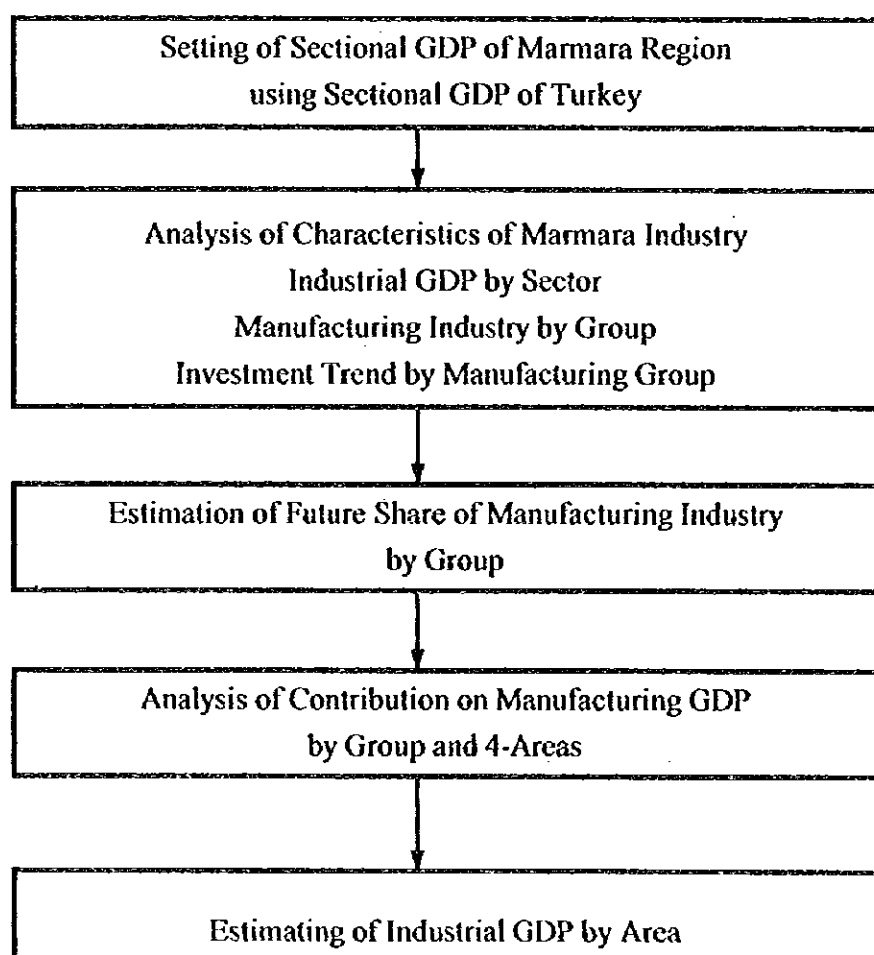


### 1.3 Industrial Development in Marmara Area and Thrace Region

#### 1.3.1 Industrial Characteristics in Marmara Area

A flow chart to estimate the future state of industry in Marmara Region is presented in Figure 1.3.1.



**FIGURE 1.3.1 Estimation Method of Future State of Industry in Marmara Region**

#### (1) Sectional GDP of Marmara Region

In setting future sectional GDP of Marmara Region, care has been taken to reflect the Region's actual share. Likewise, sectional annual growth rates are in reasonable agreement with those of Turkey as a whole which have been discussed in an earlier section of this chapter. Marmara future GDP by sector and its share are shown in Tables 1.3.1 and 1.3.2.

**TABLE 1.3.1 Future Sectional GDP of Turkey and Marmara Region  
(Trillion TL in 1994 prices)**

Year	1995		2000		2005		2010		2015	
		G/R		G/R		G/R		G/R		G/R
<b>Turkey</b>										
GDP	4026.2	5.8	5337.3	6.3	7244.2	6.3	9832.3	6.3	13345.1	
Agriculture	603.7	3.1	701.1	3.1	820.9	3.0	952.6	3.0	1102.9	
Industry	1039.2	6.8	1444.0	7.3	2053.8	7.3	2921.1	7.3	4154.8	
Service	2383.2	6.0	3189.3	6.5	4369.6	6.5	5958.6	6.3	8087.5	
<b>Marmara</b>										
GDP	1435.4	5.8	1902.8	6.3	2582.7	6.3	3505.4	6.3	4757.7	
Agriculture	99.1	1.6	107.3	1.6	116.1	1.5	125.1	1.5	131.7	
Industry	514.3	6.3	698.0	7.1	981.3	7.1	1379.6	7.1	1939.5	
Service	828.4	6.3	1124.8	6.2	1518.9	6.1	2042.0	6.0	2733.9	

