 times as much as current traffic. In particular, it is expected cruising passengers will show remarkable growth, increasing by 4.2 times over the current traffic.

2) Domestic Passenger

Nationwide domestic passenger will also increase slightly with the growth of population. On the other hand, City Line in Istanbul will lose most of its passengers owing to the completion of the railway tunnel project. Timely preparation for this drastic transformation such as countermeasure for the unemployment is strongly recommended.

3) Passenger Traffic by Region in 2020

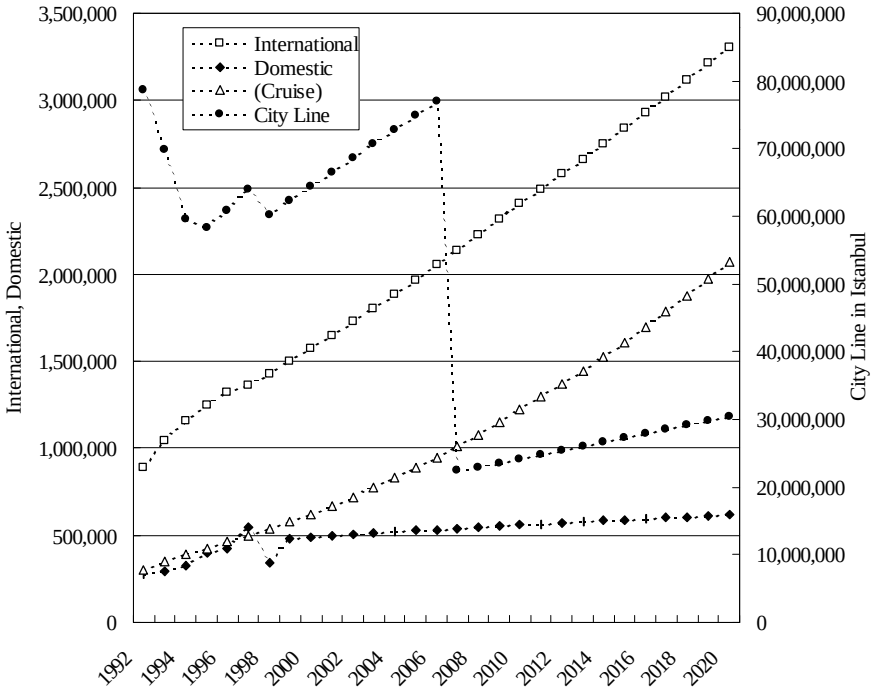
Table 4.3.20~4.3.22 show forecast of passenger in ports by region. Regional share is estimated by current status in 1997.

Table 4.3.19 Passenger Traffic in 2020

Unit: Passengers

	1997		2010		2020	
International	1,400,000	1.0	2,400,000	1.7	3,300,000	2.4
(of which, cruising)	500,000	1.0	1,220,000	2.4	2,100,000	4.2
Domestic	550,000	1.0	560,000	1.0	620,000	1.1
City Line in Istanbul	64,000,000	1.0	24,000,000	0.4	30,000,000	0.5

Source: JICA Study Team for ULIMAP



Source: JICA Study Team for ULIMAP

Figure 4.3.10 Passenger Traffic in 2020

Table 4.3.20 Forecast of Passenger Traffic in Ports by Region (1997)

Unit: Thousand passengers

		1997									
		International						Domestic		Grand Total	
		Dep. Citizen		Arr. Foreigner		Total		Total			
Passenger	**Total**	**404**	**100.0%**	**954**	**100.0%**	**1,359**	**100.0%**	**550**	**100.0%**	**1,909**	**100.0%**
	Marmara	74	18.4%	323	33.8%	397	29.2%	477	86.6%	874	45.8%
	Aegean	73	18.0%	557	58.4%	630	46.4%	69	12.5%	699	36.6%
	Medcoast	194	47.9%	66	6.9%	259	19.1%	2	0.3%	261	13.7%
	Black Sea	63	15.7%	9	0.9%	72	5.3%	3	0.6%	75	3.9%
of which, cruising	**Total**	**47**	**100.0%**	**449**	**100.0%**	**496**	**100.0%**				
	Marmara	9	18.4%	100	22.3%	109	21.9%				
	Aegean	8	18.0%	311	69.4%	320	64.5%				
	Medcoast	23	47.9%	37	8.2%	59	12.0%				
	Black Sea	7	15.7%	0	0.1%	8	1.6%				

Note. Figures have been rounded off.
Source: JICA Study Team for ULIMAP

Table 4.3.21 Forecast of Passenger Traffic in Ports by Region (2010)

Unit: Thousand passengers

		2010									
		International						Domestic		Grand Total	
		Dep. Citizen		Arr. Foreigner		Total		Total			
Passenger	**Total**	**823**	**100.0%**	**1,583**	**100.0%**	**2,406**	**100.0%**	**559**	**100.0%**	**2,965**	**100.0%**
	Marmara	165	20.0%	554	35.0%	719	29.9%	489	87.5%	1,208	40.7%
	Aegean	144	17.5%	910	57.5%	1,054	43.8%	70	12.5%	1,124	37.9%
	Medcoast	391	47.5%	119	7.5%	510	21.2%	0	0.0%	510	17.2%
	Black Sea	123	15.0%	0	0.0%	123	5.1%	0	0.0%	123	4.2%
of which, cruising	**Total**	**274**	**100.0%**	**950**	**100.0%**	**1,224**	**100.0%**				
	Marmara	55	20.0%	214	22.5%	269	21.9%				
	Aegean	48	17.5%	665	70.0%	713	58.2%				
	Medcoast	130	47.5%	71	7.5%	202	16.5%				
	Black Sea	41	15.0%	0	0.0%	41	3.4%				

Note. Figures have been rounded off.
Source: JICA Study Team for ULIMAP

Table 4.3.22 Forecast of Passenger Traffic in Ports by Region (2020)

Unit: Thousand passengers

		2020									
		International						Domestic		Grand Total	
		Dep. Citizen		Arr. Foreigner		Total		Total			
Passenger	**Total**	**1,208**	**100.0%**	**2,100**	**100.0%**	**3,308**	**100.0%**	**618**	**100.0%**	**3,926**	**100.0%**
	Marmara	242	20.0%	735	35.0%	977	29.5%	541	87.5%	1,518	38.7%
	Aegean	211	17.5%	1,208	57.5%	1,419	42.9%	77	12.5%	1,496	38.1%
	Medcoast	574	47.5%	158	7.5%	731	22.1%	0	0.0%	731	18.6%
	Black Sea	181	15.0%	0	0.0%	181	5.5%	0	0.0%	181	4.6%
of which, cruising	**Total**	**604**	**100.0%**	**1,470**	**100.0%**	**2,074**	**100.0%**				
	Marmara	121	20.0%	331	22.5%	452	21.8%				
	Aegean	106	17.5%	1,029	70.0%	1,135	54.7%				
	Medcoast	287	47.5%	110	7.5%	397	19.2%				
	Black Sea	91	15.0%	0	0.0%	91	4.4%				

Note. Figures have been rounded off.
Source: JICA Study Team for ULIMAP

Chapter 5 Formulation of Basic Policies

5.1 Existing issues of ports

(1) Problems of the port administration and management system

1) Necessity of a “PORT” concept on the legal basis

A “PORT” here is understood as a concept including the development, operation, and management of ports nationwide. In the present legal basis, port itself is taken only as a coastal facility, and is not given a status as basic infrastructure for national economic development. The coastal line in Turkey is legally public property owned by the state, and its use has to be in such a way as to contribute to the public interest. So long as the coastal line is open for public use, construction of port facilities such as wharves, piers, breakwaters etc. is permitted. Hence, it seems to be possible for anyone who satisfies that condition to be able to construct a wharf. That is, the present port regulations refer to the coastal line protection, but do not treat the systematic development of coastal facilities as ‘PORTs’. This arises because hitherto ports have not been legally defined as basic infrastructure for national economic development.

Still more, there is a deficiency in the legal regulation concerning the operation and management of the port once it is constructed. Even if the responsibility of port operations lies with each entrepreneur, the importance of the port administration/management is not clearly perceived. Although there is a wharf management law concerning the operation and management of the constructed port (wharf), this law stipulates the pricing and management of the facility utilization of municipal ports. There are cases that the constructed ports are not appropriately managed. According to the coastal law, the utilization for purposes other than the purpose stated in the construction aim is not allowed. However there are also attempts for effective use of the port through utilization of port facilities for other than their initial purposes with unfair price setting at several industrial ports.

2) Necessity of the comprehensive port administration authorities

When constructing a wharf (port), permission from the Ministry of Public Works through the governors’ offices should be obtained from the perspective of the land use plan of the coastal line, which is public property. After technical inspection of the proposed facilities is performed by the Ministry of Transport, and after obtaining construction permission from the Ministry of Finance concerning the investment plan, the entrepreneur receives final permission from the governor.

During the actual construction, the matter comes under the control of the Ministry of Transport (DLH). After completion, the entrepreneur receives a facility operation permit from the Under-Secretariat of Maritime Affairs, which is forwarded to the Ministry of Finance, and then once again applies to the local government for an operation permit.

At the stage of management and operation of the port, the management of the land area port facilities is undertaken by the port entrepreneur, however, it is the local government that has authority over the marine area surrounding the port where the water area in front of the wharf, or the berth, and the like, which are indispensable for the operation of the wharf are located. On the other hand, where the maritime vessel traffic system such as the entries and exit of the ships to and from the port, in the jurisdiction sea area etc. are concerned, it is the Under-Secretariat of Maritime Affairs that holds the authority.

As for examining port tariffs for approval, the competent authorities are different by port operators. TCDD ports are under jurisdiction of Ministry of Transport. Prime Ministry Undersecretariat of Maritime Affairs is in charge of TDI ports. There have been no organizations to coordinate price levels integratedly including private ports so far.

The present division of labor among each specialized authority system at present seems to be efficient for the administrative organization. However, there are limits to the planning-adjustment functions in this framework, especially taking the future tendency of the maritime transport cargo in Turkey into consideration. In particular, it will be difficult under this system to effectively coordinate a nationwide port development plan. Planning and coordinating function are necessary for achieving policy goals.

3) Port development by the private sector: disorderly port development

Sporadic small scale private sector port development has taken place at some regions. The total cargo handling volume of the four private wharves (373 thousand TEU) at the regions surrounding the Marmara Sea which is close to the hinterland, and where expansion of container cargo is expected, surpassed the cargo handling volume of Haydarpasa Port which is 323 thousand TEU, for the first time in 1998. That is thought to be a function that compensates for the insufficient capacity of the public ports. This sort of private sector port investment should be evaluated as a quick response to the container demand.

However, these small scale port developments based on private capital could in the medium-long term turn out to be a growth constraint. Concerning the containerization movement that will be prevalent in Turkey from now on, the presence of these small private wharves might cause a structure where handing cargoes are not accumulated at a port from the viewpoint of economy of scale. As a result, possibly it harms efficient distribution of resources by causing investment overlaps.

In other words, a national adjustment function is deemed necessary. A nationwide PORT policy that integrates these port investments by the private sector is indispensable. In that sense, in the privatized TDI ports, it is evaluated that there is a scheme that some of the cost for the port infrastructure suffered from natural disasters is to be borne by the state.

4) Management of public (state) ports: Difficult to reflect the demands of the users

At present, it is the ports managed by the TCDD which are the most strategically important and which handle the greatest cargo handling volume in Turkey. The management and operation at TCDD ports can be characterized as follows.

First, the infrastructure are owned and constructed by the Ministry of Transportation at TCDD ports. TCDD handles the cargo with the cargo handling facilities TCDD itself owns. From the port management function point of view, the preparation of the primary port facilities is undertaken by the state (Ministry of Transportation), and the preparation of functional facilities is undertaken by TCDD.

Second, the final determination of the primary policies concerning port management including investment planning and price-setting is all undertaken by the head office located at Ankara, but not at the sites where the ports are actually operating. The present management system of the TCDD ports, besides suffering difficulties concerning rapid decision making, makes it difficult to reflect the demands of the actual users. That is because the final decision making is undertaken at a completely distant (besides at several different organizations; MOT and TCDD) place from where the port activities take place.

In major ports in the world, the actual management of the ports are shared with the operators, the facility services that are inseparable with respect to the port works activities, and the determination of the operation planning are done by individual operators. Meanwhile, overall port administration function including facilities investment is performed by an independent port managing body. This system enables the managing body to coordinate throughout the port and decide flexibly as the need arises. This is based on the premise that unless utilization of the port is promoted through “user-friendly” management, the port will not attract users.

5) Possibility of interconnecting PORT and regional development

As for the regional development in the present legal framework, territorial plans which are related to land use in wider areas such as covering coastal lines are assigned to the local government (province) and the Ministry of Public Works. Meanwhile city planning and its application at the local level are entrusted to the municipality governments. Consequently, when a port facility is to be constructed, it is the necessary to coordinate with related plans.

At present, there are many ports and piers managed by local governments in Turkey. Most of these are rather small such as municipalities or towns. Some municipalities manage ports with their own port management division, but this does not involve large scale development which requires integrating the development of neighboring areas.

Among port development types in major ports in the world, there are typical two types. The first case is to develop the port area by the public enterprises under public authority, where the management is on a commercial basis. The second case is to develop the port area and the adjacent area as a whole on the basis of participation of the local government and the relevant authorities, where it is regarded as the nuclei of regional development. Especially, the latter case is also effective to correct regional economic gaps as a national policy.

The local government’s role concerning port management for efficient utilization of port should be further reviewed. As for possibilities of involvement of local authorities in port

development in future, it would be suggested that role sharing between port management bodies and local authorities in the management of land and water areas in port areas including environmental conservation could be considered.

Secondly in Turkey, there are some cases that it might be more efficient to develop a port with its surrounding area as a whole because of the land use restraint. The expansion of Haydarpasa Port to deal with increasing container cargoes is difficult because it is located near the city center. When port development is formulated under the framework of regional development plans by the involvement of local government which has wider governing areas such as metropolitan municipalities or provincial administrations, port management will have a more freehand in the development.

Thirdly, the reformation of local authorities system in Turkey is scheduled that in near future. In the new framework, the authorities of Special Provincial Administration which is a wider administration (provincial) unit will be strengthened in planning function including city areas as well as its financial allocation. It enables the local authority to establish plans on infrastructure development including more than two cities.

(2) Possible bottlenecks to national economic development

As clearly indicated in the demand forecast provided in this Study, this country, strategically located at the intersection point of the East and West, and with the natural resources and population, and manpower, has an exceedingly high potentiality for development in the future. A great increase in the port cargo demand is expected in accordance with the economic development of this country. The reverse is also true. If the supply of the resources necessary for the economic development through ports cannot be achieved to a satisfactory level, then a satisfactory economic development cannot be expected either.

Presently, comprehensive port policy is lacking, and consequently it is a reality that provision of the necessary budget and the funds for the port facility is not fulfilled smoothly, and the prospects of ensuring the facility amount that will be required in the long term is not clear. If the necessary facility amount is not ensured, then the national economic development aims will not be realized. In other words, the lagging port development might be one of the conditions that could become a bottleneck in the national economic development as well.

(3) Subordinate position in international container transport

The container cargo potential is large, and it is expected to reach 5.4 million to 6.7 million TEUs by the year 2020. As clearly indicated in the examination of the possibility of establishment of international container hub-port in this Study, the existing feeder transport is, even taking only the ship costs into account, US$ 100 more expensive than when a mother vessel directly calls a Turkish port. And it will be the Turkish enterprises, and finally the Turkish people who will have to pay for that. That makes 500 to 700 million US dollars worth of annual loss for the country. (At present the burden is 100 million US dollars.) In addition, the rather higher transportation costs of the feeder transport will be

reflected in commodity prices, and that will also harm the international competitiveness of Turkish enterprises. The meaning in having a hub-port lies in this point. If Turkey would like to have hub-ports in her territory, promotion policy for international hub-ports should be adopted as a national policy. Capacity of approximately 7 million TEUs is ensured including the planned container facilities. Most of these facilities depend on BOT. For attaining a port that has a hub-port function, enormous funds are necessary, and inevitably big risks are accompanied. If only the private companies would be expected to shoulder those risks, then it is most probable that no private companies would be willing to undertake the BOT projects. Thus a form that would bring about a proper public and private sector sharing of the risk burden is required, and the participation of the state becomes necessary.

At present, many containers are being handled at the private sector piers in the Marmara Sea, at the previous bulk cargo handling wharves where containers are being handled by mobile cranes. Although such a cargo handling form in a small-scale wharf is being conducted as an urgent measure to meet the rapid growth of containers in the absence of a large container terminal, it should be noted that such a cargo handling form might relegate Turkish ports to the status of feeder ports forever. Even in 1998, overall container amount in Marmara Sea reached 700 thousand TEUs. If this container cargo amount were concentrated at a single port, then direct call of small-size container mother ships at a Turkish port could be realized. In other words, if a container port with sufficient container handling capacity were provided in the Marmara Sea, even in 1998, Turkey could get out of its subordinate status in international container transport. This fact reveals that there is a need for the state to take a long-term perspective and guide the port development.

(4) Increasing importance of stable inflow of natural resources and energy

Bulk cargo has been hitherto handled mainly by the private sector. However, given the growth of awareness concerning the scarcity of world resources, strategic importance of stable inflow of the key commodities such as energy and industrial materials into the state is increasing. In this sense, it should be noted that governmental role to ensure the stable inflow of the key commodities also will increase.

(5) Lack of involvement in environmental issues

Concerning the environmental aspect, it is a fact that port managing bodies solely make use of the marine area and do not bear any environmental responsibilities. Port managing bodies should shoulder more responsibility for the environment including oil combating and environmental monitoring, because they are enjoying the utilization of sea area, people’s common assets, exclusively.

Since energy efficiency of maritime transport is much higher than trucks, further promotion of the utilization of the maritime transport in domestic cargo transfer is put as a main policy in the existing Five Year National Development Plan. The concrete promotion measures of maritime transport from the viewpoint of port, however, are not presented at all so far. Establishment of maritime transport promotion policy is required.

(6) Insufficiency of the maintenance works

Daily maintenance for port facilities is very important with respect to keeping the facilities in good condition during the calculated life period. That is because if a berth is damaged, the vessels can not come along the berth or cargo handling works can not be undertaken as expected, or if the cargo handling equipment is out of order, the port can not ensure sufficient productivity. However, it is also a fact that the maintenance costs constitute a considerable burden for the management. For that reason, for the majority of the ports that suffer from failures to increase their earnings, it is most probably the case that they fail to take pains for sufficient maintenance. As a result of that, decreases in productivity or cargo handling occur, and possibly some of the users might stop using that port, thus, further adverse effects on their earnings might be felt. The administration or operating organization that manage the port facilities can not concern themselves only with the earnings, and leave the conditions at the site to private companies, and show no interest. They should grasp the real time information about the port, and pay due attention to the condition of the port facilities. Then, the management ledger on port facilities and cargo handling equipment should be prepared, and be renewed at least once a year, and that ledger should be kept in such a manner that anyone who takes a look at it can obtain the latest facility information.

(7) Lack of risk management

Last year, the port facility damages due to big natural disasters followed one another, such as the damage of the terminal of the Derince Port due to the Kocaeli Earthquake in August, or the damage of the breakwater of the Trabzon Port in February. The introduction of earthquake-proof or wave-proof design is a difficult issue as it required balance between safety and economy. It can be said, however, that there is a necessity of collecting the detailed data on the damages by the natural disaster in the past 30 years, and examining the design philosophy and design criteria in Turkey. In the same vein, perhaps there is need for examining whether the construction works complied with the designs, or there was any management failure related to the damage at the site. Furthermore, central government should pay more attention to the urgent restoration works of port facilities that are damaged by natural disaster.

(8) Financial problems

Public investment undertaken by the government amounts to US$ 4500 million per year. Of that, the port budget of the government is US$ 20 million for port development (DLH), US$ 15 million for port operation (TCDD), and US$ 15 million for the maritime affairs (Under-Secretariat of Maritime Affairs). These amounts are extremely small, and facility expansion in the last 10 years does not go beyond meager small-scale port facilities.

The receipts from maritime trade are US$ 200 million. Corresponding to the expansion of the amount of maritime imports and the amount of import cargo at ports, the receipts are growing.

The municipalities do not share the costs of port investments. The total amount of public

investment of the municipalities is US$ 2400 million, and there is an item of budget.

The financial affairs situation of the port department of TCDD has rapidly recovered. The financial affairs situation of TDI is worsening.

(9) Movement of private capital

BOT contracts have not been developed satisfactorily. In the terms of the contracts, the risks that are related to arbitration, accounts, cost increases, force majeure, termination of contract are all onesided imposed on the private sector unilaterally.

Among the private sector enterprises that participate in port operation, or the private ports, losses are common, and most of them barely manage to operate, with no funds to invest in new projects.

In order to promote domestic and foreign private investment, favorable tax system is prepared. However, the investments are small, and investment areas are centered at zones of population and production accumulation where market growth is expected.

Judging from the bank savings balances, and the stock market, the situation is not for increasing private financial capital loans. Among the private enterprises, those that entertain self capital are few, and the majority of these have not the financial margins to afford new investments, and have no confidence that they can raise funds.

(10) Cargo handling efficiency that falls short of world standards

Although the cargo handling efficiency at the three big container ports operated by the TCDD (Haydarpaþa, Ýzmir, and Mersin) are said to be improving, it still lags behind when compared with the major ports in the world. This is due not only to the abilities of the operators, but also to the insufficient container yard capacities, the aged cargo handling equipment, or the delays in computerization. In order to meet the increasing container demand, the port operators, in addition to getting hold of the present situation accurately, should establish the targeted cargo handling productivity on the basis of the world standard (24-25 boxes/hour/crane, in gross), and they should provide important guidance and supervision so that that aim is attained.

Also, in order to increase the cargo handling productivity, in addition to preparations such as the expansion of capacity, or renewal of the cargo handling equipment, concerning the “hard-ware” side of the issue, completion of such steps as increasing the ability of the operators, introduction of effective communications system between the control center and the operators, computerization of the cargo handling, and the like that concerns the “software” side should be pursued.

(11) Computerization that lags behind

Though the computerization of the cargo handling operations at the Haydarpaþa and Ýzmir ports is continuing, it considerably lags behind those at the major ports of the world.

Introduction of computers into general operation business (Management, Personnel, Accounting, etc.) is continuing, however, introduction of computers into overall operations such as the Container Inventory Control, Container Delivering / Receiving Control System, or Loading / Unloading Operation Control System, etc. is still lagging.

Together with corresponding to the expanding container cargo, in order to achieve rapid and precise cargo handling operations, and competing with rival ports, it is indispensable to introduce computers into wide areas of operations. And also, computerization is deemed to be a strategic move in the direction of introduction of EDI system which, in the future, is indispensable.

(12) Inefficient custom regulations and the delays in introduction of EDI

In the recent years, the advanced ports of the world continue to simplify the port administration formalities including the introduction of EDI. EDI is handling all application and permission works that were hitherto accomplished either by written or fax form, in a paper-less way, and online via computers, and is a last trump in the way to bring port efficiency to higher levels. It could be thought that the governmental organizations or the port management body in Turkey seem to lack basic awareness or information concerning the introduction of EDI, but there is also insufficiency in grasping the global trends.

Concerning the introduction of EDI; revision of the related laws and regulations, or coordination with and informing the interested parties such as the governmental organizations, users, etc. is necessary. In this regard, leadership by the central government is all the more indispensable. In addition, concerning the custom procedures, some users point out to the excessive empty container physical inspections or sample checks, and further simplification of the procedures is required.

Consequently, by means of this study, the necessity of the introduction of EDI, the present conditions in the world, the introduction procedures, etc. are explained. The government and the port administrators are strongly required to switch to user-oriented port approach that maximizes the satisfaction of the customers, by means of increasing the efficiency of cargo handling, introduction of the EDI, and simplification of customs clearance.

(13) Insufficient utilization of railway in container transport

Due to the lack of sufficient facilities and appropriate system, railway is not utilized much in container transport. Railway should play more and more important roles in land transport from the economical and environmental viewpoint. Adequate measures to promote the railway activity in container transport should be introduced.

5.2 The Roles and Functions of Ports

Ports do not only fulfill the function as a connection point of the land and sea in the cargo

and passenger transportation, but also fulfill a productive function as well in the cases of industrial accumulation within the port. Furthermore, as a result of these functions they lead the economic development of the state and regions, and considerably contribute to the improvement of the life of the people. In order that the ports would effectively and efficiently contribute to the future development of the national economy and progress of the regions, it is necessary that the related authorities and relevant organizations have adequate awareness and understanding of the aforementioned functions and roles of the ports. For that purpose, the functions and the roles that a port should fulfill, concerning national land development, are hereby provided.

5.2.1 Functions of Ports

(1) Transport function

Transport function is a typical function of a port, and means the gathering of the cargo and people from abroad or from different regions of the country, whence they would be transferred to their final destinations.

In Turkey, annually as much as 160 million tons of cargo is being handled. In accordance with the future economic development, the volume of the cargo to be handled at the ports is expected to grow further. The cargo diversifies into various goods from the key commodities for the state such as the resources, energy, and food, to industrial raw materials, or the final consumer products. Port cargo is supporting the lives of the people and the economic development. In other words, without the sound function of the port, the national economy could not be developed and maintained, and people's lives would be crippled.

Concerning the passenger transport too, the number of international passengers that enter and exit Turkey via ships is increasing each year, and is at the 1.4 million level. Among them, foreign passengers account for 1.1 million. And of those foreign passengers, 500 thousand are tourists aboard foreign cruising ships. They are considerably contributing to the tourism industry of Turkey. Furthermore, the number of passengers utilizing the city lines within the greater city of Istanbul is 64 million people annually, and hence this is an indispensable transport mode for the citizens. The ports, thus, shoulder this type of important passenger transport function as well.

(2) Productive function

Within or in neighboring areas of a port, industries such as manufacturing, production, and trade businesses, are located. Ironworks, petroleum, petrochemical plants, shipyards, or free trade zones in the port areas could be raised as typical examples of these industries. These industries are indivisibly connected with the transport function of a port and the industries presuppose the existence of a port. There are some occasions where a port itself becomes an industrial area, or a port promotes the industrial activities. In this context, these facts of a port are generically called the "productive function of the port".

5.2.2 Basic Roles of Ports

(1) Supporting socio-economic development

A port is a node connecting the sea and land transport system and one of the most important infrastructures that contribute to socio-economic development. In Turkey, ports play an important role to supply industrial materials, to transfer manufactured products and to provide the people's daily goods. Approximately 90 % of import and 73 % of export activities are conducted through ports in Turkey. Without soundly functioning ports, national economy and people's daily lives would be thrown into confusion.

A port is developed or improved sometimes accompanied by the establishment of a new industrial zone. In this case, the port provides private sectors with a new sphere for their economic activities.

(2) Surviving in the age of globalization

The field of international container transport has entered the age of globalization where rivals compete fiercely for the status of international hub-port. For every country, a hub port is a tool that can boost their economy in various ways. First of all, a hub port gives the country the most rational transport framework and strengthens the nations industrial structure. Second, a hub-port makes it possible for the country to enjoy benefits from a third country's economy. Very few ports in a country can play this role.

(3) Supporting the regional development

It is clearly observed that there exists great and wide disparity between the eastern and western regions in terms of GDP per capita distribution in Turkey. Among the eastern regions, the Black Sea coastal area shows relatively higher GDP per capita than the inland area. It is obvious that a port has a noticeable effect on the economic growth due to the fact that the coastal areas possess a great advantage in development through the exchange with the outer world. This role can be spread even to the inland regions if a suitable assistance inland transport network is in place.

(4) Sustaining people's daily lives

Small ports for passenger's daily transport and small ports in rural areas serve to fulfill the daily needs of the people.

(5) Emergency commodities transfer route and emergency evacuation route in case of earthquake

As the considerable damage suffered from the Kocaeli Earthquake last year revealed once more, Turkey is located in an active seismic zone. In the Kocaeli Earthquake, the road network did not suffer much damage, and the transportation of emergency goods and the

emergency evacuation of the citizens have been done through the roads. However, in the case of a big earthquake, there are no guarantees that the road network will not be damaged. In the course of events, it is a fair possibility that the road network could become impossible to use due to bridge collapses. In such a situation, it is possible that the ports fulfill an important role as the emergency commodities transportation route, or the emergency evacuation route.

Furthermore, in the Kocaeli Earthquake, big damage occurred at Derince Port, and this greatly hindered the activities of the enterprises that used the Port. As the social impact from damage inflicted on a port is extremely deep, it is necessary that design and construction of port facilities should be implemented carefully to minimize earthquake damage.

(6) Protection of the marine environment

The deterioration of the marine environment at the Mediterranean Sea, Aegean Sea, Marmara Sea and Black Sea poses a problem in these areas. The ports are connected with these seas, and the environmental deterioration of the ports is connected to that worsening, hence it is necessary that the ports spend as much effort as possible for the protection of the environment at the marine areas around the ports.

5.2.3 Basic Roles of Ports in Each Region

(1) Ports of the Mediterranean Sea

In the Mediterranean Sea, Iskenderun TCDD, Mersin and Antalya Ports are concentrated on transport function, and BOTAS, Iskenderun and numerous other ports and port facilities are concentrated on the productive function. The ports at the Mediterranean are fulfilling the task of supporting the people's lives and the industrial activities in the hinterland of the ports. Especially, these ports have to play a role in promoting the GAP region as a gateway that would connect the GAP region to abroad. Iskenderun TCDD and Mersin Port should be appointed to fulfil that task.

Internationally, concerning the container transport in the Eastern Mediterranean Sea area, Turkey, as a great country, should play more important roles. Taking the geographical advantage into consideration, Turkey could be the gateway for Iran, Iraq, the CIS countries, or the countries of the Balkan Peninsula as well. Improvement of not only port facilities but also quality of port services such as the computerization for economic and efficient cargo transfer services or, prompt customs procedures and all formalities are required. Concerning the BOTAS Port, it should fulfill the smooth transportation of the petroleum from the Baku - Ceyhan pipeline, or the existing Iraq - Ceyhan pipeline to the international market.

(2) Ports of the Aegean Sea

In the Aegean Sea, many ports and port facilities such as Izmir and Kusadasi Port are concentrated on the transport function, while Aliaga Port is concentrated on the productive function. The ports of the Aegean Region are fulfilling the task of supporting the people's lives and the industrial activities in the hinterland of the ports. Still more, Izmir Port serves also as the intermediary base for the container cargo of the Black Sea ports of Turkey.

A Turkish port in the region has to rid itself of feeder port status and take advantage of the local container volume which greatly increase in future. In that case, the port could enhance the international competitiveness of the Turkish industries. It might be also possible for the port to be an intermediary base for the container cargo from the Black Sea region countries, and the Rhine and Danube Rivers. For that, improvement of not only port facilities but also quality of port services such as the computerization for economic and efficient cargo transfer services or, prompt customs procedures and all formalities are required. Kusadasi Port which is used by large numbers of international tourists is an important port from the promotion of tourism.

(3) Ports of the Marmara Sea

In the Marmara Sea, many ports and port facilities such as Haydarpasa, Bandirma and Tekirdag Port are concentrated on the transport function. Izmit Bay Port is concentrated mainly on the productive function, and Ambarli Port is serving both functions. The ports of the Marmara Sea are fulfilling the task of supporting the people's lives and the industrial activities in hinterland of the ports.

The Marmara Sea region is extremely populous, and is characterized by higher import cargo ratios. Turkish people and companies have to pay excessive transportation cost due to the utilization of feeder services. For that reason, Turkish ports in the region have to rid themselves of feeder port status and take advantage of the local container volume which will greatly increase in future. It might be also possible for the port to be intermediary bases for the container cargo from the Black Sea region countries, and the Rhine and Danube Rivers. Improvement of not only port facilities but also quality of port services such as the computerization for economic and efficient cargo transfer services or, prompt customs procedures and all formalities are required. It should be noted that existence of two many small-scale container terminals might prevent Turkish ports in the region from being calling-ports.

(4) Ports of the Black Sea

In the Black Sea, many ports and port facilities such as Samsun, Trabzon, and Rize Port are concentrated on the transport function. Eregli Port is concentrated mainly on the productive function. The ports of the Black Sea Region are fulfilling the task of supporting the people's lives and the industrial activities in the hinterland of the ports. Particularly since the ports of the East Black Sea region have to contribute to the development of the region, port development has to be planned in line with the DOCAP development plan. Since these ports can play a role as the gateway to abroad for the regions such as the GAP region or the Eastern Anatolia that do not face sea, they are expected to contribute to the

promotion of the GAP region, and the Eastern Anatolia region. That responsibility should be borne by Trabzon, Hopa and Rize Ports.

It might be also possible for the ports to serve as the outlet to the international society for the CIS countries. Port development projects should be implemented in a timely manner, observing the future progress of CIS countries' economy.

5.3. Basic Roles of Public and Private Sector

5.3.1. Ports and harbors as public assets

The concept of ports as public assets has varied. In general, ports and harbors are regarded as public assets which are used equally by each member of a society. Public assets do not exclude other users by use of one user, and therefore each member can enjoy the benefit without any payment (Existence of "Free rider"). Also, use by one user does not decrease the opportunities of use by others. Based on those characteristics, it is said public assets are not suitable for market mechanism in service supply. Ports and harbors as public assets have dual dimensions in character; non-profitable facilities and profitable facilities. Port infrastructure such as channels, waterway, anchorage and basins are classified as non-profitable facilities. That means the above-mentioned "public assets". On the other hand, berthing facilities are profitable facilities. Focusing on the profitable character of berthing facilities, ports, especially container terminals are sometimes considered private assets, not public assets.

Ports are modal shift points that connect sea transport with land transport. Especially as door-to-door transportation become prevalent under the world containerization movement, access transport from ports to hinterlands using various traffic modes such as roads, rails and airs has become an important factor for ports and port users in gaining a competitive edge over rival ports in the world.

It is imperative that ports and harbors contribute to regional/national development. The basic function of ports and harbors including non-profitable facilities is as follows.

- Base for physical distribution
- Base for industrial production
- Base for urbanization and city re-development
- Base for life activity
- Base for maritime leisure

Moreover, as an environmentally friendly means of transport, sea transport should be paid more attention in road-oriented infrastructure development.

5.3.2 Basic roles of the Public sector

Taking the characteristic of public assets in ports and harbors into consideration, the

central government should play the following fundamental roles in nationwide port development.

- Establishment of legal framework of port activities and its coordination
- Planning comprehensive guideline for nationwide port development and its follow-up
- Securing construction and maintenance of non-profitable port infrastructure
- Proper involvement in the fulfillment of port development by private finance initiative
- Taking environmental preservation into consideration

5.3.3 Basic roles of the Private sector

Private sector is expected to play the following roles

- Provision of efficient management and operation
- Transfer of the most up-to-date techniques and know-how
- Investment in port development

5.3.4 Case study: Roles of public sector, and roles of private sector in European ports

(1) Type of port management body
In Germany, the federal states are responsible for port related activities. (Three major cities, Berlin, Hamburg, and Bremen/Bremerhaven are deemed as states.) A senator of the State Congress who is also the head of the State Ministry of Ports, Shipping and Foreign Trade of the State Government is appointed to be the governor of a port management body.

In the Netherlands, Port Authority of Amsterdam Port is a department of Amsterdam City Government. This port is planning to establish a jointly-owned corporation funded 100% by local governments in collaboration with other cities who are also the port authorities of small ports located along the access channels from the North Sea to Amsterdam Port.

In Belgium, Port Authority of Antwerp Port is a department of Antwerp City Government. But the legislation to establish a corporation funded 100% by the city and qualify it as Port Authority is under deliberation.

France has seven autonomous ports that are under the administration of Port Autonome, which is an independent autonomous organization, and the ports that do not fall under this category are called non-autonomous ports. Port Authority of Le Havre Port is an independent Port Autonome, and forms an independent state (public state) financially.

British ports which are nationalized under the Transport Act 1947, historically followed the privatization process. As a result, over 300 ports and harbors from small river wharves to major docks can be categorized into three different forms of port ownership. Company owned ports are owned by private or statutory companies such as Associated British Ports (ABP), Mersey Docks & Harbor Company and Felixstowe. Those ports are privately owned, but they are also required to operate according to the relevant Acts of Parliament. Secondly, Trust ports which a large number of medium-sized and small ports belong to

were set up under individual Acts of Parliament which established self-governing statutory bodies. They own and administer each of the 114 Trust ports. The Central Government set in motion the privatization of them. Third one is Municipal ports which are owned and managed by local governments.

In the United States, on the contrary, port management was transferred from privately-managed ports to public ports. Private capital was commonly introduced into the port development in the beginning of the 19th century. Privately-managed ports had been mainly developed and operated by railroad companies. But, demerits of monopoly came to the surface conspicuously. For instance, monopolistic ownership of port facilities adversely hampered the normal cargo flow as the result of sharply increased port dues to the extent that the market could hardly endure to bear. To overcome the barriers, port authorities emerged for the purpose of managing ports under public administration from the late 19th century. However, privatization in the U.S. ports has made progress in various ways such as the consignment of port management to commercial companies, the introduction of management know-how and the leasing of port facilities to commercial companies.

(2) Involvement by central governments in port development

In Germany, the Netherlands, and Belgium, the degree of national involvement is extremely low, and port management bodies are engaged in port administration and management independently in a competitive environment on a self-support basis. The ports in those countries can be termed “Landlord type of port authority”, which are making profits by leasing the self-owned land to private stevedoring and cargo-handling companies on a long term basis. Rotterdam Port which is the most-favored port in terms of natural conditions is the price leader in determining land lease charges, port dues and others in the region that extends from Hamburg to Antwerp, where highly competitive ports are vying for superiority with one another. Therefore the ports which are exposed to severe natural conditions are subsidized by their government in building breakwaters and dredging channels in large rivers in order to secure their competitiveness.

On the contrary, the United Kingdom has no subsidy or financial support system by the central government for port development in principle. Port management bodies are responsible for installing navigation aids or dredging within port areas.

Table 5-3-1 Financial scheme of port development

	Channel	Navigation Aids	Breakwater	Berth, Dock, Reclamation,
Germany	(Construction/Maintenance) *Out of port area CG:100 % PB: 0 %	* In port area CG: 0 % PB: 100%		(Construction /Maintenance) CG: 0% PB:100%
Holland	(Construction) CG:100% PB: 0% (Maintenance) CG:100% PB: 0%		Different by each port	(Construction /Maintenance) CG: 0% PB:100%
Belgium	(Construction) CG:100% PB: 0% (Maintenance) CG:100% PB: 0%	(Installation/Maintenance) *Out of port area CG:100% PB: 0% * In port area CG: 0% PB:100%	(Construction) CG:100% PB: 0% (Maintenance) CG: 0% PB:100%	(Construction) CG:60-100% PB: 40- 0% (Maintenance) Sharing between Local Government & PB
United Kingdom	(Construction) CG: 0% PB:100% (Maintenance) CG: 0% PB:100%	(Installation/Maintenance) *Out of port area CG:100% PB: 0% * In port area CG: 0% PB:100%	(Construction/ Maintenance) CG: 0% PB:100%	(Construction /Maintenance) CG: 0% PB:100%
France	(Construction) CG: 80% PB: 20% (Maintenance) CG: 100% PB: 0%	(Installation) *Out of port area CG:100% PB: 0% * In port area CG:60-80% PB:40-20% (Maintenance) CG: 100% PB: 0%	(Construction) CG: 80% PB: 20% (Maintenance) CG: 100% PB: 0%	(Construction /Maintenance) CG: 0% PB:100%
U.S.	(Construction) *Out of port area CG:80-40% PB:20-60% * In port area CG: 0 % PB:100% (Maintenance) *Out of port area CG:100% PB: 0% * In port area CG: 0 % PB:100%	(Installation/Maintenance) CG:100% PB: 0%	(Construction/ Maintenance) CG:100% PB: 0%	Different by each port

Source: ESPO Fact Finding Report1996

Note: CG= Central Government, PB= Port Management Body

5.4. Framework of Basic Policies

5.4.1 Policy on Port Infrastructure Development

(1) Background

In formulating the basic policy on port infrastructure development, necessary and prioritized port development plan shall be proposed by the Study Team based on the forecast of total cargo/ passenger in 2020. As for the international container, development of port facilities with high level productivity and international standards shall be aimed at. On the other hand, as for other cargo and passenger, the economic rationality shall be considered.

Generally, the port provides the space not only for the transport but also for industrial activities and people's livelihood. To rectify the regional disparity in development, the development of eastern regions in this country shall be considered.

For realizing an effective port system in the long term, a huge amount of investment with an appropriate investment schedule shall be provided. Therefore, it might be necessary to establish middle term plan and to adopt the concept of intensive investment.

Since the sufficient and effective connection of other infrastructure such as roads, highways and railroads with a port is needed to maximize the function of the port, the desirable future development of other infrastructure from the standpoint of port development shall be considered.

(2) Basic Policy

Based on the above, basic policy on infrastructure development shall be summarized as follows.

1) To establish an effective international cargo transport network, particularly for international container cargo

2) To establish an effective passenger transport network

3) To establish the strategy on regional development port

4) To establish the strategy on local port

5) To establish the comprehensive port development plan including other infrastructure

6) To establish the long term investment plan

5.4.2 Policy on Port Management and Operation

Cargo handling volume in Turkish ports is estimated to increase steadily in our demand forecast. To deal with this increase, a number of measures need to be considered.

First, it should be considered how to deal with surging containerization movement in Turkey. Scale merit at strategic locations should be pursued in port development to enable efficient management. Ways of administration and management by port management bodies at present shall be reexamined from the port users' viewpoint. It should be oriented to improve port services to catch up with the global standard of services by private sector participation. Full utilization of up-to-date techniques and know-how of private sector should be more considered. Such measures would increase Turkey's competitiveness in the world.

Secondly, it is assumed that the number of ports which are administered and managed by the private sector will steadily increase as the privatization process progresses. It will thus become more important to strengthen the coordination function by the central government to avoid overlapped investment among ports for efficient port development. It is therefore essential to clarify urgently basic concepts on roles of public and private sector, the priority of development and effective incentives for private sector. It is also required to establish more accurate port statistics for strategic planning. Inconsistent data could lead to fatal errors in planning.

Thirdly, environment around port areas is becoming serious issue, especially in ports located in main industrial areas. The authority and responsibility of a port management body should be institutionally provided.

Table 5.4.1 Policy framework on port management and operation

(1) Establishment of strategic nationwide port development guideline
(2) Establishment of institutional framework on port management between central government and port management bodies
(3) Establishment of reliable statistics system on ports and harbors as the fundamental basis for strategic planning
(4) Proper involvement by government for promoting port development with PFI
(5) Strengthening the authority and responsibility of port management bodies

Chapter 6 Strategy for Port Infrastructure Development

6.1 Container Ports in the Mediterranean Sea

6.1.1 Location and Throughput of Container Ports

The total amount of containers handled at ports in the world has been increasing rapidly. The overall annual average growth rate (1990-1998) was 10.1 % and the number of international maritime containers reached approximately 188 million TEUs in 1998. Same phenomenon was witnessed in the Mediterranean Region. As a result, container ports in the region handled about 18 million containers in 1998.

Worldwide containerization in maritime cargo transport is expected to continue in future. An experienced maritime consultant expects that the number of containers could reach 491 million TEUs in 2012, an increase of 2.6 times over the present figure. In the Mediterranean Region, twice the current figure is forecasted in the future. Container ports in the Mediterranean Sea have been enjoying the rapid progress of international container transport during the last decade. Each port may take it for granted that further progress of international containerization will benefit the port automatically. Circumstances around container traffic, however, are changing radically. For example, one of the biggest maritime cargo carriers is preparing to introduce new generation container vessels with a capacity of 13,000 TEUs. If this introduction is successful, it is likely that a worldwide restructuring of international container transport will occur. Without continuous, appropriate and timely improvement of port infrastructure and port services, any port would not be able to survive in the age of global competition. In this context, it is important to evaluate the present situation of the container traffic and to scrutinize the possibility of establishing a container hub-port in this country.

Locations of major container ports in the Mediterranean Sea are shown in Figure 6.1.1. Major ports including Algeciras, Gioia Tauro and Genoa Port are located in the West Mediterranean. Major ports including Haifa, Piraeus and Marsaxlokk Port are located in the East Mediterranean. Container throughput in these major ports in 1997 is shown in Table 6.1.1. The table shows the top twelve in the West Mediterranean and the top thirteen in the East Mediterranean respectively.

Algeciras Port handled more than 1.5 million TEUs, the largest volume in the West Mediterranean, and also the largest in the whole region. Algiers Port handled only 121 thousand TEUs, the least volume in the West Region. Big ports and rather small ports are clearly divided in the West. In the East, Haifa Port has the largest volume of 684 thousand TEUs while Kum Port handles 150 thousand TEUs. Unlike the West, big ports and rather small ports are not clearly divided. Since every port will try to do its best to become a big port in the region, severer competition will be expected in the East Region.

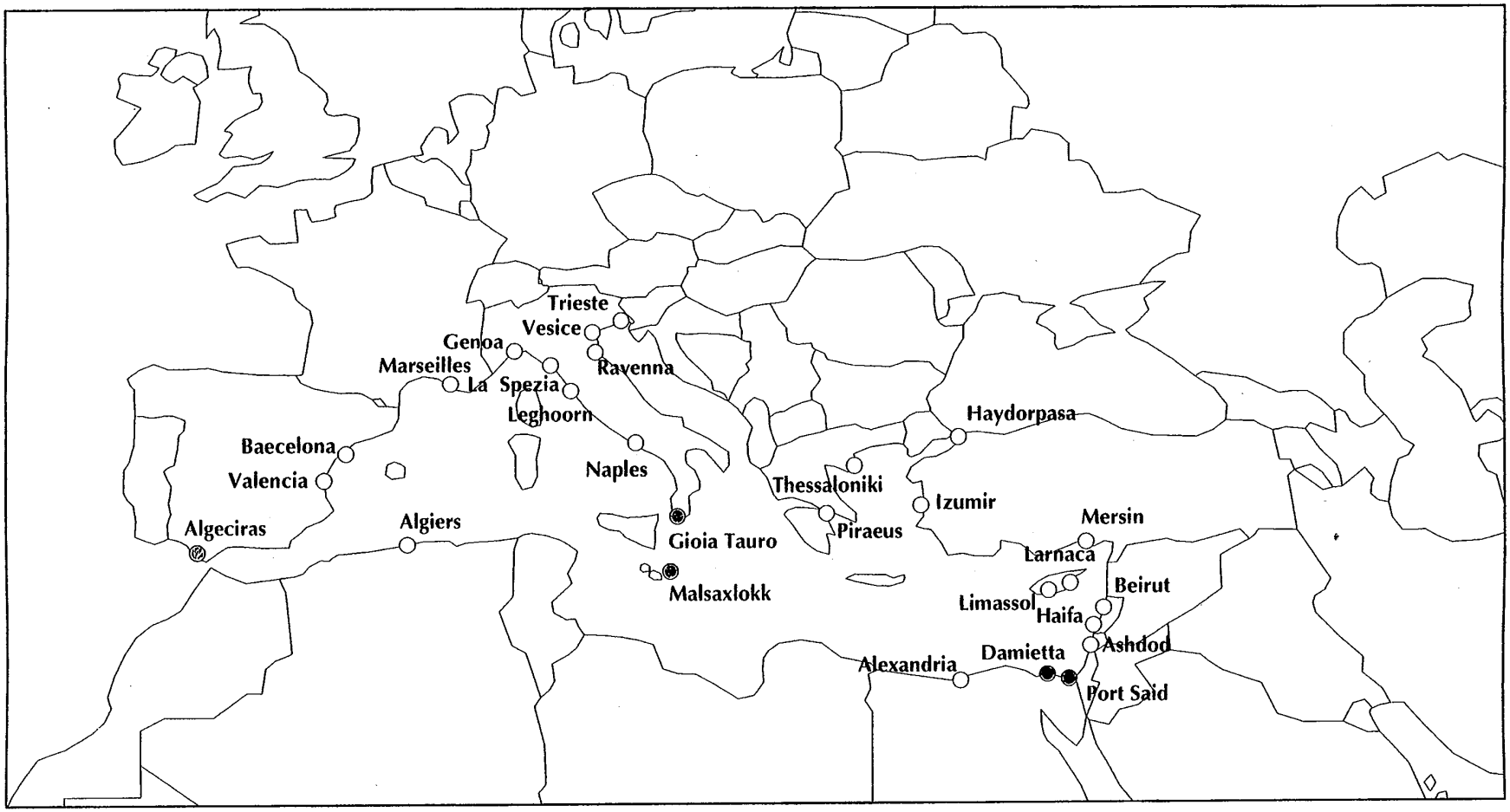


Figure 6.1.1 Location of Major Container Ports

Table 6.1.1 Container Throughput in the Mediterranean Sea (1997)

(West Mediterranean)

Name of Port	Throughput (1000 TEU)
Algeciras	1,538
Gioia Tauro	1,449
Genoa	1,180
Barcelona	972
Valencia	832
Marseilles	622
La Spezia	616
Leghorn	501
Naples	308
Venice	212
Trieste	202
Ravenna	191
Algiers	121

source: Containerization International Year Book 1999
: The Study Team (Quastionnaire to Related Organization)

(East Mediterranean)

Name of Port	Throughput (1000 TEU)
Haifa	684
Piraeus	684
Marsaxlokk	663
Damietta	604
Ashdod	427
Port Said	420
Alexandria	389
Izmir	**388**
Haydarpasa	**330**
Beirute	278
Mersin	**268**
Limassol	237
Larnace	165
Thessaloniki	156
Kum Port	**150**

source: Containerization International Year Book 1999
: The Study Team (Quastionnaire to Related Organization)

6.1.2 Transshipment Ratio of Major Container Ports

It is difficult to obtain data on the transshipment container volume in each port. “Containerization International July 1995” provides the transshipment container volume only for Damietta, Port Said, Limassol, Piraeus and Marsaxlokk port. The Study Team surveyed the transshipment ratio of some other ports in the region. Table 6.1.2 shows the transshipment ratio of major container ports.