Note: G/R=Growth Rate

**TABLE 1.3.2 Future Sectional GDP of Turkey and Marmara Region  
(share in percentage)**

Year	1995	2000	2005	2010	2015
<b>Turkey</b>					
GDP	100%	100%	100%	100%	100%
Agriculture	15%	13%	12%	10%	8%
Industry	27%	28%	29%	30%	32%
Service	58%	59%	59%	60%	60%
<b>Marmara</b>					
GDP	100%	100%	100%	100%	100%
Agriculture	6%	5%	4%	3%	3%
Industry	37%	38%	39%	41%	42%
Service	57%	57%	57%	56%	55%

Industrial GDP consists of mining, manufacturing and electricity. Recent trend of industrial share by above sector is indicated in Table 1.3.3 in the first part of the report. Future estimated share by sector is set as follows:

TABLE 1.3.3 Gross domestic product at 1987 prices - By kind of activity in producers' value

	1987		1988		1989		1990		1991		1992		1993		1994	
	Value	Share	Value	Share	Value	Share	Value	Share	Value	Share	Value	Share	Value	Share	Value	Share
	000 000 TL		000 000 TL		000 000 TL		000 000 TL		000 000 TL		000 000 TL		000 000 TL		000 000 TL	
<b>MARMARA REGION</b>																
1. Agriculture	2 078 254	7.9%	2 344 182	8.8%	2 530 464	9.2%	2 316 002	7.7%	2 219 970	7.3%	2 296 443	7.1%	2 158 654	6.7%	2 163 873	7.6%
2. Industry	9 228 344	35.0%	9 305 373	34.8%	9 745 594	35.4%	10 774 188	36.0%	11 114 378	36.5%	11 997 946	36.9%	13 213 895	37.1%	12 068 141	36.1%
Mining and quarrying	181 065	2.0%	193 945	2.1%	210 111	2.2%	189 111	1.8%	168 864	1.5%	174 212	1.5%	196 221	1.4%	173 623	1.7%
Manufacturing	8 747 869	94.8%	8 798 442	94.6%	9 040 904	92.8%	10 049 536	93.3%	10 356 028	93.2%	11 226 627	93.6%	12 404 699	93.9%	11 232 946	93.6%
Electricity, gas, water	299 410	3.2%	310 987	3.3%	494 578	5.1%	535 541	5.0%	589 486	5.3%	597 107	5.0%	612 974	5.5%	661 573	4.6%
3. Service	15 040 359	57.1%	15 054 825	56.4%	15 246 056	55.4%	16 878 650	56.3%	17 143 688	56.2%	18 205 722	56.0%	20 310 159	56.9%	18 302 128	56.3%
4. GDP	26 346 957	100.0%	26 704 380	100.0%	27 522 113	100.0%	29 968 840	100.0%	30 478 035	100.0%	32 500 112	100.0%	35 682 707	100.0%	32 534 142	100.0%
1. Agriculture																
2. Industry																
Mining and quarrying																
Manufacturing																
Electricity, gas, water																
3. Service																
4. GDP																

Note: Agriculture, Industry and Service indicate share in GDP.

Mining, Manufacturing and Electricity indicate share in Industry

Mining and quarrying	1.5 %
Manufacturing	93.0 %
Electricity, gas, water	5.5 %

## (2) Trend of Manufacturing Industry by Group

Historical trend of manufacturing industry by group is obtained using statistics from SIS. These data are based on returned questionnaires given to private and public establishments that employ more than 25 workers. Data covers period from 1985-1993.

In this study, the trend is recognized as trend of share. Table 1.3.4 shows share list by manufacturing group from 1985 to 1993. In case of estimation of share in the future, original trends are modified by investment trend in the future.

**TABLE 1.3.4 Trend of Shares(%) by Manufacturing Group (during 1985-93)**

Group	1985	1986	1987	1988	1989	1990	1991	1992	1993
Food	13.48	11.09	9.82	9.81	9.67	9.61	10.39	8.12	8.32
Textile	16.48	13.83	17.92	18.97	19.31	22.61	18.19	22.61	18.82
Wood	0.33	0.35	0.51	0.31	0.45	0.29	0.40	0.51	0.49
Paper	1.39	2.95	3.31	2.91	3.12	1.73	2.65	1.06	5.07
Chemical	28.33	37.35	28.12	27.19	28.39	19.08	31.15	20.93	28.08
Mineral	5.68	5.16	6.16	7.16	1.81	4.20	4.45	3.72	3.43
Metal	7.02	5.95	6.21	6.63	8.27	6.95	5.12	5.00	4.88
Machine	23.80	22.93	27.57	26.62	25.15	31.97	27.37	33.81	30.62
Other	0.19	0.41	0.32	0.32	0.49	0.56	0.27	0.29	0.28

Two types of investment trends are considered for adjusting future trend of manufacturing groups. Shares of total investments are summarized in Table 1.3.5. Domestic investment was centered upon traditional industries such as textile, cement, chemical, food, etc.. On the other hand foreign investment concentrated on food, chemical, cement, electric machinery, etc..

**TABLE 1.3.5 Investment Trend by Manufacturing Group**

Group	Share by Domestic Investment.	Share by Foreign Investment.
Food	5.5 %	12.5 %
Textile	26.4 %	1.6 %
Wood	2.2 %	0.3 %
Paper	0.7 %	0.3 %
Chemical	6.3 %	14.1 %
Mineral	8.6 %	6.0 %
Metal	5.4 %	4.6 %
Machinery	8.7 %	9.9 %
Other	1.0 %	3.1 %