Maritime cargo carriers do not generally use a port as only a transshipment base. They need a significant local market that makes their calls at ports worthwhile and the transshipment is a just bonus for the carriers. There are some ports, however, which handle mainly transshipped containers rather than local containers because of their advantageous location to the main shipping lanes. Algeciras Port is very close to the Straight of Gibraltar on the international trunk route and Port Said and Damietta Port are similarly well placed in relation to the Suez Canal. Marsaxlokk and Gioia Tauro Port are other typical examples that enjoy a geographical advantage, the center of the Mediterranean Sea.

There are some requirements for a successful container transshipment port. Among them the deviation distance from the shipping trunk lane is the most important. Figure 6.1.2 shows the shipping trunk lane in the Mediterranean and Table 6.1.3 shows the deviation distances between the main shipping lane and major container ports. Argeciras, Marsaxlokk, Gioiatauro and Damietta Port are dominated by the transship container traffic, supposedly due to less deviation distance. The relation between the transshipment ratio and deviation distance is shown in Figure 6.1.3.

Deviation distance of Turkish ports is also shown in Table 6.1.3. It is easily understood that Turkish ports have geographical disadvantage in playing roles similar to Argeciras, Marsaxlokk, Gioiatauro and Damietta Port in international container transshipment.

6.1.3 Classification of Container Port

(1) Hub-port (1)

The hub-port (1) is a port such as Argeciras, Marsaxlokk, Gioiatauro and Damietta Port, which treats mainly international transshipped containers and does not handle a significant amount of local cargo. These ports are located just adjacent to the main shipping lane.

There is no Turkish port in this category.

(2) Hub-port (2)

The hub-port (2) is a port such as Barcelona, Marseilles, Port Said and Piraeus Port. These ports have their original local cargo to some extent from/ to their hinterland and also handle the international transshipped containers. Local cargo had attracted the ocean-going mother vessels to these ports at first and transshipment function was attached to these ports at the same time or later.

Table 6.1.2 Transshipment Ratio of Major container Ports

Name of Port	Ratio
Algeciras	90%
Barcelona	25%
Marseilles	8%
Genoa	0%
La Spezia	0%
Gioia Tauro	100%
Marsaxlokk	90%
Piraeus	20%
Alexandria	4%
Damietta	95%
Port Said	64%
Limassol	36%

Table 6.1.3 Deviation Distance of Major Container Ports

(Unit: Nautical Mile)

Name of Port	Distance
Algeciras	0 N.M.
Barcelona	209 N.M.
Marseilles	290 N.M.
Genoa	352 N.M.
La Spezia	337 N.M.
Gioia Tauro	66 N.M.
Marsaxlokk	6 N.M.
Piraeus	178 N.M.
Alexandria	32 N.M.
Damietta	0 N.M.
Port Said	0 N.M.
Limassol	179 N.M.

source: Culuculated by OCDI

Deviation Distance of Turkish Port

(Unit: Nautical Mile)

Name of Port	Distance
Haydarpasa	691 N.M.
Izmir	345 N.M.
Mersin	339 N.M.

source: Culuculated by OCDI

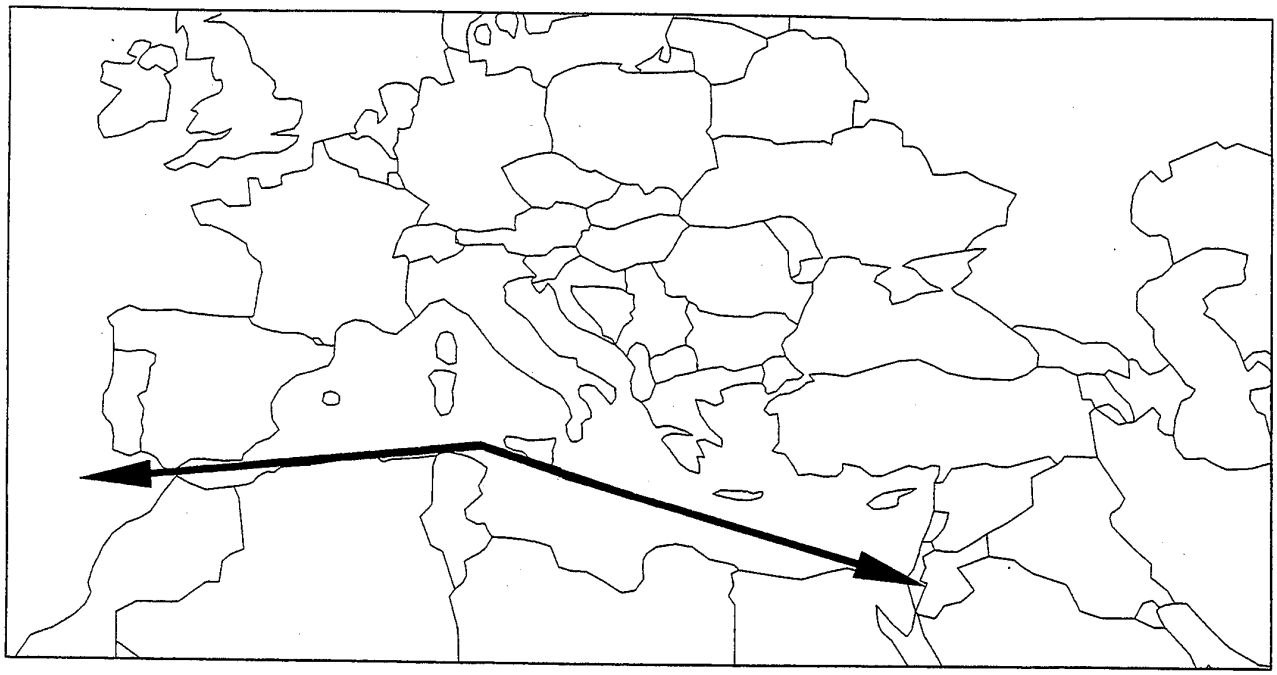


Figure 6.1.2 Shipping Trunk Lane

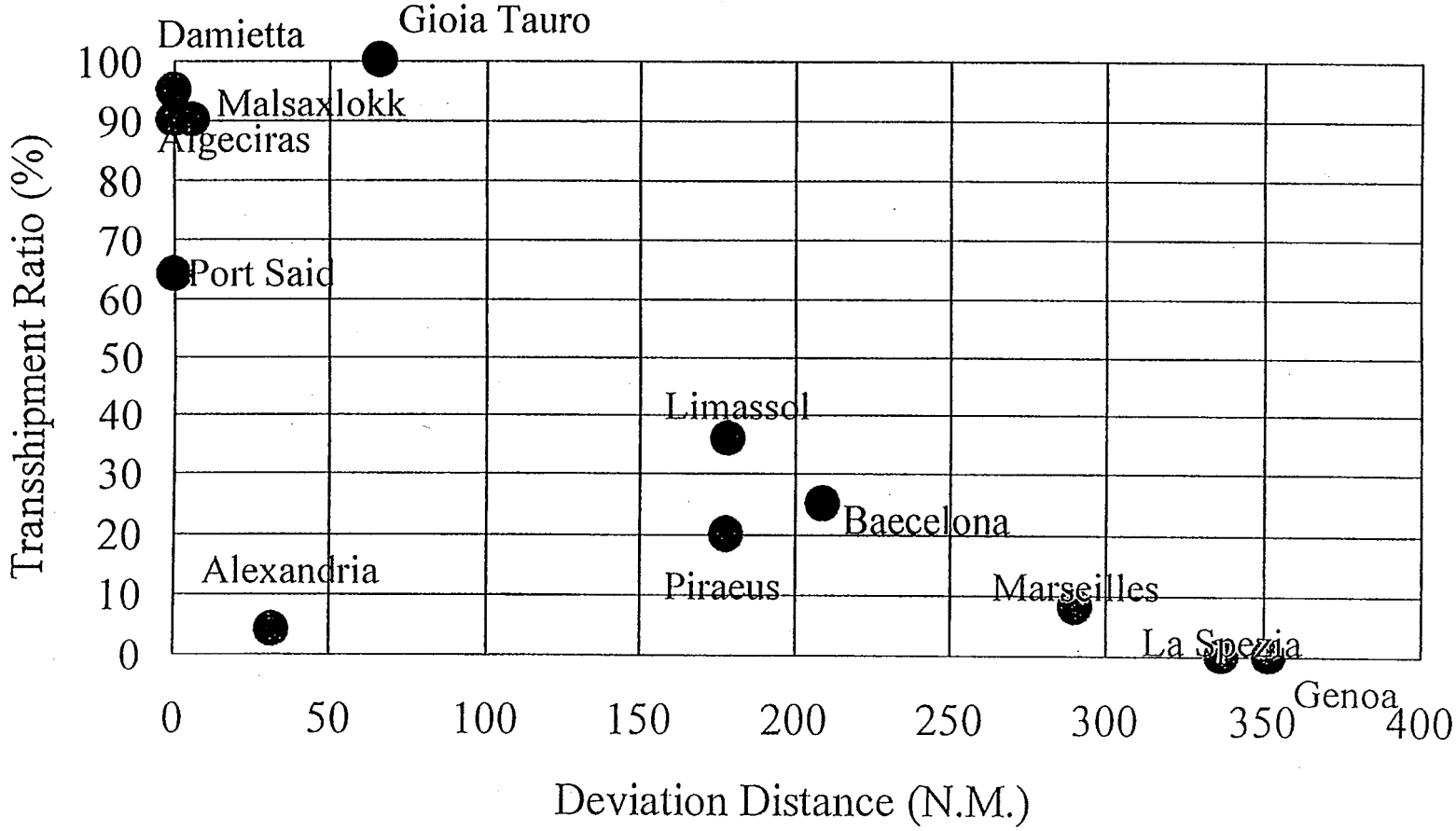


Figure 6.1.3 Transshipment Ratio and Deviation Distance

There is no Turkish port in this category.

(3) Calling-port

The calling port is a port such as Genoa and La Spezia Port at which ocean-going container vessels call periodically. This type of port does not handle international transshipped containers at all. Since this port generally has the potential to treat the transshipped containers, this port can be shifted to hub-port (2) easily. In other words, the difference between calling-port and hub-port (2) is not large.

Mersin port, at which a mother ship sailing between the East Mediterranean and Asia calls weekly, belongs to this category.

(4) Feeder-port

The feeder-port is a port at which mother container ships do not call and all international containers are transferred to/ from hub-port (1) or hub-port (2).

Almost all container ports in Turkey belong to this category.

6.1.4 Container facilities of Hub-port in the Mediterranean

Container facilities of typical hub-port (1) are shown in Table 6.1.4. Ports belonging to the hub-port (1) have long container berths with adequate water depth, plenty container handling equipment and broad storage area.

6.2 Container Traffic to/ from Turkey

6.2.1 Existing Container Traffic in the Mediterranean Sea

Container vessels moving on the Mediterranean Sea are classified by maritime route such as Europe- Far East, Mediterranean- Far East, Europe- East Asia/ East Africa, Inter-European and etc. Vessels with a large capacity are applied to Europe- Far East, therefore, feeder service is necessary to deliver containers to small ports. Inter-European services include this feeder system and local maritime service. Figure 6.2.1 shows the basic and simplified concept of the existing container traffic in this region.

Ports belonging to the hub-port (1) are located at the western/ eastern end and center of the Mediterranean Sea. The hub-port (1) at the western end has a distribution function for the west Mediterranean countries and the hub-port (1) at the eastern end has a distribution function for the East Mediterranean countries. The hub-port (1) at the center has distribution functions for both Mediterranean countries.

6.2.2 Future scenario of Container Traffic

Although international container transport is sure to expand in future, it is difficult to

Table 6.1.4 Container Facilities of Hub-ports in the Mediterranean Sea

Gioia Tauro Port

Facility	Dimension	Descrption
Container Berth	-13.5m/ -18.0m	3,012m
GC	-17 units	Panamax: 3 units Post-panamax: 14 units
Straddle Carrier	60 units	
Storage Area	950,000 sq.m	24,000 TEU ground slots

Damietta Port

Facility	Dimension	Descrption
Container Berth	-14.5m	1,000m
GC	6 units	Panamax
Toplifter	21 units	
Storage Area	163,000 sq.m	3,400 TEU ground slots

Port Said Port

Facility	Dimension	Descrption
Container Berth	-13.7m -13.7m -8.2m	(Container) 341m (Multi-porpose) 248m (Feeder Vessel) 295m
GC	6 units	Panamax
Straddle Carrier Toplifter	4 units 16 units	
Storage Area	30,000 sq.m	2,300 TEU ground slots

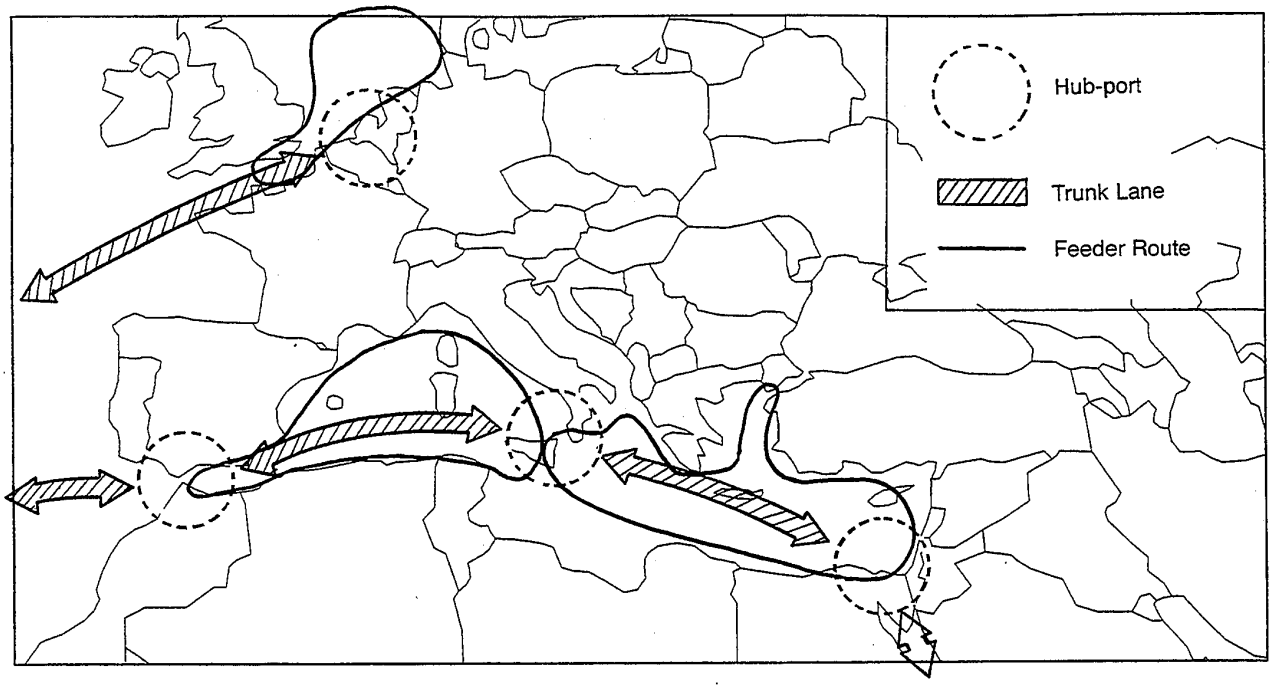


Figure 6.2.1 Existing Structure

forecast the future structure of international container traffic precisely. This is because it depends on various and unpredictable factors including the capacity of container vessels that will be introduced to the maritime transport and future capacity of each container port. For example, as mentioned above, no one can predict the effect of the introduction of the new container vessels with a capacity of 13,000 TEUs on the present competitive maritime transport business.

Two alternatives are supposed, instead, based on our experience and analysis of the present situation. One is a very similar in structure to the present traffic. In this case, slightly larger container ships and more frequent services will be introduced. The other is a case in which less hub-port (1) will be needed due to the successful introduction of gigantic container vessels. In this case, two more alternatives are supposed.

The basic concept of these alternatives is shown in Figure 6.2.2.

6.2.3 Present Situation of Container Traffic to/ from Turkey

Feeder vessels transfer most of the container to/from Turkey from/to the hub-ports such as Gioia Tauro and Damietta Port. Actually Turkey is one of the best counterpart countries of Damietta Port so far. In this section, the present situation of container traffic to/ from Turkey is analyzed by main container route.

(1) Northern Europe

The following is a typical container traffic structure between Turkey and northern European countries
Container cargo is carried by the vessels operating on the North Europe-the Mediterranean-Asia route. The cargo is transshipped at Port Said and then transferred to Mersin, Izmir and Istanbul by feeder vessels.

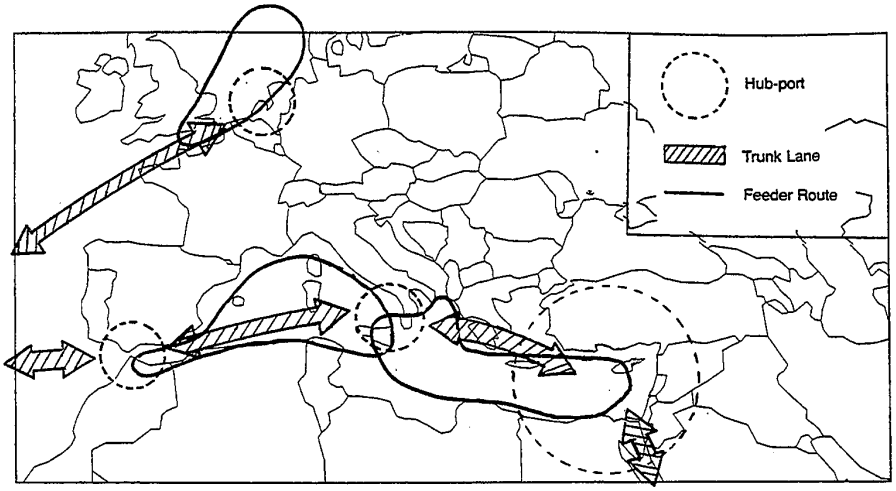
(2) North America

The following is a typical container traffic structure between Turkey and North America.
Container cargo is carried by vessels operating on the North America- the Mediterranean-Asia route. The cargo is transshipped at Gioia Tauro Port and then transferred to Mersin, Izmir and Istanbul by feeder vessels.

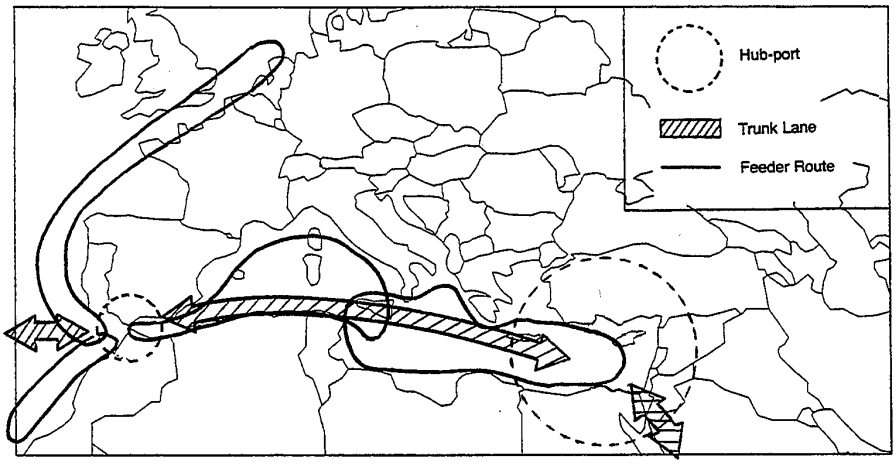
(3) West Mediterranean Region

The following is a typical container traffic structure between Turkey and West Mediterranean Region.
Container cargo is carried by vessels operating the West Mediterranean-Asia route. The cargo is transshipped at Damietta Port and then transferred to Mersin, Izmir and Istanbul by feeder vessels

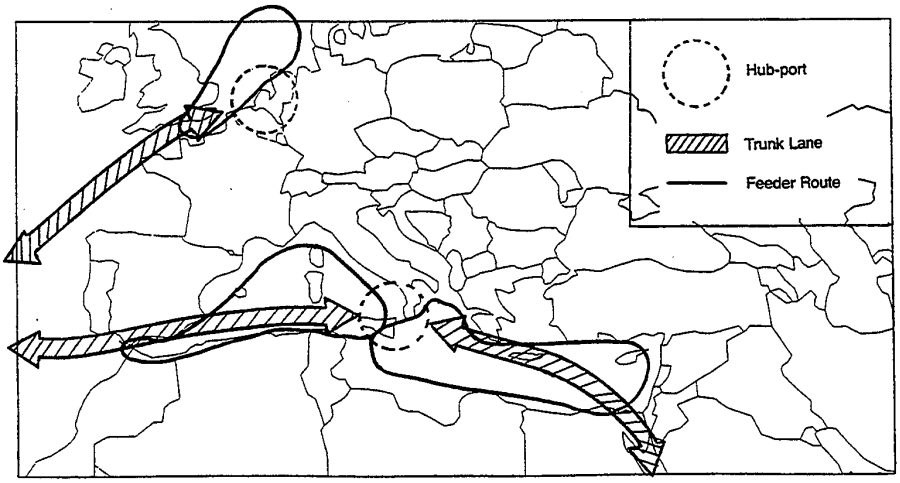
It is supposed that a certain portion of the cargo is transported by Inter-European services.



Alternative 1



Alternative 2



Alternative 3

Figure 6.2.2 Future Structure

(4) Asia

Container cargo is carried by the above mentioned ships connecting Europe and Asia. A certain portion of the cargo is transported by the vessels of East Mediterranean- Asia route where mother ships call Mersin Port.

6.3 Roles of Turkish Port in International Container Transport

6.3.1 Characteristics of Container Ports in East Med. Sea

Ship cost analysis was conducted to identify the characteristics of container ports in the East Mediterranean Sea. The Study Team selected Istanbul Port (Haydarpasa), Izmir Port and Mersin Port representing the Turkish ports in Marmara Sea, Aegean Sea and Mediterranean Sea respectively. The Study Team also selected Port Said in Egypt, Beirut Port in Lebanon, Haifa Port in Israel, Limassol Port in Cyprus and Piraeus Port in Greece as main foreign competitors of Turkish ports.

Various ship costs were calculated base on the following preconditions.
- Container cargo is transferred from Rotterdam Port to Singapore Port via the Mediterranean Sea.
- The container ship makes one-stop at the selected ports in the east Mediterranean area.
- The containers, of which final destinations are the selected countries, are unloaded from the vessel in the port and are transferred to feeder-service vessels.
- The feeder-service is not implemented in the manner of round service but shuttle-service.
- Each container ship is loaded to 80 % of capacity during operation.
- All ports have sufficient infrastructure to allow all container ships to enter the ports.
- Each port can match the service level that other ports are offering.
- Since the precise port dues of Beirut and Limassol Port are not obtained, port dues of Haifa and Piraeus Port are applied to Beirut and Limassol Port respectively.

(1) Mother ship cost

Table 6.3.1 shows the rough cost of a ship operator that is managing Rotterdam Port- Port Said- Singapore Port container liners. This table includes distance between two ports, ship size, ship capacity and volume of container, port dues, ship operation days, ship charge, container fee and total of port dues and ship charge. The last one is the cost that the ship operator has to pay. Additional cost of repositioning of empty containers is not considered in this analysis

In case vessel capacity is 6,200 TEUs, total mother ship cost is US$ 1,342,400 in which container box charge is assumed US$ 3/ TEU/ day. In cases vessel capacities are 5,250 TEUs, 4,700 TEUs, 4,300 TEUs and 3,500 TEUs, total mother ship costs are US$ 1,170,600, US$ 1,090,500, US$ 1,008,100 and US$ 877,600 respectively.

The other results of total mother ship costs by ship capacities of one-stops at Istanbul,

Table 6.3.1 Rotterdam — Port Said — Singapore

Vessel Capacity = 6,200 TEU

Name of Port	Distance (nautical mile)	Size of Vessel (TEU)	Volume of Container (TEU)	Port Due (US$)	Ship Operation Days (day)	Ship Charge (US$/day)	Ship Charge (US$)	Container Fee (US$)	Port Due + Ship Charge (US$)
Rotterdam				68,000	1	37,200	37,200		
	3,287	6,200	4,960		6	57,200	343,200		
Port Said				23,000	1	37,200	37,200	267,800	1,342,400
	5,065	6,200	4,960		9	57,200	514,800		
Singapore				14,000	1	37,200	37,200		
Total	8,352			105,000	18		969,600	267,800	1,342,400

Vessel Capacity = 5,250 TEU

Name of Port	Distance (nautical mile)	Size of Vessel (TEU)	Volume of Container (TEU)	Port Due (US$)	Ship Operation Days (day)	Ship Charge (US$/day)	Ship Charge (US$)	Container Fee (US$)	Port Due + Ship Charge (US$)
Rotterdam				60,000	1	33,100	33,100		
	3,287	5,250	4,200		6	50,100	300,600		
Port Said				20,000	1	33,100	33,100	226,800	1,170,600
	5,065	5,250	4,200		9	50,100	450,900		
Singapore				13,000	1	33,100	33,100		
Total	8,352			93,000	18		850,800	226,800	1,170,600

Vessel Capacity = 4,700 TEU

Name of Port	Distance (nautical mile)	Size of Vessel (TEU)	Volume of Container (TEU)	Port Due (US$)	Ship Operation Days (day)	Ship Charge (US$/day)	Ship Charge (US$)	Container Fee (US$)	Port Due + Ship Charge (US$)
Rotterdam				58,000	1	31,500	31,500		
	3,287	4,700	3,760		6	47,000	282,000		
Port Said				18,000	1	31,500	31,500	203,000	1,090,500
	5,065	4,700	3,760		9	47,000	423,000		
Singapore				12,000	1	31,500	31,500		
Total	8,352			88,000	18		799,500	203,000	1,090,500

Vessel Capacity = 4,300 TEU

Name of Port	Distance (nautical mile)	Size of Vessel (TEU)	Volume of Container (TEU)	Port Due (US$)	Ship Operation Days (day)	Ship Charge (US$/day)	Ship Charge (US$)	Container Fee (US$)	Port Due + Ship Charge (US$)
Rotterdam				52,000	1	30,100	30,100		
	3,287	4,300	3,440		6	43,600	261,600		
Port Said				15,000	1	30,100	30,100	185,800	1,008,100
	5,065	4,300	3,440		9	43,600	392,400		
Singapore				11,000	1	30,100	30,100		
Total				78,000	18		744,300	185,800	1,008,100

Vessel Capacity = 3,500 TEU

Name of Port	Distance (nautical mile)	Size of Vessel (TEU)	Volume of Container (TEU)	Port Due (US$)	Ship Operation Days (day)	Ship Charge (US$/day)	Ship Charge (US$)	Container Fee (US$)	Port Due + Ship Charge (US$)
Rotterdam				49,000	1	26,300	26,300		
	3,287	3,500	2,800		6	38,300	229,800		
Port Said				14,000	1	26,300	26,300	151,200	877,600
	5,065	3,500	2,800		9	38,300	344,700		
Singapore				10,000	1	26,300	26,300		
Total	8,352			73,000	18		653,400	151,200	877,600

Izmir, Mersin, Beirut, Haifa, Limassol and Piraus Port are shown from Table A.6.3.1 (1) to Table A6.3.1 (7) in Appendix.

(2) Characteristics of container ports in the east Mediterranean Sea

Table 6.3.2 shows the deviation distances, differences of mother ship costs and distances of feeder services of the selected ports. Istanbul has a deviation distance of 691 nautical miles. It means that a mother ship that makes one-stop at Istanbul has to sail 691 nautical miles longer than a mother vessel that makes one-stop at Port Said. Consequently, the cost of a mother ship with 6,200 TEUs capacity that makes one-stop at Istanbul is approximately US$ 120 thousand more expensive than the cost of a mother vessel that makes one-stop at Port Said. In cases vessel capacities are 5,250 TEUs, 4,700 TEUs, 4,300 TEUs and 3,500 TEUs, difference of mother ship costs are US$ 105,400, US$ 98,600, US$ 92,800 and US$ 79,400 respectively.

Istanbul has a feeder service distance of 4,542 nautical miles. This figure represents the necessary distance which feeder ships from Istanbul to selected foreign ports have to sail in the manner of shuttle-service and is obtained by summing up the following distances. Each feeder service distance also includes the distance between the selected ports and Lattakia port in Syria.

Istanbul- Lattakia Port	884 (N.M.)
Istanbul- Beirut Port	842 (N.M.)
Istanbul- Haifa Port	816 (N.M.)
Istanbul- Port Said	812 (N.M.)
Istanbul- Limassol	823 (N.M.)
Istanbul- Piraeus Port	365 (N.M.)
Total	4,542 (N.M.)

This table identifies the characteristics of the selected ports in terms of container transport in the region. The identified characteristics are as follows;

1) Istanbul (container ports in the Marmara Sea)

Container ports in the Marmara Sea can not be a major competitor in the East Mediterranean container transport due to the long deviation distance and feeder service distance. The volume of local container in the Marmara Sea, however, is expected to exceed at least 2.1 million TEUs and possibly more than 2.6 million TEUs in 2020. Even in 2010, the volume of local container in the Marmara Sea can reach 1.4 million to 1.6 million TEUs. These volumes are larger than the ones of whole Egypt and approximately the same as the ones of Greece. This local container volume is the most advantageous aspect of the container ports in the Marmara Sea.

If a container port in the Marmara Sea can collect a certain amount of local container cargo, the port can attract large container vessels to call at the port directly. Once the direct call by large ships is realized, transshipped cargo for the countries and regions of the Black Sea

Table 6.3.2 Characteristics of Major Ports in East Med. Sea
(Rotterdam — East Med. Region — Singapore)

Vessel Capacity = 6,200 TEU

	Port	Deviation Distance (N.M.)	Differnce of Mother Ship Cost (US$)	Distance of *) Feeder Service (N.M.)	Distance of *) Feeder Service (N.M.)	Distance of *) Feeder Service (N.M.)
Turkey	Istanbul	691	121,200	4,542	—	—
	Izmir	345	49,100	—	3,450	—
	Mersin	339	49,100	—	—	1,657
Foreign Countries	Port Said	0	0	2,345	2,186	1,888
	Beirut	418	53,400	1,944	1,944	1,310
	Haifa	241	53,400	2,001	1,828	1,430
	Limassol	254	50,800	1,973	1,700	1,285
	Piraeus	177	14,800	3,447	3,304	3,677

*) Distance is the sum of respective distances between the port and other ports. In case of Istanbul, distance means the sum of the following distances, from Istanbul to Port Said, Lattakia, Beirut, Haifa, Limassol and Piraeus.

Vessel Capacity = 5,250 TEU

	Port	Deviation Distance (N.M.)	Differnce of Mother Ship Cost (US$)	Distance of *) Feeder Service (N.M.)	Distance of *) Feeder Service (N.M.)	Distance of *) Feeder Service (N.M.)
Turkey	Istanbul	691	105,400	4,542	—	—
	Izmir	345	42,700	—	3,450	—
	Mersin	339	42,700	—	—	1,657
Foreign Countries	Port Said	0	0	2,345	2,186	1,888
	Beirut	418	46,600	1,944	1,944	1,310
	Haifa	241	46,600	2,001	1,828	1,430
	Limassol	254	44,100	1,973	1,700	1,285
	Piraeus	177	12,800	3,447	3,304	3,677

Vessel Capacity = 4,700 TEU

	Port	Deviation Distance (N.M.)	Differnce of Mother Ship Cost (US$)	Distance of *) Feeder Service (N.M.)	Distance of *) Feeder Service (N.M.)	Distance of *) Feeder Service (N.M.)
Turkey	Istanbul	691	98,600	4,542	—	—
	Izmir	345	40,300	—	3,450	—
	Mersin	339	40,300	—	—	1,657
Foreign Countries	Port Said	0	0	2,345	2,186	1,888
	Beirut	418	42,600	1,944	1,944	1,310
	Haifa	241	42,600	2,001	1,828	1,430
	Limassol	254	41,600	1,973	1,700	1,285
	Piraeus	177	12,500	3,447	3,304	3,677

Vessel Capacity = 4,300 TEU

	Port	Deviation Distance (N.M.)	Differnce of Mother Ship Cost (US$)	Distance of *) Feeder Service (N.M.)	Distance of *) Feeder Service (N.M.)	Distance of *) Feeder Service (N.M.)
Turkey	Istanbul	691	92,800	4,542	—	—
	Izmir	345	38,900	—	3,450	—
	Mersin	339	38,900	—	—	1,657
Foreign Countries	Port Said	0	0	2,345	2,186	1,888
	Beirut	418	41,100	1,944	1,944	1,310
	Haifa	241	41,100	2,001	1,828	1,430
	Limassol	254	40,000	1,973	1,700	1,285
	Piraeus	177	13,000	3,447	3,304	3,677

Vessel Capacity = 3,500 TEU

	Port	Deviation Distance (N.M.)	Differnce of Mother Ship Cost (US$)	Distance of *) Feeder Service (N.M.)	Distance of *) Feeder Service (N.M.)	Distance of *) Feeder Service (N.M.)
Turkey	Istanbul	691	79,400	4,542	—	—
	Izmir	345	32,700	—	3,450	—
	Mersin	339	32,700	—	—	1,657
Foreign Countries	Port Said	0	0	2,345	2,186	1,888
	Beirut	418	34,100	1,944	1,944	1,310
	Haifa	241	34,100	2,001	1,828	1,430
	Limassol	254	33,800	1,973	1,700	1,285
	Piraeus	177	10,500	3,447	3,304	3,677

will follow automatically. The most important matter to realize the direct call by large container vessels at a port in the Marmara Sea is to avoid the future existence of many small scale container ports with a capacity of less than 300 thousand TEUs annually. Ten small-scale container facilities have nothing to do with the rationalization of container transport of this country. A few large container ports in the Marmara Sea can qualify the ports in Turkey to play an important role in international container transport.

2) Izmir Port (container ports in the Aegean Sea)

Izmir Port has a deviation distance of 345 nautical miles. Consequently, the cost of a mother ship with 6,200 TEU capacity that makes one-stop at Izmir Port is approximately US$ 49 thousand more expensive than the cost of a mother vessel that makes one-stop at Port Said. Since the costs difference of mother ship with 6,200 TEUs capacity of Beirut, Haifa and Limassol Port are more than US$ 50 thousand, Izmir Port seems to be a major competitor in the East Mediterranean container transport. The too long feeder service distance, however, prevents Izmir Port from being a competitor in the East Mediterranean Sea.

The volume of local container in the Aegean Sea is expected to exceed at least 1.4 million TEUs and possibly more than 1.8 million TEUs 2020. Even in 2010, the volume of local container in the Aegean Sea can reach 0.9 million to 1.0 million TEUs. This local container volume is the most advantageous aspect of the container ports in the Aegean Sea.

If a container port in the Aegean Sea can collect a certain amount of local container cargo, the port can attract large container vessels to call at the port directly. Once the direct call by large ships is realized, not only the transshipped cargo in the Aegean region but also the transshipped cargo for the countries and regions of the Black Sea will follows automatically. In this case, the major competitor of a Turkish port will be Piraeus Port. Competition with Piraeus Port is to be analyzed later on.

3) Mersin Port (container ports in the Mediterranean Sea)

Mersin Port has a deviation distance of 345 nautical miles. Consequently, the cost of a mother ship with 6,200 TEU capacity that makes one-stop at Mersin Port is approximately US$ 49 thousand more expensive than the cost of a mother vessel that makes one-stop at Port Said. This figure is slightly less than the ones of Beirut, Haifa and Limassol Port. The port has a feeder service distance of 1,657 nautical miles, which is shorter than the one of Port Said.
This shorter feeder service distance is one of the advantages of Mersin Port to compete with Port Said.

The other advantage of Turkish ports in container transport is the volume of the local container. According to the study conducted by Ocean Shipping Consultants, the present shares of local container in the East Mediterranean countries, Turkey, Syria, Lebanon, Israel-West, Egypt, Cyprus and Greece, are 28.8 %, 3.7 %, 7.5 %, 23.6 %, 13.1 %, 5.3 % and 18.0 % respectively. The Ocean Shipping Consultants expects that the future shares of

local container in 2010 will be 31.2 %, 3.5 %, 4.9 %, 24.9 %, 14.6 %, 4.1 % and 16.8 % respectively. These figures are shown in the Table 6.3.3. The Study Team using the same increasing ratios of container during 1998-2010 of each country calculates figures in 2020.

Table 6.3.3 Share of Local Container in the East Mediterranean Countries

Country	1998 (%)	2010 (%)	2020 (%)
Turkey	28.8	31.2	34.7
Syria	3.7	3.5	3.8
Lebanon	7.5	4.9	3.5
Israel-West	23.6	24.9	25.3
Egipt	13.1	14.6	13.2
Cyprus	5.3	4.1	3.5
Greece	18.0	16.8	16.0
Total	100.0	100.0	100.0

Source: Ocean Shipping Consultants

Taking these advantages into consideration, Mersin Port (container ports in the Mediterranean Sea) can be a major competitor in the East Mediterranean container transport. Competition in this region is to be analyzed later on.

4) Port Said

Port Said is located in the best position from the viewpoint of deviation distance. On the contrary, Port Said has a feeder service distance of 1,888 nautical miles, which is the second longest among the ones of selected ports. The share of local container of Egypt among this region is 13.1 % and will be 14.6 % in 2010. This share is far below those of Turkey and Israel. In spite of these disadvantages, Port Said can be the most powerful competitor in the East Mediterranean container transport due to the geographical advantage of deviation distance.

5) Beirut Port

Beirut Port has a deviation distance of 418 nautical miles. Consequently, the cost of a mother ship with 6,200 TEU capacity that makes one-stop at Beirut Port is approximately US$ 53 thousand more expensive than the cost of a mother vessel that makes one-stop at Port Said. Moreover, the share of local container of Lebanon among this region is only 7.5 % and will be 4.9 % in 2010.

Taking these disadvantages into consideration, Beirut Port can not be a major competitor in the East Mediterranean container transport.

6) Haifa Port

Haifa Port has a deviation distance of 241 nautical miles. Consequently, the cost of a mother ship with 6,200 TEU capacity that makes one-stop at Haifa Port is approximately US$ 53 thousand more expensive than the cost of a mother vessel that makes one-stop at

Port Said. On the contrary, the feeder service distance is 1,430 nautical miles, approximately 450 nautical miles shorter than the one of Port Said. This is an advantage for Haifa Port. And the share of local container of Israel among this region is 23.6 % and will be 25.3 % in 2010. These figures are the second highest in the region. The volume of local container is the second advantage of Haifa Port. Moreover, since Israel is the most developed country in the region, Israel can rather easily introduce the necessary equipment such as the latest computer system and cargo handling machinery that contribute to up-grading the service level of the port than other ports.

Taking these advantages into consideration, Haifa Port can be a major competitor in the East Mediterranean container transport.

7) Limassol Port

Limassol Port has a deviation distance of 254 nautical miles. Consequently, the cost of a mother ship with 6,200 TEU capacity that makes one-stop at limassol Port is approximately US$ 51 thousand more expensive than the cost of a mother vessel that makes one-stop at Port Said. On the contrary, Limassol port has a feeder service distsnce of 1,285 nautical miles, which is the shortest among the selected ports. In spite of this advantage, Limassol Port can not be a competitor in the East Mediterranean container transport due to the lack of local container. The share of local container of Cyprus among this region is only 5.3 % and will be 4.1 % in 2010. This volume of local container can not compensate the difference of mother ship cost between Port Said and Limassol Port.

8) Piraeus Port

Piraeus Port has a deviation distance of 177 nautical miles, which is the second shortest among the selected ports. Consequently, the cost of a mother ship with 6,200 TEUs capacity that makes one-stop at Piraeus Port is approximately US$ 15 thousand more expensive than the cost of a mother vessel that makes one-stop at Port Said. Piraeus Port has a too long feeder service distance of 3,677 nautical miles, which is twice of Port Said. The advantage of Piraeus Port against Port Said is the volume of local container. The share of local container of Greece among this region is 18.0 % and will be 16.8 % in 2010. The share of local container of Egypt among this region is 13.1 % and will be 14.6 % in 2010. This advantage is too little to compensate the difference of mother ship cost between Port Said and Piraeus Port.

As a result, Piraeus Port can not be a major competitor in the East Mediterranean container transport. On the other hand, deviation distance and location of Piraeus Port can qualify the port as a tough competitor in the Aegean and Black Sea container transport.

6.3.2 Competition in the East Mediterranean Sea

The Study Team conducted ship cost analysis again to identify the competitive situation in the East Mediterranean Sea. Same preconditions of cost analysis as in the previous section are assumed.

(1) Feeder ship cost

Table 6.3.4 shows the rough cost of a feeder ship operator that is managing Port Said-Mersin Port container liners. This table includes distance between two ports, ship size, ship capacity and volume of container, port dues, ship operation days, ship charge, container fee, total of port dues and ship charge and ship cost per TEU. Additional cost of repositioning of empty containers is not considered in this analysis

In case vessel capacity is 2,200 TEUs, total feeder ship cost is US$ 83,700 in which container box charge is assumed US$ 3/ TEU/ day. In cases vessel capacities are 1,800 TEUs, 1,300 TEUs, 1,000 TEUs, 750 TEUs and 500 TEUs, feeder ship costs are US$ 71,700, US$ 54,200, US$ 44,300, US$ 35,800 and US$ 26,600 respectively.

Feeder ship costs by ship capacities from Port Said to Lattalia, Beirut, Haifa, Limassol and Piraeus Port are shown from Table A.6.3.2 (1) to Table A.6.3.2 (5) in Appendix.

Feeder ship costs by ship capacities from Mersin Port to Lattalia, Beirut, Haifa, Limassol and Piraeus Port are shown from Table A.6.3.3 (1) to Table A.6.3.3 (5) in Appendix.

Feeder ship costs by ship capacities from Beirut Port to Lattakia, Haifa, Limassol and Piraeus Port are shown from Table A.6.3.4 (1) to Table A.6.3.4 (4) in Appendix.

Feeder ship costs by ship capacities from Haifa Port to Lattakia, Limassol and Piraeus Port are shown from Table A.6.3.5 (1) to Table A.6.3.5 (3) in Appendix.

Feeder ship costs by ship capacities from Limassol Port to Lattakia and Piraeus Port are shown in A.6.3.6 (1) to Table A.6.3.6 (2) in Appendix.

Feeder ship costs by ship capacities from Piraeus Port to Lattakia Port are shown in Table A.6.3.7 in Appendix.

(2) Cost comparison of feeder ships by hub-port

1) Port-Said

The following is the cost of feeder services in which Port Said plays a role of hub-port in the Region. Figure 6.3.1 illustrates this case. The assumed preconditions are as follows;
- The mother vessel departs from Rotterdam Port and makes one-stop at Port Said in the region on her way to Singapore.
- The mother ship unloads containers of which final destinations are Turkey, Syria, Lebanon, Israel, Egypt, Cyprus and Greece at Port Said.
- The country share of unloaded container is always the same in Table 6.3.3. In this analysis, figures in 2010 are applied.
- Unloaded containers are transferred to feeder vessels for final destination countries.
- The most suitable size of feeder ship in line with the volume of container is selected.

Table 6.3.4 Port Said - Mersin (Feeder)

Vessel Capacity = 2,800 TEU

Name of Port	Distance (nautical mile)	Size of Vessel (TEU)	Volume of Container (TEU)	Port Due (US$)	Ship Operation Days (day)	Ship Charge (US$/day)	Ship Charge (US$)	Container Fee *) (US$)	Port Due + Ship Charge (US$)	Port Due + Ship Charge (US$/TEU)
Port Said				13,000	1	22,400	22,400			
	355	2,800	2,240		1	30,900	30,900	13,400	102,100	46
Mersin				0	1	22,400	22,400			
Total				13,000	3		75,700	13,400	102,100	

*) Calculation is based on the days, ship operation days − 1day, since one day of ship operation days is common with mother vessel.

Vessel Capacity = 2,200 TEU

Name of Port	Distance (nautical mile)	Size of Vessel (TEU)	Volume of Container (TEU)	Port Due (US$)	Ship Operation Days (day)	Ship Charge (US$/day)	Ship Charge (US$)	Container Fee *) (US$)	Port Due + Ship Charge (US$)	Port Due + Ship Charge (US$/TEU)
Port Said				10,000	1	18,700	18,700			
	355	2,200	1,760		1	25,700	25,700	10,600	83,700	48
Mersin				0	1	18,700	18,700			
Total				10,000	3		63,100	10,600	83,700	

*) Calculation is based on the days, ship operation days − 1day, since one day of ship operation days is common with mother vessel.

Vessel Capacity = 1,800 TEU

Name of Port	Distance (nautical mile)	Size of Vessel (TEU)	Volume of Container (TEU)	Port Due (US$)	Ship Operation Days (day)	Ship Charge (US$/day)	Ship Charge (US$)	Container Fee *) (US$)	Port Due + Ship Charge (US$)	Port Due + Ship Charge (US$/TEU)
Port Said				9,000	1	16,200	16,200			
	355	1,800	1,440		1	21,700	21,700	8,600	71,700	50
Mersin				0	1	16,200	16,200			
Total				9,000	3		54,100	8,600	71,700	

*) Calculation is based on the days, ship operation days − 1day, since one day of ship operation days is common with mother vessel.

Vessel Capacity = 1,300 TEU

Name of Port	Distance (nautical mile)	Size of Vessel (TEU)	Volume of Container (TEU)	Port Due (US$)	Ship Operation Days (day)	Ship Charge (US$/day)	Ship Charge (US$)	Container Fee *) (US$)	Port Due + Ship Charge (US$)	Port Due + Ship Charge (US$/TEU)
Port Said				5,000	1	13,000	13,000			
	355	1,300	1,040		1	17,000	17,000	6,200	54,200	52
Mersin				0	1	13,000	13,000			
Total				5,000	3		43,000	6,200	54,200	

*) Calculation is based on the days, ship operation days − 1day, since one day of ship operation days is common with mother vessel.

Vessel Capacity = 1,000 TEU

Name of Port	Distance (nautical mile)	Size of Vessel (TEU)	Volume of Container (TEU)	Port Due (US$)	Ship Operation Days (day)	Ship Charge (US$/day)	Ship Charge (US$)	Container Fee *) (US$)	Port Due + Ship Charge (US$)	Port Due + Ship Charge (US$/TEU)
Port Said				3,000	1	11,000	11,000			
	355	1,000	800		1	14,500	14,500	4,800	44,300	55
Mersin				0	1	11,000	11,000			
Total				3,000	3		36,500	4,800	44,300	

*) Calculation is based on the days, ship operation days − 1day, since one day of ship operation days is common with mother vessel.

Vessel Capacity = 750 TEU

Name of Port	Distance (nautical mile)	Size of Vessel (TEU)	Volume of Container (TEU)	Port Due (US$)	Ship Operation Days (day)	Ship Charge (US$/day)	Ship Charge (US$)	Container Fee *) (US$)	Port Due + Ship Charge (US$)	Port Due + Ship Charge (US$/TEU)
Port Said				2,000	1	9,000	9,000			
	355	750	600		1	12,200	12,200	3,600	35,800	60
Mersin				0	1	9,000	9,000			
Total				2,000	3		30,200	3,600	35,800	

*) Calculation is based on the days, ship operation days − 1day, since one day of ship operation days is common with mother vessel.

Vessel Capacity = 500 TEU

Name of Port	Distance (nautical mile)	Size of Vessel (TEU)	Volume of Container (TEU)	Port Due (US$)	Ship Operation Days (day)	Ship Charge (US$/day)	Ship Charge (US$)	Container Fee *) (US$)	Port Due + Ship Charge (US$)	Port Due + Ship Charge (US$/TEU)
Port Said				2,000	1	6,500	6,500			
	355	500	400		1	9,200	9,200	2,400	26,600	67
Mersin				0	1	6,500	6,500			
Total				2,000	3		22,200	2,400	26,600	

*) Calculation is based on the days, ship operation days − 1day, since one day of ship operation days is common with mother vessel.

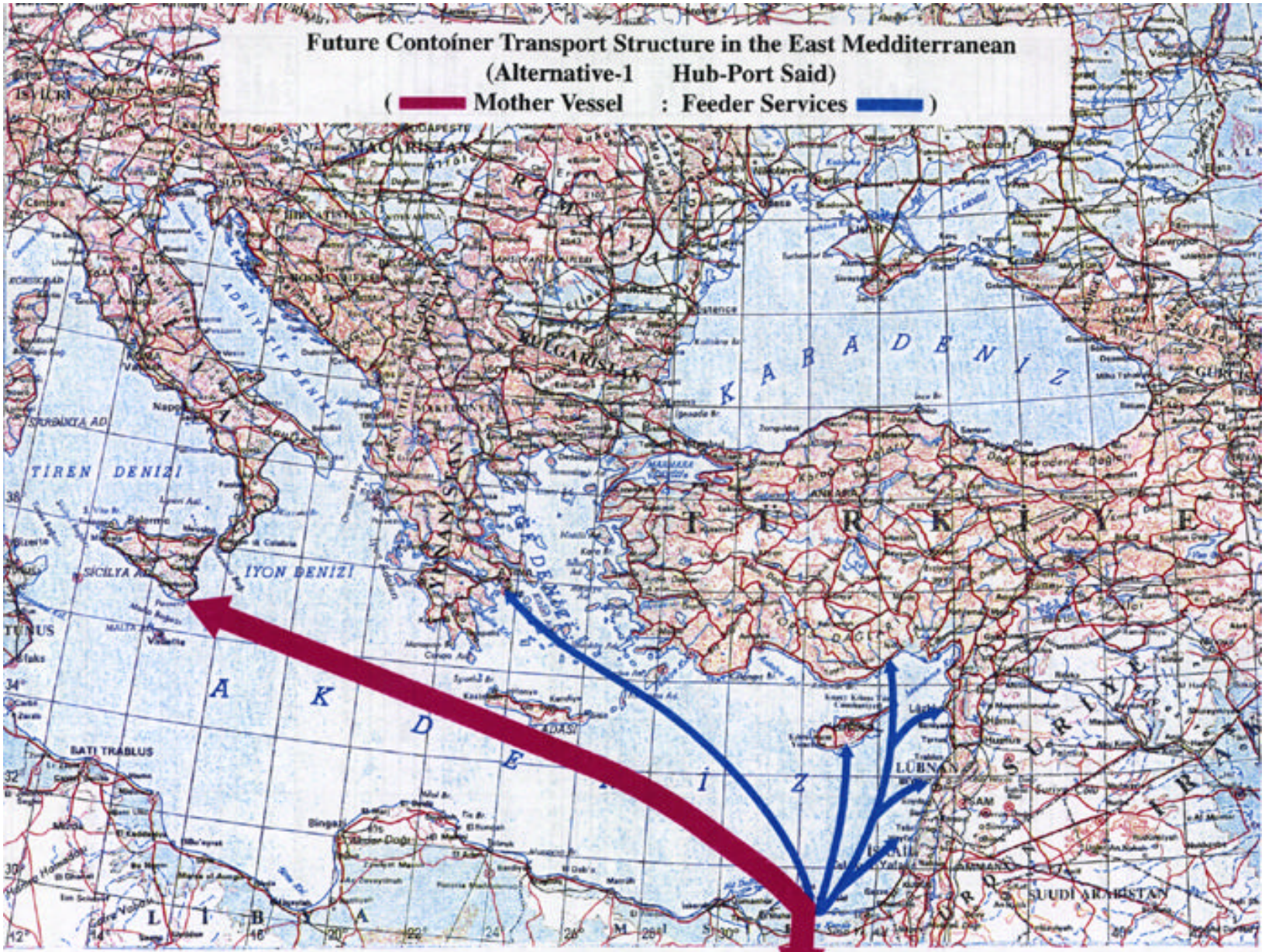

Future Contoíner Transport Structure in the East Medditerranean
(Alternative-1 Hub-Port Said)
(Mother Vessel : Feeder Services)
TÜRKİYE
KARADENİZ
AKDENİZ
TİREN DENİZİ
İYON DENİZİ
SURİYE
LÜBNAN
SUUDİ ARABİSTAN
LİBYA
BATI TRABLUS
BULGARİSTAN
MACARİSTAN

Figure 6.3.1

(Case-1) Mother ship unloads 5,000 TEUs at Port Said

a) Number of container for each country

Turkey (Mersin Port)	1,550 TEU
Syria (Lattakia Port)	180 TEU
Lebanon (Beirut Port)	250 TEU
Israel-west (Haifa Port)	1,240 TEU
Egypt (Port Said)	730 TEU
Cyprus (Limassol Port)	210 TEU
Greece (Piraeus Port)	840 TEU
Total	5,000 TEU

b) Suitable feeder ship and her cost

From the Table 6.3.4, feeder ship with 2,200 TEU capacity is chosen for Mersin Port. And her cost is US$ 83,700.
From the Table A.6.3.2 (1), feeder ship with 500 TEU capacity is chosen for Lattakia Port. And her cost is US$ 27,000.
From the Table A.6.3.2 (2), feeder ship with 500 TEU capacity is chosen for Beirut Port. And her cost is US$ 27,000.
From the Table A.6.3.2 (3), feeder ship with 1,800 TEU capacity is chosen for Haifa Port. And her cost is US$ 72,400.
From the Table A.6.3.2 (4), feeder ship with 500 TEU capacity is chosen for Limassol Port. And her cost is US$ 27,000.
From the Table A.6.3.2 (5), feeder ship with 1,300 TEU capacity is chosen for Piraeus Port. And her cost is US$ 74,800.
Total cost of all feeder vessels is US$ 311,700

(Case-2) Mother ship unloads 4,500 TEUs at Port Said

Same procedures can be applied and total cost of all feeder vessels is US$ 286,300.

(Case-3) Mother ship unloads 4,000 TEUs at Port Said

Same procedures can be applied and total cost of all feeder vessels is US$ 268,700.

(Case-4) Mother ship unloads 3,500 TEUs at Port Said

Same procedures can be applied and total cost of all feeder vessels is US$ 257,300.

(Case-5) Mother ship unloads 3,000 TEUs at Port Said

Same procedures can be applied and total cost of all feeder vessels is US$ 229,700.

(Case-6) Mother ship unloads 2,500 TEUs at Port Said

Same procedures can be applied and total cost of all feeder vessels is US$ 219,800.

2) Mersin Port

The following is the cost of feeder services in which Mersin Said plays a role of hub-port in the Region. Figure 6.3.2 illustrates this case. The assumed preconditions are as same as the case of Port Said except the following.

- The mother vessel departs from Rotterdam Port and makes one-stop at Mersin Port in the region on her way to Singapore.

(Case-1) Mother ship unloads 5,000 TEUs at Mersin Port

a) Number of container for each country
The same as in the case of Port Said.

b) Suitable feeder ship and her cost
From the Table A.6.3.3 (1), feeder ship with 500 TEU capacity is chosen for Lattakia Port. And her cost is US$ 25,000.
From the Table A.6.3.3 (2), feeder ship with 500 TEU capacity is chosen for Beirut Port. And her cost is US$ 25,000.
From the Table A.6.3.3 (3), feeder ship with 1,800 TEU capacity is chosen for Haifa Port. And her cost is US$ 63,400.
From the Table 6.3.4, feeder ship with 1,000 TEU capacity is chosen for Port Said. And her cost is US$ 44,300.
From the Table A.6.3.3 (4), feeder ship with 500 TEU capacity is chosen for Limassol Port. And her cost is US$ 24,800.
From the Table A.6.3.3 (5), feeder ship with 1,300 TEU capacity is chosen for Piraeus Port. And her cost is US$ 69,800.

Total cost of all feeder vessels is US$ 252,300

(Case-2) Mother ship unloads 4,500 TEUs at Mersin Port

Same procedures can be applied and total cost of all feeder vessels is US$ 240,900.

(Case-3) Mother ship unloads 4,000 TEUs at Mersin Port

Same procedures can be applied and total cost of all feeder vessels is US$ 218,800.

(Case-4) Mother ship unloads 3,500 TEUs at Mersin Port

Same procedures can be applied and total cost of all feeder vessels is US$ 208,400.

(Case-5) Mother ship unloads 3,000 TEUs at Mersin Port

Same procedures can be applied and total cost of all feeder vessels is US$ 200,300.

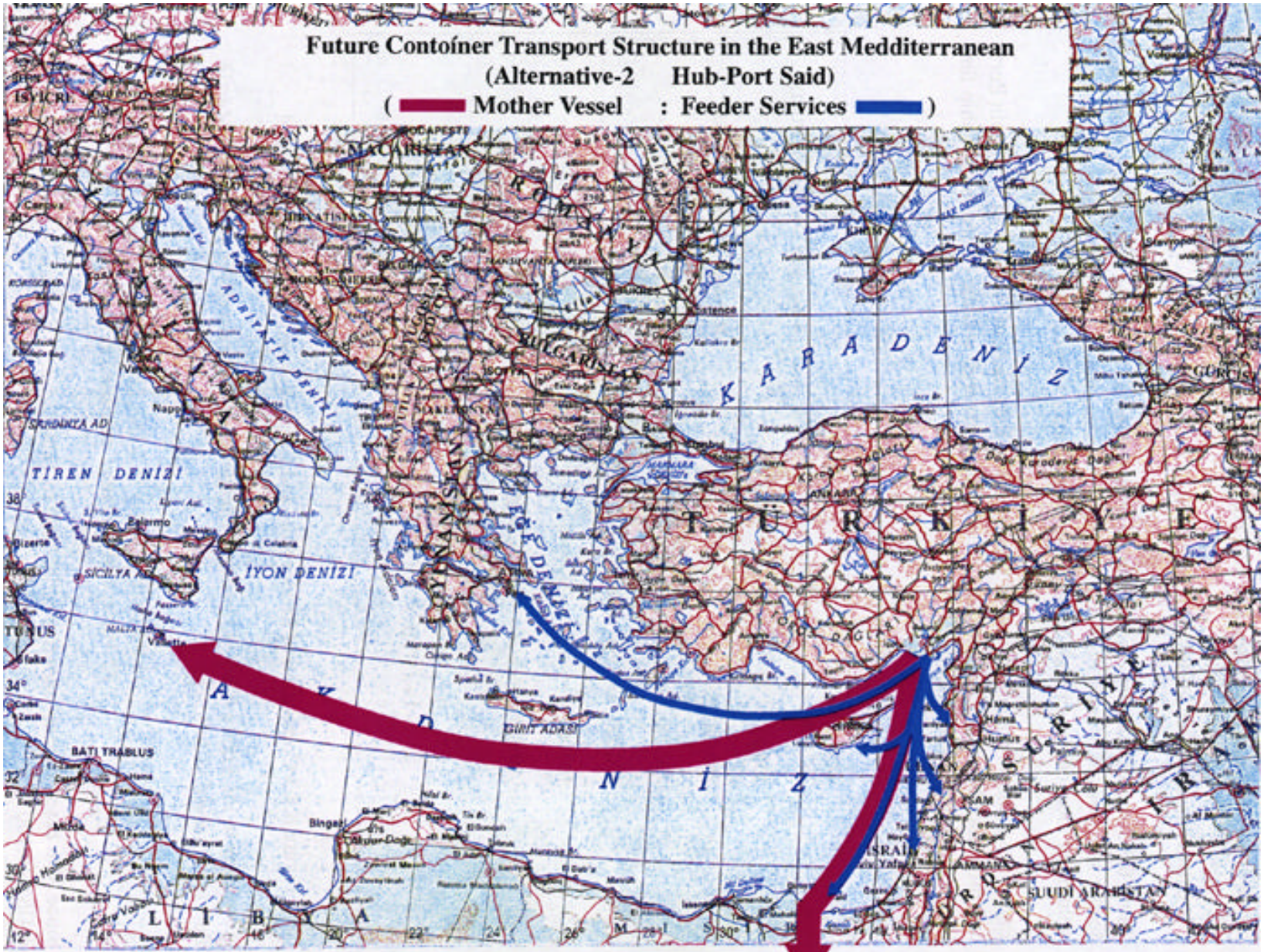

Future Contoíner Transport Structure in the East Medditerranean
(Alternative-2 Hub-Port Said)
(Mother Vessel : Feeder Services)
TİREN DENİZİ
İYON DENİZİ
KARADENİZ
TÜRKİYE
SURİYE
SUUDİ ARABİSTAN
BATI TRABLUS
GİRİT ADASI
SİCİLYA AD.
SARDUNYA AD.
TUNUS
MACARİSTAN
BULGARİSTAN
GÜRCÜSTAN

Figure 6.3.2

(Case-6) Mother ship unloads 2,500 TEUs at Mersin Port

Same procedures can be applied and total cost of all feeder vessels is US$ 191,100.

3) Cost comparison of feeder ships of Port Said and Mersin Port

Table 6.3.5 shows the cost comparison of feeder ships of Port Said and Mersin Port. The feeder ship cost of Mersin Port is always cheaper than the one of Port Said due to larger volume of local container and shorter distance of feeder service.

Figure 6.3.3 shows the correlation of feeder cost of Port Said, of feeder cost of Mersin Port and difference between Port Said and Mersin Port and cargo volume of one mother ship for the East Mediterranean countries.

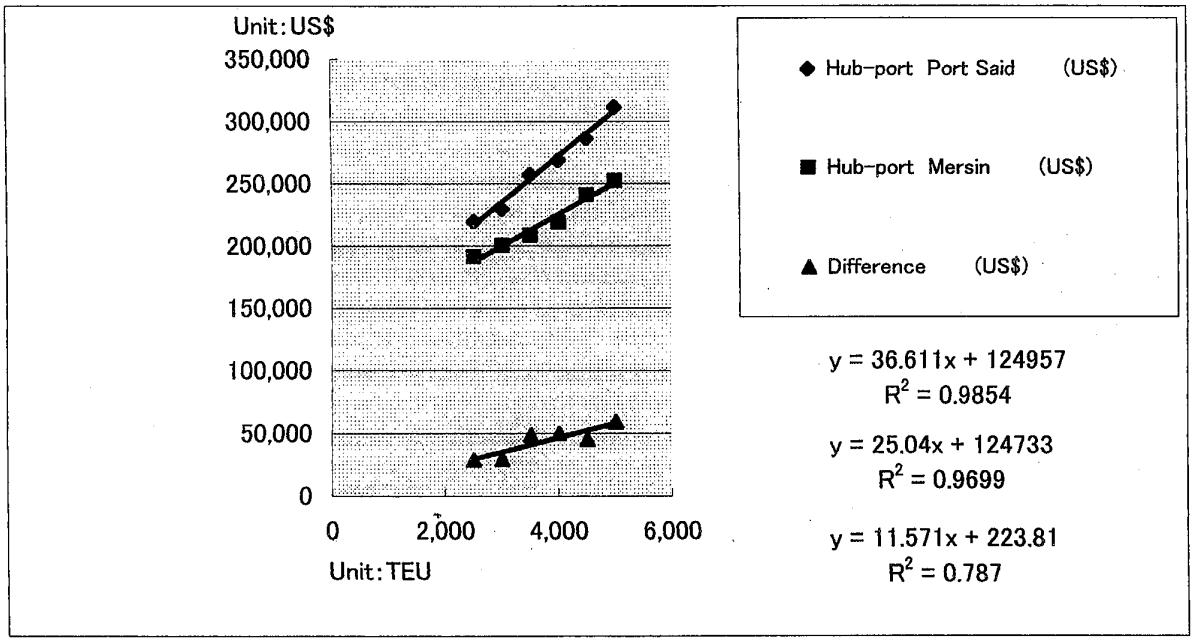


Figure 6.3.3 Correlation of Feeder Cost and Cargo Volume of one Mother Vessel

According to the Figure 6.3.3, difference of feeder ship cost between Port Said and Mersin Port is expressed as follows;

Difference (US$) = 11.57X+ 223.8
X: Volume of container unloaded at one time

Since X in case of vessel capacity 6,200 TEU in Table 2.1,2, difference of mother ship cost is US$ 49,100.

49,100= 11.571X+223.81
X= 4,220 (TEU)

Table 6.3.5 Cost Comparison of Feeder Services by Hub-port

(5,000 TEU)

Destination	Port Said		Mersin	
	Vessel Capa. (TEU)	Cost (US$)	Vessel Capa. (TEU)	Cost (US$)
Mersin	2,200	83,700	---	---
Lattakia	500	27,000	500	25,000
Beirut	500	27,000	500	25,000
Haifa	1,800	72,400	1,800	63,400
Port Said	---	---	1,000	44,300
Limassol	500	26,800	500	24,800
Piraeus	1,300	74,800	1,300	69,800
Total		311,700		252,300 -59,400

(4,500 TEU)

Destination	Port Said		Mersin	
	Vessel Capa. (TEU)	Cost (US$)	Vessel Capa. (TEU)	Cost (US$)
Mersin	1,800	71,700	---	---
Lattakia	500	27,000	500	25,000
Beirut	500	27,000	500	25,000
Haifa	1,800	72,400	1,800	63,400
Port Said	---	---	1,000	44,300
Limassol	500	26,800	500	24,800
Piraeus	1,000	61,400	1,000	58,400
Total		286,300		240,900 -45,400

(4,000 TEU)

Destination	Port Said		Mersin	
	Vessel Capa. (TEU)	Cost (US$)	Vessel Capa. (TEU)	Cost (US$)
Mersin	1,800	71,700	---	---
Lattakia	500	27,000	500	25,000
Beirut	500	27,000	500	25,000
Haifa	1,300	54,800	1,300	49,800
Port Said	---	---	750	35,800
Limassol	500	26,800	500	24,800
Piraeus	1,000	61,400	1,000	58,400
Total		268,700		218,800 -49,900

(3,500 TEU)

Destination	Port Said		Mersin	
	Vessel Capa. (TEU)	Cost (US$)	Vessel Capa. (TEU)	Cost (US$)
Mersin	1,800	71,700	---	---
Lattakia	500	27,000	500	25,000
Beirut	500	27,000	500	25,000
Haifa	1,300	54,800	1,300	49,800
Port Said	---	---	750	35,800
Limassol	500	26,800	500	24,800
Piraeus	750	50,000	750	48,000
Total		257,300		208,400 -48,900

(3,000 TEU)

Destination	Port Said		Mersin	
	Vessel Capa. (TEU)	Cost (US$)	Vessel Capa. (TEU)	Cost (US$)
Mersin	1,300	54,200	---	---
Lattakia	500	27,000	500	25,000
Beirut	500	27,000	500	25,000
Haifa	1,000	44,700	1,000	41,700
Port Said	---	---	750	35,800
Limassol	500	26,800	500	24,800
Piraeus	750	50,000	750	48,000
Total		229,700		200,300 -29,400

(2,500 TEU)

Destination	Port Said		Mersin	
	Vessel Capa. (TEU)	Cost (US$)	Vessel Capa. (TEU)	Cost (US$)
Mersin	1,000	44,300	---	---
Lattakia	500	27,000	500	25,000
Beirut	500	27,000	500	25,000
Haifa	1,000	44,700	1,000	41,700
Port Said	---	---	500	26,600
Limassol	500	26,800	500	24,800
Piraeus	750	50,000	750	48,000
Total		219,800		191,100 -28,700

Among these containers, volume of container for Mersin Port is as follows;

4,220 x 0.312= 1,320 (TEU)

This means that if the volume of local container demand between Rotterdam Port (North Europe) and Mersin Port is more than 5,280 TEUs* a week (275,000 TEUs** annually), the direct call at Mersin Port by mother vessels would be realized. Container volume between Turkey and North Europe can be assumed to be composed of approximately 30 %*** of whole containers of this country. Accordingly, that figure, 275,000 TEUs, could be converted to 920,000 TEUs as annual total demand of containers in Mersin Port. This volume of local container demand can be called " marginal local container volume".

* 1,320 x 2(loading and unloading) x 2(twice a week) = 5,280
** 5,280 x 52(weeks) = 275,000
*** This figure is calculated based on the Table x.x.x of Volume I, excluding the figure of the Black Sea Route because the general cargo in the Black Sea Area is transported mainly by Ro/Ro vessels.

Marginal local container volumes in cases of other vessel capacities can be obtained by the same means. Table 6.3.6 shows the result of other marginal local container volume.

Table 6.3.6 Marginal Local Container Volume of Mersin Port against Port Said

Vessel Capacity (TEU)	Marginal local Container Volume (TEU)
6,200	920,000
5,250	800,000
4,700	750,000
4,300	720,000
3,500	630,000

It should be noted that the marginal container volume is only an example of ship cost analysis based on a lot of preconditions that make the methodology of the analysis more simple. Ship operating companies take various aspects into consideration, when they choose a suitable hub-port/ calling-port in each region. Among them, the service level of the container terminal is one of the most important factors. Since the service level of the container terminal is not easily converted into monetary terms, it is not taken into consideration in the cost analysis. The high quality container transfer services consists of quick loading/ unloading to vessels, small ratio of cargo damage, smooth and quick implementation of governmental/ official procedures including C.I.Q, quick cargo transfer to other transport modes etc. Each component of the high quality container service is not existing independently. Each component has a strong correlation with each other. In other words, whole system should be established and kept in good condition. The existing level of Turkish ports is far below from the global standards from the viewpoint of a comprehensive system. The upgrading of service level in Turkish ports is the most urgent issue. Without the upgrading, nothing will be achieved in this country in the field of international container transport.

It should be noted also that this cost analysis is based on the existing port dues policy of the selected countries. Egypt sets higher port dues than other neighboring countries. No one can guarantee that Egypt will keep her port dues policy forever. If the Egyptian Government lifts the port dues system, future circumstances of Turkey on international container transport will become harder and harder. In that case, high quality service that Turkish ports can offer will gain more and more importance in the competition with other foreign ports in international container transport.

6.3.3 Competition in the Aegean Sea

(1) Mother ship cost

Table A.6.3.1 (2) and (7) gives us the mother ship costs of a ship operator that is managing Rotterdam Port- Izmir Port and Rotterdam Port- Piraeus Port respectively. According to the Table A.6.3.1 (2), mother ship cost between Rotterdam Port to Izmir Port can be obtained as follows;

(Ship capacity: 4,700 TEU)		
Port dues	US$	58,000
Ship charge	US$	345,000
Container fee	US$	67,700
Total	US$	470,700

According to the Table A.6.3.1 (7), mother ship cost between Rotterdam Port to Piraeus Port can be obtained as follows;

(Ship capacity: 4,700 TEU)		
Port dues	US$	59,300
Ship charge	US$	321,500
Container fee	US$	62,000
Total	US$	442,800

The difference of both mother ship costs is US$ 27,900.

(2) Feeder ship cost

Table 6.3.7 shows the rough cost of a ship operator that is managing Izmir Port- Pireaus Port container liners. It contains feeder cost per TEU by vessel capacity. Assuming that average feeder cost per TEU is US$ 44, the container volume that can make up the difference of mother ship costs is 630 TEUs.

$$27{,}900/\ 44 = 630\ (\text{TEU})$$

(3) Marginal local container volume

Table 6.3.3 gives us the share of local container in the East Mediterranean countries. Since the shares of Turkey and Greece in 2010 are 31.2 % and 16.8 %, these figures can be converted into 65 % and 35 % in bilateral relation. Necessary volume of local containers can be obtained as follows;

Table 6.3.7 Piraeus — Izmir (Feeder)

Vessel Capacity = 2,800 TEU

Name of Port	Distance (nautical mile)	Size of Vessel (TEU)	Volume of Container (TEU)	Port Due (US$)	Ship Operation Days (day)	Ship Charge (US$/day)	Ship Charge (US$)	Container Fee *) (US$)	Port Due + Ship Charge (US$)	Port Due + Ship Charge (US$/TEU)
Izmir				0	1	22,400	22,400			
	213	2,800	2,240		1	30,900	30,900	13,400	90,000	40
Piraeus				900	1	22,400	22,400			
Total				900	3		75,700	13,400	90,000	

*) Calculation is based on the days, ship operation days − 1day, since one day of ship operation days is common with mother vessel.

Vessel Capacity = 2,200 TEU

Name of Port	Distance (nautical mile)	Size of Vessel (TEU)	Volume of Container (TEU)	Port Due (US$)	Ship Operation Days (day)	Ship Charge (US$/day)	Ship Charge (US$)	Container Fee *) (US$)	Port Due + Ship Charge (US$)	Port Due + Ship Charge (US$/TEU)
Izmir				0	1	18,700	18,700			
	213	2,200	1,760		1	25,700	25,700	10,600	74,500	42
Piraeus				800	1	18,700	18,700			
Total				800	3		63,100	10,600	74,500	

*) Calculation is based on the days, ship operation days − 1day, since one day of ship operation days is common with mother vessel.

Vessel Capacity = 1,800 TEU

Name of Port	Distance (nautical mile)	Size of Vessel (TEU)	Volume of Container (TEU)	Port Due (US$)	Ship Operation Days (day)	Ship Charge (US$/day)	Ship Charge (US$)	Container Fee *) (US$)	Port Due + Ship Charge (US$)	Port Due + Ship Charge (US$/TEU)
Izmir				0	1	16,200	16,200			
	213	1,800	1,440		1	21,700	21,700	8,600	63,400	44
Piraeus				700	1	16,200	16,200			
Total				700	3		54,100	8,600	63,400	

*) Calculation is based on the days, ship operation days − 1day, since one day of ship operation days is common with mother vessel.

Vessel Capacity = 1,300 TEU

Name of Port	Distance (nautical mile)	Size of Vessel (TEU)	Volume of Container (TEU)	Port Due (US$)	Ship Operation Days (day)	Ship Charge (US$/day)	Ship Charge (US$)	Container Fee *) (US$)	Port Due + Ship Charge (US$)	Port Due + Ship Charge (US$/TEU)
Izmir				0	1	13,000	13,000			
	213	1,300	1,040		1	17,000	17,000	6,200	49,600	48
Piraeus				400	1	13,000	13,000			
Total				400	3		43,000	6,200	49,600	

*) Calculation is based on the days, ship operation days − 1day, since one day of ship operation days is common with mother vessel.

Vessel Capacity = 1,000 TEU

Name of Port	Distance (nautical mile)	Size of Vessel (TEU)	Volume of Container (TEU)	Port Due (US$)	Ship Operation Days (day)	Ship Charge (US$/day)	Ship Charge (US$)	Container Fee *) (US$)	Port Due + Ship Charge (US$)	Port Due + Ship Charge (US$/TEU)
Izmir				0	1	11,000	11,000			
	213	1,000	800		1	14,500	14,500	4,800	41,500	52
Piraeus				200	1	11,000	11,000			
Total				200	3		36,500	4,800	41,500	

*) Calculation is based on the days, ship operation days − 1day, since one day of ship operation days is common with mother vessel.

Vessel Capacity = 750 TEU

Name of Port	Distance (nautical mile)	Size of Vessel (TEU)	Volume of Container (TEU)	Port Due (US$)	Ship Operation Days (day)	Ship Charge (US$/day)	Ship Charge (US$)	Container Fee *) (US$)	Port Due + Ship Charge (US$)	Port Due + Ship Charge (US$/TEU)
Izmir				0	1	9,000	9,000			
	213	750	600		1	12,200	12,200	3,600	34,000	57
Piraeus				200	1	9,000	9,000			
Total				200	3		30,200	3,600	34,000	

*) Calculation is based on the days, ship operation days − 1day, since one day of ship operation days is common with mother vessel.

Vessel Capacity = 500 TEU

Name of Port	Distance (nautical mile)	Size of Vessel (TEU)	Volume of Container (TEU)	Port Due (US$)	Ship Operation Days (day)	Ship Charge (US$/day)	Ship Charge (US$)	Container Fee *) (US$)	Port Due + Ship Charge (US$)	Port Due + Ship Charge (US$/TEU)
Izmir				0	1	6,500	6,500			
	213	500	400		1	9,200	9,200	2,400	24,800	62
Piraeus				200	1	6,500	6,500			
Total				200	3		22,200	2,400	24,800	

*) Calculation is based on the days, ship operation days − 1day, since one day of ship operation days is common with mother vessel.

630/(0.65-0.35) = 2,100 (TEU)
2,100 x 0.65 = 1,370 (TEU) (for Mersin Port)
2,100 x 0.35 = 730 (TEU) (for Piraeus Port)
(1,370 x 2 x 2 x 52)/ 0.3 = 950,000 (TEU)

Marginal local container volume of Izmir Port against Piraeus Port by mother vessel capacity can be obtained by means of same procedure. Table 6.3.8 shows the Marginal local container volume of Izmir Port against Piraeus Port.

Table 6.3.8 Marginal Local Container Volume of Izmir Port against Piraeus Port

Vessel Capacity (TEU)	Marginal local Container Volume (TEU)
4,700	950,000
4,300	890,000
3,500	760,000

It should be noted that the marginal container volume is only an example of ship cost analysis based on a lot of preconditions that make the methodology of the analysis more simple. Ship operating companies take various aspects into consideration, when they choose a suitable hub-port/ calling-port in each region. Among them, the service level of the container terminal is one of the most important factors. Since the service level of the container terminal is not easily converted into monetary terms, it is not taken into consideration in the cost analysis. The high quality container transfer services consists of quick loading/ unloading to vessels, small ratio of cargo damage, smooth and quick implementation of governmental/ official procedures including C.I.Q, quick cargo transfer to other transport modes etc. Each component of the high quality container service is not existing independently. Each component has a strong correlation with each other. In other words, whole system should be established and kept in good condition. The existing level of Turkish ports is far below from the global standards from the viewpoint of a comprehensive system. The upgrading of service level in Turkish ports is the most urgent issue. Without the upgrading, nothing will be achieved in this country in the field of international container transport.

6.3.4 Analysis of a container port in the Marmara Sea

Table 6.3.9 shows the rough cost of a container transfer from Rotterdam Port to Haydarpasa Port via Port Said. This type of transport is the typical system of North Europe- Turkey container transfer. This system utilizes the mother container ship between North Europe to Far East. A small vessel with the capacity of 750 TEUs is supposed for the feeder service. Cost of transport of one container to Haydarpasa Port is US$ 576.

Table 6.3.10 shows the rough cost of a container direct transfer from Rotterdam Port to Hydarpasa port. A container vessel with the capacity of 1,300 TEUs is supposed for this service. Cost of transport of one container to Haydarpasa Port is US$ 468. It is clear that

the direct transport system has advantage for ship operators and consignees over other system with feeder services.

This means that if the volume of direct cargo demand between Rotterdam Port (North Europe) and a Port in the Marmara Sea is more than 4,160 TEUs* a week (216,000 TEUs** annually), the direct transport service would be realized. Container volume between Turkey and North Europe is assumed to be composed of approximately 30 %*** of whole containers of this country. Accordingly, that figure, 216,000 TEUs, could be converted to 720,000 TEUs. High quality services in Turkish ports should be achieved before the introduction of this kind of direct transport system.

* 1,040 x 2(loading and unloading) x 2(twice a week) = 4,160
** 4,160 x 52(weeks) = 216,000
*** This figure is calculated based on the Table x.x.x of Volume I, excluding the figure of the Black Sea Route because the general cargo in the Black Sea Area is transported mainly by Ro/Ro vessels.

Table 6.3.9 North Europe-Istanbul (Transship)

Name of Port	Distance (nautical mile)	Size of Vessel (TEU)	Volume of Container (TEU)	Port Dues (US$)	Ship Operation Days (day)	Ship Charge (US$/day)	Port Dues + Ship Charge (US$)	Ship Charge (US$/TEU)	Container Handling Charge (US$/TEU)
Rotterdam				49,000	1	26,000	75,000		120
	3,287	3,500	2,800		6	38,000	228,000	123	
Port Said				15,000	1	26,000	41,000		80
Port Said				2,000	1	9,000	11,000		
	812	750	600		2	12,000	24,000	73	
Istanbul				0	1	9,000	9,000		180
Subtotal								196	380
Total									576

Table 6.3.10 North Europe-Istanbul (Direct)

Name of Port	Distance (nautical mile)	Size of Vessel (TEU)	Volume of Container (TEU)	Port Dues (US$)	Ship Operation Days (day)	Ship Charge (US$/day)	Port Due + Ship Charge (US$)	Ship Charge (US$/TEU)	Container Handling Charge (US$/TEU)
Rotterdam				30,000	1	13,000	43,000		120
	3,163	1,300	1,040		7	17,000	119,000	168	
Istanbul				0	1	13,000	13,000		180
Subtotal								168	300
Total									468

6.3.5 Analysis of future container transfer in the Black Sea

Many countries depend on the Black Sea in international container transport. Several countries do not face to the sea and do not have any seaport. These countries have to utilize ports in foreign countries. These countries choose the foreign port not only for economical reason but also for political reason. Among the countries in this area, there are several newly independent nations in which transport statistics are no available at all. Moreover, it

Table 6.3.11 Container Traffic in the Black Sea Region

Country	Population (million)	Area (1000 km2)	G D P (million US$)	GDP per capita (US$)	container (1997) (1000 TEU)	TEU/GDP(1997) (1000TEU/ TrillionUS$)	TEUs (2010)/ TEUs(1997) (Times)	Note
Turkey (All ports) *	62.9	814.6	199,307	3,160	1232.6	6.18	2.5～2.9	JICA(ULIMAP)
Turkey(Black Sea ports)	7.8	115.4	19,273	2,470	7.1	0.37	19.7～23.9	JICA(ULIMAP)
Bulgaria	8.3	11.1	9,750	1,170	51.5	5.28	2.8	Ocean Shipping Consultants
Romania	22.6	23.8	31,787	1,410	95.0	2.99	2.6	ditto
Ukraine	50.7	60.4	52,625	1,040	61.0	1.16	2.3	ditto
Russia	148.1	1707.5	337,744	2,415				not available
Georgia	5.4	7.0	4,656	860	38.6	8.29	3.2～4.5	(2012)by OCDI
Armenia	3.8	3.0	2,112	560				42～57(1000TEU)(2012)by OCDI
Azerbaijan	7.6	8.7	3,886	510				105～144(1000TEU)(2012)by OCDI
Turkmenistan	4.7	48.8	2,987	640				7～9(1000TEU)(2012)by OCDI
Moldova	4.3	3.4	1,974	460				not available
Uzbekistan	23.7	190.5	23,490	1,010				ditto
Tajikistan	6.0	14.3	2,010	330				ditto
Kazakhstan	15.8	271.7	21,317	1,350				ditto
Total (Except *)					253.2		3.7～4.3	

Source: World Statistics
: OCDI, Oean Shipping Cosultants

is sometimes difficult to forecast the economic development of these newly independent countries due to the political and economic turmoil so far.

These are the reasons why it is difficult to analyze the container transport in the Black Sea region clearly. In this context, the Study Team draws the future perspective of container transfer in this region base on the results of existing forecast conducted a few different organizations. Since different organizations forecasted future cargo demands independently, method, data and preconditions for the forecasting are different each other.

(1) The Black Sea countries and other CIS countries

The rough future perspective of container transfer in the Black Sea Region is shown in the Table 6.3.11. The general outlook of countries in the region is also shown in the Table. Bulgaria, Romania, Ukraine, Russia and Georgia are facing the Black Sea and other countries in the table are inland countries. These inland countries have to depend on foreign seaports to export/ import the necessary commodities.
According to the Table, the following remarks can be obtained.

1) Turkey shows the outstanding presence in international container transport in this region.
2) Although Turkish ports in the Black Sea dandle very small amount of container so far, these ports is expected to handle approximately 20 times containers of present level.
3) Even if Russia is excluded out of consideration, approximately 4 times of containers are expected around 2010.
4) From the viewpoint of container volume per GDP of each country, the figures of Bulgaria, Romania and Ukraine are less than the one of Turkey. Supposing that the figures of three foreign countries reach to the present level of Turkey, total volume of container will be more than 4 times.
5) Future container demand of inland countries such as Armenia, Azerbaijan and Turkmenistan is expected to be approximately 150- 210 thousand TEUs. Once Turkish ports in the Black Sea can manage to attract international containers of these countries, Turkish ports in the region will play the role of gateway for these countries.

It should be noted that the Georgia Government has a development plan of Poti Port to become a gateway for Armenia, Azerbaijan and Turkmenistan. Since other central Asian countries including Uzbekistan, Tajikistan and Kazakhstan have not enough container demand to affect the future development of Poti Port so far, the Georgia Government excludes these countries out of its targeted countries. Uzbekistan and Kazakhstan, however, have the outstanding population in Central Asia. Future development of these countries must be watched carefully.

(2) The Danube River

Traffic volume of the Danube River in four concerned countries, Slovak, Hungary, Romania and Bulgaria has been decreasing since the end of 80’. Total traffic volume dropped from 76.7 million tons in 1989 to 21.5 million tons in 1994. (See Table 6.3.12)

The Commission of European Communities forecasted the cargo volume of the Danube by commodities in 2000, 2005 and 2015. (See Table 6.3.13) According to the forecast, traffic volume will increase again from 21 million tons in 1994 to 31 million tons. Particularly, general cargo will increase rapidly. Although the containerized ratio of this general cargo is not obtained so far, future development of containerization of the Danube River transport should be paid more attention.

Table 6.3.12 Total Traffic of the Danube

(Unit: thousand tons)

Country	1989	1993	1994
Slovak Republic	15,746	3,634	2,213
Hungary	17,776	4,914	2,130
Romania	35,534	14,536	14,586
Bulgaria	7,675	2,556	2,566
Total	76,731	25,640	21,495
Index	100	33	28

Source: Danube Commission Statistics

Table 6.3.13 Traffic Forecast by Commodities

(Unit: thousand tons)

No.	Commodity	1994	%	2000	2005	2015	%
	Bulk cargo						
I.	Iron ore	4,044	19	6,815	6,815	6,815	22
II.	Non ferrous ore	1,122	5	1,080	1,080	1,080	3
III.	Crude minerals	7,197	33	3,810	3,810	3,810	12
IV.	Construction materials	483	2	540	630	830	3
V.	Solid fuels	2,944	14	6,445	6,445	6,445	21
VI.	Crude oil, refined products	1,505	7	2,010	2,575	4,210	13
	Sub-total	17,295	80	20,700	21,355	23,190	74
	Conventional cargo						
VII.	Agricultural products	956	4	1,115	1,335	1,735	6
VIII.	Industrial products	2,014	9	2,585	2,585	2,585	8
IX.	Miscellaneous	1,230	6	1,740	2,175	3,620	12
	Sub-total	4,200	19	5,440	6,095	7,940	26
	Total	21,495	100	26,140	27,450	31,130	100
	Index	100		122	128	145	

Source: The Commission of the European Communities

(3) Other factor

If traffic capacity of the Turkish Straits is limited due to the safety or environmental

reasons, Turkish ports will have to play more important role as transit-ports for other Black Sea countries including inland nations.

6.3.6 Desirable Future Roles of Turkish Ports

Figure 6.3.4- Figure 6.3.6 illustrate the desirable future roles of Turkish ports in each coastal area. Figure 6.3.4 shows the role of a port in the Mediterranean Sea. Figure 6.3.5 shows the role of a port in the Aegean Sea and Figure 6.3.6 shows the role of a port in the Marmara Sea. Although related data of Mersin Port, Izmir Port and Hydarpasa Port were used in the cost analysis, these three ports were selected as typical examples in each coastal area, which provide the Study Team with materials of the cost analysis. Concrete locations of the ports which would play very important roles in the container transport should be determined taking the various aspects such as future expansion area, existing expansion plan, future land transport connection, financial situation etc. into consideration.