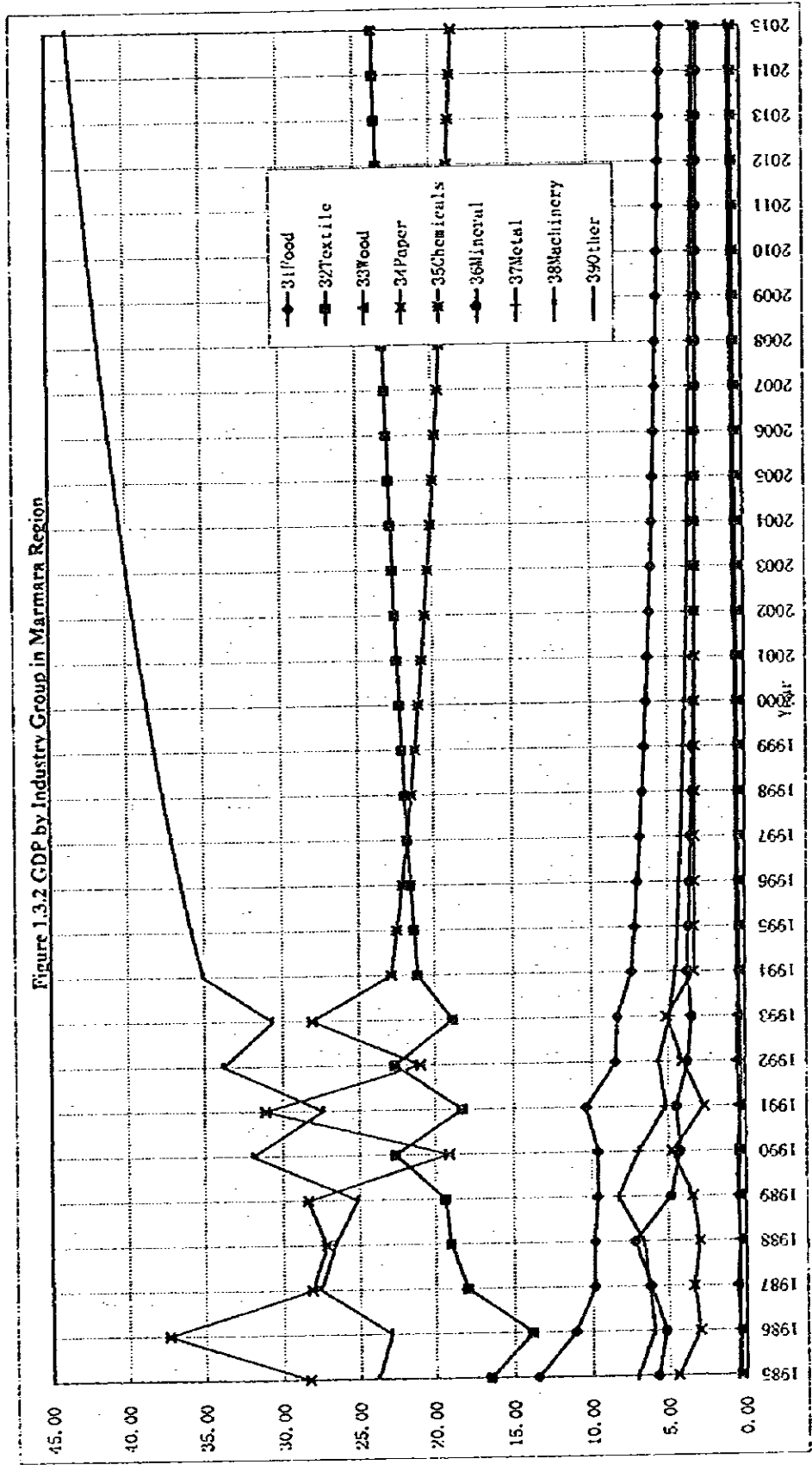
### (3) Future Industrial Output

Distribution of manufacturing activity is assumed to be the same as current activity, and future industrial output is obtained by using future share(%) in Figure 1.3.2 and Table 1.3.6. Table 1.3.7 shows value added by manufacturing group and Table 1.3.8 shows value added by area.

## 1.3.2 Industrial development in Thrace Region

### (1) Basic assumption

The types of industry likely or desired to be located in the Thrace Region and their development scale are examined as shown in Figure 1.3.3.



**TABLE 1.3.6 Share of Manufacturing Group by Area**

	1991	1995	2005	2015
<b>Thrace</b>				
31 Food	6.19%	4.31%	3.49%	3.07%
32 Textile	11.94%	14.27%	15.11%	15.60%
33 Wood	0.17%	0.17%	0.21%	0.21%
34 Paper	2.41%	3.02%	2.84%	2.76%
35 Chemicals	8.63%	6.33%	5.57%	5.13%
36 Mineral	1.19%	0.99%	0.81%	0.73%
37 Metal	1.38%	1.20%	0.96%	0.82%
38 Machinery	9.38%	12.48%	14.08%	14.93%
39 Other	0.23%	0.43%	0.60%	0.69%
<b>Total</b>	<b>41.51%</b>	<b>43.18%</b>	<b>43.66%</b>	<b>43.93%</b>
<b>Izmit</b>				
31 Food	3.38%	2.35%	1.90%	1.68%
32 Textile	5.58%	6.66%	7.05%	7.28%
33 Wood	0.22%	0.22%	0.27%	0.27%
34 Paper	0.08%	0.09%	0.09%	0.09%
35 Chemicals	21.31%	15.62%	13.75%	12.66%
36 Mineral	3.10%	2.59%	2.11%	1.90%
37 Metal	3.55%	3.07%	2.45%	2.10%
38 Machinery	16.89%	22.48%	25.36%	26.91%
39 Other	0.03%	0.06%	0.08%	0.09%
<b>Total</b>	<b>54.13%</b>	<b>53.15%</b>	<b>53.07%</b>	<b>52.98%</b>
<b>Baliksir</b>				
31 Food	1.33%	0.99%	0.83%	0.75%
32 Textile	0.08%	0.10%	0.11%	0.12%
33 Wood	0.01%	0.01%	0.01%	0.01%
34 Paper	0.10%	0.13%	0.13%	0.13%
35 Chemicals	0.79%	0.62%	0.57%	0.54%
36 Mineral	0.00%	0.00%	0.00%	0.00%
37 Metal	0.00%	0.00%	0.00%	0.00%
38 Machinery	0.13%	0.19%	0.22%	0.24%
39 Other	0.00%	0.00%	0.00%	0.00%
<b>Total</b>	<b>2.43%</b>	<b>2.03%</b>	<b>1.87%</b>	<b>1.78%</b>
<b>Canakkale</b>				
31 Food	0.32%	0.23%	0.20%	0.18%
32 Textile	0.00%	0.00%	0.00%	0.00%
33 Wood	0.00%	0.00%	0.00%	0.00%
34 Paper	0.00%	0.00%	0.00%	0.00%
35 Chemicals	0.07%	0.05%	0.05%	0.05%
36 Mineral	1.54%	1.35%	1.16%	1.08%
37 Metal	0.00%	0.00%	0.00%	0.00%
38 Machinery	0.00%	0.00%	0.00%	0.00%
39 Other	0.00%	0.00%	0.00%	0.00%
<b>Total</b>	<b>1.93%</b>	<b>1.63%</b>	<b>1.41%</b>	<b>1.30%</b>