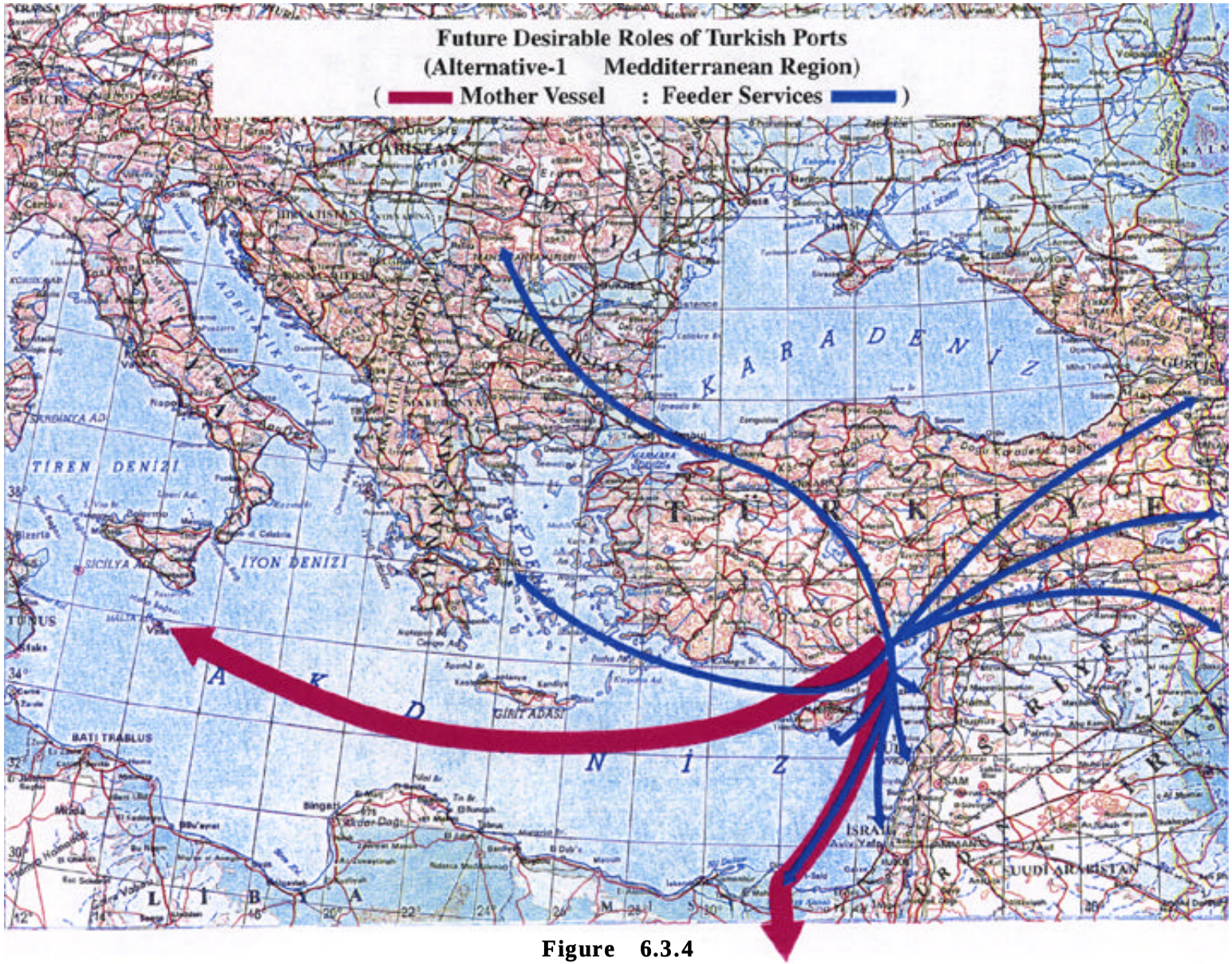

Future Desirable Roles of Turkish Ports
(Alternative-1 Medditerranean Region)
(Mother Vessel : Feeder Services)
TİREN DENİZİ
İYON DENİZİ
KARADENİZ
AKDENİZ
TÜRKİYE
SURİYE
İSRAİL
SUUDİ ARABİSTAN
LİBYA
TUNUS
BATI TRABLUS
GİRİT ADASI
SİCİLYA AD.
SARDUNYA AD.
MACARİSTAN

Figure 6.3.4

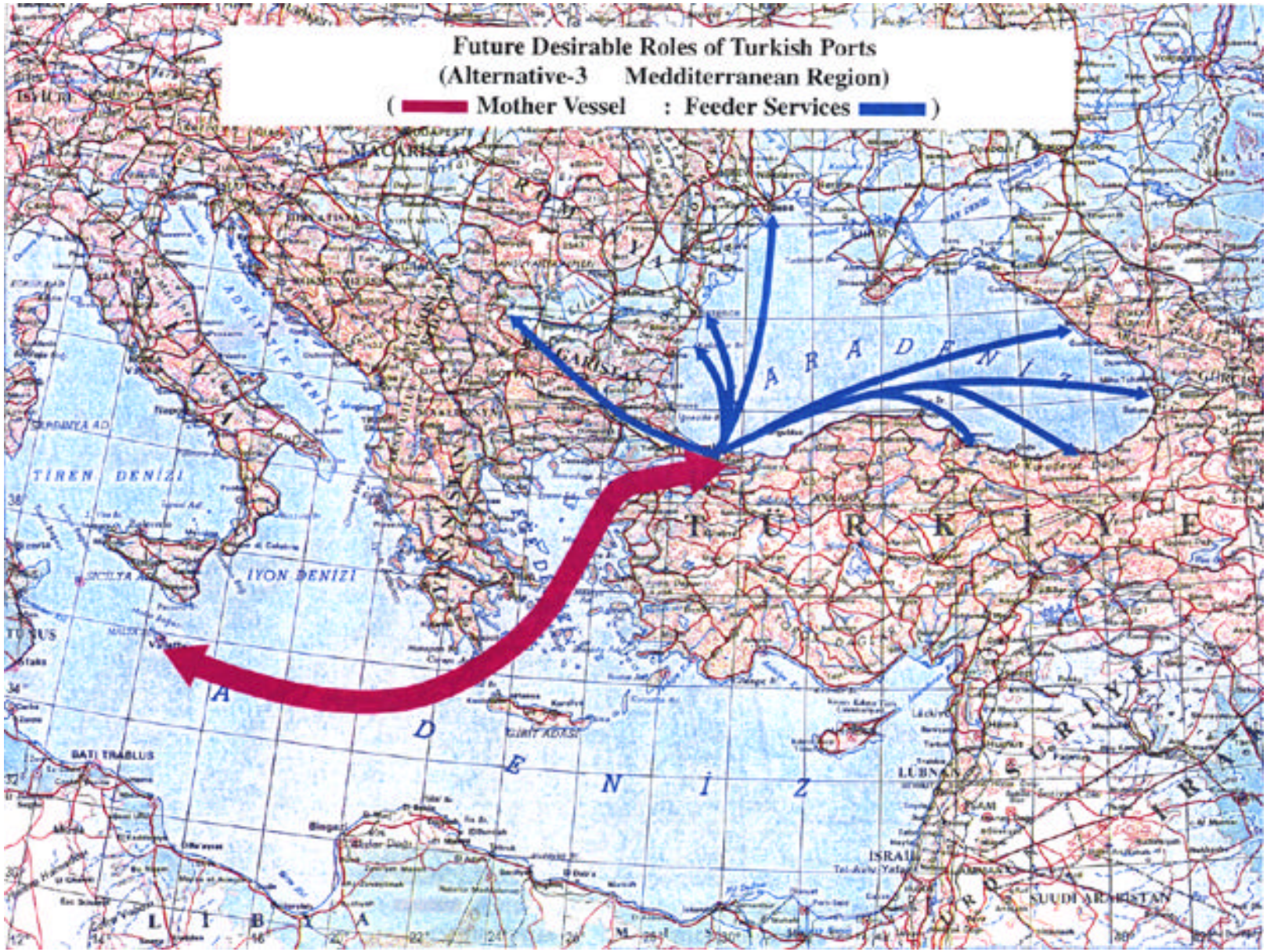

Future Desirable Roles of Turkish Ports
(Alternative-3 Medditerranean Region)
(Mother Vessel : Feeder Services)
TİREN DENİZİ
İYON DENİZİ
A D E N İ Z
T U R K İ Y E
L İ B Y A
BATI TRABLUS
LÜBNAN
ISRAİL
SUUDİ ARABİSTAN

Figure 6.3.5

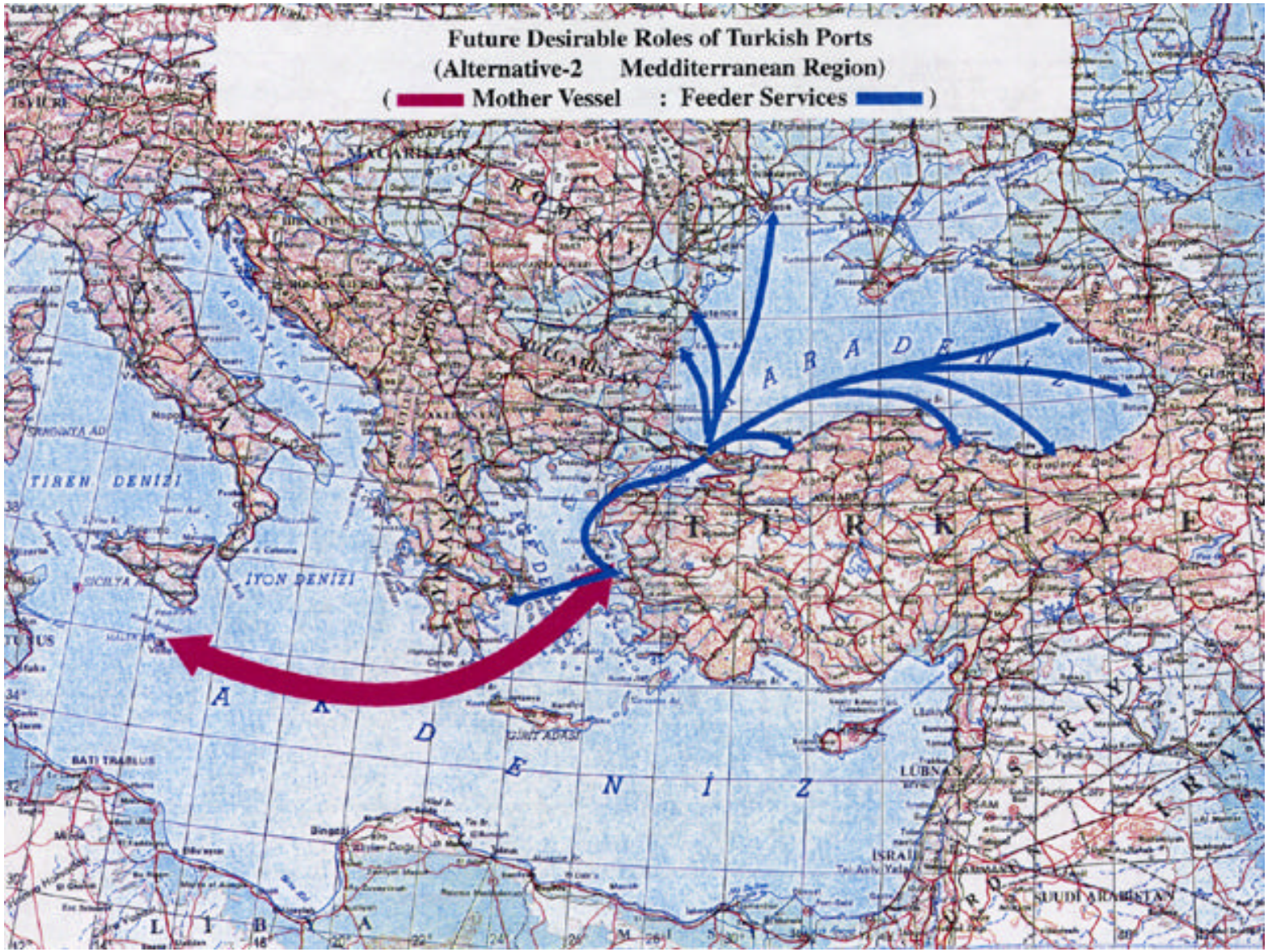

Future Desirable Roles of Turkish Ports
(Alternative-2 Medditerranean Region)
(Mother Vessel : Feeder Services)
TİRENİ DENİZİ
İYON DENİZİ
A K D E N İ Z
T Ü R K İ Y E
BATI TRABLUS
LÜBNAN
İSRAİL
SUUDİ ARABİSTAN

Figure 6.3.6

6.4 Port Classification

6.4.1 Background

One hundred and fifty three coastal facilities with port function are found along the 8,333 km Turkish coastline. Some coastal facilities could be called “a port” independently. In another case, a group of coastal facilities could be called “a port” from the viewpoint of their geographical location and their functions. Moreover there are many coastal facilities with a single component such as a pier without any other neighboring coastal facility. Various kinds of port are existing in Turkey.

Various organizations such as National Railways, public corporations, municipal governments, large manufacturing companies and port managing companies are managing these ports in their own manner based on their own historical background. Various kinds of port are existing in Turkey in terms of management organization.

Since no arrangement on the facility development and management direction among these ports has been conducted, a wasteful use of national resources and conflict among those port-managing bodies has been witnessed.

Ports are requested to carry out their functions and roles for achievement of national objective with making full use of national resources. That is why the basic idea of port classification is needed. The role of the central government needs to be identified in each class.

6.4.2 Major-port and Other-port

The Study Team suggests dividing Turkish ports into two categories. The one is Major-port and the other is other-port.

(1) Major-port

A Major-port is a port that has been significantly contributing to the development of national economy and international trade. Without the sound function of the port, the national economy could not be developed and maintained, and people’s lives would be crippled. In other words, a Major-port has a significant effect on the national interest. The government has to pay special attention to the development and maintenance of the function of the port, even if the port is constructed and managed by a private sector. The government may extend assistance to a major port not only in development of facilities but also in port management and operation. It should be noted that the possible assistance in facility development in a private port does not necessarily means public investment in a private port.

(2) Other-port

All remaining ports are classified as other-ports.

6.4.3 Roles of Central Government in Major-port

Since a major-port has a significant effect on the national interest. The government has to pay special attention to the development and maintenance of the function of the port, even if the port is constructed and managed by a private sector. The government should bear the following roles.

(1) To examine the coherency of the port development plan/ project with the long term port development policy

(2) To examine the coherency of port management and operation with the long term port development policy

(3) To extend possible assistance to the port managing body to improve the basic port facilities and quality of port management and operation

(4) To take the initiative in establishing a united organization for port management and operation in case of a “group port”

(5) To collect the necessary data and information to examine the progress of the long term port development plan and to revise the plan

6.4.4 Roles of Central Government in Other-port

(1) To extend possible assistance to the port managing body to improve the basic port facilities and quality of port management and operation

(2) To collect the necessary data and information to examine the progress of the long term port development plan and to revise the plan

6.4.5 Ports to be classified

Table 8.2.1 in Volume I shows the ports identified by the Study Team which will be classified.

6.4.6 Criteria

The following criteria will be used for the definition of “Major Ports” respectively or jointly.
(1) Total quantity of international cargo handled in the port
(2) Quantity of international general cargo handled in the port
(3) Total value of international trade conducted through the port
(4) Total number of international passengers of the port

6.4.7 Conclusion

Table 6.4.1 shows the present status of Turkish ports in terms of international cargo, international general cargo, international trade value and international passenger. All figures represent the average of three years, 1996- 1998. The figures of each year of each item are shown in Table A.6.4.1 to Table A.6.4.4.

(1) Total quantity of international cargo handled in the port

Since a major port has a significant effect on national interest, volume of the international cargo handled in a major port should be over a certain extent. The Study Team set up the criteria of 500 thousand tons in any year of 1996- 1998. It means that a port which handled more than 500 thousand tons of international cargo in any year of 1996- 1998 in Table A.6.4.1 is qualified as a major port. As a result, twenty ports including Iskendern TCDD Port, Iskendern Port qualify as major ports. The sum of international cargo of the major ports composes approximately 96 % of whole international cargo handled in Turkish ports.

(2) Total quantity of international general cargo handled in the port

The Study Team set the criteria of 100 thousand tons. It means that a port which handled more than 100 thousand tons of international general cargo in the Table 6.4.1 qualify as a major port. As a result, nineteen ports including Tasucu Port, qualified as major ports. The sum of international general cargo of the major ports composes approximately 98 % of whole international cargo handled in Turkish ports.

(3) Total value of international trade conducted through the port

The Study Team set the criteria of US$ 100 million in any year of 1996-1998. It means that a port which handled more than US$ 100 million of international trade in any year of 1996-1998 in Table A.6.4.3 qualify as a major port. As a result, twenty-three ports including Rize Port, Hopa Port qualify as major ports. The sum of international trade of the major ports composes approximately 99 % of whole international cargo handled in Turkish ports.

(4) Total number of international passengers of the port

The Study Team set the criteria of 50 thousand foreigners. It means that a port which handled more than 50 thousand foreign travelers in the Table 6.4.1 qualify as a major port. As a result, six ports namely Alanya Port, Marmaris Port, Bodrum Port, Kusadasi Port, Istanbul TDI Port and Trabzon Port qualify as major ports. The sum of foreign passengers of the major ports composes approximately 81 % of whole foreign travelers, who entered into Turkey through ports.

(5) Major Ports

Consequently, the twenty-nine ports shadowed in Table 6.4.1 are selected as major ports.

Table 6.4.1Present Status of Turkish Ports

	Name of Port and Group Port	Im/Ex Cargo (1,000 Tones)	Im/Ex General Cargo (1,000 Tones)	Foreign Trade (1,000,000 USD	Foreign Travelors (1,000 person)
(Mediterranean)					
1	Iskenderun TCDD	1,056.856	234.738	421.41	0.49
2	Iskenderun	9,932.359	4,811.994	768.63	
3	Botas	12,169.863	674.982	615.51	
4	Mersin	7,639.805	1,814.677	2,126.96	3.51
5	Tasucu	146.340	130.574	3.80	21.22
6	Anamur	96.667		0.02	1.05
7	Alanya	2.849			0.95
8	Antalya	592.412	165.738	154.98	59.56
9	Finke	0.336	0.336		0.39
(Aegean)					
10	Fethiye	63.289	5.046	5.96	8.28
11	Marmaris			2.81	74.93
12	Bodrum	7.777	7.753	0.71	95.44
13	Gulluk	1,474.663	15.290	20.85	0.12
14	Kusadasi	2.666	2.666	1.40	353.27
15	Cesme	1.214	0.057	5.10	21.85
16	Izmir	2,526.562	1,533.850	6,527.94	9.56
17	Aliaga	18,191.444	6,039.066	1,574.39	
18	Dikili	194.686	66.879	11.23	11.31
19	Ayvalic	2.371	0.752	28.54	3.78
20	Bozcaada	4.984	1.417		
21	Gokceada Kuzu	13.559	10.822		
(Marmara)					
22	Canakkale	2,243.739	1,698.824	152.82	18.33
23	Lapseki		0.000		
24	Gelibolu	124.224	45.407	0.27	
25	Karabiga	22.087	10.662		
26	Bandirma	2,833.657	861.719	405.07	0.51
27	Mudanya	198.690	66.593	372.60	
28	Gemlik	2,120.866	1,508.514	1,581.23	
29	Yalova				
30	Izmit	25,235.138	9,009.985	5,663.74	1.62
31	Darica				
32	Hydarpasa	6,257.125	5,851.563	6,368.12	
33	Istanbul TDI				219.01
34	Istanbul Zeyport				
35	Ambarli	5,415.506	2,337.758	1,595.83	
36	Silivri	2,156.632	530.960		
37	Tekirdag	1,446.559	692.858	932.49	15.84

(Black Sea)					
38	Sile	0.200	0.200		
39	Kefken		0.000		
40	Eregli	6,998.762	1,616.246	756.05	0.11
41	Zonguldak	98.986	87.908	33.78	0.36
42	Bartin	776.646	716.647	111.77	0.15
43	Amasura	0.200	0.200		
44	Kurucasile				
45	Inebolu	34.293	15.998	8.25	
46	Ayancik	300.006	1.762	2.67	
47	Sinop	9.175	6.730	2.67	0.22
48	Gerze				
49	Samsun	1,858.214	561.026	413.78	17.13
50	Unye	225.185	26.307	30.06	
51	Fatsa	153.756	89.985	20.13	
52	Ordu	132.511	84.996	125.68	0.01
53	Giresun	132.031	32.906	174.43	0.41
54	Vakfikebir				
55	Akcaabat				
56	Trabzon	432.124	65.415	151.45	50.92
57	Rize	209.444	18.707	96.78	0.05
58	Cayeli				
59	Pazar	14.536	6.575		
60	Hopa	143.553	2.323	73.37	
	TOTAL	**113,694.548**	**41,465.411**	**31,343.276**	**990.355**

6.5 Required Facilities in Long Term Perspective

6.5.1 Basic Direction of Infrastructure Development

(1) Container facilities

The demand forecast conducted by the Study Team provides the future demand of container traffic in 2010 and 2020 by each region.

Future Container Demand by Region

(2020)

Region	Sub-region	High Case (1,000 TEU)	Middle Case (1,000 TEU)	Low Case (1,000 TEU)
Marmara Sea		2,680	2,400	2,160
Aegean Sea		1,840	1,650	1,480
Black Sea		500	460	410
	Western Black Sea	340	310	280
	Eastern Black Sea	160	150	130
Mediterranean		1,660	1,490	1,350
	Iskendern	280	250	230
	Mersin	1,250	1,120	1,010
	Antalya	130	120	110
Total		6,680	6,000	5,400

(2010)

Region	Sub-region	High Case (1,000 TEU)	Middle Case (1,000 TEU)	Low Case (1,000 TEU)
Marmara Sea		1,550	1,460	1,370
Aegean Sea		1,020	960	890
Black Sea		170	160	140
	Western Black Sea	120	110	100
	Eastern Black Sea	50	50	40
Mediterranean		840	800	740
	Iskendern	140	130	120
	Mersin	640	610	560
	Antalya	60	60	60
Total		3,580	3,380	3,140

Container volume of the Mediterranean Sea region will reach approximately 740- 840 thousand TEUs in 2010 and 1.4- 1.7 million TEUs in 2020. These figures can be divided into two ports, Iskendern Port and Mersin Port. The container volume of Iskendern Port will reach approximately 120- 140 thousand TEUs in 2010 and 230- 280 thousand TEUs in 2020. On the other hand, the container volume of Mersin Port will reach approximately 610- 700 thousand TEUs in 2010 and 1.1- 1.4 million TEUs in 2020.

Container volume of Aegean Sea region will reach approximately 0.9- 1.0 million TEUs in

2010 and 1.5- 1.8 million TEUs in 2020.

Container volume of the Marmara Sea region will reach approximately 1.4- 1.6 million TEUs in 2010 and 2.2- 2.7 million TEUs in 2020.

Container volume of Black Sea region will reach approximately 140- 170 thousand TEUs in 2010 and 410- 500 thousand TEUs in 2020. These figures of the Black Sea can be divided into two sub-regions, West Black Sea region and East Black Sea region. Container volume of West Black Sea region will reach approximately 100- 120 thousand TEUs in 2010 and 280- 340 thousand TEUs in 2020. On the other hand, container volume of East Black Sea region will reach approximately 40- 50 thousand TEUs in 2010 and 130- 160 thousand TEUs in 2020.

1) The Mediterranean Sea

Iskendern Port handles several hundred containers at the general cargo quay-wall with mobile cranes so far. The existing container handling capacity of Iskendern Port is approximately 60 thousand TEUs. Iskendern Port has a future project of container terminal with a capacity of 300 thousand TEUs. Total capacity will be 360 thousand TEUs after the completion of the new container terminal. It matches the future demand of 120- 140 thousand TEUs in 2010 and 230- 280 thousand TEUs in 2020.

Since the present container volume handled in Iskendern Port is far below the existing capacity, the new container terminal should be constructed in a timely manner, watching the future progress of container volume of the port.

Mersin Port handles 242 thousand containers at the existing container terminal with three gantry cranes. The existing container handling capacity of Mersin Port is approximately 380 thousand TEUs including a super gantry crane, which will be introduced within a few months. Mersin Port has a future project of container terminal with a capacity of 1.0 million TEUs. Total capacity will be 1.4 million TEUs after the completion of the new container terminal. It matches the future demand of 610- 700 thousand TEUs in 2010 and 1.1- 1.4 million TEUs in 2020.

Since it is certain that the container volume will exceed the existing capacity within several years, the new terminal should be constructed step by step to work in that case. Full capacity of 1.0 million TEUs of the new terminal is not necessary at the first stage of the development.

It should be noted that, as mentioned in the previous section, container volume of more than 630 thousand TEUs in a port might attract a mother vessel with a capacity of 3,500 TEUs. In that case, a certain amount of transshipped containers will follow automatically and a sudden increase of container cargo will take place.

2) The Aegean Sea

Izmir Port handles 399 thousand containers at the existing container terminal with five gantry cranes so far. The existing container handling capacity of Izmir Port is approximately 440 thousand TEUs. Izmir Port has a future project of container terminal with a capacity of 180 thousand TEUs. Total capacity will be 620 thousand TEUs after the completion of the new container terminal. It does not match the future demand of 0.9- 1.0 million TEUs in 2010 and 1.5- 1.8 million TEUs in 2020.

Since it is certain that the container volume will exceed the existing capacity within a few years, the new terminal should be constructed as soon as possible. Even if the new terminal will be completed, the shortage of capacity of 30- 40 thousand TEUs in 2010 and of 0.9- 1.2 million TEUs will be expected in a Aegean Sea region. Another new terminal with sufficient capacity should be constructed. A close investigation and study should be done as soon as possible to determine the most suitable location for the large container terminal.

It should be noted that, as mentioned in the previous section, container volume more than 760 thousand TEUs in a port might attract a mother vessel with a capacity of 3,500 TEUs. In that case, a certain amount of transshipped containers will follow automatically and a sudden increase of container cargo will take place.

3) The Marmara Sea

Ports in the Marmara Sea handle 700 thousand containers so far. The existing container handling capacity of the Marmara Sea is approximately 940 thousand TEUs. Ports in the Marmara Sea have some future expansion projects of container terminal with a capacity of 790 thousand TEUs. And there are some other planned projects with a capacity of 1.3 million TEUs. Total capacity will be 3.1 million TEUs. It does not match the future demand of 1.4- 1.6 million TEUs in 2010 and 2.2- 2.7 million TEUs in 2020.

Since it is certain that the container volume will exceed the existing capacity within several years, new terminals should be prepared. It should be taken into consideration that too many small-scale container terminals would prevent a port in this region from becoming a calling-port. In this context, large-scale container terminals, namely Derince container terminal and Marmara Port, should be given high priority.

It should be noted that, as mentioned in the previous section, container volume more than roughly 700- 800 thousand TEUs in a port might attract a mother vessel. In that case, a certain amount of transshipped containers will follow automatically and a sudden increase of container cargo will take place.

4) The Black Sea

Ports in the Black Sea handle only 5 thousand containers at the general cargo quay-walls with mobile cranes so far. The existing container handling capacity of the Black Sea is approximately 180 thousand TEUs. Ports in the Black Sea have some future expansion projects of container terminal with a capacity of 160 thousand TEUs. And there are some

other planned projects with a capacity of 0.8 million TEUs. Total capacity will be 1.2 million TEUs. It does not match the future demand of 140- 170 thousand TEUs in 2010 and 410- 500 thousand TEUs in 2020.

Since the present container volume handled in ports in the region is far below the existing capacity, new facilities for containers should be constructed in a timely manner, watching the future progress of container volume of each port.

5) Other infrastructures

Railway is the most reasonable land transport system for containers from the economical and environmental viewpoint in case of long distance transportation. If TCDD could provide economical and quick container transfer services, a lot of containers would be transported by railway. Taking into the consideration that the container volume of this country will increase rapidly, strengthening the railway cargo transport system would be one of the most urgent issues for the national economy and environment. Particularly the capacities along the “Marmara- Ankara- Mersin Axis”, “Izmir- Ankara- Samsun Axis”, “Southeast Anatolia Axis” and “East Anatolia North to South Axis” should be increased for nationwide development and regional development.

Road network is also important for container land transport. Particularly the capacities along “Southeast Anatolia Axis” and “East Anatolia Frontier Sub-Axis” should be emphasized.

(2) Facilities for general cargo except containers

Since a certain amount of general cargo will exceed the capacity of Turkish ports in 2020, new facilities for general cargo should be constructed in a timely manner, watching the future progress of cargo volume of each port.

(3) Bulk Cargo

Since a certain amount of bulk cargo will exceed the capacity of Turkish ports in 2020, new facilities for bulk cargo should be constructed in a timely manner, watching the future progress of cargo volume of each port.

6.5.2 Estimation of Required Construction Investment in Long Term

(1) Method of Estimating Initial Construction Investment

The following five steps are used to examine the total amount of the initial investment for the development of public port facilities until the target year:

(1) Grasping capacities of existing and planned facilities
(2) Demand forecast as of target year
(3) Formulating nationwide port development policy and plan
(4) Initial construction cost estimation for standardized facilities
(5) Estimating the required initial investment amount by the target year

A flow chart, which traces the relation of the above-mentioned items, is shown in Figure 6.5.1. Item (2) and (3) are described in previous chapter and section respectively in this study.

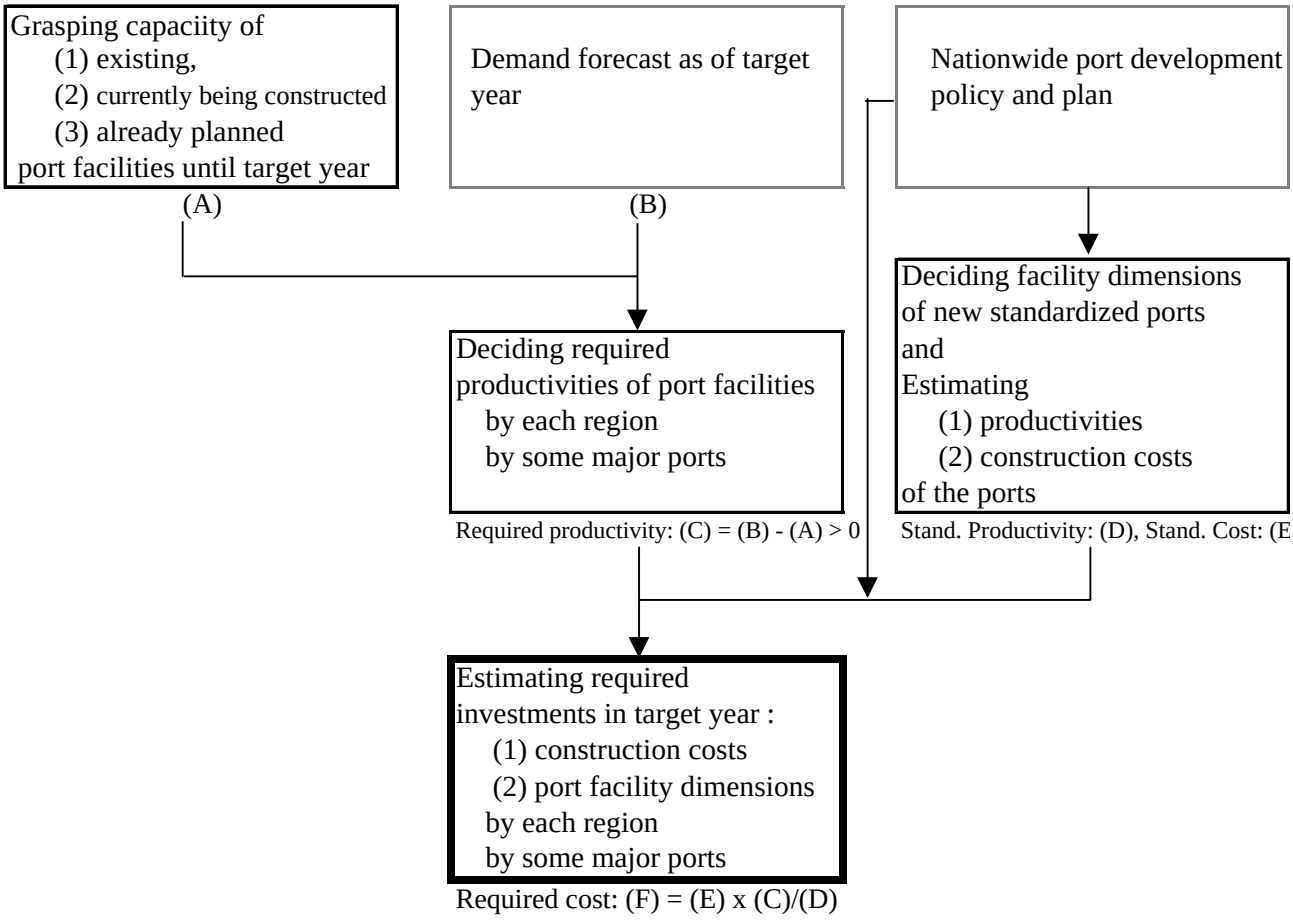


Figure 6.2.1 Estimation of Required Initial Construction Investment

(2) Required productivity of port facilities until target year

With regard to all cargo types, annual cargo handling volume of the nationwide ports is approximately 156 million tons in 1998, while total capacity of the existing nationwide ports is assumed to be approximately 440 million tons.

Additional capacity generated by expansion projects, rehabilitation and port development plan is assumed to be approximately 120 million tons/year. The total capacity is assumed to be some 560 million tons/year in addition to the existing capacity, while demand forecast of cargo traffic is approximately 380 million tons per year as of 2020. Therefore overall capacity will be sufficient to handle the future cargo volume.

However, as port cargo handling activities differ by cargo type, the required productivity in future needs to be considered for each cargo type.

The required productivity of container, general cargo and dry bulk cargo handling in Turkish ports until the target year is calculated based on the result of cargo traffic in micro forecast and the capacity of existing port facilities. (The method is shown in Figure 6.5.1.)

Concerning container cargo handling, an additional 4.2 million TEUs/year needs to be handled nationwide by the target year (2020). On the other hand, the sum of capacities, by container terminal planned, on-going project of container berth expansion and procurement of container handling equipment in Turkey, amounts to 6.5 million TEUs/year. If more than 64% of the planned port facilities are constructed by 2020, Turkish ports will have enough capacity to handle future container traffic.

However, the required additional capacity differs by region. Approximately 1.1 million TEUs/year until 2020 is required in the Mediterranean region. Since existing plans will generate additional capacity of 1.5 million TEUs/year, if more than 74% of the planned port facilities are constructed by 2020, the Mediterranean regional ports will have enough capacity to handle future container traffic. In the Aegean region the required additional productivity is approximately 1.2 million TEUs/year by the target year. Since existing plans will generate additional capacity of 1.6 million TEUs/year, if more than 76% of the planned port facilities are constructed by the target year, the Aegean regional ports will have enough capacity to handle future container traffic. In the Marmara region the additional productivity of approximately 1.6 million TEUs/year is required by the target year. Since existing plans will generate additional capacity of 2.4 million TEUs/year. If more than 66% of the planned port facilities are constructed by 2020, the Marmara regional ports will have enough capacity to handle future container traffic. In the Black Sea region the required additional productivity is approximately 0.3 million TEUs/year by the target year. Since existing plans will generate additional capacity of 1.0 million TEUs/year, if more than 30% of the planned port facilities are constructed by 2020, the Black Sea regional ports will have enough capacity to handle future container traffic.

With regard to general cargo handling, the additional capacity of approximately 35 million tons/year will be required by 2020. On the other hand, additional capacity, of general cargo

terminal and the on-going general cargo berth expansion generated by the planned, is 21 million tons/year. Even if all of the planned port facilities are constructed completely by 2020, general cargo berths will lack the capacity of more than 10 million tons/year. Capacity shortage will be serious in the Mediterranean, Aegean and Marmara regions.

With regard to dry bulk cargo handling, the total capacity of nationwide ports is larger than future dry bulk traffics as of the target year (2020). In each region of Turkey, though the existing capacities of grain bulk cargo are lower than the future cargo traffic in the Aegean and Black Sea region, it can be covered by existing plans for grain bulk cargo being carried out by the target year. In the Black Sea region a lack of capacity to handle ore/coal cargo is anticipated, even if all of existing plans are carried out by the target year.

The above mentioned results of container, general cargo and dry bulk cargo are summarized from Table 6.5.1 to 6.5.3 respectively.

Table 6.5.1 Existing Capaciity of Facilities and Demand Forcast of Container Traffic

(Unit: Million TEUs/year)

Region	Existing capacity (A)	Container volume: (B)				Required volume: (B)-(A)>0		
		1998	2010	2015	2020	2010	2015	2020
Mediterranean	0.39	0.24	0.80	1.06	1.49	0.41	0.67	1.10
Aegean	0.44	0.40	0.96	1.29	1.65	0.52	0.85	1.21
Marmara	0.80	0.70	1.46	1.95	2.40	0.66	1.15	1.60
Black Sea	0.18	0.01	0.16	0.20	0.46	-	0.02	0.28
Total	1.81	1.35	3.38	4.50	6.00	1.57	2.69	4.19

Source: Prepared by JICA Study team

Table 6.5.2 Existing Capaciity of Facilities and Demand Forcast of General Cargo Traffic

(Unit: Million tons/year)

Region	Existing capacity (A)	General cargo volume*: (B)			Required vol.: (B)-(A)>0	
		1998	2010	2020	2010	2020
Mediterranean	12.12	9.29	14.54	16.94	2.43	4.83
Aegean	12.75	12.69	22.22	27.33	9.47	14.58
Marmara	22.45	22.36	33.29	39.57	10.84	17.12
Black Sea	13.17	4.54	7.20	11.20	-	-
Total	60.49	48.88	77.25	95.04	16.76	34.56

*: Except for container

Source: Prepared by JICA Study team

Table 6.5.3 Existing Capaciity of Facilities and Demand Forcast of Dry Bulk Cargo Traffic

(Unit: Million tons/year)

Region	Existing capacity (A)	Dry bulk cargo volume: (B) 1998	2010	2020	Required vol.: (B)-(A)>0 2010	2020
Mediter.(grain)	7.12	3.74	5.45	5.60	-	-
(ore/coal)	32.11	5.99	10.98	17.63	-	-
Aegean(grain)	1.52	0.91	1.43	1.88	-	0.36
(ore/coal)	4.68	3.31	6.03	9.70	1.34	5.02
Marmara(grain)	9.85	1.66	2.87	4.02	-	-
(ore/coal)	27.42	5.69	10.05	15.78	-	-
Black Sea(grain)	1.08	0.62	0.94	1.19	-	0.11
(ore/coal)	11.25	8.74	14.95	23.90	3.70	12.65
Sub total (grain	19.58	6.92	10.70	12.70	-	-
(ore/coal)	75.47	23.74	42.00	67.00	-	-
Total	95.05	30.65	52.70	79.70	-	-

Source: Prepared by JICA Study team

(3) Setting up standardized port facilities

In the Feasibility Study (F/S) of a specific port, initial investment for a new terminal construction is generally estimated according to the following procedure:

- Preliminary designs of all facilities to be constructed are implemented to obtain the necessary quantity of various materials for facility construction.
- The cost of each material is calculated by means of multiplying the unit cost of the material by the necessary quantity.
- Then the initial construction cost of the facilities is decided by means of adding the cost of materials required to the construction, cost of material transportation, labor cost and miscellaneous expenditure.
- Furthermore dredging cost of channel/basin construction and procurement cost of cargo handling equipment are added.

In other words, F/S requires that the cost estimation be examined at the micro level to the specific port. On the other hand, this master plan (ULIMAP) aims at grasping the required investment at the macro level, which is the sum of nationwide and/or each region initial construction cost of port facilities.

For this purpose, firstly ULIMAP establishes original unit cost by setting up dimension/numbers to the standardized port facility/equipment (including parameters such as berth length, depth, storage area, breakwater length, dredging volume, cargo handling equipment and so on). And required initial investment until target year is estimated by means of the unit cost and dimension/numbers of the standardized port facility/equipment .The formula of the cost calculation is envisaged as follows:

$$PC = \sum_{i=1}^{4} (Ai \times Bi)$$

PC: Required initial investment
Ai: Unit cost of standardized port (i = 1 to 4; Terminal facility, breakwater, channel/basin dredging and cargo handling equipment)
Bi: Required cargo handling volume

The unit prices of the standardized port facility construction and the procurement cost of cargo handling equipment are obtained by referring to past construction projects and cost estimation in other feasibility studies.

Container facilities are classified by cargo type and port type in the above-mentioned basic direction of infrastructure development, such as international container hub port terminal (berth length 350~380m, depth15~16m), international container major port terminal (berth length300~330m, depth13~14m) and feeder type container terminal (berth length 250m, depth 12m). Facility dimension of general cargo and dry bulk cargo terminal are also set up. And standardized productivity and initial construction cost which correspond to these facility dimensions are set up. The tentative result is summarized in Table 6.5.4. Details of the condition set up are shown from Table A6.5.1 to A6.5.3 in Appendix for Chapter 6.

Table 6.5.4 Initial Construction Cost of Proposed Standardized Port Facilities

No	Standardized Port Facilities	Berth length (m)	Depth (m)	Productivity per berth (A)	Construction cost (B) (Million US$)	Cost perform. index (B)/(A)
1	International container hub port terminal	350~380	15~16	354 thousand TEUs/year	71	200
2	International container major port terminal	300~330	13~14	266 thousand TEUs/year	54	203
3	Container port terminal (Feeder)	0	12	177 thousand TEUs/year	38	213
4	Multi-purpose general cargo terminal	250	12	174 thousand TEUs/year 533 thousand tons/year	20	115 38
5	General cargo berth	200~240	10~12	533 thousand tons/year	14	27
6	Dry bulk berth (Grain)	250~300	13~15	5,613 thou. tons/year	35	6
7	Dry bulk berth (Ore/Coal)	250~300	13~15	1,020 thou. tons/year	19	18

Source:JICA Study Team

(4) Tentative calculation of required initial construction investment for standardized port facilities

The required initial investment for container, general and dry bulk cargo terminal construction is estimated by adopting standardized port facilities that correspond to the required cargo handling volume by the target year in the above-mentioned basic direction of infrastructure development.

Concerning container terminal, as Turkish ports have a possibility of becoming hub ports, that is, arranged transshipment type to Mersin and mother port type to Izmir ~ Aliaga and Tekirdag ~ Istanbbul ~ Izmit, required initial construction investment is calculated by assuming that hub port being settled to the Mediterranean, Aegean and Marmara region

respectively until target year. Hub port type berth is constructed in hub port. Major port type berth and feeder port type berth will be constructed in hub port or respective type ports. Container cargo berth, including all container port type, will be required for five berths in the Mediterranean region, six berths in the Aegean region, seven berths in the Marmara region and two berths in the Black Sea region. The amount of initial construction investment of container terminal in Turkey by 2020 is estimated at approximately US$880 million. The total berth length is assumed 5,900m.

Ten general cargo berths will be required for the Mediterranean region, 28 berths for the Aegean region and 33 berths for the Marmara region. And a portion of the berths will be constructed as multi-purpose type. The initial construction investment of general cargo terminal in Turkey by 2020 is estimated at approximately US$1,060 million. Total berth length is assumed 17,100m.

Dry bulk cargo berth will be required for one grain berth and 13 ore/coal berths in the Black Sea region and several berths in the Aegean region. The initial construction investment of dry bulk cargo terminal in Turkey by 2020 is estimated at approximately US$410 million. Total berth length is assumed 6,000m.

The above-mentioned results for container, general cargo and dry bulk cargo terminal are summarized from Table 6.5.5 to 6.5.7 respectively (The maintenance cost and the cost by improvement of existing productivity are not considered in this estimation.).

Table 6.5.5 Tentative Calculation of Required Initial Construction Investment on Container Terminal in Turkey (2020)

Region	Required initial investment				Remark			
	Berth length (m)	Depth (m)	Construction cost (Mil. US$) Amount	Ave. year	Hub (Berth number)	Major	Feeder	Multi
Mediterranean	1,460	-12 to -16	220	11	1	1	2	1
Aegean	1,790	-12 to -16	274	14	1	2	2	1
Marmara	2,120	-12 to -16	328	16	1	3	2	1
Black Sea	500	-12	58	3			1	1
Total	5,870		879	44	3	6	7	4

Source: Prepared by JICA Study team

Table 6.5.6 Tentative Calculation of Required Initial Construction Investment on General Cargo Terminal in Turkey (2020)

Region	Required initial investment				Remark	
	Berth length (m)	Depth (m)	Construction cost (Mil. US$) Amount	Ave. year	General (Berth number)	Multi
Mediterranean	2,410	-12	149	7	9	1
Aegean	6,750	-12	419	21	25	3
Marmara	7,960	-12	496	25	29	4
Black Sea	-	-	-	-	-	-
Total	17,120		1,064	53	63	8

Source: Prepared by JICA Study team

Table 6.5.7 Tentative Calculation of Required Initial Construction Investment on Dry Bulk Cargo Terminal in Turkey (2020)

Region	Required initial investment				Remark	
	Berth length (m)	Depth (m)	Construction cost (Mil. US$) Amount	Ave. year	Grain (Berth number)	Ore/coal
Mediterranean	-	-	-	-	-	-
Aegean	1,800	-12	130	6	1	5
Marmara	-	-	-	-	-	-
Black Sea	4,200	-12	280	14	1	13
Total	6,000		410	20	2	18

Source: Prepared by JICA Study team

(5) Annual maintenance cost of port facilities

Maintenance of port facilities is vital for maintaining capacity of the facilities during service life time. For example, damage of mooring facility affects vessel berthing and cargo handling working. The port cannot maintain productivity without functioning cargo handling equipment.

According to information of annual maintenance cost on seven TCDD ports from 1996 to 1998, the sum of the annual maintenance cost of seven TCDD ports, which covers berth, apron, storage area, building and breakwater except dredging and labor cost, averages approximately US$1,800,000 per year. As the amount of initial construction cost of seven TCDD ports is assumed US$16,000,000,000, even if labor cost is taken into account, the annual maintenance cost cannot help but be said to be insufficient. The total annual maintenance cost of cargo handling equipment is approximately US$1,260,000. This figure is also not enough as TCDD possesses 11 gantry cranes, 29 transtainers, 86 mobile cranes, 105 quay cranes and so on. The ratio of maintenance cost of many local ports is likely lower than TCDD ports. The annual maintenance cost converted to US$ of TCDD ports is shown in Table A6.5.4 of Appendix for Chapter 6.

When the annual maintenance cost of new port facilities is estimated, some ratio of initial construction cost of the new facilities is needed as maintenance cost for each year of the facility's life time. Generally, terminal facilities require approximately 1% of the initial construction cost as annual maintenance cost while this increases to two for breakwaters. Approximately 5% of the procurement cost of gantry cranes is required and 10% is needed for mobile cranes.

The amount of annual maintenance cost of new port facilities after 2020 in Turkish ports is estimated at approximately US$54 million /year. The maintenance cost is divided into US$17 million /year for port facilities and US$37 million for cargo handling equipment. The results are summarized in Table 6.5.8. General ratio of maintenance cost, to port facilities and cargo handling equipment, and average length of economic life are shown from Table A6.5.5 to A6.5.7 in Appendix for Chapter 6.

Concerning maintenance of port facilities and cargo handling equipment, port manager should prepare a ledger on port management (which describes the present condition, structure, scale, volume and number of port facilities and cargo handling equipment) by himself. This ledger must be revised every year. And the ledger should be accessible to everybody related to maintenance and management so that they can obtain the latest information on the port facilities/cargo handling equipment.

Table 6.5.8 Rough Estimation of Required Annual Maintenance Cost on New Port Facility Construction (After 2020)

New terminal	Initial construction cost until 2020 (Million US$)	Required annual maintenance cost (Million US$/year)		
		Port facilities	Handling equipment	Total
New container terminal	879	4.4	22.0	26.4
New general cargo terminal	1,064	9.6	10.6	20.2
New dry bulk cargo terminal	410	3.3	4.1	7.4
Total	2,353	17.3	36.7	54.0

Note: These maintenance include building, berth, storage area, breakwater, dredging and labour cost.
Source: JICA Study team

(6) Examination of damage cost of port facilities by natural disaster

Costs to repair the damage to Deringe port by the Kocaeli earthquake are assumed at approximately US$30,000,000 (The estimation is shown in Appendix 6.5.1). In case of earthquake in this country, all Turkish ports are exposed to damage risk. Therefore in order to correspond to the damage of port facilities by large natural disaster, central government should prepare an emergency fund. In deciding the amount of such a fund, the example of Deringe port would be instructive.

Provided fund against damage of port facilities by large natural disaster
=US$30,000,000

Countermeasures to natural disaster, such as large scale earthquakes and wave, are as follows:

1) Examination of an aseismatic berth construction
2) Establishment of restoration policy
3) Establishment of technical standard for Turkish port facilities, including the reexamination of design seismic coefficient
4) Checking system on managing execution of construction work

In the feasibility study of a specific port in Turkey, the above-mentioned maintenance cost and the cost of port facilities exposed to damage risk will need to be examined in detail. In this case, for example the summary of the study report of Assoc. Prof. Can E BALAS (Gazi University) is introduced in Appendix 6.5.2.

(7) Other: Examination of road/rail way system accessing port

A plan by which road and/or rail way connect ports with urban and industrial zone is essential for the feasibility study of a specific port. Chapter 3 "the axes of nation land development (See to Figure3.2.9)" recommends the development of access road/rail way. Furthermore if a port is planned to specific access road/rail way in accordance with the above-mentioned basic direction, the plan should be based on the concept which is introduced in Appendix 6.5.3.

6.6 Program of Infrastructure Development in the Short Term (2010)

When stage plan of infrastructure development is considered, it is essential to prioritize port facilities that should be constructed in the short term (2010).

Concerning container terminal, in accordance with the policy of hub port and demand forecast in this Master Plan, the construction of a calling port of mother port type in the Aegean and Marmara region respectively will be required by the target year (2010). Two container cargo berths, including all container port type, will be required in the Mediterranean and Aegean region respectively, and three berths in the Marmara region. The initial construction investment of container terminal in Turkey until 2010 is estimated at approximately US$360 million. The total berth length is assumed 2,200m.

Five general cargo berths will be required for the Meditterranean region, 18 berths for the Aegean region and 21 berths for the Marmara region. And a portion of the berths will be constructed as Multi-purpose type. Initial construction investment of general cargo terminal in Turkey until 2010 is estimated at approximately US$650 million. Total length is assumed 10,000m.

Two dry bulk cargo berth will be required for the Aegean region and four berths for the Black Sea region. Initial construction investment of dry bulk cargo terminal in Turkey until 2010 is estimated at approximately US$110 million. Total length is assumed 1,800m.

The above-mentioned result for container, general cargo and dry bulk cargo terminal is summarized from Table 6.6.1 to 6.6.3 respectively.

Table 6.6.1 Tentative Calculation of Required Initial Construction Investment on Containe Terminal in Turkey (2010)

Region	Required initial investment				Remark			
	Berth length (m)	Depth (m)	Construction cost (Mil. US$) Amount	Ave. year	Hub (Berth number)	Major	Feeder	Multi
Mediterranean	580	-12 to -14	91	9		1	1	
Aegean	630	-12 to -16	108	11	1		1	
Marmara	960	-12 to -16	162	16	1	1	1	
Black Sea	-	-	-	-	-	-	-	-
Total	2,170		362	36	2	2	3	0

Source: Prepared by JICA Study team

Table 6.6.2 Tentative Calculation of Required Initial Construction Invest on General Cargo Terminal in Turkey (2010)

Region	Required initial investment				Remark	
	Berth length (m)	Depth (m)	Construction cost (Mil. US$) Amount	Ave. year	General (Berth number)	Multi
Mediterranean	1,200	-12	72	7	5	
Aegean	4,340	-12	269	27	16	2
Marmara	5,060	-12	312	31	19	2
Black Sea	-	-	-	-	-	-
Total	10,600		654	65	40	4

Source: Prepared by JICA Study team

Table 6.6.3 Tentative Calculation of Required Initial Construction Invest on Dry Bulk Cargo Terminal in Turkey (2010)

Region	Required initial investment				Remark	
	Berth length (m)	Depth (m)	Construction cost (Mil. US$) Amount	Ave. year	Grain (Berth number)	Ore/coal
Mediterranean	-	-	-	-	-	-
Aegean	600	-13 to -15	38	4		2
Marmara	-	-	-	-	-	-
Black Sea	1,200	-13 to -15	75	8		4
Total	1,800		113	11	-	6

Source: Prepared by JICA Study team

Chapter 7. Strategy for Port Management

7.1 General

Following three chapters, seven to nine, deal with administrative, management and institutional issues including financial aspects. In general, these issues contain a lot of concrete conduct and procedures. Since these concrete conduct and procedures overlap with one another, administrative, management and institutional issues can not be divided clearly. Deepening the understanding on the three chapters, it is useful to clarify the scope of the following key words: port management, port administration and institutional framework.

7.1.1 Definition of Port Administration, Port Management and Institutional Framework

This report uses these words with the following meanings respectively.

- Port administration means to clarify ideal blueprints on nationwide or individual port development based on policies, strategies or plans by national or local governments, and lead ports and harbors to those policy goals. It also includes giving permit and approval on legal basis in the implementation process. Port administration implies the following concrete conduct and procedures.

  (Port administration of central government)
  - To clarify “Ports” to be managed -
  - To establish the nationwide port development master plan -
  - To establish the guideline for port development master plan of individual port -
  - To coordinate organization concerned in formulating port development master plan of individual port -
  - To approve the port development master plan submitted by Port Authority -
  - To approve the development plan of coastal facilities (port facilities) based on relevant laws and regulations
  - To grant port operational right to appropriate organizations in individual port -

  (Port administration of each port managing body (Port Authority))
  - To approve appropriate utilization of port facilities by port users -
  - To coordinate relevant activities of various port users -

- Port management means to manage an individual port, making full use of port facilities, personnel and funds which include both existing and future resources. Port management implies the following concrete conduct and procedures.
  - To clarify individual port to be managed -
  - To establish a port managing body (Port Authority) in individual port-
  - To clarify the responsibilities and function of Port Authority-
  - To establish port management system including personnel education and outsourcing of human resources in Port Authority -

- To establish a port development master plan of individual port -

- Institutional Framework means the legal and organizational framework to secure port management and administration. Institutional framework implies the following concrete conduct and procedures.
  - To introduce necessary laws and regulations to clarify “Ports” to be managed -
  - To restructure the port administrative and management organization to meet the global current -
  - To restructure the port administrative organization to strengthen the coordination and cooperation function among the organization concerned in central government-
  - To introduce appropriate system to reinforce the ability of human resources in relevant organization -
  - To introduce necessary framework for effective port administration including port statistics on legal bases

7.1.2 Main Topics of Chapter 7, 8 and 9

(1) Since it is clearly observed that the matter of definition of ports is common issue of port administration, port management and institutional framework, this matter is dealt in Chapter 7 as a common issue.

(2) Since the mater of port development master plan is also common in port management and port administration, this matter is dealt in Chapter 7 as another common issue.

(3) Except these common issues, the concrete conduct and procedures of port administration can be divided into two categories. One is a matter of coordination function of central government and the other is a matter of Port Authority. Former is dealt in Chapter 9 and the latter is dealt in Chapter 7.

(4) Consequently Chapter 7 describes two common issues and other topics concerning port managing bodies.

(5) Chapter 8 focuses on financial issues.

(6) Chapter 9 deals the institutional issues and other topics concerning the coordination function of central government. Chapter 9 also describes the step-wise preparation for the nationwide port development taking various issues of administrative, management and institutional issues including financial aspects into account.

7.2 Definition of 'PORTs' to be managed

In order to provide a firm foundation for a unified port administration system, basic concept and legal definition of 'ports' should be clarified. In this study, 'Port' is understood as:
"An organic structure of a set of coastal facilities for cargo and passenger traffic to be administered, managed and operated as a unified functional unit and with a certain legal boundary which is necessary at least for port administration, management and operation"

Table 7.2.1. Concept of 'PORT' on legal basis

	Present 'port'	'PORT' to be considered
1. Characteristic	One of Coastal Facility	Basic Infrastructure of the National Development
2. Use	Public use (ports occupied in coastal line as public property)	Public use (PORTs as public assets)
3. Objects	Port facilities (wharves, piers, breakwaters, superstructures)	Port facilities and the surrounding areas (land & water); a certain scale of areas necessary for sound port function
4. Management	Management of municipal ports, etc (Law on the management of wharves)	Overall administration and management of PORT (Including price-setting, operating safety, etc.)
5. Related laws	Ports law (1341,43), Law on the management of wharves (1936), Law on the construction of ports, and the Additional law (1954, 59), Coastal Law (1990,92)	

Source: JICA Study Team for ULIMAP

7.3 Port Development Master Planning

7.3.1 Port Development Master Plan

(1) Characteristics
In this study, port development master plans are defined as follows.

1) Port Development Master Plan should be established by each port authority on a legal basis. This plan is a guideline both for administration and management of port. It is a master plan with a long term planning period (approximately 10-15 years) that includes the use and maintenance of ports and harbors, and examination on environmental impact, as well as port development. The key concept is that port is regarded a space to be managed which includes land and facilities.

2) This plan is a masterplan, which is to be a guideline for realizing what the port should be in the future. It is different from a construction plan. It does not include specific items such as construction bodies, technical methods, and implementation schedule. This enables

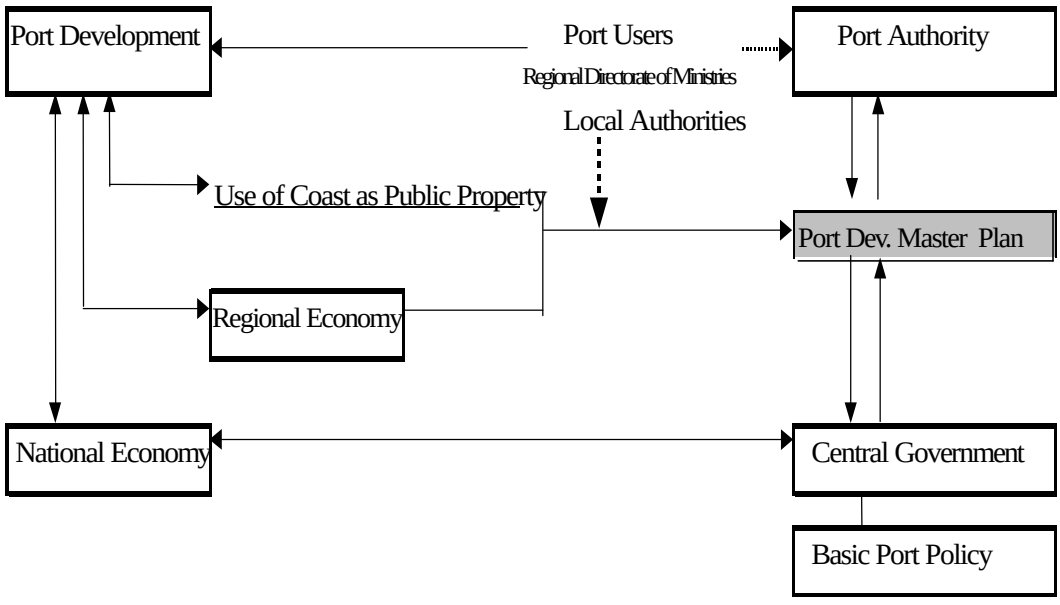
the port authority to deal with socio-economic changes flexibly during the long planning period. Port authority makes implementation plan in the shorter term separately for achieving the goals set out in the master plan.

3) Port authorities at major ports should have an obligation to obtain the government's approval in case of establishing and changing the port development master plan. This is because major ports are considered to have a serious impact on the national interest. The government adopts measures to support the realization of the contents of the approved plans. The central government also establishes the guideline for formulating the masterplan.

(2) Strategic Port Development through Port Development Master Plan

Port development is one of the important aspects of national development. Port development has numerous impacts on both the national and regional economy. In the planning process, port development master plan is first coordinated with other land-use plans in the adjacent area on a regional basis. The central government then coordinates and guides the masterplan on the nationwide port development. Through this dual coordination system, the government can lead each port development to well-controlled development by giving priority with definite function; such as commercial ports based on scale-merit principle for containers, or local public ports for regional demand, as well as avoiding overlapped investment in a certain area. We call this system 'strategic port development'. Figure 7.3.1. shows the concept of strategic port development.

Figure 7.3.1. Concept of strategic port development



Source: JICA Study Team for ULIMAP

7.3.2. Contents of Port Development Master Plan

Port development master plan consists of main texts and attached ground plan. The ground plan includes the scale, arrangement and land use on scheduled port facilities as well as the existing port facilities. The main items to be described in the master plan are as follows:

Table 7.3.1 Main items of Port Development Master Plan

Category	Items to be formulated
1. Basic policy	(1) Location (including socio-economic situation), and Function (2) Development and use of port facilities (including examination of other adjacent port function) (3) Land use of port area (4) Environmental consideration in port (5) Securing safety in port area
2. Capacities of port	Cargo handling volume, passenger volume and other capacities at the target year
3. Scale and Arrangement of port facilities	(1) Water facilities (Channel, Basin, etc.), if any (2) Outer facilities (Breakwater, etc.), if any (3) Berthing facilities, if any (4) Access Transportation facilities (Roads, Rail, etc.) , if any (5) Cargo handling equipment, storages, if any (6) Passenger facilities, if any
4. Environmental preservation in port area	(1) Kinds and volume of waste materials to be dealt with in port area (2) Scale and arrangement of main environmental facilities for disposal or prevention
5. others	(1) Type of facilities use (Public or Exclusive use) (2) Scale and arrangement of land to be reclaimed (3) Category of land use in port area

Source: JICA Study Team for ULIMAP

7.4 Port Authority

7.4.1 Definition of Port Authority

In this study, 'Port Authority' is understood as follows: "A statutory body which develops, maintains ports as a unified functional unit, and secures port services for public use".

It should be emphasized that proper port administration needs to be secured at each port. Historically speaking, port authorities were established in the U.K. or U.S. to secure public interests expected from various port activities, which originated in constraints of individual port management by private sector. In the U.S. in the 18-19 century, port development was mainly done by private rail companies. Monopolized management by the private sector resulted in higher prices and lower service levels, over-capacity at some ports, and under-

capacity at others. With the establishment of port authorities in the U.S., the disorderly competitive situation was corrected, price setting became rational, and optimum utilization of waterfront areas and port facilities was made.

What is required at present in Turkey is a system to control port management by proper involvement of the central government. In such a system, each port operator is obliged to manage and operate a port based on port master plans which are authorized by the central government.

7.4.2 Function of Port Authority

The responsibilities of the 'Port Authority' are to be specified by legislation. Main items are as follows:

(1) To administer overall port activities
(2) To establish Port Development Master Plan
(3) To compile port statistics for port development
(4) To implement construction and maintenance works for port facilities
(including projects by the central government.)
(5) To maintain port area and port facilities in good operating condition
1) This includes controlling the use of land and water areas of port by restricting disorderly use. This authority is exercised in case additional legal measures are taken by the local government concerned.
2) Port facilities are managed by port-facilities register (including cases in which the central government does the maintenance work on port infrastructure).
(6) To maintain and improve environmental conditions of the port
This authority is exercised in case additional legal measures are taken by the local government concerned.
(7) To regulate the use of port facilities
(8) To ensure the adequate provision of port services
Port authority does not always mean providing operational activities by itself.
(9) To prepare port tariff and collect fees and charges from port users
(10) To conduct surveys for port promotion

7.4.3 Recommended Classification of Port Authority

It is recommended to establish statutory bodies as port authorities by granting them public status. These authorities should be categorized based on the present status of each port management body for the time being in order to facilitate a smooth switchover. Port authorities might be classified as follows: Turkish Port Authority (TPA), Local Port Authority (LPA), and Private Port Authority (PPA). Details are as shown in the following table.

Table 7-4-1 Classification of Port Authority

Present Port Management Bodies	New Category of Port Authority
TCDD (port department)	TCDD As **Turkish Port Authority (TPA)**
Municipality Government (port division)	Municipality Government, State Economic Enterprise (non-privatized) As **Local Port Authority (LPA)**
State Economic Enterprise (non-privatized) (port division)	
State Economic Enterprise (privatized) (port division)	State Economic Enterprise (privatized), TDI. Inc.Co. Private operating companies As **Private Port Authority (PPA)**
TDI. Inc.Co. (department of ports)	
Private operating companies(Privatized TDI ports)	
Private operating companies (private ports)	

Source: JICA Study Team for ULIMAP

In general, one port is administered by one port authority. In an area which is designated as a 'Group port', the status of port authority is granted to a representative organization, if one exists. Otherwise, a representative organization should be established as a port authority. The representative organization coordinates with each member port in formulating a port development master plan as a unified port authority. The central government can give advice or make recommendations to the port authority.

7.4.4 Responsibilities of Port Authority

Each statutory body as port authority takes responsibilities as described in section 7.4.3. There is no difference in function among the categories basically, but some responsibilities such as controlling the use of land and water areas of port, and environmental conservation in port are exercised in case the competent authorities entrust the port authority with these matters.

7.4.5. Port Management for 'competitive edge' at state ports

(1) Background

At present, it is the ports managed by the TCDD that are strategically most important and which handle the greatest volume of cargoes. The government should consider measures to create internationally competitive ports, so-called hub ports, which can handle large volumes of container cargoes and offer a high level of services.

The management and operation at TCDD ports is characterized as follows. Firstly, the infrastructure is owned and constructed by the Ministry of Transportation at TCDD ports. TCDD handles the cargo with the cargo handling facilities TCDD itself owns. From the port management function point of view, the preparation of the primary port facilities is undertaken by the state (Ministry of Transportation), and the preparation of functional facilities is undertaken by TCDD. Secondly, the final determination of the primary policies concerning port management including investment planning and price-setting is all

undertaken by the head office of TCDD located at Ankara, but not at the sites where the ports are actually being operated. The present management system of the TCDD ports, besides suffering difficulties concerning rapid decision making, makes it difficult to reflect the demands of the actual users. That is because the final decision making is undertaken at a completely distant (besides at several different organizations; MOT and TCDD) place from where the port activities actually take place.

In major ports in the world, the actual management of the ports is shared with the operators. The facility services that are inseparable with respect to the port works activities, and the determination of the operation planning are done by individual operators. While, overall port administration function including facilities investment is done by an independent port managing body. This system enables one managing body to coordinate all activities and functions of a port in a flexible manner. It is based on the premise that unless utilization of the port is promoted through “user-friendly” management, the port will not attract users.

(2) Strategy to Create Competitive Ports

Overall port administration by an independent port authority promotes efficient and flexible management.

1) Port facilities management should be done by one port authority. It should be considered, if necessary, that the facilities of TCDD ports are integratedly managed by TCDD as a port authority, including port infrastructure as well as superstructure by transferring authorities from the Ministry of Transport. This will allow the port authority to allocate finances flexibly in a comprehensive port development scheme.

2) Especially at the ports designated as the ‘competitive ports’, it is required to strengthen the port administration and management function at the site where the ports are actually operating, by giving port managers an administrative freehand for efficient management. Necessary authorities/responsibilities should be transferred to port managers from headquarters. Meanwhile, headquarters should focus on overall administration policy such as privatization and training.

3) It should be considered to open up opportunities for talented employees beyond the middle management class including outsourcing. It should be required to recruit talented personnel including outsourcing.

4) In order to raise handling productivity, it is one of alternatives to begin with partly adoption of operation by private sectors to encourage competition between TCDD operation and private operation.

Following table shows port management system in Turkey including TCDD ports.

Table 7.4.2. Port Management System

Present Port Management Body	Future Port Authority	Remarks
T C D D Infrastructure: MOT Superstructure: TCDD	Turkish Port Authority(TPA) • (Administration/Management) TCDD(Ankara) → TCDD/MOT MOT (Ankara) • (Operation) TCDD → TCDD each Port Directorate Private	*TCDD ports designated strategically competitive ports are granted necessary authorities from the headquarters.
Municipal Government State Economic Enterprise (SEE)	Local Port Authority(LPA) • (Administration/Management) Municipality Gov./MOT • (Operation) (Private sector)	Infrastructure: MOT Superstructure: (Private)
TDI.Inc.Co. * Privatized TDI ports* Privatized SEE Private sector	Private Port Authority(PPA) • (Administration/Management) Private/MOT* • (Operation) Private sector	(*In extraordinary cases such as emergency in terms of public interest)

Source: JICA Study team for ULIMAP

Chapter 8 Strategy for Port Investment and Finance

8.1 Present Situation and Evaluation on Public Port Investment

The Turkish government is expected to move on structural reform, cut inflation and to achieve a primary budget surplus in order to realize further progress.

Current Financing scheme for port development and maintenance is as follows; Construction of port sub-structure at public ports is undertaken by the national budget of maritime port while maintenance for these structures is undertaken by respective port management bodies at their own expense. Super-structures and cargo handling facilities are procured by port management bodies and/or private operating companies.

See Table 8.1.1

Maritime port investment was more than US$ 30 million in the beginning of the 1990's but has decreased to US$ 20 million in 1998. The share in maritime transportation investment was nearly 40% but less than 0.5% of government investment.

Maritime port investment amount is extremely small compared to road investment of 30% share of government investment. This amount is insufficient to meet the foreseeable demand. The authorities should endeavor to increase the amount.

Local administrations have not invested in ports in recent years although that they provide budgetary items concerning pier and berths.

See Table 8.1.2 and Figure 8.1.1

Treasury receipts from foreign maritime trade is 6% of the government revenue and reached annual receipts of US$ 2 billion. 85% of trade volume and 46% of trade value has passed through ports. In this sense, the authorities should give a priority to port investment.

See Table 8.1.3, 8.1.4 and Figure 8.1.2

TCDD has been rapidly improving its financial performance of the port account. The operating ratio and the working ratio have entered satisfactory ranges. One of reasons is that an investment of US$ 144 million has enabled the ports to increase capacity and efficiency, which has generated a rough operating profit of US$ 468 million during 1990-1998.

TDI's financial performance has worsened, and operating ratio and working ratio are of the 80% level compared to high performance at the beginning of the 1990s.

Table 8.1.1 Maritime Port Investment

		1990	1991	1992	1993	1994
Maritime Transportation	Billion TL	271	421	593	846	867
	Million US$	104	101	86	77	29
Share in Gov.Investment(%)		3.0	2.5	2.0	1.6	1.2
Maritime Port	Million TL	88,900	119,500	111,320	214,000	265,000
	Million US$	34	29	16	19	9
Share in Maritime Transportation(%)		32.8	28.4	18.8	25.3	30.6
General Directorate of TCDD	Million TL	29,000	55,000	100,000	100,000	185,000
	Million US$	11	13	15	9	6
Maritime Affairs	Million TL	79,000	70,000	93,000	160,000	200,000
	Million US$	30	17	14	15	7
Highway Transportation	Billion TL	4,059	8,213	12,521	24,737	34,262
Railway Transportation	Billion TL	706	934	1,480	2,120	2,925
Airway Transportation	Billion TL	345	688	700	2,715	5,869
Pipeline	Billion TL	450	610	1,220	1,100	2,800
Total	Billion TL	5,831	10,866	16,514	31,518	46,723
	Million US$	2,236	2,606	2,404	2,869	1,573
Share in Gov. Investment(%)		66	63	56	59	64
Government Investment	Billion TL	8,902	17,146	29,239	53,161	72,788

		1995	1996	1997	1998
Maritime Transportation	Billion TL	1,284	3,802	8,336	15,055
	Million US$	28	47	55	58
Share in Gov.Investment(%)		1.0	1.3	1.2	1.3
Maritime Port	Million TL	417,000	1,268,000	3,171,100	5,750,000
	Million US$	9	16	21	22
Share in Maritime Transportation(%)		32.5	33.4	38.0	38.2
General Directorate of TCDD	Million TL	300,000	1,498,000	2,218,000	4,500,000
	Million US$	7	18	15	17
Maritime Affairs	Million TL	250,000	500,000	2,100,000	3,800,000
	Million US$	5	6	14	15
Highway Transportation	Billion TL	31,782	47,686	157,852	377,765
Railway Transportation	Billion TL	4,593	9,352	17,419	31,660
Airway Transportation	Billion TL	4,744	20,675	27,047	56,550
Pipeline	Billion TL	3,900	0	0	45,000
Total	Billion TL	46,303	81,515	210,654	526,030
	Million US$	1,013	1,005	1,391	2,023
Share in Gov. Investment(%)		37	28	30	46
Government Investment	Billion TL	123,777	289,493	700,382	1,155,000

Source: State Planning Organization
Note: Figure is appropriation budget

Table 8.1.2 Treasury Receipts by Maritime Trade and Maritime Amount/Volume

		1992	1993	1994	1995	1996
Treasury Receipts	Million US$	1,466	1,767	1,328	1,746	2,004
Custom duty	Million US$	107	504	324	435	322
Value-added tax on imports	Million US$	876	1,185	975	1,282	1,676
Other foreign trade income	Million US$	-	79	28	29	6
Stamp duty on imports	Million US$	258	-	-	-	-
Port duty	Million US$	225	-	0	1	-
Foreign Trade						
Maritime Import						
Amount	Million US$	12,050	16,103	12,182	18,874	21,618
Volume	Thousand tons	48,234	62,781	54,628	63,882	67,879
Maritime Export						
Amount	Million US$	5,919	6,431	8,037	8,978	9,815
Volume	Thousand tons	20,957	17,264	24,072	22,068	19,677

Source: 1)Statistical Yearbook of Turkey 1998, State Institute of Statistics, Prime Ministry
2)Main Economic Indicators 1999, SPO
3)Foreign Trade by Transport System,SIS

Note: 1)Tax receipts are the data of Statistics Yearbook
2)Maritime Import amounts/volumes are the data of Foreign Trade by Transport System
3)Maritime Export amounts/volumes are the data of Foreign Trade by Transport System
4)Amount of Treasury Receipts are the amount allocated by maritime share of total import amount

Figure 8.1.1 Treasury Receipts by Maritime Trade and Maritime Amount/Volume

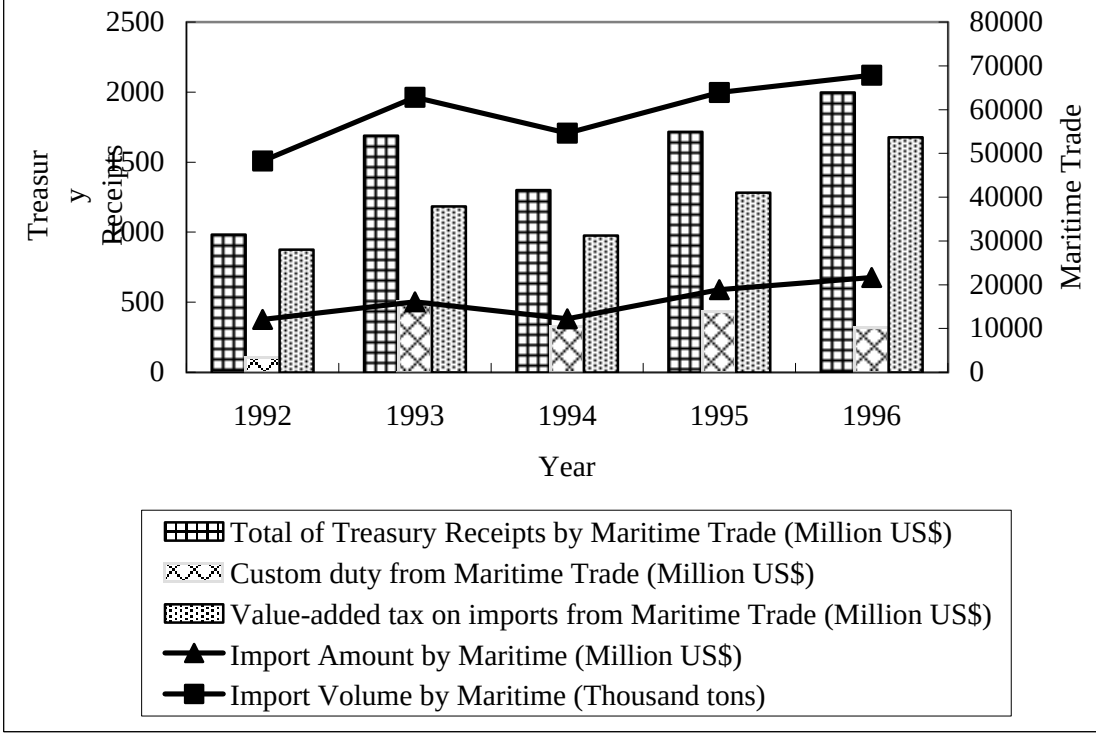


Table 8.1.3 TCDD Ports Financial Performance

		1990	1991	1992	1993	1994
Cargo Handling Volume						
Total	1000 ton	27,283	25,921	27,184	30,052	25,867
Container	TEU	352,432	396,403	456,564	572,078	588,341
Administration						
Official	Number	1,523	1,444	1,407	1,376	1,296
Permanent Workers	Number	3,823	3,808	3,669	3,552	3,370
Investment						
Total	Million US$	19	17	10	10	8
by DLH	Million US$	12	11	5	8	2
by TCDD	Million US$	7	6	5	2	7
Foreign loan included	Million US$	0	0	2	0	0
Revenue	Million US$	118	146	153	177	134
Operating	Million US$	109	136	144	168	129
Expenses	Million US$	112	152	157	200	143
Administrative and Operating	Million US$	79	101	114	136	81
Depreciation	Million US$	15	16	17	21	10
Operating Ratio	%	86	85	91	94	70
Working Ratio	%	72	74	79	81	63

		1995	1996	1997	1998
Cargo Handling Volume					
Total	1000 ton	29,267	31,643	34,770	35,155
Container	TEU	715,239	874,121	1,001,692	972,307
Administration					
Official	Number	1,229	1,184	1,160	1,298
Permanent Workers	Number	3,237	3,106	4,412	4,172
Investment					
Total	Million US$	10	13	12	45
by DLH	Million US$	2	4	5	5
by TCDD	Million US$	8	9	7	40
Foreign loan included	Million US$	0	0	1	31
Revenue	Million US$	148	174	203	220
Operating	Million US$	145	170	199	220
Expenses	Million US$	154	149	132	88
Administrative and Operating	Million US$	79	74	79	80
Depreciation	Million US$	16	12	13	9
Operating Ratio	%	65	51	46	40
Working Ratio	%	54	44	40	36

Source: TCDD Annual Reports, interviews, and DLH Investment Program

Note: Investment by TCDD includes foreign loans

As to the TL-US$ exchange rate, the corresponding figures indicated in Table 11.2.1, Vol. 1 have been used.

Table 8.1.4 TCDD Revenue-Expenditure

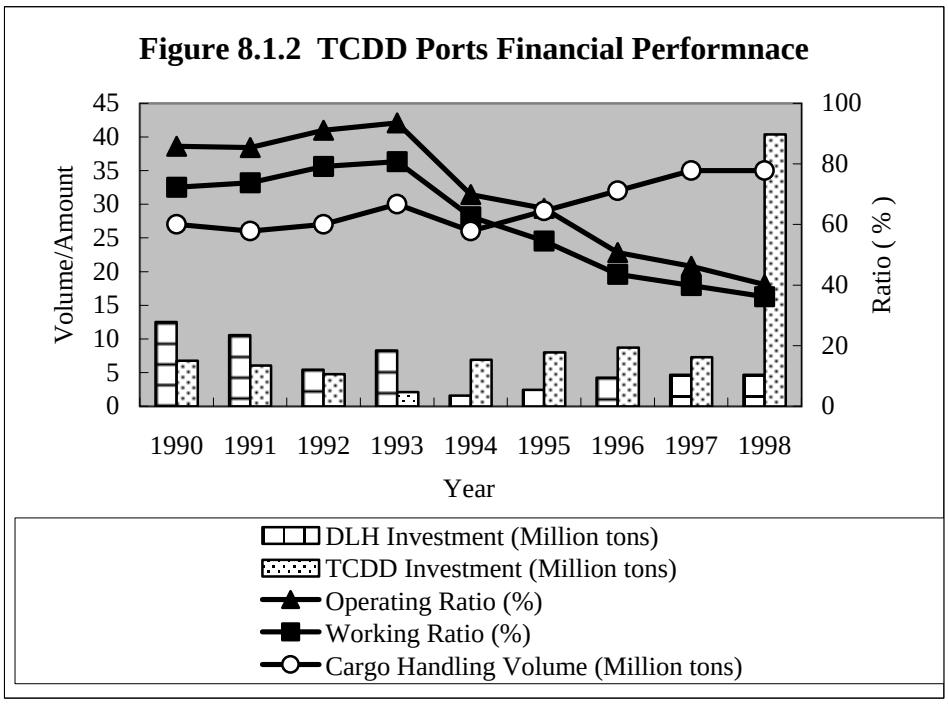
(Million US$)

		1994	1995	1996	1997
Port	Revenue	134	148	174	203
	Operating Revenue	129	145	170	199
	Subsidies for Van Lake Operation	5	4	3	4
	Expenditure	143	154	149	132
	Administrative and Operating	81	79	74	79
	Depreciation	10	16	12	13
	Non-Operating	52	59	63	40
	Profit/Loss	-9	-5	25	72
Railway	Revenue	251	266	274	303
	Operating Revenue	120	142	153	178
	Passenger and Baggage	40	44	49	53
	Freight	151	185	234	0
	Subsidies	86	91	87	96
	For track maint. and repair	12	11	10	9
	For uneconomical lines	74	80	77	87
	Non-Operating Revenue	44	34	34	30
	Expenditure	1,100	1,093	1,048	1,061
	Operating	421	449	451	488
	Depreciation	74	118	105	99
	Administration	47	49	58	71
	Non-Operating	558	477	434	403
	Profit/Loss	-849	-826	-774	-758
Total	Profit/Loss	-858	-831	-749	-686

Prepared by OCDI on the basis of the TCDD Annual Report

Note: Exchange rates are yearly average rates based on Main Economic Indicators published by SPO

Figure 8.1.2 TCDD Ports Financial Performnace



8.2 Present Situation and Evaluation on Private Port Investment

Private investment has increased since the promotion of private participation and privatization of the state owned organizations began in the 1980s, and now account for more than 70% of the gross fixed investment. **Existing capacity** in private ports represents more than 50% of the national port capacity. Port operation at TDI ports has been transferred to the private sector and BOT projects have been conducted. However due to a lack of financial and legal incentives, private companies are finding it difficult to generate expected profits.

8.2.1 Built-Operate-Transfer (BOT) Scheme

BOT port projects were contacted in 1999 for Fylios Port and Derice Port, which are under preparation for construction. Another projects in Iskendeln Port and Izmir Port are on the plan of BOT scheme but no bidder has yet come forward.

BOT bidding procedure and **construction procedure** are well provided and port projects have been carefully carried out taking an overall settlement into consideration. The projects have also been carefully scheduled with regard to landfill.

BOT contract agreement has some articles that make contractors hesitant to enter the bidding because of unclearness and unfairness, and this may preclude international finance. The authorities should start to reconsider articles concerning arbitration, account, cost increase, force majeure and termination from a viewpoint of risk sharing.

Articles to be reconsidered are as follows;

a) **Arbitration**: related to Article-26, 27 of the agreement and Article-29 of the bidding papers

Arbitration should be resolved by the framework of international arbitration rule. The arbitration takes place in the English language in Paris, Geneva, New York and Singapore. The Constitution has been amended this August to enable the government to enter international arbitration, but the concrete procedure is not published in English.

b) **Account**: related to Article-23 and –25 of the agreement

It should be stipulated that the account for income of the contractor should be an offshore account in US$ because transactions between the contractor and consignors will be made in US$, and payment to the Treasury is designated in US$.

c) **Cost Increases**: related to Article-8 and -24 of the agreement

The government should share or bear the cost increase by an increase in taxes and an adoption of new taxes because the government can manage the tax system.

d) **Force Majeure**: related to Article-26 of the agreement

The government should share some of the outcome of force majeure that happen due to a lack of governing ability because the contractor cannot manage whole matters outside the contract.

e) **Termination**: related to Article-21, –26 and -27 of the agreement
It should be stipulated that the contractor must comply with instructions of the government that are in accordance with the scope of the agreement. However, the contractor should have the right not to comply with any instructions not in the agreement. In addition, the contractor should have the right to terminate the agreement when the government does not comply with the agreement.

Principle of BOT scheme should be reconsidered from a following points;
a) BOT is a project financing scheme, by which income generated from projects is applied to repayment of a loan and the assets employed in the projects are used as collateral for the loan. In other words, the contractor of BOT projects has to repay lenders from cash generated by terminal operation. The prime characteristics of this concept is that the parent company of the project is not responsible for financing as a general rule.

b) Lenders' obligation is to eliminate every risk or, if this is impossible, to control and manage every risk as far as possible. However, it is impossible for lenders to actually control and manage all risks. In this situation, the government is expected to take the initiative in projects and to provide projects with overall support. If the government is willing to take a risk, lenders will be more likely to grant loans for projects.

c) Risk sharing between the government and contractors should be appropriate and fair in order to attract investors into projects. A guideline of risk sharing is that a party efficiently governing a risk should bear the risk. Operational risks such as designs and management could be basically borne by contractors. On the other hand, the contractors should not bear onesidedly risks on earnings such as market and taxes. In this sense, it is necessary for the government to take a market risk during some period, because it would be rare for the contractor to achieve the target volume at the beginning of operation.

d) Coordination mechanism should be incorporated into the agreement. This mechanism includes legal and economic procedures, which will allocate risks reasonably when risks happen. Because risks will occur in response to socioeconomic changes, it is impossible for the government to prepare an agreement that foresees all risks during the contract period.

e) Consultation with financial advisers and lawyers is very useful to grasp the views of the private sectors. This kind of consultation is very important to improve/develop skills on BOT scheme, because risk sharing is formed on the basis of culture, tradition, and experience of each country.

8.2.2 Port Operating Company at Privatized Ports

Agreement on transfer contract of operation right has some articles, which would result in a financial burden for contractors. The authorities should start to reconsider articles concerning repair cost of natural disaster and assignment of authorization.

Articles to be reconsidered are as follows;
a) **Repair cost of natural disaster**: related to Article-17 of the agreement
Repair cost of damage by natural disaster should be paid by the government because contractors pay both an operation right price and a concession fee for using unmovable and super-structures belonging to the government. In addition, contractors have limited capital and precise estimation of damage cost is impossible at the moment of the signing.

A recent amendment which has incorporated insurance coverage against damage caused by natural disaster can be regarded as a certain improvement compared to the previous provision in the agreement, although the payment of insurance premiums is left to the responsibility of contractors.

Considering the necessity to minimize the risk of contractors as well as the financial burden of the Government, it is understandable that such an amendment has been introduced.

b) **Assignment of authorization**: related to Article-22 of the agreement
It should be defined that contractors may transfer all of their rights to lenders or their nominees with prior written consent of the government, if contractors go bankrupt or experience financial difficulties.

Contract agreement on transfer of operation right decides that “A” Operating Company pays US$ 5,606 thousand as operation right price to Privatization Administration, and 25% of operation income and 2% of other income out of operation every year during 30 years to TDI. The “A” Company can decides tariff for port services, but cannot increase tariffs more than 20% in the first 5 years and approval of TDI is necessary.

See Table 8.2.1

Income statement of “A” Company shows a loss of US$ 639 thousand including US$ 216 thousand operating activities loss. Operating ratio is extremely inefficient, which suggests that the financial situation will not be rapidly improved. Even though the relationship between gross sales and tariffs is unknown, “A” Company is in a financially difficult position and cannot afford to spend money for maintenance or new investment.

Pre-and post-privatization conditions should be surveyed and its results should be reflected in the agreement and in the administrative policies. It should be noted that the operating ratio of TDI was high at the beginning of the 1990s when ports were under operation of TDI, but operation ratios both of TDI itself and of an operating company have been low since privatization.

8.2.3 Private Port Managing Company

Private ports have been contributing to development of the nation by providing the country with a connecting function of sea-land transportation. However, some ports are in financial difficulties.

See Table 8.2.2

Income statement of “B” Company shows a loss of US$ 981 thousand despite an

operating profit of US$ 1,450 thousand. This is caused by the repayment of US$ 2,686 thousand for the long-term debt. Operating ratio is not high, which would be examined from a viewpoint of tariffs. Financial performance would be improved in the future but "B" Company will not be able to invest in new projects.

Table 8.2.1 "A" Company Income Statement

(Thousand US$)

	1997	1998
Revenue	189	485
Gross Sales	189	474
Other Usual Activities		11
Expenses	109	1126
Operating Activities	103	690
Cost of sales sold	0	94
Administration	103	596
Other Usual Activities	3	411
Long-term debt		411
Short-term debt	3	
Extraordinary	3	25
Deferred expenses	3	25
Operating Activities Profit/Loss	86	-216
Other Usual Activities Profit/Los	-3	-400
Total Profit/Loss	80	-639
Operating ratio(%)	-	145

Note:

1) The transfer contract of the operation rights is signed and activated on 6/8/1997

2) Exchange rates are yearly average exchange rates.

3) This Income Statement is rearranged from the original statement for comparison with other financial reports.

4) Operating ratio is the proportion of operating activities versus gross sales

Table 8.2.2 "B" Company Income Statement

(Thousand US$)

	1999
Revenue	11,252
Gross Sales	10,943
Other Usual Activity	286
Selling stocks and bonds Exchange profits	
Extraordinary Revenue	23
Expenses	12,233
Operating Activities	9,493
Cost of sales sold	8,695
Sales discount	110
Administration, Marketing	688
Other Usual Activities	2,738
Exchange losses	52
Long-term debt	2,686
Extraordinary Expenses	2
Operating Activities Profit/Loss	1,450
Other Usual Activities Profit/Loss	-2,452
Total Profit/Loss	-981
Operating ratio(%)	87

Note:

1) Exchange rates are yearly average exchange rates.

2) Figures of 1999 are figures of during Jau.-Sep.1999.

3) This Income Statement is rearranged from the original for comparison with other financial reports.

4) Operating ratio is the proportion of operating activities versus gross sales

8.2.4 Private Capitals

(1) Investment Trends

Investment incentive scheme is provided for domestic and foreign investors. This scheme guarantees equal treatment between domestic and foreign investors by the law and treaties. Investors must receive an incentive certificate from the authority to enjoy this scheme. This scheme is well provided for large investors but not small investors. **A tax incentive** is not available for small companies when they invest in procurement of equipment.

See Table 8.2.3

The amount of Investment Incentive Certificates declined to US$ 15 million in 1998 from US$ 25 million in 1996, of which 40% has been invested in the Marmara Region, 16% in the Aeagean Region and 13% in the Central Anatolia. Private capitals like to realize efficient performance of investment in the region where market is expanding, industries are piling up, connection to market is easy and human life infrastructure is well developed.

(2) Foreign Investment

Foreign investment policy provides investors with equal treatment between domestic and foreign investors, no limitation in participating of foreign capital, free transfer of profits/fees/royalties, and no limitation of employment of foreigners.

See Table 8.2.4 and 8.2.5

Foreign direct investment inflows into Turkey reached US$ 807 million in 1998, but its share in the world has been declining; Turkey ranks 55th among countries receiving foreign direct investment. The government is concerned about the decline and has increased promotional efforts.

(3) Domestic Financing Volume

See Table 8.2.6

There is **a shortage of funds** in domestic banks and in the stock market. The outstanding volume of deposits of domestic banks was a low ratio of 20% of GDP, amounting to US$ 40 billion in 1998 because of distrust in present banking system. On the other hand, the trading volume at Istanbul stock market was 35% of GDP, amounting to US$ 70 billion, however there are only 260 companies, which will give investors a difficulties of equity finance.

Therefore private sectors who intend to start port business or to renew port facilities, find it difficult to raise funds.

Table 8.2.3 Investment Amount of Investment Incentive Certificates

(Million US$)

	1996	1997	1998	Population	GDP
Investment Amount of Investment Incentive certificates	25	22	15		
Sectors Breakdown	100.0	100.0	100.0		
Agriculture	1.8	0.8	2.1		
Mining	1.3	1.7	2.2		
Manufacturing	73.7	63	48.9		
Energy	3.4	7.0	5.0		
Services(Transportation,Tourism,Other	19.8	27.6	41.8		
Regional Breakdown	100.0	100.0	100.0	100.0	100.0
Marmara	49.2	44.0	39.4	26.2	36.1
Central Anatolia	11.0	13.6	13.2	17.1	16.0
Aeagean	11.5	14.7	16.5	13.7	15.9
Mediterranean	10.0	12.9	9.3	12.3	12.9
Black sea	11.7	3.8	7.2	12.7	9.7
East Anatolia	2.2	1.9	2.8	8.0	4.0
Southeast Anatolia	9.6	7.1	7.6	9.9	5.4
Multi-Regional	1.5	2.1	4.0		

Source: Main Economic Indicators 1999 and Turkish Economy: Statistics and Analysis,1999

Table 8.2.6 Domestic Credits, Deposits and Stock Trading Value

(Million US$)

	1996		1997		1998	
GDP	182,064		190,425		198,528	100.0
Outstanding Amount of Domestic Credits	40,715		46,577		42,256	21.3
Central Bank Credits(Public)	4,367	2.4	2,237	1.2	4	0.0
Deposit Money Bank Credits	34,208	18.8	42,160	22.1	39,952	20.1
Invest. Dev. Bank Credits	2,140	1	2,180	1	2,299	1.2
Outstanding Amount of Domestic Deposits	32,113	17.6	34,004	17.9	39,884	20.1
Commercial Deposits	4,909	2.7	4,339	2.3	6,748	3.4
Time Deposits	20,791	11.4	20,343	10.7	23,993	12.1
Other Deposits	6,413	3.5	9,322	4.9	9,143	4.6
Trading value at Stock Market	37,737	20.5	58,104	31.4	70,396	34.9
Trading value of Bond and Bill	32,737	18.0	35,472	19.0		

Source: Main Economic Indicators 1999 and hearing from Istanbul Stock Exchange Market

Note: Figures of Credits and Deposits were taken on the last Friday of December of each year

Table 8.2.4 Foreign Direct Investment Inflows in the World

(Million US$)

	1993	1994	1995	1996	1997	1998
World	219,421	253,506	328,862	358,869	464,341	643,879
Developed Countries	133,850	146,379	208,372	211,120	273,276	460,431
%	61	58	63	59	59	72
Central and East Europe	6,757	5,932	14,266	12,406	18,532	17,513
%	3	2	4	3	4	3
Developing Countries	78,813	101,196	106,224	135,343	172,533	165,936
%	36	40	32	38	37	26
Asia	54,835	63,844	68,126	82,035	95,505	84,880
West Asia	3,710	1,562	-418	621	4,638	4,579
Turkey	636	608	885	722	805	807
South,East,S-East Asia	49,798	61,386	67,065	79,397	87,835	77,277
Central Asia	1,327	897	1,479	2,017	3,032	3,023
The Pacific	226	170	562	180	146	175
Latin America, Caribbean	20,009	31,451	32,921	46,162	68,255	71,652
Africa	3,469	5,313	4,145	5,907	7,657	7,931
Developing Europe	274	417	470	1,060	970	1,297

Source: 1999 World Investment Report, UNCTAD

Note 1)West Asia covers Bahrain, Iran, Iraq, Jordan, Kuwait, Lebanon, Qatar, Oman, Saudi Arabia, Syrian, United Ara
2)Central Asia covers Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekis
3)Singapore, Hong Kong(China),Taiwan Province of China, Malaysia, Chile and the Republic of Korea are ranked among the 20 most competitive economies in the world in 1998

Table 8.2.5 Foreign Direct Investment Permits by Sectors

(Million US$)

	1995		1996		1997		1998	
	Number of Permits	Amount of Capital	Number of Permits	Amount of Capital	Number of Permits	Amount of Capital	Number of Permits	Amount of Capital
Total	1225	2938.3	1178	3837.0	1340	1678.0	1224	1645.8
Agriculture	33	31.7	35	64.1	28	12.2	20	5.7
Mining	17	60.6	14	8.5	14	26.7	22	13.7
Manufacturing	411	1996.5	352	625.6	442	867.9	454	1021
Services	764	849.5	777	3123.7	856	767.5	728	605.3
Commerce	443	113.7	414	146.4	429	171.8	353	101.8
Tourism	84	174.8	127	129.1	142	240.1	111	52.1
Banking	19	82.7	9	34.4	11	48.3	12	72.4
Land transportation	7	4.3	9	4.3	4	0.6	2	0.4
Air transportation	10	2.3	2	0.1	5	12.8	1	0.1
Marine transportation	8	0.9	6	0.3	8	0.7	9	0.6
Investment Financing	7	18.8	10	181.5	6	4.7	12	54.8
Others	186	452.1	200	2627.5	251	288.4	228	323.1

Source: Main Economic Indicators 1999

8.3 Required Amount for Port Investment up to 2020

8.3.1 Investment Amounts for TCDD ports, Other public ports and Private ports

Required investment amounts are necessary for examining the financial scheme. Required investment amounts are roughly estimated for container, general cargo, dry bulk and liquid bulk as follows.

See Figure 8.3.1

Required investment includes both improvement of existing facilities and construction of new facilities. The calculation is made by region on a basis of cargo forecast volume, existing port capacity and unit cost arranged from cost estimation of standard facilities.

See Table 8.3.1

Step 1: **Required port capacity** consists of improved capacity and construction capacity. The construction capacity is obtained by deducting improved port capacity from forecast volume. The improved capacity and construction capacity are calculated in each region when existing port capacity will run short of forecast cargo volume in the region. The total columns sum up the capacity of each region. Therefore the total forecast volume does not equal the sum of improved capacity and construction capacity because some regions will not need to improve existing facilities and/or construct new facilities to handle the forecast cargo volume.

See Table 8.3.2 and Appendix for Chapter 8

Step 2: **Required amount** consists of improvement amount and construction amount. Required construction amount is calculated as the product of construction capacity times unit cost of construction. Required improvement amount is calculated as the product of improved capacity times unit cost of improvement. Unit costs of construction of new facilities are computed from standardized facilities. Unit costs of improvement of existing facilities are replacement of handling equipment at standardized facilities.

See Table 8.3.3

Step 3: **Required construction amount** is allocated to TCDD ports, other public ports and private ports at the present proportion to the total capacity. The present proportion is a proportion of existing port capacity necessary for increasing capacity. And then these amounts are divided into sub-structure and super-structure at the proportion to total construction cost.

See Table 8.3.4

Step 4: **Required improvement amount** is allocated to TCDD ports, other public ports and private ports at the same proportion, and then these amounts are divided into sub-structure and super-structure at the proportion to total improvement cost.

See Table 8.3.5

Step 5: **Required gross investment amount** is calculated as the sum of required construction amount and required improvement amount in TCDD ports, other public ports and private ports, which are divided into sub-structure and super-structure.