**TABLE 1.3.7 Value Added of manufacturing Group by Area**  
(unit: Billion TL in 1994 price)

	1991	1995	2005	2015
<b>Thrace</b>				
31 Food	26,380	20,635	31,829	55,405
32 Textile	50,917	68,239	137,927	281,428
33 Wood	709	792	1,895	3,752
34 Paper	10,253	14,434	25,963	49,739
35 Chemicals	36,789	30,265	50,805	92,489
36 Mineral	5,061	4,749	7,373	13,137
37 Metal	5,899	5,723	8,717	14,791
38 Machinery	39,964	59,674	128,471	269,323
39 Other	988	2,043	5,478	12,393
<b>Total</b>	<b>176,960</b>	<b>206,554</b>	<b>398,459</b>	<b>792,458</b>
<b>Izmit</b>				
31 Food	14,392	11,258	17,365	30,228
32 Textile	23,765	31,849	64,374	131,350
33 Wood	936	1,045	2,501	4,950
34 Paper	321	451	812	1,556
35 Chemicals	90,839	74,732	125,448	228,374
36 Mineral	13,210	12,396	19,245	34,289
37 Metal	15,116	14,665	22,338	37,904
38 Machinery	72,012	107,527	231,492	485,293
39 Other	132	274	733	1,659
<b>Total</b>	<b>230,721</b>	<b>254,196</b>	<b>484,309</b>	<b>955,603</b>
<b>Baliksir</b>				
31 Food	5,649	4,730	7,593	13,552
32 Textile	338	485	1,021	2,135
33 Wood	21	26	64	130
34 Paper	410	618	1,157	2,272
35 Chemicals	3,375	2,972	5,192	9,691
36 Mineral	0	0	0	0
37 Metal	0	0	0	0
38 Machinery	564	901	2,019	4,339
39 Other	0	0	0	0
<b>Total</b>	<b>10,358</b>	<b>9,733</b>	<b>17,045</b>	<b>32,119</b>
<b>Canakkale</b>				
31 Food	1,345	1,100	1,791	3,217
32 Textile	0	0	0	0
33 Wood	0	0	0	0
34 Paper	0	0	0	0
35 Chemicals	304	262	464	871
36 Mineral	6,578	6,457	10,578	19,450
37 Metal	0	0	0	0
38 Machinery	0	0	0	0
39 Other	0	0	0	0
<b>Total</b>	<b>8,227</b>	<b>7,819</b>	<b>12,832</b>	<b>23,538</b>



**TABLE 1.3.8 Marmara Industry by Area**

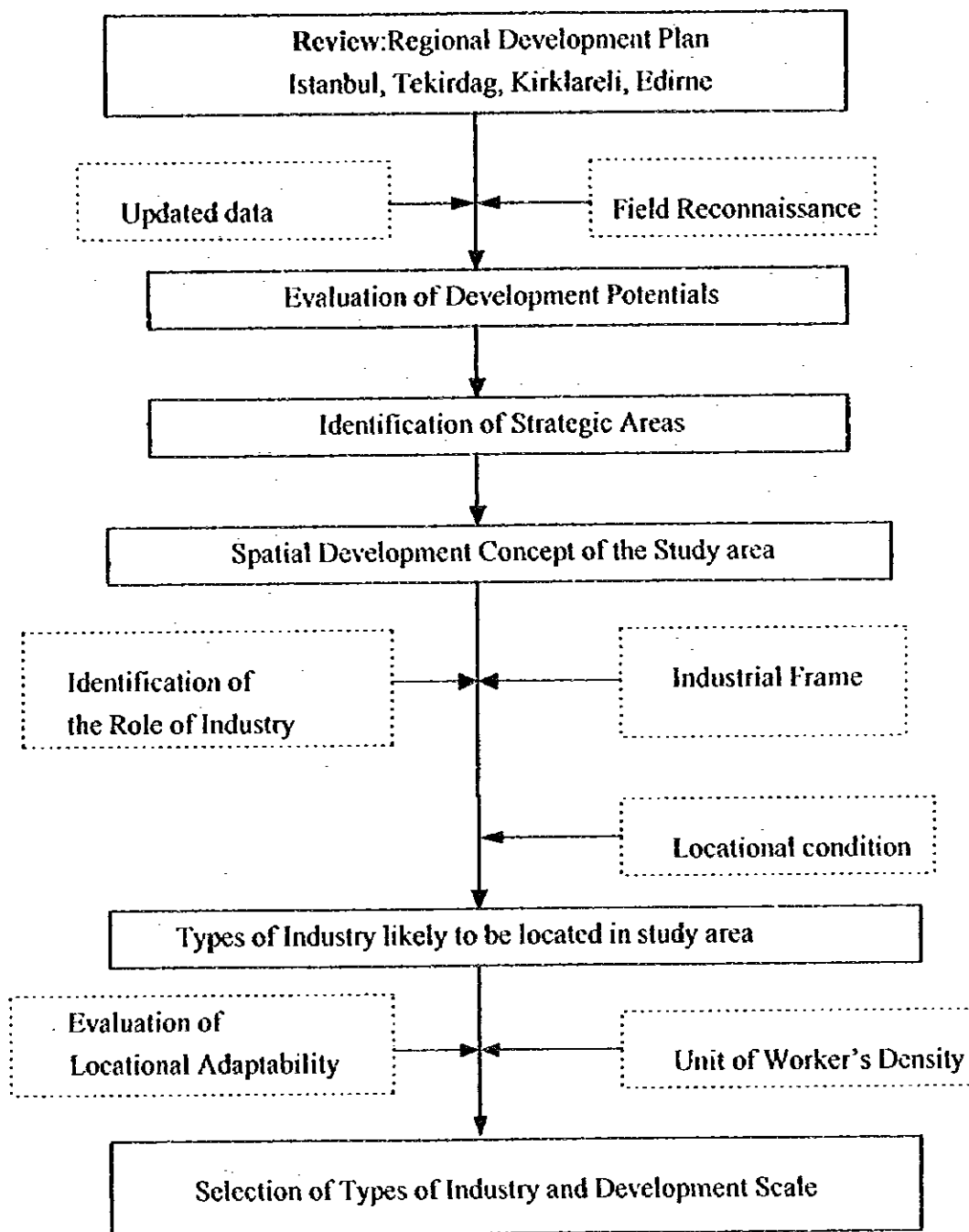
Value Added	(Billion TL in 1994 prices)			
	1991	1995	2005	2015
Thrace	190,279	222,102	428,451	852,106
Izmit	248,087	273,329	520,763	1,027,530
Balkesir	11,138	10,465	18,328	34,537
Canakkale	8,846	8,407	13,798	25,310
Total	458,351	514,304	981,340	1,939,483

**Distribution by Area**

	1991	1995	2005	2015
Thrace	41.51%	43.18%	43.66%	43.93%
Izmit	54.13%	53.15%	53.07%	52.98%
Balkesir	2.43%	2.03%	1.87%	1.78%
Canakkale	1.93%	1.63%	1.41%	1.30%
Total	100.00%	100.00%	100.00%	100.00%

**Multiplying Factor by Area(1995=1)**

	1991	1995	2005	2015
Thrace	0.86	1.00	1.93	3.84
Izmit	0.91	1.00	1.91	3.76
Balkesir	1.06	1.00	1.75	3.30
Canakkale	1.05	1.00	1.64	3.01
Total	0.89	1.00	1.91	3.77



**FIGURE 1.3.3 Selection of Industries and Development Scale**

In examining industrial development in the port hinterland, it is important to realize that there are two port functions in relation with industry. The first providing the infrastructure for the heavy industries located along waterfront within the port area and the second is serving as a commercial port to distribute industrial materials to factories and industrial products from the industries in the hinterland. In this study, the probability of heavy industry being developed on the waterfront along the sea coast of Thrace region has been investigated. It was found that the regional development plan of central and local government did not contain any scheme for heavy industry development nor did Turkish business circles

have any inclination to develop heavy industry. Therefore it will be assumed that no heavy industry is established within the planned time span in the Thrace region.