Figure 8.3.1 Flow Chart on Required Investment Amount by the Organization

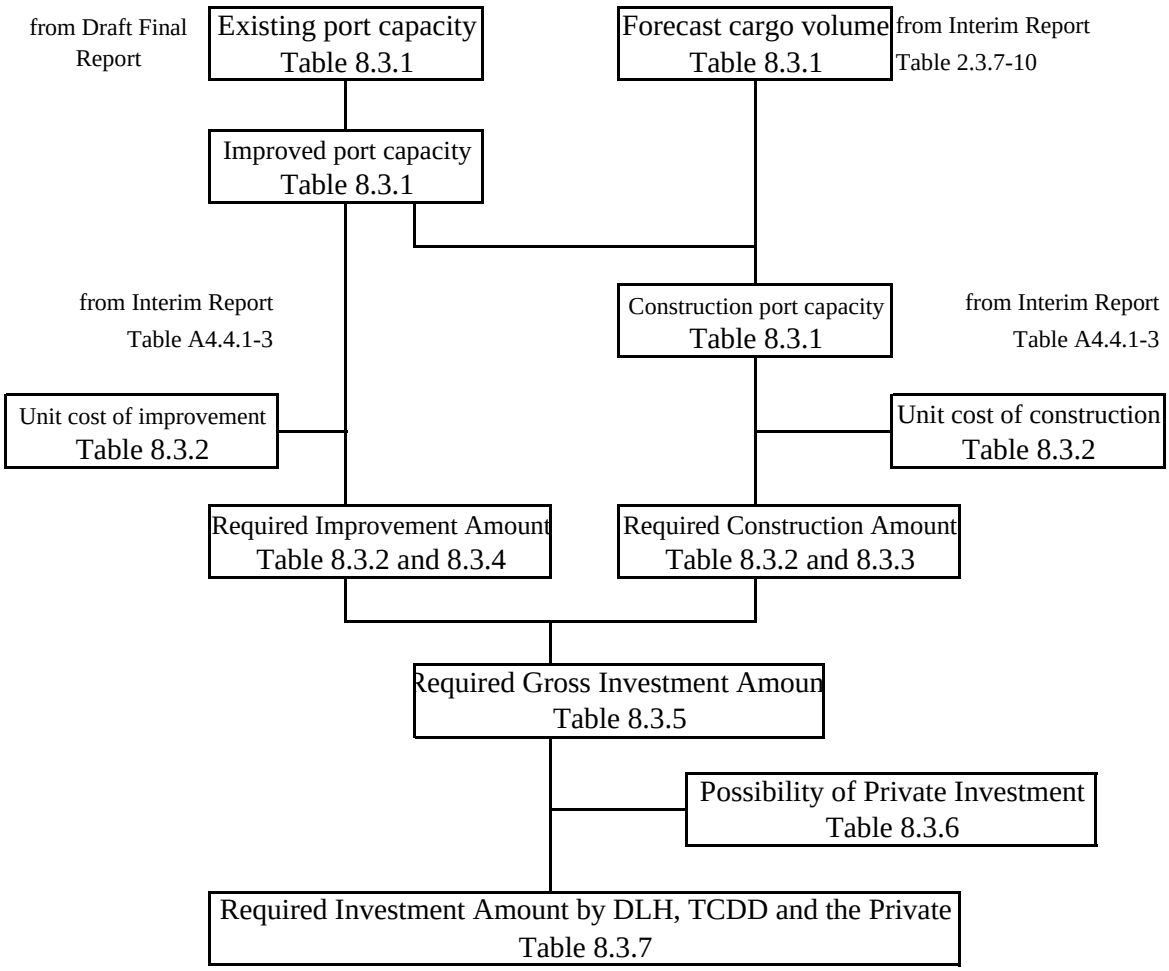


Table 8.3.1 Required Port Capacity

Improved Efficiency of Existing Capacities

	1998	at 2010	at 2020
Cotainer	1.00	1.15 15% up	1.32 32% up
General Cargo	1.00	1.25 25% up	1.56 56% up
Dry bulk	1.00	1.11 11% up	1.30 30% up
Liquid bulk	1.00	1.05 5% up	1.10 10% up

(Unit:thousand TEUs/year or thousand tons /year)

Region / Cargo type	1998	at 2010			at 2020		
	Existing Capacity	Forecast volume	Improved Capacity	Construction Capacity	Forecast volume	Improved Capacity	Construction Capacity
Total							
Container	1,814	3,380	1,873	1,347	6,000	2,394	3,606
General cargo	56,081	77,250	60,769	9,888	95,040	87,486	9,963
Dry bulk	95,103	52,700	19,303	4,047	79,700	22,607	14,063
Liquid bulk	270,129	105,530	0	0	137,798	0	0
Marmara							
Container	795	1,460	914	546	2,400	1,049	1,351
General cargo	23,748	33,290	29,685	3,605	39,570	37,047	2,523
Dry bulk	38,478	12,920	0	0	19,800	0	0
Liquid bulk	69,320	43,041	0	0	54,794	0	0
Aegean							
Container	443	960	509	451	1,650	585	1,065
General cargo	12,750	22,220	15,938	6,283	27,330	19,890	7,440
Dry bulk	5,204	7,460	5,776	1,684	11,580	6,765	4,815
Liquid bulk	94,775	40,060	0	0	54,156	0	0
Midcoast							
Container	391	800	450	350	1,490	516	974
General cargo	12,117	14,540	15,146	0	16,940	18,903	0
Dry bulk	39,235	16,430	0	0	23,230	0	0
Liquid bulk	103,165	20,743	0	0	26,745	0	0
Black Sea							
Container	185	160	0	0	460	244	216
General cargo	7,466	7,200	0	0	11,200	11,647	0
Dry bulk	12,186	15,890	13,526	2,364	25,090	15,842	9,248
Liquid bulk	2,869	1,686	0	0	2,103	0	0

Source: 1) Cargo traffic volumes are taken from Table 2.3.7-10 of Interim Report

2) Port capacities are taken from Table of Draft Final Report

Table 8.3.2 Required Investment Amount for Construction and Improvement

Unit Cost of Improvement and Construction (US$/(TEU or ton/year))

	1998	at 2010		at 2020	
		Improvement	Construction	Improvement	Construction
Container		178	204	183	201
General Cargo		4	29	4	29
Dry bulk		3	11	3	11
Liquid bulk					

Required Investment Amount for Construction and Improvement

	1998	up to 2010			up to 2020		
Region Cargo type	Existing Capacity	Required Amount	Improvement Amount	Construction Amount	Required Amount	Improvement Amount	Construction Amount
	(Td/year)	(Million US$)	(Million US$)	(Million US$)	(Million US$)	(Million US$)	(Million US$)
Total							
Container	1,814	318	43	275	864	139	725
General cargo	56,081	335	49	287	444	155	289
Dry bulk	95,103	50	6	45	170	16	155
Liquid bulk	270,129	0	0	0	0	0	0
Marmara							
Container	795	133	21	111	317	46	271
General cargo	23,748	128	24	105	126	53	73
Dry bulk	38,478	0	0	0	0	0	0
Liquid bulk	69,320	0	0	0	0	0	0
Aegean							
Container	443	104	12	92	240	26	214
General cargo	12,750	195	13	182	244	29	216
Dry bulk	5,204	20	2	19	58	5	53
Liquid bulk	94,775	0	0	0	0	0	0
Midcoast							
Container	391	82	10	71	218	23	196
General cargo	12,117	12	12	0	27	27	0
Dry bulk	39,235	0	0	0	0	0	0
Liquid bulk	103,165	0	0	0	0	0	0
Black Sea							
Container	185	0	0	0	88	45	43
General cargo	7,466	0	0	0	47	47	0
Dry bulk	12,186	30	4	26	113	11	102
Liquid bulk	2,869	0	0	0	0	0	0

Source: 1) Unit costs are average costs of Table A4.4.1-3 of Interim Report

Table 8.3.3 Reqired Construction Amount for TCDD ports, Other public ports and Private ports

Allocation of construction requirement / Existing Port capacity to be invested

(Thousand TEUs or tons/year)

	Total	TCDD ports	Others	Private	Total	TCDD ports	Others	Private
Container	1.00	0.59	0.04	0.37	1,814	1,063	71	680
General Cargo	1.00	0.25	0.19	0.57	48,615	11,934	9,082	27,599
Dry bulk	1.00	0.18	0.46	0.36	17,390	3,160	7,998	6,232
Liquid bulk	1.00				0	0	0	0

Required Construction Amount for TCDD ports, Other public ports and Private ports (Million US$)

	up to 2010				up to 2020			
	Total	TCDD ports	Others	Private	Total	TCDD ports	Others	Private
Container	275	161.1	10.8	103.1	725	424.8	28.4	271.8
General Cargo	287	70.5	53.6	162.9	289	70.9	54.0	164.1
Dry bulk	45	8.2	20.7	16.1	155	28.2	71.3	55.5
Liquid bulk	0	0.0	0.0	0.0	0	0.0	0.0	0.0
Total	607	239.8	85.1	282.1	1,169	524.0	153.7	491.4

Allocation of construction cost

	Total	Sub	Super
Container	1.00	0.42	0.58
General Cargo	1.00	0.88	0.12
Dry bulk	1.00	0.70	0.30
Loquid bulk	1.00	0.50	0.50

TCDD ports construction amount (Million US$)

	up to 2010			up to 2020		
	Total	Sub	Super	Total	Sub	Super
Container	161.1	67.7	93.5	424.8	178.4	246.4
General Cargo	70.5	62.0	8.5	70.9	62.4	8.5
Dry bulk	8.2	5.7	2.5	28.2	19.7	8.4
Liquid bulk	0.0	0.0	0.0	0.0	0.0	0.0
Total	239.8	135.4	104.4	524.0	260.6	263.4

Other public ports construction amount (Million US$)

	up to 2010			up to 2020		
	Total	Sub	Super	Total	Sub	Super
Container	10.8	4.5	6.2	28.4	11.9	16.5
General Cargo	53.6	47.2	6.4	54.0	47.5	6.5
Dry bulk	20.7	14.5	6.2	71.3	49.9	21.4
Liquid bulk	0.0	0.0	0.0	0.0	0.0	0.0
Total	85.1	66.2	18.9	153.7	109.3	44.3

Private ports construction amount (Million US$)

	up to 2010			up to 2020		
	Total	Sub	Super	Total	Sub	Super
Container	103.1	43.3	59.8	271.8	114.1	157.6
General Cargo	162.9	143.4	19.6	164.1	144.4	19.7
Dry bulk	16.1	11.3	4.8	55.5	38.9	16.7
Liquid bulk	0.0	0.0	0.0	0.0	0.0	0.0
Total	282.1	198.0	84.2	491.4	297.4	194.0

Table 8.3.4 Required Improvement Amount for TCDD ports, Other public ports and Private ports

Allocation of improvement requirement / Existing Port capacity to be invested

(Thousand TEUs or tons/year)

	Total	TCDD ports	Others	Private	Total	TCDD ports	Others	Private
Container	1.00	0.59	0.04	0.37	1,814	1,063	71	680
General Cargo	1.00	0.25	0.19	0.57	48,615	11,934	9,082	27,599
Dry bulk	1.00	0.18	0.46	0.36	17,390	3,160	7,998	6,232
Liquid bulk	1.00				0	0	0	0

Required Improvement Amount for TCDD ports, Other public ports and Private ports (Million US$

	up to 2010				up to 2020			
	Total	TCDD ports	Others	Private	Total	TCDD ports	Others	Private
Container	43	25.2	1.7	16.1	139	81.5	5.4	52.1
General Cargo	49	12.0	9.2	27.8	155	38.0	29.0	88.0
Dry bulk	6	1.1	2.8	2.2	16	2.9	7.4	5.7
Liquid bulk	0	0.0	0.0	0.0	0	0.0	0.0	0.0
Total	98	38.3	13.6	46.1	310	122.4	41.8	145.8

Allocation of improvement cost

	Total	Sub	Super
Container	1.00	0.25	0.75
General Cargo	1.00	0.20	0.80
Dry bulk	1.00	0.20	0.80
Liquid bulk	1.00	0.20	0.80

TCDD ports improvement amount (Million US$)

	up to 2010			up to 2020		
	Total	Sub	Super	Total	Sub	Super
Container	25.2	6.3	18.9	81.5	20.4	61.1
General Cargo	12.0	2.4	9.6	38.0	7.6	30.4
Dry bulk	1.1	0.2	0.9	2.9	0.6	2.3
Liquid bulk	0.0	0.0	0.0	0.0	0.0	0.0
Total	38.3	8.9	29.4	122.4	28.6	93.9

Other public ports improvement amount (Million US$)

	up to 2010			up to 2020		
	Total	Sub	Super	Total	Sub	Super
Container	1.7	0.4	1.3	5.4	1.4	4.1
General Cargo	9.2	1.8	7.3	29.0	5.8	23.2
Dry bulk	2.8	0.6	2.2	7.4	1.5	5.9
Liquid bulk	0.0	0.0	0.0	0.0	0.0	0.0
Total	13.6	2.8	10.8	41.8	8.6	33.1

Private ports improvement amount (Million US$)

	up to 2010			up to 2020		
	Total	Sub	Super	Total	Sub	Super
Container	16.1	4.0	12.1	52.1	13.0	39.1
General Cargo	27.8	5.6	22.3	88.0	17.6	70.4
Dry bulk	2.2	0.4	1.7	5.7	1.1	4.6
Liquid bulk	0.0	0.0	0.0	0.0	0.0	0.0
Total	46.1	10.0	36.1	145.8	31.8	114.1

Table 8.3.5 Required Gross Investment Amount

TCDD ports (Million US$)

	up to 2010			up to 2020		
	Total	Sub	Super	Total	Sub	Super
Construction	239.8	135.4	104.4	524.0	260.6	263.4
Improvement	38.3	8.9	29.4	122.4	28.6	93.9
Total	278.1	144.3	133.8	646.4	289.1	357.2

Other public ports (Million US$)

	up to 2010			up to 2020		
	Total	Sub	Super	Total	Sub	Super
Construction	85.1	66.2	18.9	153.7	109.3	44.3
Improvement	13.6	2.8	10.8	41.8	8.6	33.1
Total	98.7	69.0	29.7	195.4	118.0	77.5

Private Ports (Million US$)

	up to 2010			up to 2020		
	Total	Sub	Super	Total	Sub	Super
Construction	282.1	198.0	84.2	491.4	297.4	194.0
Improvement	46.1	10.0	36.1	145.8	31.8	114.1
Total	328.2	208.0	120.2	637.2	329.2	308.0

All Ports (Million US$)

	up to 2010			up to 2020		
	Total	Sub	Super	Total	Sub	Super
Construction	607.0	399.6	207.4	1,169.0	667.3	501.7
Improvement	98.0	21.8	76.3	310.0	69.0	241.1
Total	705.0	421.3	283.7	1,479.0	736.3	742.7

8.3.2 Required Investment Amount by DLH, TCDD and the Private Sector

(1) Responsibilities of DLH, TCDD and the Private Sector

Responsibilities of DLH, TCDD and the private are as follows;
-DLH is in charge of investment for construction and improvement of sub-structures at TCDD ports and other public ports.

-TCDD is in charge of investment for construction and improvement of super-structures at TCDD ports.

-Private sector is responsible for construction and improvement of private ports including sub-structures and super-structures. Private sector is also responsible for construction and improvement of super-structures at public ports other than TCDD ports.

(2) Required Investment Amount on the Present Status of Quota

See Table 8.3.7

The required investment amount is rearranged in Table 8.3.7 from required gross investment for TCDD ports, other public ports and private ports (Table 8.3.5) according to respective responsibilities.

See Table 8.3.8

Increased port capacity by investment, realized port capacity in 2020 and a rough profit of TCDD port account are estimated based upon this investment program.

DLH is required to invest US$ 289.1 million in sub-structures of TCDD ports and US$ 118.0 million in other public ports. Total amount is US$ 407.1 million up to 2020.

TCDD is required to invest US$ 357.2 million in super-structures of TCDD ports up to 2020.

Private sectors are required to invest US$ 637.2 million in their ports and US$ 77.5 million in super-structure at other public ports. Total amount is US$ 714.7 million up to 2020.

Port Capacity will increase by 2,477 thousand TEUs/year to 3,540 thousand TEUs/year in TCDD ports in 2020. Other public ports will increase by only 169 thousand TEUs/year to 240 thousand TEUs/year in 2020. Private ports will increase their container capacity by 1,540 thousand TEUs/year to 2,220 thousand TEUs/year in 2020.

TCDD port account will increase its rough operating profit by US$ 119 million/year to US$ 252 million/year in 2020. TCDD port account is expected to receive a rough operating profit of US$ 3,706 million during 2001-2020 with an investment of US$ 289.1 million by DLH and of US$ 357.2 million by TCDD.

Treasury has a close financial relation with TCDD in terms of both management and financial operation. Treasury can expect to increase its receipts from TCDD. Treasury has

also a financial relation with TDI in terms of land use, but Treasury's receipts are unchanged because the land usage fee is not related to cargo handling volume.

(3) Possibility of Private Investment

However, **the question** is whether private ports can invite private capitals to invest US$ 637.2 million in their ports in order to handle increasing cargo. The most important issue is how to evaluate the possibility of investment by private capitals.

See Table 8.3.6 and Figure 8.3.1

Private investment has been evaluated in 8.2. Present Situation and Evaluation on Port Investment by the Private. Private investment is assumed as follows;

-Private investment during 2000-2010 is only BOT projects of Derince and Filyos Ports. This is equivalent to 0.5 and 0.7, which means that only 50% of required private investment in sub-structure is expected up to 2010 and that only 70% of required private investment in super-structure is expected up to 2010.

-Private investment during 2010-2020 may be expected, but a clear view on attracting private investors in the field of ports has not appeared so far. Therefore, 0.3 and 0.7 are assumed with an expectation that enthusiasm will increase in the future.

-The shortage of private investment amounts to US$ 140 million up to 2010 and US$ 281 million up to 2020.

-In other words, private ports will not be able to handle the forecast cargo because of a shortage of private investment of US$ 281 million. A shortage of private investment will remain cargo on the sea, which are scheduled to handle at private ports.

(4) Measures to counter Shortage of Private Investment

Who will take a measure to cope with a shortage of private investment. In other words, who will handle the remaining cargo on the sea, which are scheduled to handle at private ports, but now placed on the sea because of a shortage of private investment.

Two case studies are examined from the above viewpoint.

In case-1, an investment in other public ports will be increased by US$ 281 million to cover the shortage of private investment. In other words, other public ports will handle the remaining cargo on the sea, which are now placed on the sea because of a shortage of private investment in private ports.

In case-2, an investment in TCDD ports will be increased by US$ 281 million to cover the shortage of private investment. In other words, TCDD ports will handle the remaining cargo on the sea.

(5) Case Studies

Case-1: Investment is made in **other public ports** to cover the shortage of private investment

See Table 8.3.7

Investment in other public ports will be increased by US$ 281 million to cover the shortage of private investment.

See Table 8.3.9

DLH is required to invest US$ 289.1 million in sub-structures of TCDD ports and US$ 306.8 million in other public ports. Total amount is US$ 595.9 million up to 2020.

TCDD is required to invest US$ 357.2 million in super-structures of TCDD ports up to 2020.

Private sectors are required to invest US$ 356.0 million in their ports and to increase their investment in super-structures at other public ports by US$ 92.4 million. Total required amount is US$ 525.9 million up to 2020.

Port Capacity will increase by 963 thousand TEUs/year to 1,034 thousand TEUs/year in other public ports in 2020. Private ports will increase their container capacity by 746 thousand TEUs/year to 1,426 thousand TEUs/year in 2020.

TCDD port account will receive the same rough operating profit of US$ 3,706 million during 2001-2020 as in the Present Status of Quota.

Case-2: Investment is made in **TCDD ports** to cover the shortage of private investment

Investment in TCDD ports will be increased by US$ 281 million to cover the shortage of private investment.

DLH is required to invest US$ 478.0 million in sub-structures of TCDD ports and US$ 118.0 million in other public ports. Total amount is US$ 595.9 million up to 2020.

TCDD is required to invest US$ 449.6 million in super-structures of TCDD ports up to 2020.

Private sectors are required to invest US$ 356.0 million in their ports and US$ 77.5 million in super-structure at other public ports. Total requested amount is US$ 433.4 million up to 2020.

Port Capacity will increase by 3,271 thousand TEUs/year to 4,334 thousand TEUs/year in TCDD ports in 2020. Private ports will increase their container capacity by 746 thousand TEUs/year to 1,426 thousand TEUs/year in 2020.

Rough operating profit of TCDD port account will increase by US$ 155 million/year to US$ 288 million/year in 2020. TCDD port account is expected to receive a rough operating

profit of US$ 4,045 million during 2001-2020 with an investment of US$ 478.0 million by DLH and of US$ 449.6 million by TCDD. The expected rough operating profit of Case-2 is US$ 339 million more than that of Case-1 and Case-the Present Status of Quota during 20 years of 2001-2020.

(6) Evaluation of Case Studies

Evaluation of case studies is made from the viewpoint of receipts of TCDD port account that directly contribute to increase the government revenue and that have a potential to be used as loan for private sectors. Therefore, the government must improve its financial performance as soon as possible. Meanwhile private sectors are finding it difficult to raise funds. On the other hand, receipts of cargo handling at other public ports and/or private ports dose not have a direct route of contributing to the government revenue.

See Table 8.3.11

The annual rough operating profit in 2020 is US$ 252 million/year in the Present Status of Quota and Case-1, while US$ 288 million/year in Case-2. Receipts during 20 years of 2001-2020 is US$ 3,706 million with an investment of US$ 289.1 million by DLH and of US$ 357.2 million by TCDD in Case-1, while US$ 4,045 million with an investment of US$ 478.0 million and of US$ 449.6 million in Case-2. Investment performance of Case-2 is slightly lower than that of Case-1, but amount of receipts of Case-2 is larger than that of Case-1.

Table 8.3.6 Private Participation Ratio

	2000 - 2010		2011 - 2020	
	Sub	Super	Sub	Super
Ratio	0.5	0.7	0.3	0.7

Note 1) During 2000-2010, private investment is only BOT projects of Derince Port an Filyos Port. This is equivalent to 0.5 and
2) During 2010-2020, private investment may be expected. This is equivalent to 0.3 and 0.7.

Table 8.3.7 Required Gross Investment Amount by Organizations

on the Present Status of Quota

	up to 2010				up to 2020			
	Total	TCDD ports	Others	Private	Total	TCDD ports	Others	Private
DLH	213.3	144.3	69.0		407.1	289.1	118.0	
TCDD	133.8	133.8			357.2	357.2		
Private Sector	357.9		29.7	328.2	714.7		77.5	637.2
Total	705.0	278.1	98.7	328.2	1479.0	646.4	195.4	637.2

Case-1 Other public ports handle the remaining cargo on the sea

The remaining cargo on the sea requires an investment of US$ 281 million, which are scheduled to handle at private ports but now placed on the sea because of shortage of private investment.

	up to 2010				up to 2020			
	Total	TCDD ports	Others	Private	Total	TCDD ports	Others	Private
DLH	317.3	144.3	173.0		595.9	289.1	306.8	
TCDD	133.8	133.8			357.2	357.2		
Private Sector	253.9		65.8	188.2	525.9		169.9	356.0
Total	705.0	278.1	238.7	188.2	1479.0	646.4	476.6	356.0

Case-2 TCDD ports handle the remaining cargo on the sea

The remaining cargo on the sea requires an investment of US$ 281 million, which are scheduled to handle at private ports but now placed on the sea because of shortage of private investment.

	up to 2010				up to 2020			
	Total	TCDD ports	Others	Private	Total	TCDD ports	Others	Private
DLH	317.3	248.3	69.0		595.9	478.0	118.0	
TCDD	169.8	169.8			449.6	449.6		
Private Sector	217.8		29.7	188.2	433.4		77.5	356.0
Total	705.0	418.2	98.7	188.2	1479.0	927.6	195.4	356.0

Table 8.3.8 Port Capacity and Rough Operating Profit realized by Investment

on the Present Status of Quota

Investment Amount by Organizations (Million US$)

	up to 2010				up to 2020			
	Total	TCDD ports	Others	Private	Total	TCDD ports	Others	Private
DLH	213.3	144.3	69.0		407.1	289.1	118.0	
TCDD	133.8	133.8			357.2	357.2		
Private Sector	357.9		29.7	328.2	714.7		77.5	637.2
Total	705.0	278.1	98.7	328.2	1479.0	646.4	195.4	637.2

Port Capacity increased by investment (Thousand TEUs or thousand tons per year)

	up to 2010				up to 2020			
	Total	TCDD ports	Others	Private	Total	TCDD ports	Others	Private
Container	1,591	837	129	625	4,186	2,477	169	1,540
General cargo	22,748	5,730	4,343	12,675	42,343	11,527	5,462	25,354
Dry bulk	5,960	1,043	2,743	2,174	19,280	3,440	8,870	6,970
Liquid bulk	0	0	0	0	0	0	0	0

Existing Port Capacity (Thousand TEUs or thousand tons per year)

	Total	TCDD ports	Others	Private
Container	1,814	1,063	71	680
General cargo	56,081	12,836	13,053	30,192
Dry bulk	95,103	20,642	10,622	63,839
Liquid bulk	270,129	150	3,543	266,436

Port Capacity realized by investment (Thousand TEUs or thousand tons per year)

	up to 2010				up to 2020			
	Total	TCDD ports	Others	Private	Total	TCDD ports	Others	Private
Container	3,405	1,900	200	1,305	6,000	3,540	240	2,220
General cargo	78,829	18,566	17,396	42,867	98,424	24,363	18,515	55,546
Dry bulk	101,063	21,685	13,365	66,013	114,383	24,082	19,492	70,809
Liquid bulk	270,129	150	3,543	266,436	270,129	150	3,543	266,436

TCDD ports Profit and Investment

	1998	2001-2010	2010	2011-2020	2020	2001-2020	Remark
Investment							
DLH (Million US$)		144.3		144.8		289.1	
TCDD (Million US$)		133.8		223.5		357.2	
Port capacity (Thousand tons)	44,258		59,401		83,995		Note 1)
Rough profit (Million US$/year)	133		178		252		Note 2)
Rough profit (Million US$)		1,555		2,151		3,706	

Note

1)For calculation of port capacity, 1TEU is equal to 10 tons.

2)Rough profit ratio is set at US$ 3 per ton according to TCDD ports financial performance, Table 11.4.2

Table 8.3.9 Port Capacity and Rough Operating Profit realized by Investment

Case-1 Other public ports handle the remaining cargo on the sea

The remaining cargo on the sea requires an investment of US$ 281 million, which are scheduled to handle at ports by private investment but now placed on the sea because of shortage of private investment.

Investment Amount by Organizations (Million US$)

	up to 2010				up to 2020			
	Total	TCDD ports	Others	Private	Total	TCDD ports	Others	Private
DLH	317.3	144.3	173.0		595.9	289.1	306.8	
TCDD	133.8	133.8			357.2	357.2		
Private Sector	253.9		65.8	188.2	525.9		169.9	356.0
Total	705.0	278.1	238.7	188.2	1479.0	646.4	476.6	356.0

Port Capacity increased by investment (Thousand TEUs or thousand tons per year)

	up to 2010				up to 2020			
	Total	TCDD ports	Others	Private	Total	TCDD ports	Others	Private
Container	1,591	837	358	396	4,186	2,477	963	746
General cargo	22,649	5,730	7,408	9,511	42,243	11,527	9,447	21,269
Dry bulk	5,960	1,043	2,743	2,174	19,280	3,440	8,870	6,970
Liquid bulk	0	0	0	0	0	0	0	0

Existing Port Capacity (Thousand TEUs or thousand tons per year)

	Total	TCDD ports	Others	Private
Container	1,814	1,063	71	680
General cargo	56,081	12,836	13,053	30,192
Dry bulk	95,103	20,642	10,622	63,839
Liquid bulk	270,129	150	3,543	266,436

Port Capacity realized by investment (Thousand TEUs or thousand tons per year)

	up to 2010				up to 2020			
	Total	TCDD ports	Others	Private	Total	TCDD ports	Others	Private
Container	3,405	1,900	429	1,076	6,000	3,540	1,034	1,426
General cargo	78,730	18,566	20,461	39,703	98,324	24,363	22,500	51,461
Dry bulk	101,063	21,685	13,365	66,013	114,383	24,082	19,492	70,809
Liquid bulk	270,129	150	3,543	266,436	270,129	150	3,543	266,436

TCDD ports Profit and Investment

	1998	2001-201(	2010	2011-202(	2020	2001-202(	Remark
Investment							
DLH (Million US$)		144.3		144.8		289.1	
TCDD (Million US$)		133.8		223.5		357.2	
Port capacity (Thousand tons)	44,258		59,401		83,995		Note 1)
Rough profit (Million US$/year)	133		178		252		Note 2)
Rough profit (Million US$)		1,555		2,151		3,706	

Note

1)For calculation of port capacity, 1TEU is equal to 10 tons.

2)Rough profit ratio is set at US$ 3 per ton according to TCDD ports financial performance, Table 11.4.2

Table 8.3.10 Port Capacity and Rough Operating Profit realized by Investment

Case-2 TCDD ports handle the remaining cargo on the sea

The remaining cargo on the sea requires an investment of US$ 271 million, which are scheduled to handle at private ports but now placed on the sea because of shortage of private investment.

Investment Amount by Organization (Million US$)

	up to 2010				up to 2020			
	Total	TCDD ports	Others	Private	Total	TCDD ports	Others	Private
DLH	317.3	248.3	69.0		595.9	478.0	118.0	
TCDD	169.8	169.8			449.6	449.6		
Private Sector	217.8		29.7	188.2	433.4		77.5	356.0
Total	705.0	418.2	98.7	188.2	1479.0	927.6	195.4	356.0

Port Capacity increased by investment (Thousand TEUs or thousand tons per year)

	up to 2010				up to 2020			
	Total	TCDD ports	Others	Private	Total	TCDD ports	Others	Private
Container	1,591	1,066	129	396	4,186	3,271	169	746
General cargo	22,649	8,795	4,343	9,511	42,243	15,512	5,462	21,269
Dry bulk	5,960	1,043	2,743	2,174	19,280	3,440	8,870	6,970
Liquid bulk	0	0	0	0	0	0	0	0

Existing Port Capacity (Thousand TEUs or thousand tons per year)

	Total	TCDD ports	Others	Private
Container	1,814	1,063	71	680
General cargo	56,081	12,836	13,053	30,192
Dry bulk	95,103	20,642	10,622	63,839
Liquid bulk	270,129	150	3,543	266,436

Port Capacity realized by investment (Thousand TEUs or thousand tons per year)

	up to 2010				up to 2020			
	Total	TCDD ports	Others	Private	Total	TCDD ports	Others	Private
Container	3,405	2,129	200	1,076	6,000	4,334	240	1,426
General cargo	78,730	21,631	17,396	39,703	98,324	28,348	18,515	51,461
Dry bulk	101,063	21,685	13,365	66,013	114,383	24,082	19,492	70,809
Liquid bulk	270,129	150	3,543	266,436	270,129	150	3,543	266,436

TCDD ports Profit and Investment

	1998	2010	2020	Remark
Investment				
DLH (Million US$)		248.3	229.6	478.0	
TCDD (Million US$)		169.8	279.8	449.6	
Port capacity (Thousand tons)	44,258	64,756	95,920	Note 1)
Rough profit (Million US$/year)	133	194	288	Note 2)
Rough profit (Million US$)		1,635	2,410	4,045	

Note

1)For calculation of port capacity, 1TEU is equal to 10 tons.

2)Rough profit ratio is set at US$ 3 per ton according to TCDD ports financial performance, Table 11.4.2

Table 8.3.11 TCDD ports Profit and Investment

on the Present Status of Quota

		1998	2000-2010	2010	2011-2020	2020	Total 2000-2020	Remark
Investment								
DLH	(Million US$)		144.3		144.8		289.1	
TCDD	(Million US$)		133.8		223.5		357.2	
Port capacity	(Thousand tons)	44,258		59,401		83,995		Note 1)
Rogh profit	(Million US$/year)	133		178		252		Note 2)
Rogh profit	(Million US$)		1,555		2,151		3,706	

Case-1 Other public ports handle the remaining cargo on the sea

		1998	2000-2010	2010	2011-2020	2020	Total 2000-2020	Remark
Investment								
DLH	(Million US$)		144.3		144.8		289.1	
TCDD	(Million US$)		133.8		223.5		357.2	
Port capacity	(Thousand tons)	44,258		59,401		83,995		Note 1)
Rogh profit	(Million US$/year)	133		178		252		Note 2)
Rogh profit	(Million US$)		1,555		2,151		3,706	

Case-2 TCDD ports handle the remaining cargo on the sea

		1998	2000-2010	2010	2011-2020	2020	Total 2000-2020	Remark
Investment								
DLH	(Million US$)		248.3		229.6		478.0	
TCDD	(Million US$)		169.8		279.8		449.6	
Port capacity	(Thousand tons)	44,258		64,756		95,920		Note 1)
Rough profit	(Million US$/year)	133		194		288		Note 2)
Rough profit	(Million US$)		1,635		2,410		4,045	

Note

1)For calculation of port capacity, 1TEU is equal to 10 tons.

2)Rough profit ratio is set at US$ 3 per ton according to TCDD ports financial performance.

8.4 Proposed Strategic Financial Scheme for Port Investment

Proposed strategic financial scheme is comprise of two parts; the one is a scheme for an efficient financial operation of TCDD port account and a scheme for encouraging private sectors who are expected to enter the port or port related business.

For an efficient financial operation of TCDD port account, authorities should start to consider a matter that the port account should be separately operated from the railway account on the following conditions;

1) The port account should continue to increase Treasury receipts. The annual amount transferred to Treasury would be 50% of the annual rough operating profit. The transferred amount to Treasury during the 20 years from 2001-2020 totals US$ 2,022 million in Case-2.

   It is expected that the Government will take necessary measures to utilize this transferred amount mainly for the rationalization of the TCDD railways and the as compensation for the loss of the TCDD railways.

2) The port account should be efficiently operated to raise investment effectiveness. The port account should be allowed to invest in both sub-structure and super-structure in order to realize effective investment by short-term construction and improvement. Thus budget amount of the maritime port investment for TCDD ports should be transferred to the port account. Annual amount for self-operation would be 40% of the annual rough operating profit, which will allow investment in both sub-structure and super-structure in TCDD ports. Self-operation amount during 20 years sums up US$ 1,618 million in Case-2.

3) The port account should function like a public fund to support private sectors because TCDD is unable to handle all of the increasing cargo. On the other hand private sectors will be wanting lenders in order to cope with the increasing cargo in their ports because of shortage of private credits. Therefore this account is expected to function as a public fund. Both Treasury and Transport Ministry will operate this account from a viewpoint of encouraging the private sectors. TCDD will act as a secretariat of the account. The annual amount of this function would be 10% of the annual rough profit. This amount during 20 years from 2001-2020 totals US$ 404 million in Case-2, which compensates a large portion of the shortage of private financing resources.

4) It should be noted that this TCDD fund is not utilized as a subsidy, but as a loan which will bear interest on a commercial basis.

For encouraging private sectors, the authorities should begin to reconsider the following points on BOT scheme, transfer of operation right, the support function for private sectors and the tax system.

1) In a BOT contract, the authorities should start to reexamine articles on arbitration,

account, cost increase, force majeure and termination from the viewpoint of risk sharing. Details are explained in “8.2.1. BOT scheme.” In order to make an attractive BOT scheme, the authorities should have opportunities to consult with financial advisers and lawyers to improve and develop skills on BOT financial scheme.

2) In an agreement of transfer of operation rights, the authorities should reexamine articles on repair cost of natural disaster and assignment of authorization because some private operating companies may be faced with financial difficulties according to financial statements. Details are explained in “8.2.2 Port Operation at Privatized Port.”

3) Investment by private capitals is inactive as explained in “8.2.4 Private Capitals.” A public function should be established, which provides private sectors with a direct loan and/or a guarantee to a loan from private banks. This function will be in the TCDD port account as described above. This public function will compensate a large portion of the shortage of private financing resources.

4) A tax system has a function to provide enterprises with financing resources as exemption. Because those enterprises in the port businesses or those which intend to enter the port business are small, they are not eligible for incentive schemes. In this sense, a tax system of prepaid stock dividends and special depreciation is a powerful tool to encourage private investment and should be considered to compensate the shortage of private funds.

Chapter 9. Strategy for Institutional Framework

9.1 General

Ports and harbors are essential for the growth of the national economy, as well as the nuclei of regional development. Port development by the private sector also should be guided by this basic principle.

In Turkey, as economic growth is expected to increase cargo handling demand as well as increase private sector participation in port development, it is required for the government to achieve overall administration on nationwide port development in future. In order to facilitate planning and coordination function by the central government, individual ports should be administered by statutory bodies entitled at the first step. There are numerous ports along the long coastline in Turkey, and conditions vastly differ by region. Each port authority has an obligation to administer and manage properly in line with the actual condition such as the existence of neighboring ports and the distance from the city center. The central government establishes institutional framework for the basics of the port administration. In addition, government coordinates and leads each port authority to the policy goals.

9.2 Policy Framework to be required

Chapter 7 analyzed the relationship among port administration, port management and institutional framework and identified a lot of conduct and procedures. Almost of all those conduct and procedures related to institutional framework should be borne by central government and can be categorized into the following four policies.

(1) Policy on coordination by port master planning
This policy contains the following issues.

- To establish the nationwide port development master plan -
- To establish the guideline for port development master plan of individual port -
- To coordinate organization concerned in formulating port development master plan of individual port -
- To approve the port development master plan submitted by Port Authority -
- To approve the development plan of coastal facilities (port facilities) based on relevant laws and regulations
- To grant port operational right to appropriate organizations in individual port -

(2) Policy on organization
This policy contains the following issues.

- To restructure the port administrative and management organization to meet the global current -
- To restructure the port administrative organization to strengthen the coordination and cooperation function among the organization concerned in central government-

(3) Policy on sub-framework for port management

- To introduce appropriate system to reinforce the ability of human resources in relevant organization -
- To introduce necessary framework for effective port administration including port statistics on legal bases

(4) Policy on step-wise preparation for nationwide port development

9.3 Coordination System by Port Master Planning

9.3.1 Basic framework

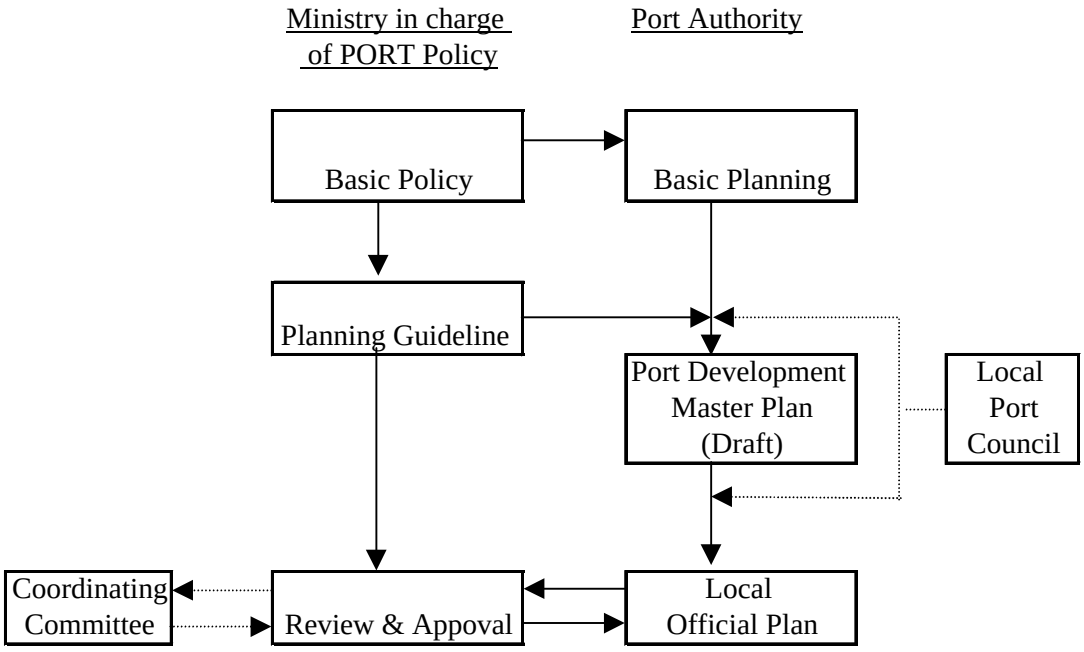
(1) Establishment of Guideline for Port Development Master Plan
The central government formulates a guideline for port development master plans which are established by each port authority, and the planning criteria including items to be established, and items to be considered. Those standards for masterplans are based on the basic policy for nationwide port development.

(2) Establishment of 'Port Planning Coordinating Committee'
The government tentatively establishes a 'port planning coordinating committee' in the ministry which is in charge of comprehensive port policies, which consists of staffs from the port-related ministries concerned. The committee coordinates among the ministries concerned on matters from port masterplans to the construction plans.
Apart from this committee, the government establishes a task force meeting to examine the integration of port and harbor administration in the Prime Ministry.

9.3.2 Procedures for coordination

The government reviews the port development master plan submitted by a port authority, based on the guideline which follows the basic policy, and gives approval. In case of changing the plan, it is also necessary for the port authority to obtain approval from the central government. After obtaining approval, port authority makes construction plan, deciding the development priorities based on the government's basic policy and the approved master plan. Following figure shows the flow of coordination procedure. Based on the submitted construction plans, the government formulates the nationwide port development plan that includes investment by private sector, taking into consideration development priorities by the criteria of ports. The formulated nationwide port construction plan is submitted to SPO for approval. The projects which are not eligible for financial assistance by the government are reviewed for approval at the port planning coordinating committee.

Figure 9.3.1 Procedures for port planning and Implementation



Source: JICA Study Team for ULIMAP

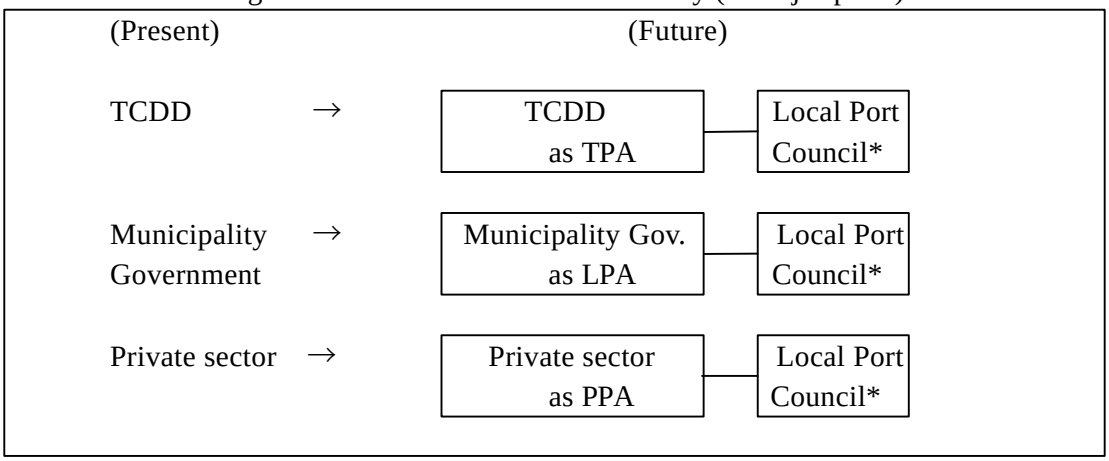
9.4. Organization of Port Authority

9.4.1 Establishment of 'Local Port Council'

Port authorities at major ports designated by the government must have a 'Local Port Council' with which to consult and obtain comments and recommendations on establishing or changing port development master plan. This is because the development of major ports is considered to have a significant impact on the national interest.

The Local Port Council gives advice and makes recommendations at two sectional meetings for administration, and management & operation. Staffs from the competent local government (province or metropolitan municipality), and the branch office of port related ministries are appointed as the members of the administrative meeting. The management & operation meeting consists of port customers such as shippers and consignees, vocational chambers, port operators and persons of learning and experience. Following figures show key concepts of recommended port authority in Turkey.

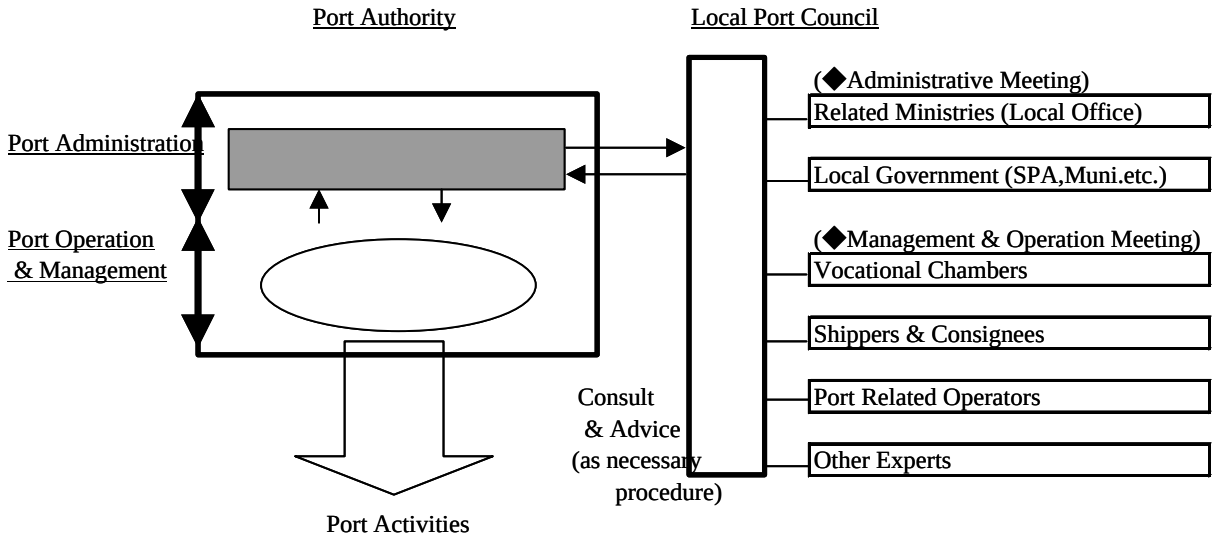
Figure 9.4.1 Structure of Port Authority (at major ports)



*Local Port Council is established in the category of major ports under legislation.

Source: JICA Study Team for ULIMAP

Figure 9.4.2 Organization of Port Authority



Source: JICA Study Team for ULIMAP

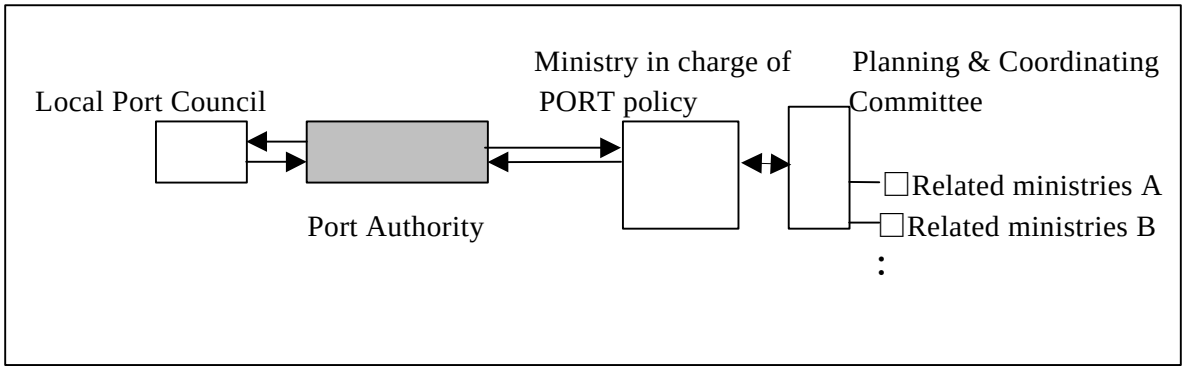
9.4.2 Relationship between Port Authority and Government

In the new framework, the main ministry which has the greatest responsibility for promoting the national port development should be clarified. Until now, the responsibilities on port development have been cut into pieces functionally among the competent ministries. This is one of the reasons why a total coordination function is lacking in the present system.

Following figure shows a relationship between port authorities and government. Under the new concept, for regional matters, local port authorities are to take necessary procedures with the ministries concerned through a local port council. Meanwhile, at the national level port authorities contact the competent ministry to submit the port development master plan. The contact ministry establishes a coordinating committee, which consists of port-related ministries concerned.

Financial involvement by the central government in the new scheme will be basically the same as in the present framework for the time being. This is because it is necessary at present to establish a framework as soon as possible for port development with the participation of private sector in future. The difference is that the government establishes port development priorities financially by introducing port priority policy.

Figure 9-4-3 Relationship between port authorities and government



Source: JICA Study Team for ULIMAP

9.4.3 Characteristics of Proposed Port Authority in Turkey

(1) Autonomous port administration

Granting port authority status to port management bodies establishes a foundation for an autonomous port administration system. Especially for major ports that have great influence on the national development, coordination function by the central government is strengthened through the approval of the port development master plans and so on.

(2) Flexible port management
The system should reflect the comments or recommendations by the local port council to ensure that the port management bodies function in an efficient and customer oriented manner.

(3) Financial Independence
Pursuit of financial independence depends on the development policy of each port. The central government assigns financial priority based on the classification of ports (main ports /local ports etc.). At present, most port authorities in Turkey are not financially independent. (But some exceptional cases are found among port authorities that belong to Private Port Authorities.)