The future plans for the organized industrial area, the small scale industrial estate and the free zone are listed in the tables below. The summary of Industrial Plan by province shows various contributions to the whole industrial GDP of the province depending on province by province, ranging from 8% to 87%. In European Istanbul, the share of planned industry is small. But in Tekirdag and Edirne, these shares are high. However, it is important to note that the large industrial output planned in the Tekirdag are is separate from the existing industrial capacity.

**TABLE 1.3.9 Industrial Outputs of Organized Industrial Areas**

	Existing			Future Plan		
	Area (ha)	Value-Added (bill.TL)	Employee (number)	Area (ha)	Value Added (bill.TL)	Employee (number)
Istanbul	240	9806	16564	800	32687	55215
Tekirdag	440	17978	30368	2070	84578	142868
Kirklareli	0	0	0	400	16344	27607
Edirne	0	0	0	295	12053	20360

**TABLE 1.3.10 Industrial Outputs of Small Scale Industrial Estates**

Employee	Existing			Future Plan		
	Area (ha)	Value-Added (bill.TL)	Employee (number)	Area (ha)	Value Added (bill.TL)	Added (number)
Istanbul	1066	1530	5330	151	217	755
Tekirdag	1518	2178	7590	1042	1495	5210
Kirklareli		402	577	500	718	2500
Edirne	0	0	0	0	0	0

**TABLE 1.3.11 Industrial Outputs of Free Zone**

	Existing			Future Plan		
	Area (ha)	Value-added (bill.TL)	Employee (number)	Area (ha)	Value Added (bill.TL)	Employee (number)
Istanbul	11.4	6960	2850	0	0	0
Tekirdag	0	0	0	200	21275	18123
Trade Area				20	13920	5700
Manufacturing Area					180	7355
Kirklareli		0	0	0	0	0
Edirne	0	0	0	0	0	0

**TABLE 1.3.12 Planned industry**

	Whole IDP (bill.TL)	Planned (bill.TL)	Share in region	Contrib. to the whole
Istanbul	550,609	44,240	22.0%	8%
Tekirdag	147,085	127,504	63.3%	87%
Kirklareli	80,086	17,638	8.8%	22%
Edirne	14,679	12,053	6.0%	82%
Total	792,459	201,435	100.0%	25%

The above is considered to be reflection of the government policy of the industrial decentralization. According to this policy, the share of industrial product in Istanbul is assumed to decrease gradually in this study. And it is assumed that the share of industrial production in Istanbul, which is around 90% at present, will decrease to 80% in 2005 and 70% in 2015.

**(2) Provincial distribution of the industrial production.**

Based on the assumption described in the previous section, no heavy industry is considered to be developed in the region and only inland light industry is considered. The share of industrial production by province at the year 2005 and 2015 is projected in Table 1.3.13.

**(3) Relation with port.**

A forementioned industrial production in Thrace Region is projected without new port. If implementation of the new port project proceeds, these plans should be reviewed, taking into account the new port and its access road. In particular, recommended that the Free Trade Zone be newly planned along the access road in order to utilize the port function and other industrial resources in the region.