(4) Port development in liaison with regional development
Local governments (provinces or municipalities) can be involved in local port councils which are to be established at major ports preferably by laws to promote integrated land use between port area and the adjacent area, as well as effective use of the port area including environmental conservation. Necessary coordination would be done flexibly at the port authority. The competent government can entrust the statutory bodies with necessary authorities such as management of environment of port areas, if necessary. This system would be more effective when regional development projects are promoted in liaison with port development with the government's initiative.

9.5 Establishment of Sub-framework for Port Management

9.5. 1 Strengthening Port Statistics System

Port statistics are very important as a tool for nationwide port development. It is essential to make full use of port statistics for recognizing present situation on port activities nationwide in establishing basic policy. The port statistics here are understood as the data related to port administration, management and operation such as cargo handling volume by port, and by handling shape. Especially cargo handling data are required in details in examining designing port facilities, procuring handling equipment and yard arrangement etc.

(1) Present Situation
Basic port statistics in Turkey have three categories by data sources: the Prime Ministry Undersecretariat Maritime Affairs (PMUMA), customs, and port management bodies. Unfortunately, there are many inconsistencies among the different data sources.

Firstly, the number of ports in port statistics by PMUMA is not consistent with the total number of ports. Because harbor master offices which keeps statistics are established only at major ports. In addition, the cargo handling volume is not consistent between PMUMA and port management bodies. The data of PMUMA are compiled based on the application for port entry procedure by captains. Meanwhile, the data of port management bodies are

the cargo handling volume which are treated at the site.

Secondly, the category of conventional cargo is different between PMUMA and each port management body. Even worse, this holds true among each port management body. The fact is that each port management body compile necessary port data for its own use. One of the reasons is that there is no legislation requiring that port management bodies compile data in a standardized manner.

(2) Recommendation

- Authorization of Port statistics by port authority

At present in Turkey, the most systematic and consistent data are port statistics by PMUMA. The cargo handling data, however, is insufficient from the viewpoint of port development and promotion because the data source originally comes from inspection reports for port entry application. Another data source with regard to cargo handling volume should be secured to supplement PMUMA data. In that sense, port statistics by port management bodies should be paid more attention.

Firstly, as for the cargo handling volume, the data by port management bodies seem reliable because the figure is the actual volume which is treated on the site. Secondly, the details such as the handling volume by handling type can be grasped. Lastly, port management bodies which understand the importance of marketing activities for port promotion such as some private ports have tendency to compile accurate and detailed statistics. For your reference, the data source of Containerization Year Book (CYB), one of the de facto standard statistics, is also port management bodies from world ports.

At least, port statistics of major ports which have significant impact on the national interest should be periodically reported to the central government under the law.

- Unified category of statistics

As for the statistics of PMUMA, it has been examined to adjust their coding system into global standards. Statistical categories should be unified among each port management body on the national basis. Related guidelines in EU or international organizations also should be examined as they must be compatible in future. Unified criteria on port statistics cargo enable comparison of the port data among all ports regardless of type of port management bodies, which is a powerful tool for nationwide port development policy making.

- Nationwide Physical Distribution Survey

Fundamental data on nationwide container cargo flows is useful for the examination of nationwide port development strategies. Periodical OD (Origin-Destination) survey for container cargoes is a supplementary means to grasp the cargo handling volume.

9.5. 2 Management of Port facilities by Register

In many ports, port facilities management by register is not always being done in an integrated fashion by the port management body. Because port infrastructure is constructed and maintained by the government, while superstructure is constructed by the port management body. Management of port facilities including data collection should be implemented integratedly by the port authority exclusively. In this way, it would become clear when port facilities need to be renewed.

9.5. 3 Personnel Education System

(1) Present situation
Specialization on functional basis in the present port administration system works well in solving immediate problems. Because each expert in the related field can tackle subjects intensively. However, port administration involves dealing with a number of fields simultaneously in an effective manner. This is because a variety of activities such as reclamation works, port operation, land transportation, manufacturing, trading take place in ports and adjacent area.

Secondly, it is important for the staffs in charge of port development and administration to deepen their understanding of container transportation which will become prevalent even in Turkey from now on. Basic concepts such as punctual time management, door-to-door transportation and intermodal transportation should be considered in the construction of port facilities and port management and operation.

(2) Recommendation
- Personnel Changes among Port-related Ministries

Personnel changes among port-related ministries should be considered to increase communication and information sharing. It should be noted that bureaucracy in the government would inevitably hinder effective port management and operation.

- Establishment of ‘Port and Harbor Council’

Persons of learning and experience in the field of ports and harbors should be utilized in the process of policy making. Fortunately, there are many talented people with wide experience in container transportation and port management around the business world in Turkey. A system to draw on their opinions should be established urgently. For instance, it is effective to establish ‘Port and Harbor Council’ in the government, apart from the existing transportation council in MOT. ‘Port and Harbor Council’ which consists of experts on port construction, port management and operation, and other experienced persons concerned, should be established in the government to give comments and recommendations when necessary.

9.6 Step-wise Preparation for the Nationwide Port Development

In order to realize strategies for nationwide port development, we tentatively propose the following steps. Considering the necessity to deal with changes of external environment, it is better to start the new institutional framework as soon as possible, and strengthen the system by adopting mitigating policies.

(1) Preparatory Stage: (～2002)

- The main ministry responsible for nationwide port development is decided.
- The competent ministry prepares draft framework of basic policy for nationwide port development plan.
- Port Planning Coordinating Committee should be established in the competent ministry for comprehensive overall administration on Ports and Harbors as an urgent measure for unifying port administration.
- Task Force on Effective Administration on Nationwide Port Development is established in Prime Ministry for restructuring authorities and organizations. The members are appointed by the ministers concerned under the legislation. This task force also discusses the draft framework on the basic policy making.
- Possibility of separating port account from rail account is discussed between MOT and TCDD.
- Personnel Changes among the port-related ministries are examined.

(2) Policy-Making Stage: (2003～2005)

- The competent ministry formulates specific policies in each field of the basic policy, based on the discussion in the Task Force. The competent ministry also establishes related laws and regulations on the specific policies.
- The competent ministry establishes guideline for port development master plan which is to be made by port authority, based on the basic policy.
- Task Force establishes restructuring policy on overall port administration system such as the matters including allocation of authority among the relevant ministries concerned.
- Necessary revision of related laws and regulations on port administration is implemented as proposed:

  1) Definition of 'PORT' to be managed
  2) Introduction of 'PORT AUTHORITY'
  3) Introduction of Port Development Master Plan & coordinating system
  4) Reexamination in present related laws such as laws on establishment of local governments (Province, Metropolitan municipality, and Municipality), laws on land use, etc.

- Financial framework and allocation scheme are discussed among the ministries concerned, based on the progress of the meeting on TCDD account.
- New system to draw on experts' opinions in the administration is examined.

- The competent ministry establishes Task Force Team on formulating unified port statistics criteria in cooperation with PMUMA.

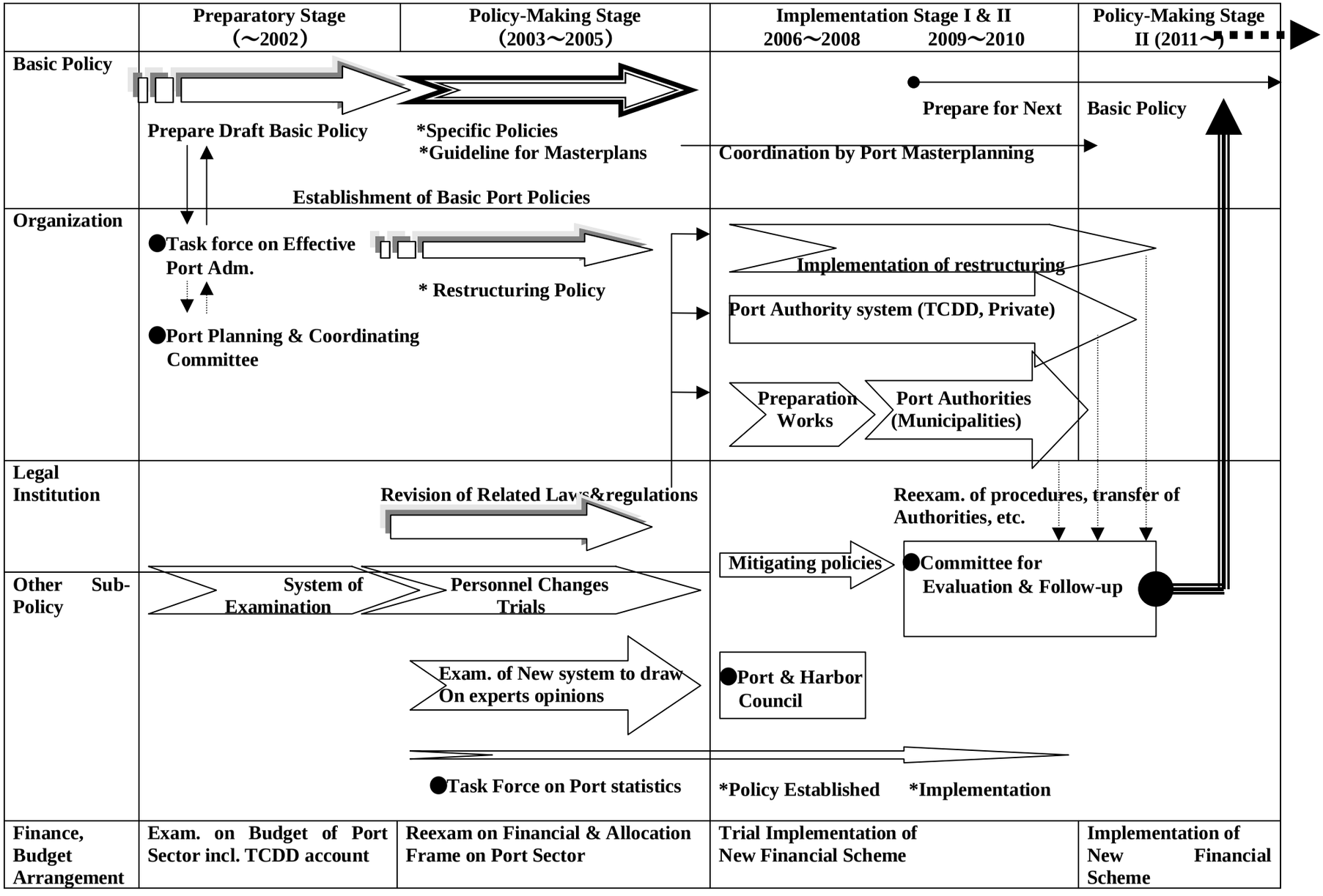
(3) Implementation Stage I: (2006～2008)

- The 1st restructuring of organization is implemented for integrating the port administration.
- Port Authority system is introduced for TCDD ports and Private ports.
- Preparatory works for introduction of port authority into local municipality governments are implemented such as personnel, job assignment, and staff training.
- Coordinating system through establishing port development master plan by each port authority is partly executed. (Period for trials and errors)
- Preparation of various sub-systems for mitigating drastic impacts are done by the ministries concerned.
- New financial scheme is implemented on trial base.
- Port and Harbor Council is established in the competent ministry.
- Task Force Team on formulating unified port statistics criteria establishes port statistics policy.

(4) Implementation Stage II: (2009～2010)

- The competent ministry prepares for next term port development basic policy.
- The 2nd restructuring of organization is implemented as the final stage.
- Port Authority system is introduced for local municipalities ports.
- Coordinating system through establishing port development master plan by each port authority is implemented.
- “Evaluation Committee for newly introduced system” is established by the ministries concerned to evaluate and take countermeasures as follow-up. This PLAN-DO-SEE process is repeated to realize the nationwide port development.
- New financial scheme is implemented.
- Port statistics system based on unified criteria are prepared by port authorities.

Figure 9.6.1 Procedure for the Realization of ULIMAP



Chapter 10 Strategy for Port Operation

10.1. Importance of Establishment of Basic Concept

10.1.1 General

In examining the strategy for port operation, effective use of existing facilities is getting more and more important owing to a lack of public funds. High cargo handling productivity should be realized in order to provide users with high quality services without further investment in facilities in the terminal. It is also necessary for port operators to enhance their productivity by introducing appropriate cargo handling system and facilities. In addition, introduction of EDI (Electronic Data Interchange) and simplification of custom clearance are also considered as a chain of efficiency of port operation.
In Turkey, generally, cargo handling productivity is not so high compared with many other major ports in the world. This is mainly due to lack of capacity, old handling equipment, lack of trucks & trailers, traffic congestion etc. From the above-mentioned views, the details of the strategy shall be summarized as follows. In this chapter, the discussion shall be concentrated on port operations at TCDD ports, which comprise the major ports in Turkey.

1) Establishment of Basic Concept for Efficient Port Operation
2) Improvement of Container Handling Operation
3) Improvement of Conventional Cargo Handling Operation
4) Improvement of Dry Bulk Cargo Handling Operation
5) Introduction of EDI (Electronic Data Interchange) System

10.1.2 Establishment of Basic Concept for Efficient Port Operation

In order to improve cargo handling efficiency, it is necessary for Turkish Ports to consider the following basic concepts.

(1) Effective Use of Existing Facilities

If Turkish ports use the existing facilities efficiently, the government can avoid further investment for the ports. If the productivity of cargo handling increases by 30%, the cargo volume also may increase by 30%. In this sense, effective use of existing facilities enables government not only to secure efficient port operation and but also to avoid further investment.

(2) Concept of Land-lord Port Type

Seaports of TCDD are planning to be taken into the privatization portfolio in the near future. In this case, the fact should be kept in mind that a port should be administered and controlled comprehensively by a public organization called a port authority (port management body), whereas cargo-handling operations should be performed by private companies because their pursuit of profit can promote efficient cargo-handling operations

(landlord port). The current worldwide trend in the port field is undoubtedly towards the "landlord port". In fact, purely private ports are exceptional among worldwide ports. For reference, the following Table 10.1.1 indicates the classification of port type.

Table 10.1.1 Classification of Port Type

No	Port Type	Type	Planning & supervision	Construction			Operation	
				Channel Dredging	Site develop-ment	Terminal facilities	Administ rative Facilities	Cargo handling
①	Service Port (TCDD Port)	-	Public	Public	Public	Public	Public	Public
②	Landlord Port 1 (Japanese public berth)	Lease	Public	Public	Public	Public	Public	Private
③	Landlord Port 2 (Japanese semi public berth)	Lease	Public	Public	Public	Public	Private	Private
④	Land-lord Port 3	Lease	Public	Public	Public	Private	Private	Private
⑤	BOT		Public	Public	Private	Private	Private	Private
⑥	Privatized		Private	Private	Private	Private	Private	Private

(3) Encouragement of Competition

It is necessary to introduce competition in the field of cargo handling operation to improve the performance and service level to customers. In addition, it is necessary to abolish the monopolistic privileges of state-owned companies (TCDD) so that all the parties can compete on equal conditions; encouraging competition between state-owned companies and private companies will improve the service level. This concept is a key element for the success of the privatization in which the aim is to improve the service level to customers.

Today, changing trends can be seen in Turkish ports. For example, Hayderpasa port is being obliged to compete with privatized ports such as Kum Port. If Hayderpasa port can't provide good services to users with reasonable prices, its share may be diverted to private ports. Furthermore, Izmir port plans to develop a container terminal on BOT basis. If the plan is realized, TCDD may have to compete with the private sector (Inter-terminal competition). In accordance with the increase of cargo volume, the necessity of effective use of the private sector in port operation will be inevitable.

(4) Satisfaction of Customers (User-oriented Port)

Customers' demands are efficient cargo handling and speedy procedure for cargo delivery with lower costs. The recent world trend suggests the competition will be more and more severe in the future. In accordance with the increase of competition, the customers demands may grow rapidly. Management will have to meet these demands to survive severe competition. Turkish ports should aim to become not "employee-oriented" but "user-oriented".

(5) Monitoring the Performance of Operators

Generally, port management body should monitor the performance of operators and recommend the improvement of productivity if the performance is poor and reject the renewal of lease contract if improvement is not expected. TCDD and TDI need to put pressure on port operators or their staff to improve the productivity of operation. This will become an important role of the port management body.

(6) Incentive for Good Performance

Good management should be rewarded or employees should be motivated by incentives to achieve good performance. If the operator is highly productive, he or she should be rewarded. On the contrary, in case of poor performance, the appropriate guidance or supervision shall be given. In order to do so, port management body needs to establish appropriate targeted productivity of cargo handling and to monitor the performance.

(7) Introduction of Payment based on Ability

As a chain of incentive system, introduction of "payment based on ability (productivity)" is one idea. Some port authorities such as PSA (Port of Singapore Authority) have already introduced this kind of system. By introducing a wage system based on handling volume, if work is done efficiently, port workers can earn the same wages as at present in a shorter time. This may raise the efficiency of port activities, and the port management body will earn more revenue with the increase of cargoes handled.
TCDD and TDI have already introduced a similar system. However, it can't be said that this system has worked well so far as he productivity and service levels have not increased.

10.2 Improvement of Container Handling Operation

10.2.1 Evaluation of Present Container Handling Productivity

(1) Productivity of Container handling at Major Ports in Turkey

According to information reported from certain ports, the productivity of cargo handling is 22-25 TEU per hour at specific TCDD ports by using gantry cranes and 18-19 TEU per hour by mobile cranes at some private ports. These figures are not bad. However, according to cargo volume-berthing time analysis based on TCDD statistics (Limani Aylik Istatistic Cetveli, 1998, See Appendix 10.3), the container handling productivity (gross time) can be assumed 10.11-10.17 box/hour/crane (about 15 TEU/h/c).

Taking into consideration "non-working time" for stevedoring preparation, various procedures & departure preparation (usually 2-3 hours), the productivity will increase to about 12-13 box/hour/crane (gross time). It can be assumed that net time productivity is approximately 15-17 box/hour/crane (about 30% up). Although the productivity may be improving little by little, it is still low compared with many other ports in the world.
Several reasons for low productivity are pointed out. One major reason is traffic congestion resulting from storing of containers in excess of nominal capacity.

Table 10.2.1 Productivity of Container handling at 3 Major Ports based on Cargo Volume-Berthing Time Analysis (1998)

Item	Hayderpasa	Izmir	Mersin
① Cargo volume (TEU)	322,596	398,619	241,865
② Cargo volume (box)	221,881	281,001	161,385
③ Total berthing time (hour)	21,812	27,628	15,949
④ Productivity (①/③) (TEU/hour/crane)	14.78	14.42	15.16
⑤ * Gross productivity (②/③) (Box/hour/crane)	10.17	10.17	10.11
⑥ * Revised Gross productivity (Box/hour/crane)	11.93	11.75	12.63
⑦ * Net productivity (Box/hour/crane)	15.50	15.27	16.41

Source : TCDD
* Note
"Gross productivity" includes idling time. "Net productivity" doesn't includes idling time (break time, crane movement & hutch cover operation, etc).

(2) Comparison of Container Handling Productivity

The following Table 10.2.2 compares productivity of major Turkish container ports (Hayderpasa, Izmir & Mersin) and other major ports in the world. For reference, Table 10.2.3 summarizes productivity of container handling at Turkish major ports (1998) and Table 10.2.4 shows examples of container handling in other major ports (1997).
Container handling productivity of all Turkish ports (246-496TEU/m) is less than that of major ports. This means there is room for receiving more cargoes. In terms of quay crane operational productivity, Izmir (99,654) compares favorably while Hayderpasa (36.65) & Izmir (36.00) demonstrate high productivity in container turnover in storage.

Table 10.2.2 Result of Comparison with Other Major Ports

Description	Unit	Turkish 3 Major Ports (1998)	Other Major Ports (1997)
① Container handling productivity	TEU/m	246-496	773-1,919
② Quay crane operational productivity	TEU/crane/year	79,723-80,649	88,888-150,000
③ Container turnover in storage	Times year	28.54-36.65	39.18-344.37

Table 10.2.3 Productivity of Container Handling at 3 Major Container Ports (1998)

Item	Hayderpasa	Izmir	Mersin
① Length (m)	* 650	1,050	980
② Berth number	4	5	4
③ Maximum depth (m)	-12	-13	-10～-14
④ Quay gantry crane	4 (40t)	5 (40t)	3 (40t)
⑤ Transfer crane	9	9	11
⑥ Holding capacity (TEU)	8,800	11,072	8,474
⑦ Container yard (m2)	179,040	211,017	266,130
⑧ TEU (1998)	322,596	398,619	241,865
⑨ ⑧/① (TEU/m)	496	379	246
⑩ ⑧/② (TEU/berth)	80,649	79,723	60,466
⑪ ⑧/④ (TEU/crane/year)	80,649	79,723	80,621
⑫ ⑧/⑥ (Times year)	36.65	36.00	28.54

* The figure doesn't include the container terminal (250m) with ship cranes.

Table 10.2.4 Examples of Container Handling in Other Major Ports (1997)

Item	Tg. Priok (Indonesia)	MICT (Philippine)	Laem Chabang (Thailand)	Delta Sealand Terminal (Rotterdam)	Pier 300 APL (LA)
① Length (m)	1,410	900	1,200	970	1,219
② Width (m)	83	-	-	577	770
③ Depth (m)	-14	-14.5	- 15	-16.5	-15
④ Quay gantry crane	17	9	8	8	12
⑤ Holding Capacity (TEU)	35,204	19,000	-	7,664	-
⑥ TEU	1,533,090	907,202	1,000,000	750,000	1,800,000
⑦ ⑥/① (TEUs/m)	1,087	1,008	833	773	1,476
⑧ ⑥/④ (TEU/crane/year)	90,181	100,800	125,000	93,750	150,000
⑨ ⑥/⑤ (Times year)	43.54	47.74	-	97.86	-

Item	Hong Kong		Singapore		
	HIT (CT 4,6,7,8 east)	MTL (CT 1,2,5,8 west)	Tg. Pagar	Keppel	Brani Terminal
① Length (m)	3,932	1,822	2,142	2,785	2,375
② Width (m)	-	-	-	-	-
③ Depth (m)	-12.2 - -15	-15	-9 - -14.8	-9.6 - 14.6	-12 - -15
④ Quay gantry crane	45	19	30	36	31
⑤ Holding Capacity (TEU)	87,314	51,991	16,400	14,316	15,000
⑥ TEU	4,000,000	2,037,185	4,110,000	4,930,000	3,780,000
⑦ ⑥/① (TEUs/m)	1,017	1,118	1,919	1,770	1,592
⑧ ⑥/④ (TEU/crane/year)	88,888	107,220	137,000	136,944	121,935
⑨ ⑥/⑤ (Times year)	45.81	39.18	250.60	344.37	252.00

Prepared by OCDI

(3) Reasons for Low Performance

1) General

Following reasons for low productivity of container cargo handling at TCDD ports are identified. First of all, the "non-competition" environment (monopolistic structure) can be pointed out. In addition, the following reasons can be seen from the physical point of view.

① Lack of capacity causes traffic congestion in the port and reduces the efficiency of container handling. Containers unloaded from ship must wait for the arrival of tractors.
② Infrastructure of the port is in poor condition and this has a negative impact on the vehicle and equipment.
③ In specific ports, pavement of container terminal is deteriorated, preventing smooth transportation of container traffic.
④ Cargo handling equipment is quite old and often requires maintenance, which leads to reduced productivity (See 10.2.6).
⑤ Number of spare parts for the container handling equipment is insufficient.
⑥ Since tugs and pilots services are operated by TCDD and TDI respectively, insufficient linkage in the works of these services causes delay in the vessel schedule.

The reasons for low productivity particularly for the 3 major ports are analyzed. The following reasons by each port can be pointed out. However, further study will be necessary for researching detailed reasons for low productivity.

2) Haydarpasa

(a) Lack of Capacity
(b) Obstructed Container Traffic Flow
(c) Maintenance Issue
(d) Old Cargo Handling Equipment (See Chapter 10.2.6)
(e) Delayed Computer System

3) Izmir

(a) Limited Container Stacking Space
(b) Shortage of Trailers & Chassis
(c) Manual Operation of Stuffing and Unstuffing in the Open Yard
(d) Non-computerized Container Handling Operation

4) Mersin

(a) Shortage of Gantry Cranes and Transfer Cranes (Only 3 QGC & 11 Transfer Cranes)
(b) Shortage of Container Handling Equipment (Only 7 Forklifts & 8 Reach Stackers)
(c) Non-computerized Container Handling Operation

10.2.2 Establishment of Targeted Productivity

The following Table 10.2.5 shows container handling productivity in neighboring major ports. The average container handling productivity in neighboring competitive ports such as Algeciras &Gioia Tauro account for 23-26 box/hr (For reference, See Table 10.2.6 & 10.2.7 container handling productivity in world major ports & in Japanese major ports).
Generally speaking, current world trends indicate that the targeted productivity of container handling should be 24-25 boxes/hour per crane. It is required to achieve the targeted productivity of container loading/unloading operation to handle the future container traffic in the existing facilities. This target means that a crane operator has to finish one cycle of movement within 2 minutes and 30 seconds.
Although efficiency of container loading/unloading operation depends on the skill or technique of a crane operator, the productivity of marshalling yard is also very important for quick and smooth operation.

Table 10.2.5 Container Handling Productivity in Neighboring Major Ports

Port	Container traffic	Container handling productivity (Gross Time)
*Algeciras (Spain)	1,825,614 TEUs (1998)	Av. 25 Box/hr (Ships operation) Av. 27 Box/hr (Yard operation)
* Gioia Tauro (Italy)	2,125,640 TEUs (1998)	Av. 26 Box/hr (Ships operation)
* Marsaxlokk(Malta)	720,000 TEUs (1998)	Av. 23 Box/hr (Ships operation)
* Damietta (Egypt)	610,000 TEUs (1997)	Av. 14.3 Box/hr (Ships operation) (337,494 box÷23,593hr = 14.3)
* Port Said (Egypt)	312, 454 TEUs (1997)	Av. 16.4 Box/hr (Ships operation) (312,454 box÷19,009hr = 16.4)
* Alexandria (Egypt)	188,000 TEUs (1997)	Av. 16.9 Box/hr (Ships operation) (133,031 box÷7,890hr = 16.9)
* El Dekheila (Egypt)	151,622 TEUs (1997)	Av. 18.6 Box/hr (Ships operation) (112,446 box÷6,032hr = 18.6)
** Latakia (Seria)	101,427 TEUs (1995)	Av. 10.05 Box/hr (Ship crane)
** Tartous (Seria)	83,680 Ton (1995)	Av. 5-10 Box/hr (Ship crane) Av. 3-5 Box/hr (Floating crane) Av. 10 Box/hr (Ro/Ro)
*** Aqaba (Jordan)	139,317 TEUs (1996)	Av.16 Box/hr (Gantry crane)

Source : * Study on Master Plan & Rehabilitation Scheme of the Great Alexandria Port (OCDI, November 1999)
** Study on the Port Development Plan in the Syrian Arab Republic (OCDI, August 1996)
*** Study on the Improvement Plan of the Port of Aqaba in the Hashemite Kingdom of Jordan (OCDI, February 1996)

Table 10.2.6 Container Handling Productivity in Major World Ports (Reference)

Port or terminal	Ranking (96)	Container traffic (96)	* Container handling productivity of ship operation (box/hour/crane)
Kaohsiung (Taiwan)	3	5,063,048 TEUs	Av. 28-29 b/h/c
Rotterdam : Delta Sea Land (Holland)	4	4,935,616 TEUs	Av. 25-30 b/h/c
Busan (South Korea)	5	4,725,206 TEUs	Av. 30-35 b/h/c
Felixstowe (U.K.)	16	2,042,423 TEUs	Av. 22-23 b/h/c
Seattle (USA)	22	1,473,562 TEUs	Av. 26 b/h/c
Tg.Priok CT1, CC3 (Indonesia)	24	1,421,693 TEUs	Av. 22.7 b/h/c (Net : 28.36 b/h/c)
Tg.Priok CT1, CC4 (Indonesia)			Av. 24.2 b/h/c (Net : 32 b/h/c)
JCT Colombo (Srilanka)	26	1,356,301 TEUs	Av. 18-20 b/h/c (main vessel) Av. 14-15 b/h/c (feeder vessel)
QCT Colombo (Srilanka)			Av. 14-15 b/h/c (main vessel)
Bangkok (Thailand)	28	1,232,610 TEUs	Av. 21 b/h/c
Leharvre (France)	33	1,020,040 TEUs	Av. 22-23 b/h/c
Mumbai (India)	59	585,415 TEUs	Av. 21.03 b/h/c
Tg. Perak (Indonesia)	61	571,153 TEUs	Av. 21.03 b/h/c
Jawaharlal Neru (India)	73	423,148 TEUs	Av. 14.2 b/h/c

Prepared by OCDI based on specific studies

* Note : The figure includes idling time (gross time).

Table 10.2.7 Container Handling Productivity in Major Japanese Ports

Types of Container Handling	Handling Productivity
1) Gantry crane	40 b/h/c (net), 30 b/h/c (gross)
2) Ship crane	15 b/h/c
3) Truck crane	8-10 b/h/c
4) Floating crane	6 b/h/c

Source : Study on Container Terminal Planning (OCDI)

10.2.3 Effective Measures for Container Handling Operation

In order to achieve the targeted productivity, following measures shall be promoted from the practical point of view.

(1) For Unloading Operation

1) In case of unloading, a crane operator has to know in advance the location of containers to be lifted in a hold or on deck.
2) An operator of quayside crane should not stop a spreader to find a container to be lifted.
3)The operator has to put a spreader on a container exactly and should not hit a spreader or container against other containers. Sway of containers prevents a crane operator from loading containers onto tractor/trailers quickly and smoothly.
4) A crane operator should move a spreader at the appropriate and constant speed to prevent the sway of containers.
5) Drivers of yard tractors should cooperate with a crane operator to minimize delay at the interface between a quayside crane and stacking area to achieve the targeted productivity.
6) A crane operator should not stop the movement of spreader to wait for arrival of trailers.
7) Three trailers usually work for one quayside crane. 3 drivers make up a team and they transfer containers in turn from quayside to stacking area or vice versa. If a trailer needs more than 7.5 minutes (2.5 minutes×3) to return to quayside, it is necessary to increase the trailers of one team.

(2) For Other Operations

1) In case of loading operation, before arrival of a vessel, it is necessary to get together and stack containers to be loaded in accordance with the stowage bay plan of vessels.
2) It is essential to pick up containers to be loaded onto a vessel quickly based on the sequence list of loading containers.
3) In case of delivering containers to consignees, it is required to retrieve nominated containers from stack quickly.
4) Information system in the following chapter should be adopted for precise and efficient operation.

(3) Importance of Roles of Signalman

In order to achieve the targeted productivity, signalman's role to support a crane operator is also very important for quick and smooth operation. A signalman must consider the standing position to give signals to a crane operator. If signalman's position is improper, the operator can not see the signalman. To avoid misunderstanding signals, hand signals must be standardized and unified. A signalman on shore must instruct a tractor/trailer driver properly to adjust the halt position so that an operator of quayside crane/RTG can load containers onto tractor/trailers smoothly. To give proper signals to crane operators, a crane operator needs to work as a signalman in turn while he is not operating a quayside gantry crane.

(4) Minimizing the Breakdown Time of Container Handling Equipment

To achieve the targeted productivity, it is essential to minimize the breakdown time of container handling equipment. Competent personnel should be appointed as a yard operator. This yard operator should always stand by in the terminal office to monitor both loading/unloading and yard operation. If some trouble with a quayside crane or container handling equipment occurs, the yard operator contacts the maintenance department to repair it. To minimize the breakdown time of quayside gantry crane or RTG, backup spreaders must be procured. It is also advisable to conduct preventive maintenance at a regular interval

(5) Establishment of Targeted Time for Tractor Flow (Round Time)

Advanced container terminals in the world have targeted productivity for tractor flow in order to satisfy customer's demands. It is called "round time" (dwelling time of tractor). Round time is different by operation types such as transfer crane type and straddle carrier type. The most popular target is within 30 minutes for tractors from gate-in to gate-out. It is advisable for TCDD ports to establish appropriate targeted time (desirably, within 30 minutes) based on accurate understanding of the current situation.

10.2.4 Introduction of Advanced Technology

To improve the efficiency of container handling operation, it is essential to exchange information and communicate effectively between crane operators and the supervisor at the control center. In Turkish container ports (Hayderpasa, Izmir), “walkies talkies” are being favored for communication between their offices and crane operators. However, most of operations are covered by man-power communication. Thus, the situation is far different from modern container terminals.
The following 4 systems for transmitting information are currently used at container terminals. The following Table indicates the particularities of each system.

Table 10.2.8 Particularities of Advanced System

Item	Ways of Utilization	Particularities
(1) Walkie Talkies	One way communication from control center to crane operators	① Relatively old system ② The system is fitted for small-scale CT
(2) Mobile Radio Terminal on Vehicle System	Two way communication between control center & crane operators	① Exchange of real-time information ② The system will widely introduced.
(3) PHS	Two way communication between control center & crane operators	① The system is fitted for small-scale CT. ② Small investment
(4) GPS	Installed on vehicles to detect the locations	① Detecting & indication of exact location of handling equipment. ② The system makes it possible to give appropriate instruction to operators.

(1) Radiotelephone (Walkie Talkies) System

This system has been used since the start of container transport. In this system, communication is only one way at the same time. Since the number of containers increased and electronic communication devices developed remarkably, this system is no longer a major means and has only been used as a supplementary means of communication at ordinary container terminals. It is still popularly used, however, at small-scale container terminals and van pools and more extensively by drivers of marine container tractor/trailers.

(2) Mobile Radio Terminal on Vehicle System

In this system, the mobile radio (receiver/transmitter) terminals installed on vehicles are connected with the host computer in the operation room, though partly off line. Information is exchanged in real time through the radio terminals on vehicles or the handy terminals carried and operated by the workers in the container yard. Although the output power is low, the range performance covers the whole terminal area with the help of a network of antennas linked with coaxial cables. As several manufacturers of various countries are making and developing this type of equipment, this system is expected to be widely introduced to various physical distribution facilities before long.

(3) Mobile Telephone System (PHS = Personal Handy phone System)

This is a communication system with mobile telephones using weak radio waves, whose band is different from that of ordinary mobile telephones. As their range performance is a radius of approximately 100 meters, antennas need to be installed at vast container terminals. This system is extensively used as the information transmittal system at small-scale container terminals and warehouses. Since the initial investment costs for the system are low, it is expected to be more popular at inland depots, van pools, etc.

(4) Global Positioning System (GPS)

GPS is not a communication system between crane operators and a supervisor in the terminal office but a system for detecting and indicating the accurate position of objectives in the world using satellites and their ground stations. The GPS receivers, which are installed in the container handling equipment, can indicate the location of the equipment in real time. By grasping the exact location of container handling equipment, the supervisor can instruct the operator in the nearest position to retrieve/stack containers quickly and efficiently based on information from gate offices or container inventory system. Consequently, the operation time can be minimized.

There might be some places in the terminal where radio waves can not reach the receivers due to quayside crane or high stack of containers. To solve these problems, it is necessary to set up antennas, which are different from those of the communication system. This system is not adopted at many terminals yet because the initial investment costs are high. However it is expected to become widely adopted as the size of container terminal becomes larger and this system can be introduced in a short time without special civil works.

10.2.5 Introduction of Computer Systems

(1) Documentation

1) Current Situation

Currently computers in TCDD ports are used only for specific administrative activities such as accounting, statistics & personnel. Computers are not yet connected with outside users. In Hayderpasa port, some specific activities (control of location of containers, container yard plan & personnel information) are disposed by computer. Therefore, TCDD does not make full use of the potential of computer systems.
There is a lot of paper work between port users and TCDD. Once a document is submitted to TCDD, basic information on the document is entered on other sheets or ledgers repeatedly. This may cause some errors. A lot of personnel are engaged in such manual documentation. Therefore, some miscalculations often can be seen in their documents.

If a computer system is introduced for other wider fields, for example, documentation, berth assignment, accounting, administration work and personnel management as well as statistics, the documentation will be streamlined and the required time for port users to finish necessary procedures will be shortened. Consequently, the dwelling time of cargoes will be shortened and capacity of the port will increase.

2) Importance of Computerization

Computerization will make it unnecessary to get access to the same information on other documents and possible to use repeatedly the information once fed into computers. It is also expected that compiling statistics concerning port activities will become easier.
Although the ultimate goal of computerization is “EDI”, it takes a long time to enact or amend relevant laws and regulations and to establish consensus and cooperation among concerned parties to implement EDI. Therefore at first, TCDD should introduce the computer system concerning documentation inside the PMB (Port Management Body), and as a next step, it is necessary to upgrade functions and expand the areas covered by the computer system. Consequently, the computer system will become an open system in which the parties concerned can participate.

To eliminate exchange of documents and speed up the clearance, a terminal computer linked to the computer system of container terminal should be installed at a gate office. Through this computer system, information on containers to pass through the port gate will be exchanged in real time between the port gate office and container terminal. Introduction of a computer information system inevitably results in job losses, so it is essential to consider a method to minimize such losses or a retraining program so that personnel affected may find work elsewhere.

The following measures shall be considered to enhance container handling productivity.

1) To promote a computer system concerning documentation inside the PMB at first.
2) To upgrade functions and expand area covered by the computer system as a next step.
3) To introduce computer system such as container inventory system, delivering/receiving control system and loading/unloading control system.
4) To exchange information and communicate effectively between crane operators and the supervisor at the control center in the container terminal by introducing advanced technology.
5) To implement EDI system

(2) Container Inventory Control

Inventory control of containers stored in CY is the most important task in container terminal operation. It is essential to grasp the location and kind of containers stored in CY to operate a container terminal efficiently.

Before the introduction of computer systems, a black (white) board was used for container inventory control in developed countries. This black (white) board was designed like CY and rectangles drawn on the black (white) board indicated slots of containers. Personnel were engaged in entering and changing container numbers on each slot manually. As the number of containers increased and the size of container terminals became larger, a method using cards was adopted. This method, still seen in some container terminals of developing countries, is to control container inventory with cards on which basic information on containers is written. Personnel arrange these cards by shipping line, yard location and container number and grasp location or situation of containers.
According to experience in developed countries, it becomes impossible to control container inventory by the card system when the number of containers in CY exceeds 3,000 TEUs. In such a case, it is necessary to introduce a computer system for container inventory control as a next step. In Hayderpasa port, most of container inventory control is still conducted by “inventory cards” although the container throughput amounts to 322,596 TEU (1998).

Containers in CY must be sorted and stored by the following classifications.

1) Shipping line
2) Container size (20’ or 40’), kind (dry, reefer, open top, flat bed, tank)
3) Loaded containers (by vessels, port of discharge)
4) Empty containers (damaged or not)

Gate offices, yard control center and container handling equipment should be linked with each other to exchange information effectively and assure the accuracy of information on containers. The above information is entered into the terminal computer at the gatehouse and transmitted to the control center in real time. The yard control center instructs operators of container handling equipment to pick up/stack the designated containers.

(3) Container Delivering/Receiving Control System

Gate offices of container terminal play important roles in receiving/delivering containers from/to shippers/consignees. Every container must pass through terminal gates, which are the final check points to find a mistake. If a gate clerk does not identify an error, both the shipper/consignee and shipping line would have trouble. Delivering containers is one of the most important functions of a container terminal. Gate is the boundary separating the limit of responsibilities between shippers/consignees and the container terminal. After an export container enters through the gate, it is the responsibility of the container terminal. After an import container passes through the gate, the responsibility of the container terminal is terminated.

In receiving an export container, it is important to decide its optimum location in CY based on the container's information for efficient operation. In CY, heavy containers should be stacked on light containers since heavy containers must be loaded at the bottom of holds to keep the stability of vessels.

In delivering an import container, it is important to instruct the tractor/trailer driver to go to the location of the containers quickly and to inform the operator of container handling equipment of the tractor/trailer's arrival. After loading the container on the tractor/trailer, it is necessary to check the container number, container damage and container seal number at the gate.

It is possible to grasp the storing location and exact information on container by inputting and renewing it into a terminal computer in real time after verifying the driver's documents and the container. Necessary information to be inputted into a terminal computer at the gate is as follows: (See Figure 10.2.1 & 10.2.2)

1) Carrying in an export container
    Name of vessel, Voyage number
    Container number, size, type
    Port of loading
    Weight
    Special cargo (hazardous or refrigerated)
2) Carrying out an import container
    Name of vessel, Voyage number
    Container number, size, type
    Number of Customs permission
    Destination
    Name of shipping line
    Date to return the container
3) Carrying in an empty container
    Container number, size, type
    Outside condition of the container (damaged or not)
    Name of shipping line
    Name of transporter (or consignee)
4) Carrying out an empty container
    Container number, size, type
    Booking number
    Destination of the container
    Name of shipping line
    Name of transporter (or shipper)

Figure 10.2.1 Container Delivering Control System

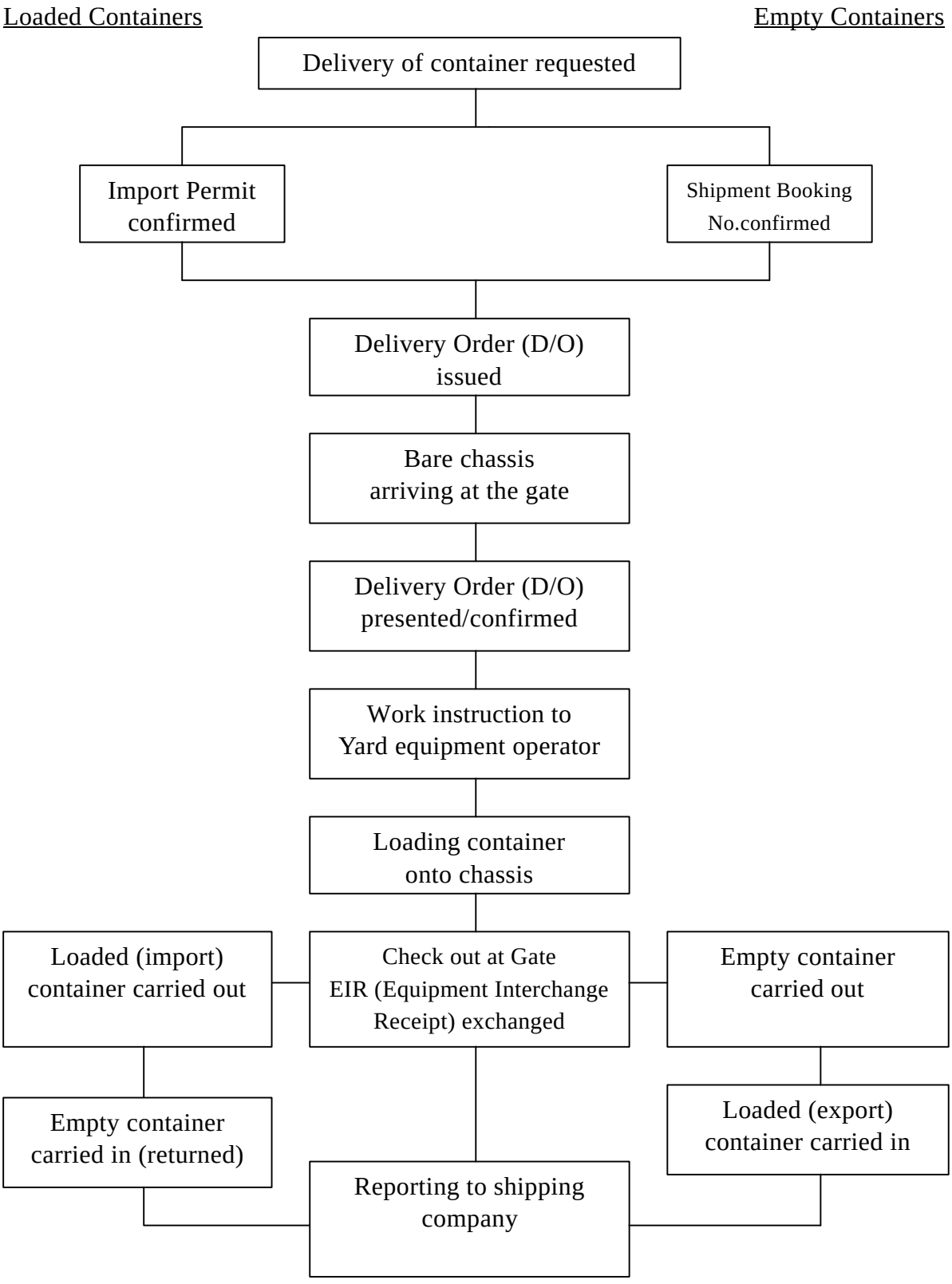
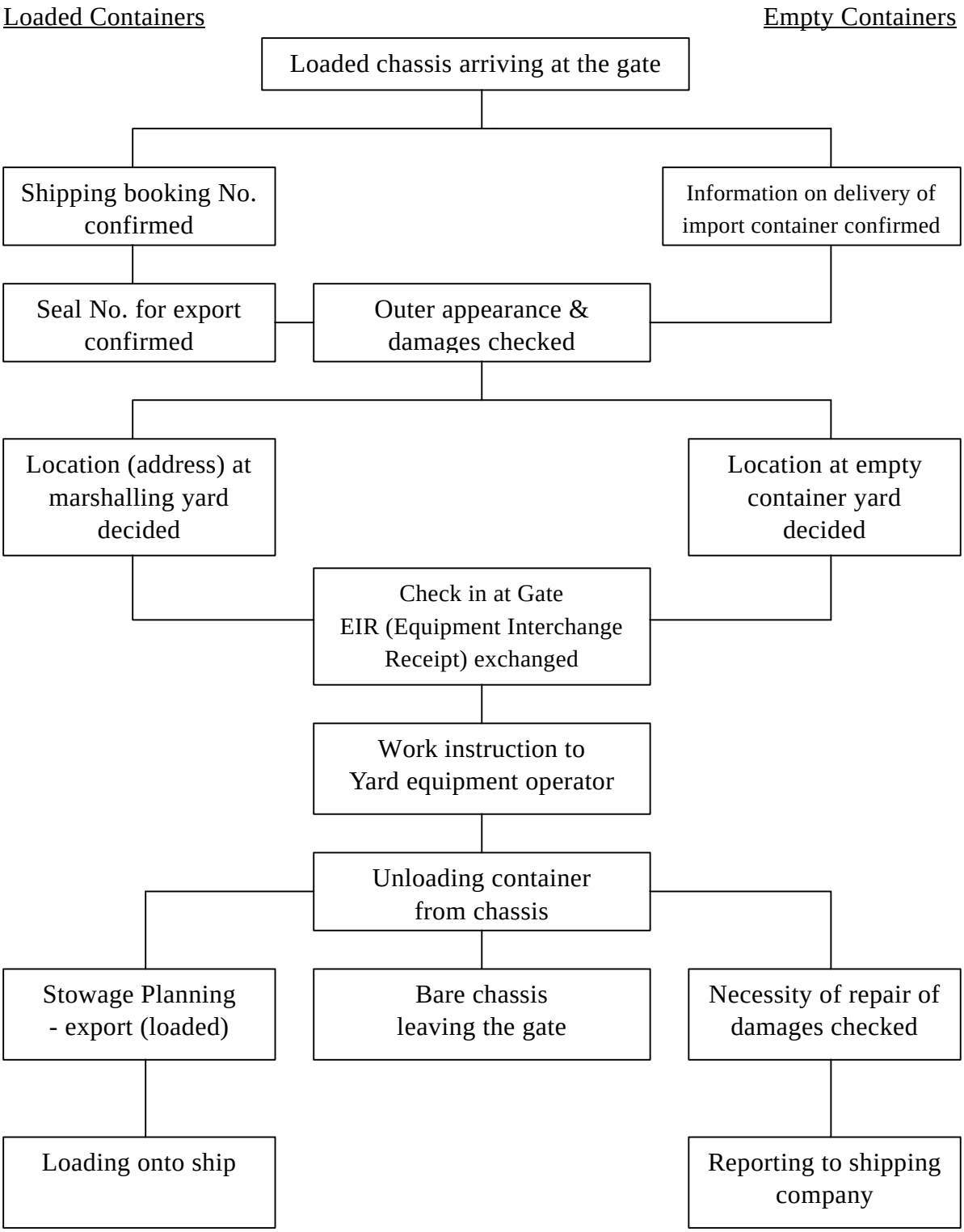


Figure 10.2.2 Container Receiving Control System



(4) Loading/Unloading Operation Control System

When two or more than two quayside gantry cranes serve a vessel, it is necessary to equalize the work loads of each quayside gantry crane. Furthermore, it is important to prepare an operation plan so that one crane does not interfere with the operation of another crane. In loading export containers, it is very important to load containers based on the yard planning system by weight, port of discharge and container size for stability and safe navigation of vessels. Refrigerated containers and hazardous containers must be loaded according to international regulations.
Required functions for the loading/unloading operation system are as follows:

1) Container unloading operation system
2) Container loading operation system
3) Container re-handling system
4) Gantry crane allocation system
5) Hull strength calculation system

Necessary information on containers should be obtained from shipping lines or agents as early as possible. Obtaining the information in advance enables a terminal operator to prepare the working schedule indicating the order of unloading/loading containers and to minimize the operation time. Before preparing the working schedule, it is necessary to obtain the latest stowage bay plan after the last port's operation. The necessary information is as follows:

1) Name of vessel and voyage number
2) Date of departing the last port
3) Estimated time of arrival
4) Details of containers
    a) Container number, size and weight
    b) Port of loading/unloading
5) Special containers
    a) Temperature of refrigerated cargoes
    b) IMO classification of hazardous cargoes
6) Draft of vessel at departing the last port and estimated draft at the entry

In advanced ports, the above information is transmitted by EDI between the terminal operator and the shipping line/agent but in ordinary ports, facsimile is used.

After loading containers, the terminal operator prepares the stowage bay plan, which indicates the result of the operation, and passes it to the captain or shipping agent. Making the stowage bay plan is an important task of a terminal operator. In advanced container terminals, the operation section makes stowage plans with a computer system. In Turkey, port users (shipping agents) usually must make bay plan at their own costs, which is completely against the concept of "user-oriented" port.

Stowage bay plan includes the following information:

1) Prefix and container size
2) Container number
3) Port of loading and unloading
4) Weight and description of special cargo
5) Location in hold/on deck (bay-row-tier)

10.2.6 Proper Use & Maintenance of Cargo Handling Equipment

(1) Replacement of Old Cargo Handling Equipment

As mentioned before, generally, cargo handling equipment of Turkish ports is rather old. The use of old and insufficient cargo handling equipment leads to inefficient cargo operation. Therefore, it is imperative for Turkish ports to replace old handling equipment. The following Table 10.2.9 indicates average length of economic life for port facilities and equipment according to UNCTAD (the United Nations Conference on Trade & Development).

For reference, Table 10.2.10 shows the list of container cargo handling equipment of Port of Haydarpasa. Some handling equipment (container forklift, trailer & tug master) is very old according to the UNCTAD list although TCDD has been making efforts to replace old container handling equipment. It is noted that the use of old equipment causes not only inefficient operation but may also result in fatal accidents for workers.

Table 10.2.9 Average Length of Economic Life for Port Facilities & Equipment

Facilities & equipment		Average economic life (years)
Tugs		20
Pilot launches		20
Warehouses & sheds		25
Cranes	Grabbing	20
	Quay	20
	Gantry	15
	Mobile	8
	Mobile tower	15
	Floating	20
Ship-loaders		25
Stackers & reclaimers		25
Belt conveyors	Belt conveyors	20
	Belts	3
	Idlers	7
Mobile mechanical shovels		6
Straddle-carriers		6
Tractors & trailers		8
RO/RO ramps		15
Fork-lift trucks		8
Dump trucks		6

Source : UNCTAD

Table 10.2.10 List of Container Cargo Handling Equipment of Port of Haydarpasa (1999)

Type (Number)	Capacity	Built year	Number of equipment			Durability	
			Total	Available	Remarks	Years	* old or not
QGC (4)	40 t	1988	3	3	MSM	20	○
	40 t	1989	1	1	MSM		
Transtainer (9)	40 t	1987	4	9	MSM	15	○
	40 t	1988	5	5	MSM		
Container fork lift (21)	10 t	1983	1	1	LANSING	8	×
	25 t	1983	1	1	LANSING		×
	42 t	1983	1	1	LANSING		×
	10 t	1988	3	3	FANTUZZI		×
	8 t	1999	15	15	FANTUZZI		○
Reach stacker (15)	40 t	1987	2	2	BELOTTI	25	○
	42 t	1992	1	1	BELOTTI		○
	42t	1999	12	12	KALMAR		○
Trailer (66)	20 t	1981	10	10	BORONKAY	8	×
	40 t	1982	4	4	GURSAN		×
	40 t	1984	3	3	KARDES CELIK		×
	40 t	1987	18	18	KATMERCILER		×
	40 t	1996	1	1	EFE		○
	40 t	1999	30	30	IBRAHIM ORS		○
Tugmaster (Terminal truck) (32)	25/50 t	1982	2	2	MAFI	8	×
	25/50 t	1985	2	2	PLAN TERBERG		×
	25/50 t	1988	13	13	SISU		×
	25/50 t	1999	15	15	SISU		○

Source : TCDD

Note : ○→Not old, ×→Old

(2) Importance of Continuous Maintenance

So as to maintain the handling machines in a good condition anytime, it is essential to inspect them at fixed intervals such as 1, 6 and 12 months. It is one of the most important jobs in managing a container terminal to prevent breakdowns during the ship's loading/unloading operations.

The number of items to inspect periodically change depending on the intervals but generally increase as the machines advance in years. Periodic inspections of each machine are to be made according to schedule in order to minimize the adverse effects on the terminal business. With respect to the handling equipment mounted-rubber tires, it is to be noted that as tires on the "driving axles" wear out much faster than those on the "trailing axles", they need to be periodically exchanged with each other so that they wear out equally on both axles, for which purposes also computers play an important role.

(3) Preparation of Spare Parts

Even the same type of machines in the same terminal might be products of different manufacturers. The more types of machines and the more numbers of them used in the terminal, the more kinds of spare parts need to be stocked for their repair and maintenance. In order to maintain each piece of handling equipment in good condition, it is necessary to keep a proper stock of such a wide range of spare parts and supply them as necessary. However, as it is difficult to do so by hand, making use of computer becomes essential.

10.2.7 Enrichment of Training System

Not only management staff but also terminal operators should be appropriately educated and trained. The objective of training for employees is to improve the capability of each worker, which in turn leads to efficient port management and operation. Employees can gain expert knowledge, leadership ability, skill & experiences to manage and operate port equipment appropriately.

Especially, introduction of sophisticated computer system will be essential to improve port operation in Turkey. Appropriate training to master computer shall be provided to all staff at TCDD ports. Enrichment of the training programs for each staff will improve overall service level for port users.

10.3 Improvement of Conventional Cargo Handling Operation

10.3.1 Evaluation of Present Conventional Cargo Handling Productivity

Table 10.3.1 shows the standard productivity for conventional cargo established by TCDD. Appendix 10.4 shows the actual conventional cargo productivity at Hayderpasa, Izmir, Mersin & Banderma. The average productivity ranges from 19.50-26.82 ton/hour excluding that of private companies. Generally, the productivity is not so high. Some reasons for the low productivity can be pointed out : the waiting time for custom clearance, many direct loading & unloading, unavailability of truck/forklift and old handling equipment, etc. Such waiting time makes operational efficiency relatively low.
For reference, Table 10.3.2 shows package-wise productivity at Alexandria Port (Egypt). Alexandria port seems show a little superiority over Turkish ports in terms of its productivity. It is necessary for Turkish ports to take effective measures in order to improve their productivity.

Table 10.3.1 Standard Productivity of Conventional Cargo handling at TCDD Ports

Package style	Kinds of cargo	Major handling style	Productivity (ton/hour)
Bag (grain)	Sugar	Shore crane with hook & sling	16.6 t/h
	Rice		16.6 t/h
Bag (chemical)	Fertilizer	Shore crane with hook & sling	19.3 t/h
	Sulfur		9.9 t/h
	Cement		19.9 t/h
Box	Olive oil	Shore crane with hook & wire	12 t/h
	Citrus fruits		12 t/h
	Frozen meat & fish		13 t/h
Palettes	Chemicals	Shore crane with hook & pallet sling	15.9 t/h
	Citrus fruits		15.3t/h
Bale	Paper	Shore crane with hook & sling	20.6 t/h
Barrel	Small barrel	Shore crane with hook & special sling	18.6 t/h
	Olive oil & wine		18.6 t/h
Roll	Paper roll	Shore crane with hook & rope sling	20.6 t/h
	Kraft paper		37.3 t/h
	Steel bar	Ship gear with hook wire	23.3 t/h
Bundle	Sawn timber	Shore crane or mobile crane	31.3 t/h
	Plank timber		28.6 t/h
	Steel coil	Shore crane with hook & coil sling	49.9 t/h

Source : TCDD Note : Standard tonnage÷7.5 hours (1shift)

Table 10.3.2 Package-wise Productivity of Conventional Cargo at Alexandria Port (Egypt)

Package style	Kinds of cargo	Equipment	Productivity (ton/hour)
Bag (grain)	Sugar, Rice, Flour, etc.	Shore crane with hook & sling	20 t/h
Roll	Paper	Shore crane with hook & sling	35 t/h
Bundle	Sawn timber	Ship gear	47 t/h
	Steel products		48 t/h

Prepared by OCDI

10.3.2 Establishment of Targeted Productivity

It is essential for Turkish ports to establish a targeted productivity for conventional cargo operation in order to promote efficient operation. The productivity depends upon various conditions such as operator's skill, climate, facilities, equipment etc. In addition, the overall productivity depends not only on the productivity (1) of transfer from vessel to quayside but also on the productivity (2) of transfer from quayside to storage area (open yards or warehouse/sheds).

The following Table shows the examples of targeted productivity from vessel to quayside. It is possible to raise the productivity by approximately 20-25 % in 2010 and 45-50% in 2020 by using effective measures mentioned later.

Concerning the unloading operation, the targeted productivity from wharf to warehouse by cargoes (bagged cargo, steel products, timber, paper products & etc) shall be established. Once establishing the target, all kinds of effective measures shall be considered to achieve the target.

Table 10.3.3 Examples of Targeted Productivity of Conventional Cargo at TCDD Ports

Package style	Kinds of cargo	Present Standard Productivity (ton/hour)	Future Productivity (ton/hour)	
			2010 (20-25%up)	2020 (45-50%up)
Bag (grain)	Sugar, Rice	16.6	20	25
Bag (chemical)	Fertilizer, Cement	19.3	24	28
Box	Olive oil, Fruit	12	15	18
Roll	Paper roll	20.6	25	30
Bundle	Sawn timber	31.3	39	46
	Plank timber	28.6	35	42
	Steel coil	49.9	62	75

Prepared by OCDI

10.3.3 Effective Measures at Conventional Handling Operation

(1) Private Sector Participation in Conventional Cargo Operation

In order to increase the productivity, it is essential for Turkish ports to utilize know-how, technology and experiences of the private sector. Conventional cargo operation is the most suitable field for private sector participation owing to its labor-intensive nature. Today, most of conventional operations are conducted by the private sector in developed countries. Therefore, it is very rare that the public sector directly is involved itself in conventional cargo operation (Land-lord Port Type).
The participation of the private sector in specific berths of TCDD ports shall be allowed on certain conditions in the future. The competition between the public sector (TCDD) and private sector will be useful to increase the productivity and eventually boost the economy.

(2) Establishment of Comprehensive Terminal Operators for Conventional Terminals

As mentioned before, the private sector is restricted to participate in conventional terminal operation at TCDD ports. However, in the future, it will be necessary to establish private terminal operators that perform general cargo handling operation comprehensively. This is very common at conventional terminals in advanced European ports.
The basic concept shall be explained. The conventional terminals are divided into some portions and they are allocated to the terminal operators. Each terminal should have the appropriate size for conventional cargo handling and have open storage yards and warehouses for exclusive use. In addition, a terminal operator can preferentially use a berth in front of its storage area. It is essential to establish comprehensive terminal operators, which conduct everything from cargo handling operation to warehousing in order to secure more efficient operations.

(3) Avoiding Direct Loading/Delivery

In case of conventional cargoes, loading/unloading operations are generally performed with shore cranes or ship’s cranes. Currently, unloaded cargoes from a vessel are directly loaded onto trucks/trailers. In Mersin port, 90% of conventional cargoes are directly loaded on trucks or unloaded from trucks.
Although this method reduces cargo damage during operation, productivity is lower than when landing on the quay. Landing cargoes on small platforms of trucks/trailers makes the cycle time longer. The throughput of cargoes depends on the arrival of trucks and the turn-around on the apron. It is advised that this method should be adopted only for handling specific cargoes, such as hazardous cargoes, frozen cargoes, perishable cargoes and special heavy cargoes. Turkish ports should avoid direct loading & delivery and utilize forklifts as much as possible.

(4) Utilization of General Cargo Forklifts & Warehouse

So far, general cargo forklifts and warehouse are not utilized positively in conventional berths. This is mainly owing to shortage of space in storage areas. However, as mentioned in (3), it is essential to promote non-direct loading & delivery operation to secure quick turnover and increase the productivity. In order to do so, TCDD should utilize forklifts on the wharves as much as possible and transfer cargoes quickly from wharves to storage area (open yards or warehouse/sheds).

(5) Promotion of Pallet System

It is necessary to use pallets for landing cargoes on the quay so those forklifts could pick up, carry and sort the landed cargoes and store them in the sheds/warehouse behind the quay. In addition, palletized cargoes are also very easy for handling in vessels by using forklifts. Therefore, bagged cargo such as fertilizer and sugar and cartons must be palletized as much as possible to increase the throughput.

(6) Securing Sufficient & New Cargo Handling Equipment

Cargo damage is likely to happen during the loading/unloading operation rather than the sea transportation. The lack of adequate cargo handling equipment (rope, wire slings, spreaders & attachment for forklifts) is a main factor. In addition, the condition of open yard is also a contributing factor.
Furthermore, handling equipment for general cargo is very old compared with container handling equipment. The use of old and insufficient cargo handling equipment leads to inefficient cargo operation. Therefore, it is imperative for Turkish ports to replace old handling equipment.
For reference, Table 10.3.4 indicates the list of general cargo handling equipment of Port of Haydarpasa. According to UNCTAD list and our experience, most of shore cranes, mobile cranes and general cargo forklift are very old for speedy and accurate operation. That old handling equipment should be replaced by the newest types as early as possible. This will be helpful to increase the overall productivity.

Table 10.3.4 List of General & Dry Bulk Cargo Handling Equipment of Port of Haydarpasa (1999)

Type (Number)	Capacity	Built year	Number of equipment			Durability	
			Total	Available	Remarks	Years	* old or not
Shore crane (17)	3 t	1958	4	4	DEMAG	15	×
	25 t	1959	1	1	DEMAG		×
	2 t	1968	2	2	KOCKS		×
	5 t	1968	1	1	KOCKS		×
	10 t	1983	7	7	MSM		×
	10 t	1983	2	2	MSM		×
Mobile crane (18)	25 t	1976	1	1	NELSON	8	×
	6 t	1977	3	3	NELLEN		×
	15 t	1978	2	2	NELLEN		×
	10 t	1983	10	10	COLES		×
	5 t	1983	2	2	NELLEN		×
General cargo fork lift (59)	3 t	1975	10	10	TOYOTA	8	×
	5 t	1980	2	2	FENWICK		×
	5 t	1983	1	1	CLIMAX		×
	5 t	1985	3	3	LANSING		×
	3 t	1986	9	9	CUKUROVA		×
	3 t	1986	6	6	CUKUROVA		○
	3 t	1990	4	4	LINDE		○
	2 t	1992	6	6	ISMAK		○
	2 t	1994	5	5	ISMAK		○
	2 t	1995	4	4	YALE		○
	2.5 t	1999	9	9	YALE		○
Battery forklift (8)	1.5 t	1983	4	4	LANSING	8	×
	2.5 t	1999	4	4	STILL		○
Loader (1)	1 t	1982	1	1	VOLVO	25	○

Source : TCDD

* Note : ○→Not old, ×→Old

10.4 Improvement of Dry Bulk Cargo Handling Operation

10.4.1 Evaluation of Present Dry Bulk Cargo Handling Productivity

According to the data (Limani Aylik Istatistik Cetveli in 1998) provided by TCDD, average productivity for dry bulk ranges from 33 ton/hour (Mersin) to 65 ton/hour (Bandirma) by using grab bucket type and 126 ton/hour (Izmir) and 169.55ton/hour (Mersin) by using pneumatic unloader (Appendix 10.5). Although TCDD has 2 pneumatic unloaders (160t/h) and 10 (50t/h) at 3 TCDD ports, the discharging capacity is not so high.
It can't be said that productivity of dry bulk handling is high. Generally, productivity for dry bulk mainly hinges upon the quality of the cargo handling equipment. Therefore, the reasons for low productivity are mainly due to the old handling equipment and its low capacity. In the future, it is expected that specific Turkish ports need dry bulk terminals with longer length and deeper depth (e.g. length 300m & depth –15m). In order to raise the productivity and meet the increasing demand for dry bulk cargo, it is advisable for ports to introduce advanced handling equipment.
In addition, the smooth connection between handling equipment such as unloader and subsequent facilities such as belt conveyor & silo is also an important element in determining productivity. It is advisable for ports to install appropriate related facilities to comply with advanced loader & unloader.

10.4.2 Examples of European Countries & Japan

(1) Types of Dry Bulk Handling Equipment

Generally, there are 3 types for dry bulk handling (grab bucket type, pneumatic type & continuous type). The following Table 10.4.1 shows a comparison of each type.
In European countries, most bulk terminals for iron ore and coal adopt unloading machines (grab type). The main reason is that the maintenance cost is cheaper than that of continuous type. Pneumatic unloader is the most popular for grain terminals. However, most ports are considering converting to mechanical types due to its bad energy-efficiency.
Different from European countries, continuous unloader is favored over the grab unloader in Japan, which has many special ports. Continuous unloader has its advantages in efficiency, energy-saving and environmental friendliness (See Table 10.4.2).

Table 10.4.1 Comparison of Each Type

Description	Grab Bucket Type	Pneumatic Type	Continuous Type (Mechanical)
Bottom-cleaning	×	○	×～△
Energy-efficiency	△	×	○
Multi-purpose	○	×	×
Dust-discharging	×	○	○

* ○ (Excellent), △ (Middle), × (Poor)

Table 10.4.2 General Preference for Dry Bulk Handling Equipment in European Countries & Japan

Item	Kinds of Dry Bulk	Handling Equipment
Most European Countries	Iron ore & coal	Grab unloader
	Grain	Pneumatic unloader
Japan	Iron ore & coal	Continuous unloader
	Grain	Continuous unloader & Pneumatic unloader

(2) Examples of Handling Equipment in Japan

The following Table 10.4.3 shows typical handling equipment at dry bulk terminal (length with 240-480 m & depth with –12 - -13 m) in Japan. Mainly, pneumatic unloader (300-400 t/h) is favored for grain and mechanical unloader (400-800 t/h) is used for ore & coal. Based on the example in Japanese ports, it is advisable for Turkish ports to introduce more advanced equipment with high capacity (300t/h-800t/h) in order to meet increasing sizes of dry bulk carriers.

Table 10.4.3 Typical Handling Equipment at Dry Bulk Terminal in Japan

Port Name	Berth Capacity			Unloader (discharging rate)
	Length (m)	Depth (m)	DWT	
Otaru (Katsunai silo)	270	- 13	45,000	1 Pneumatic unloader (400t/h)
Kashima (Kanto grain terminal Co., LTD)	280	- 13	65,000	1 Pneumatic unloader (400t/h) 2 Mechanical unloader (400t/h)
Yokohama (Nissin Logistics Co., LTD)	310	- 12	55,000	1 Pneumatic unloader (400 t/h)
Niigata (Zen-noh Silo Co., LTD)	340	- 13	65,000	1 Mechanical unloader (800t/h)
Shimizu (Shimizu Futo Co., LTD)	240	- 12	60,000	2 Pneumatic unloader (300t/h) 1 Mechanical unloader (600t/h)
Hakozaki (Hakozaki Futo Co., LTD)	480	- 12	30,000	1 Pneumatic unloader (400t/h) 1 Mechanical unloader (400t/h)

Prepared by OCDI

10.4.3 Introduction of Advanced Handling Equipment

The productivity will be improved rapidly (see Table 10.4.4) by employing the newest handling machines with high capacity such as pneumatic type (300-400 t/h) and mechanical type (400-800 t/h) at TCDD ports. It is desirable for TCDD dry bulk ports to introduce the newest machines in order to meet increasing demands for dry bulk cargo by 2020.

Table 10.4.4 Improvement of Dry Bulk Handling Productivity

Port	Kinds of cargo	Present Productivity(1998) (ton/hour)	Future productivity (2020) (ton/hour)
Mersin	Grain & Ore	33.07	300-400
Bandirma	Ore	65.10	400-800
Izmir	Grain	48.21	300-400

10.4.4 Necessity of Appropriate Private Sector Participation for Dry Bulk Handling

In both European countries and Japan, dry bulk cargo is mainly handled by the private sector due to the nature of that business. It is advisable for TCDD ports to introduce gradually the private sector into dry bulk handling to increase its productivity and meet the increasing demands. In order to do so, appropriate deregulation is required. For example, it is one idea that specific terminals at TCDD ports are exclusively rent to specific private sector with sound business mind on certain conditions. This idea will make it possible for the private sector to bring its own advanced handling equipment to the terminals. TCDD will be able to get certain rents from the private sector and avoid further investment for the equipment (land-lord port type).

10.5 Introduction of EDI (Electronic Data Interchange) System

10.5.1 General

It is essential for Turkey to consider the introduction of a more advanced information system in the future. Advanced ports such as Singapore and Rotterdam in the world are not only developing port information network systems but also promoting terminal automation. Recently major overseas ports have been implementing EDI to control entry/departure to and from a port without paper work and long procedures. In major overseas ports, EDI for necessary procedure for arrival/departure vessels has been introduced, and “Paperless Procedure” and “One Stop Service” has been implemented.

In Japan, although EDI is implemented for customs clearance and import cargo inspection, Japan was still lagging behind in the Maritime Safety Department and port & harbor administration procedures for arrival /departure vessels. Therefore, the introduction of EDI is thought to be one of the important issues for Japan to tackle as well. The renovation of custom clearance information system in 1999 has enabled Japanese ports to reach the most advanced level in the world.

To increase international competitiveness and provide user-oriented services, it is necessary for Turkey to promote the implementation of EDI, which would simplify and improve efficiency of port and harbor administration. It is advisable for Turkish Ports to learn from the examples of major competitive ports in advanced countries.

10.5.2 Purposes of EDI

(1) Definition of EDI

EDI represents ;

1) Interchange of standardized data for trading through computer 2) Used by different organizations 3) Based on a widely agreed design

EDI system in port procedure makes it possible to apply for various procedures and exchange information quickly and accurately by linking the network to government agencies & outside users.
For example, when the vessel enters the port, the shipping agencies must submit a lot of applications and declarations to relevant government organizations (custom office, harbor master, quarantine, immigration, port management body, etc). If EDI system is implemented, users can submit these applications and receive permissions through computer network.
In addition, EDI network makes it possible to exchange necessary information among different organizations. For example, port operators can obtain container information such as stowage bay plan from shipping agencies as soon as possible. As a result, port operators can prepare enough for loading/unloading operations before the vessel enters.

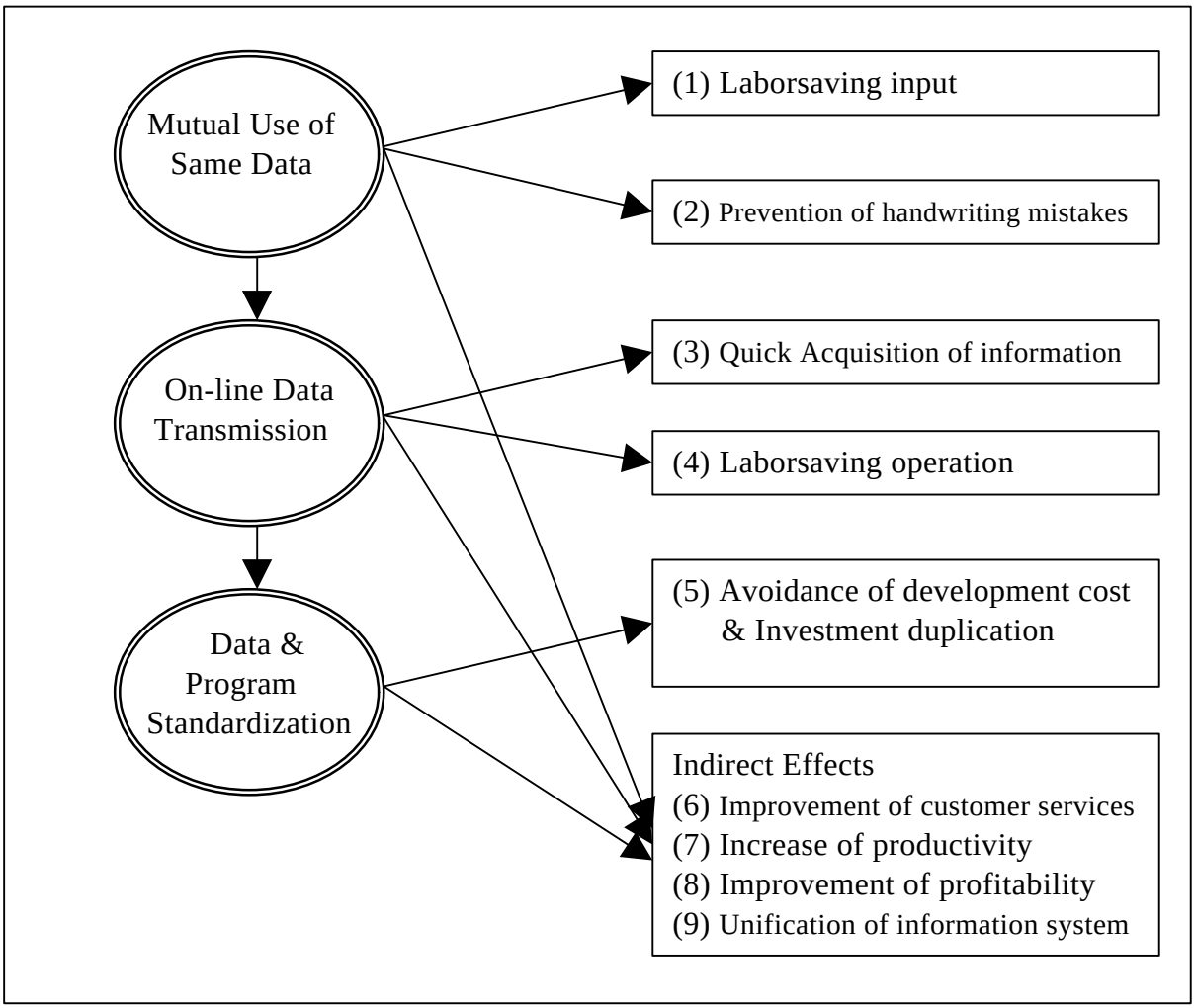
(2) Merits of EDI

EDI makes it possible to solve various issues brought by change of conditions in international distribution, to implement information exchange regarding trade, clerical procedures & settlement and to exchange business data and information between government organizations and port users.

The merits of EDI can be summarized as follows (See Figure 10.5.1);

1) To enable port users to complete almost all procedures by submitting electronic application to only one authority
2) To minimize paper flow resulting in elimination of errors in communication and faster response
3) To share same data among different organizations & to retrieve necessary data quickly
4) To increase efficiency of documentation procedure through simplification and electronization of administrative procedure
5) To improve the level of service for users by reducing total costs & minimizing entry/departure time
6) To strengthen international competitiveness of ports

Figure 10.5.1 Expected Effects from Introduction of EDI



10.5.3 Example of Singapore

(1) Outline of Advanced System

Singapore is the largest container port, handling 15 million TEUs in 1998. Approximately 80 % of them are transshipment containers. In the port, automation of terminal is indispensable due to efficient handling of increasing containers and shortage of workers. Therefore, OHBC (Over Head Bridge Crane) and AGV (Automated Guide Vehicle) will be utilized for container handling. Two different systems are adopted for yard operation. While OHBC is introduced for transshipment container, RMG (Rail Mounted Gantry Crane) is used for local containers. Furthermore, gantry cranes, OHBC and RMG can be operated by remote control from the control room.

Singapore has the most advanced EDI system in the world. To meet the changing needs of customers, the applications are continuously enhanced with state-of-the-art technologies and move user-friendly tools. “TRADENET”, “PORTNET”, and “MAINS” are some of the EDI systems that help shipping lines & forwarders transact business conveniently and expeditiously with the port and to tranship their containers in the fastest possible way. The EDI system is based on UN/EDIFACT (world standard) as business protocol message.

PSA (Port of Singapore Authority) is a pioneer in “Information Technology” (IT), with over 350 computer applications to computerise all facets of operations. The innovative and strategic use of IT has enabled PSA to provide efficient, reliable and value-for-money services to customers. In Singapore, the information network regarding physical distribution including port has already been established, and “Port EDI” already functions as part of the social network.

(2) Objectiveness of Promotion of EDI

The objectiveness of promotion of EDI can be summarized as follows ;

1) To pump more efficiency & productivity out of operations
2) To provide customers with value-added services through customized products to meet their needs
3) To help customers better manage their business by improving work processes, increasing productivity & lowering costs

(3) TRADENET (For Trade & Custom Clearance)

In Singapore, both “TRADE NET” (application for trade & custom clearance) and “PORTNET” (application for port management body) were introduced from 1989. While TRADE NET is managed by TDB (Trade Development Board), PORTNET is managed by PSA. TRADE NET provides various kinds of services related to trade such as import/export declaration, access to trade statistics database, etc (See Figure 10.5.2).

Today, more than 95 % of import/export custom declarations are disposed through TRADENET. As a result of introduction of Trade Net, disposal time for documentation of trade procedures has been shortened from 1-4days to 15 minutes.

(4) PORTNET (For Port Management Body)

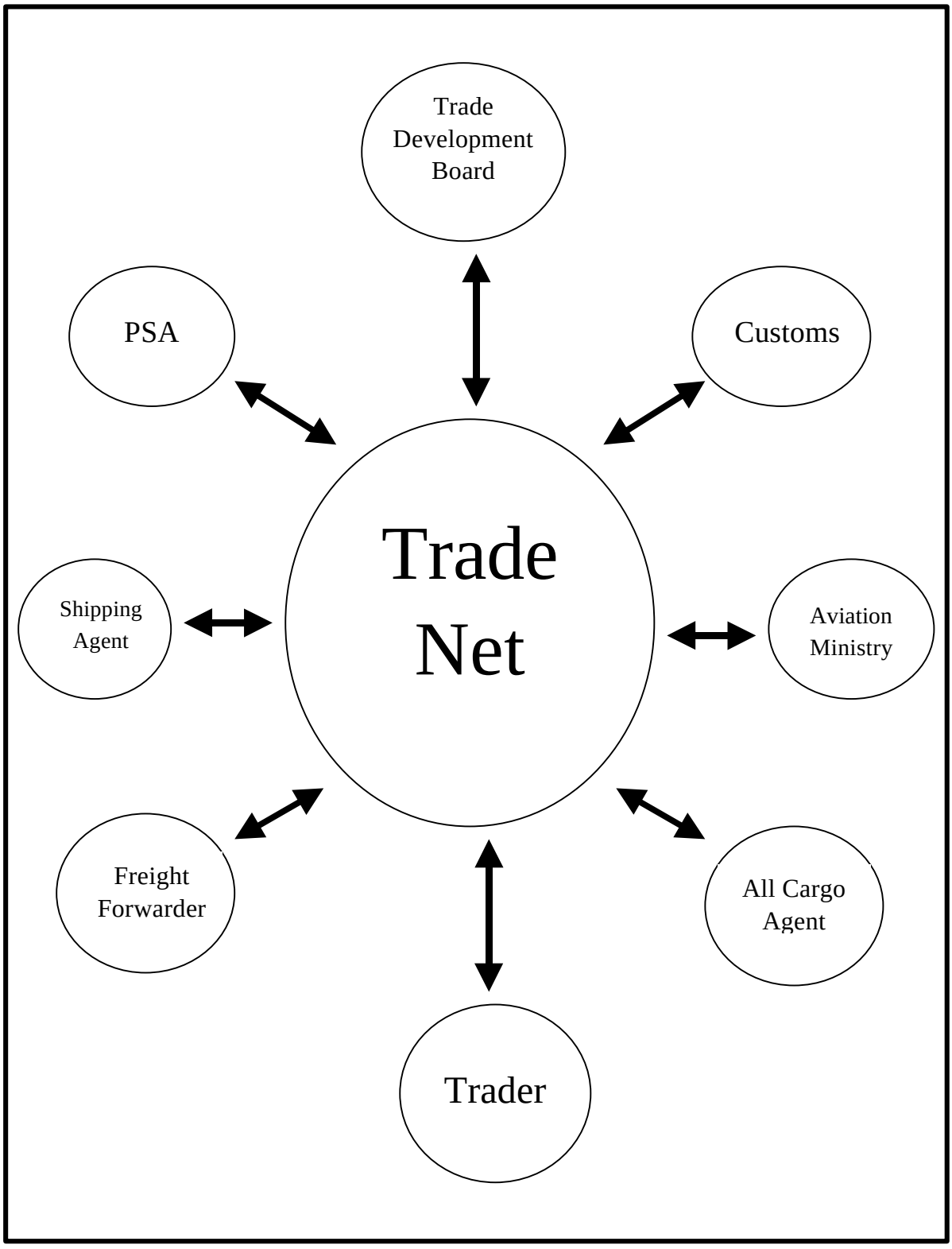
"PORTNET", established in 1989, is a 24-hour on-line electronic data communications system between PSA (port management body) and its customers. PORTNET is now connected with approximately more than 1,400 users (shipping agencies, consignees, forwarders, truck companies, etc.). In addition, "PORTNET" also can provide easy access service to "TRADENET". It allow customers to electronically communicate with PSA as follows ;

1) To submit their declaration, plans and manifest
2) To submit information for the planning of loading & unloading operations on a ship
3) To place bookings for berths, tugs and pilots
4) To allow freight forwarders & hauliers to book a time to pick up or offload their containers
5) To check the progress of activities at the container terminals and cruise terminal

(5) MAINS

In addition, "MAINS"(The Maritime Information System), which integrates both systems (TRADENET & PORTNET) came into use from the end of 1992 in order to eliminate duplication of data input among different organizations. MAINS enables PSA to share information with other agencies and port users to exchange both information. If the cargo manifest is transmitted from a terminal unit, almost all procedures will automatically be completed. As a result, accurate and fast information exchange can be done. MAINS is the most convenient system for port users and parties concerned.

Figure 10.5.2 System of Trade Net in Singapore



Prepared by OCDI

10.5.4 Gradual Procedure for Introducing EDI System in Turkey

1) Introduction of Computer System for Documentation

Although the ultimate goal of computerization is EDI, it takes a long time to enact or amend relevant laws and regulations and to establish consensus and cooperation among concerned parties to implement EDI. Therefore at first, PMB (TCDD & TDI) should introduce the computer system concerning documentation inside the PMB, and as a next step, it is necessary to upgrade functions and expand the areas covered by the computer system. Consequently, the computer system will become an open system in which the parties concerned can participate (See Appendix 10.8 Results of Questionnaires Concerning Computer Network System at Turkish Container Ports).

2) Promotion of One-Stop Service System (Single-Window Service System)

After introduction of computer system for documentation & many other fields, the relevant government agencies and PMB should promote the "one-stop service system" in every international port (See Figure 10.5.3 Rough Image of One-Stop Service System).
The system makes it possible for port users to complete almost all procedures by submitting application to "only one" authority. The duplications of the application are sent to other agencies through comprehensive organization (It is often called "One-stop Service Center").
If this system is introduced, cumbersome procedures of bringing documents from one department to another for port users can be eliminated. It is very rational for the government and PMB to proceed to EDI system after the introduction of single-window service. The combination between EDI system and one-stop service system makes overall procedures more reliable and easier without consuming time & money consuming and many kinds of papers.

3) Government Strong Leadership for Promoting EDI

The central government is expected to show strong leadership in introducing EDI system as follows ;

① The government shall work to establish consensus and cooperation among concerned parties.
② At that time, the government shall listen to the views of port users and users associations as much as possible.
③ At the same time, the government shall cooperate with related world organizations in order to establish EDI system based on world standard.
④ Based on the domestic and world based-consensus, the government shall enact or amend relevant laws and regulations.
⑤ In addition, it takes a lot of money to implement EDI network. Related business associations may be required to share a part of the costs.

However, the government should not hesitate to invest in information technology. Without appropriate & quick information investment by both public and private sector, there is a danger that Turkish ports will be further and further behind neighboring rival ports.

4) Implementation of EDI System based on International Standard

At first, it is necessary for Turkish ports to introduce EDI system at every container port. However, it is necessary for the government to implement EDI by using "widely accepted common terms" (protocol). Without a widely agreed rules and standards, EDI system can't work well. In this respect, the following 2 factors shall be carefully considered.

(a) Business Protocol Standard

EDI is to standardize the formats to be used. If users don't comply with "the common terms" agreed on among parties concerned and "the formats" needed for output were different from terminal to terminal in the work, EDI would never work effectively. Therefore, "a single standardized format" (EDI standard = Business Protocol Standard) must be used in common by all participants all over the world.

(b) Other Standards

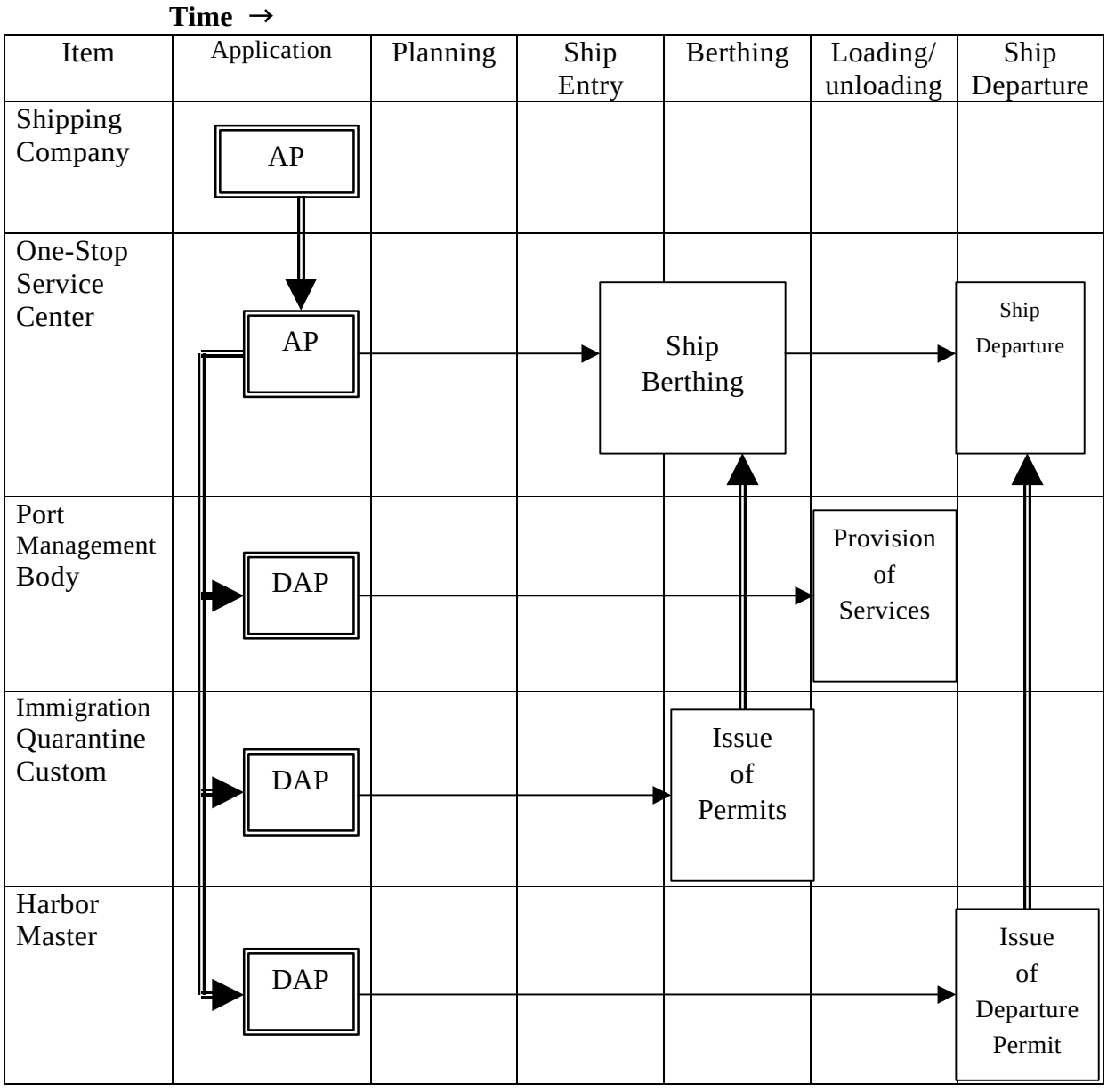
In addition, other important matters (ways of data transmission, business operation & contract terms) must be standardized.

In this respect, the standardization is classified into the following 4 sectors of contracts.

a) Communication Protocol (on how to transmit data)
b) Business Protocol (on how to express data)
c) Business Manual Protocol (on business operation)
d) Basic Business Protocol (on contract terms)

Today, standardization of EDIFACT (Electronic Data Interchange for Administration, Commerce & Transport) has been studied among many nations all over the world under the guidance of the United Nations. Today, "UN/EDIFACT" is thought to be the world standard of business protocol message. More and more advanced ports in the world have introduced "UN/EDIFACT" as the most reliable world standard.

Figure 10.5.3 Rough Image of One-Stop Service System
(In Case of Procedure for Ship Entry/Departure & Loading/Unloading Services)



Note :
*1 AP **:** Application, DAP **:** Duplicate of Application
*2 ⟹ **:** Flow of documentation
→ **:** Flow of actions or services

10.5.5 Simplification of Customs Clearance

(1) Many competitive ports in the world have been making efforts to simplify cumbersome custom procedures in order to be “user-oriented” ports. These efforts include simplifying physical inspection, minimizing the number of documents, unification of necessary application forms and introduction of EDI system. “Time value” is most important for port users such as shipping companies and consignees. Even if the productivity of cargo handling improves, time-consuming customs clearance will weaken the competitiveness of Turkish ports. Taking into consideration the importance of simple custom procedures & world trends, the government is required to tackle these issues more positively.

(2) The “Under Secretariat of Customs” under authority of Prime Ministry is responsible for custom administration. In Turkey, container box is regarded not as a “container” but as a “cargo”. Therefore, even “empty containers” are subject to custom clearance (physical inspection), in which containers are regarded as “imported commodities” and taxed. This is one of the reasons for the long waiting time of containers in the port. In order to reduce the waiting time of containers and to secure smooth operation in the port, physical inspection against empty containers should be limited to the necessary and minimum scope.

(3) Some port users complain about high ratio of sampling checks. Customs inspector designates samples for checking at an inspection site. When one consignment consists of more than one container, samples must be retrieved from each container.
When a packing list is not attached with import declaration, all the goods are required to be unstuffed from containers. It takes a long time to finish the physical inspection and consequently many containers stay in the port area for a long time.

(4) To speed up custom clearance, the ratio of sample check should be limited to approximately 5%. At first, customs officers should select and inspect only one container physically regardless of the volume of consignment. If they do not find contraband in this container, they should end the physical inspection.

(5) Some port users complain that the custom law and legislation have not been changed in accordance with the European Custom regulations even after joining the “Custom Union”. The government would execute the New Custom Law (gazette No.23866) after 5th, February 2000 in order to try to introduce European standards for simplifying of customs procedures. In addition, the government has an idea to introduce EDI system to customs documentation in the future. Although the details are not clear, careful attention shall be paid to the directions.

Chapter 11 Environmental Consideration

11.1 Environmental Issues around ports

11.1.1 Administrative Aspect

One of the most important activities concerning the environment is the periodical monitoring of water quality, air quality, noise level and other necessary items. In Turkey, this kind of monitoring is conducted by the Ministries concerned, their local branches and Municipalities. A port managing body has nothing to do with the periodical environmental monitoring even in the port area except the case in which the port managing body is conducting the construction works and relevant laws and regulations oblige the port managing body to monitor the environmental qualities.

Generally, water qualities of ports, which are located in metropolitan areas and industrial areas, are seriously bad due to the inflow of the domestic and industrial wastewater to port area. As a port managing body is no direct polluter to the sea, it does not need to implement a project for water quality improvement. Legal responsibility belongs to the Ministries concerned, their local branches and Municipalities. This fact applied to the accidental oil leakage from vessels in the port area.

11.1.2 Environmental Qualities around Ports

(1) Water quality

As water quality monitoring in port area is conducted by other organizations, port managing bodies do not have enough data for the analysis on water qualities. However, many environmental reports suggest environmental seriousness of the following areas.

1) The Bay of Iskenderun
2) The Bay of Izmir
3) The Bay of Candarli
4) The Bay of Izmit
5) The Bay of Gemlic
6) The Bay of Golden Horn

(2) Air quality

As air quality monitoring in port area is conducted by other organizations, port managing bodies do not have enough data for analysis on air qualities.

(3) Noise level

As noise level monitoring in port area is conducted by other organizations, port managing bodies do not have enough data for analysis on noise levels.

However, it is reported that people residing in an adjacent area to a port facing to the Black Sea commenced to make a complaint about the noise from port activities. Recently, cargo handling of 24 hours is prevailing in many ports not only in Turkey but also in the rest of the world. With growing environmental consciousness among the people, it is easily expected that the number of complaints will increase year by year, particularly in a port, which is located near the residential area.

11.1.3 Environmental Assessment

The assessment is well conducted in line with the EIA regulation. The report mentions a lot of measures to be taken during the construction works and operation in future. Among them, oil-combating measures and facilities in emergency are most important and urgent. A huge amount of petroleum product leaked out of tanks into sea and devastating sea contamination was witnessed when the Kocaeli Earthquake jolted western Turkey. Since Turkey is prone to suffer from seismologic tremors, appropriate countermeasures and equipment should be prepared. Individual companies and organizations can not cope with an emergency situation like the oil leakage caused by the Kocaeli Earthquake. Comprehensive oil-combating system involving the relevant public and private sectors should be established.

Generally, port activities are closely related to the industrial development and other projects in the hinterland, which have wide ranging impact and effect on economic growth and urban activities. In this context, environmental consideration in port development should be done not only on the port facilities and activities but also on related economic activities in the hinterland.

11.1.4 Transport System Depending Mainly on Road Traffic

Due to the lack of sufficient facilities and appropriate system, railway is not utilized much in container transport. Railway should play more and more important roles in land transport from the economical and environmental viewpoint. Adequate measures to promote the railway activity in container transport should be introduced.

11.2 Recommendation

(1) To take necessary measures for preventing destruction and pollution of maritime environment
(2) To provide port managing body with the authority to monitor the environmental quality and implement environmental projects
(3) To establish comprehensive oil-combating system involving the relevant public and private sectors
(4) To do environmental consideration in port development not only on the port facilities and activities but also on related economic activities in the hinterland
(5) To establish domestic maritime transport promotion policy