TABLE 1.3.13 Distribution of Manufacturing Industry in Thrace Region by Percentage Share

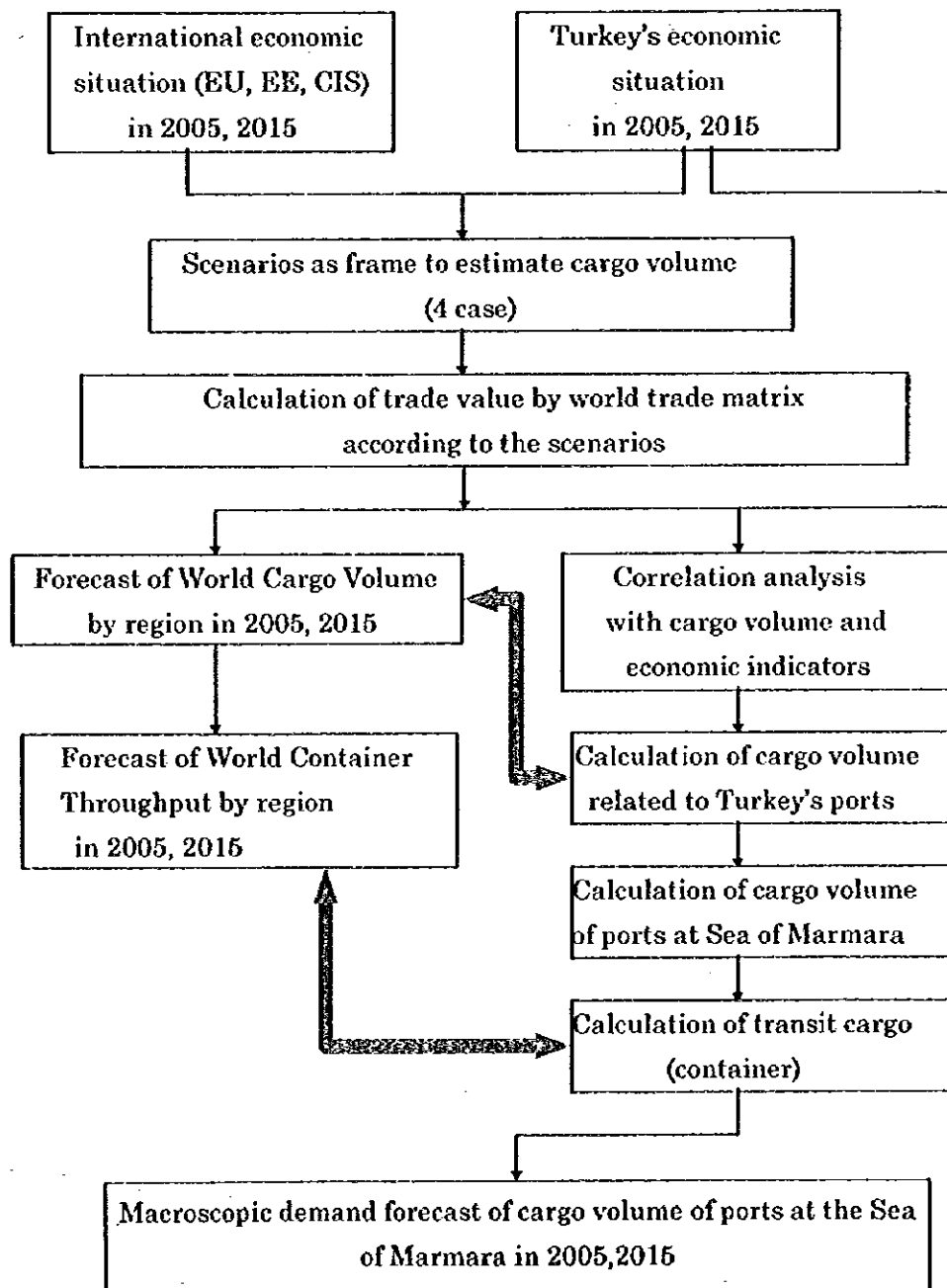
Year	Thrace		Edirne		Istanbul-European Side		Kırklareli		Tekirdağ	
	1991	2005	1991	2015	1991	2005	1991	2005	1991	2015
31 Food	14.91%	7.95%	6.95%	0.82%	0.76%	0.83%	0.76%	3.61%	0.91%	1.05%
32 Textile	28.77%	31.61%	35.50%	0.82%	0.97%	1.05%	0.97%	20.74%	2.91%	4.13%
33 Wood	0.40%	0.18%	0.48%	0.00%	0.01%	0.01%	0.01%	0.11%	0.07%	0.23%
34 Paper	5.79%	6.50%	6.28%	0.00%	0.02%	0.01%	0.02%	5.94%	0.11%	0.10%
35 Chemical	20.79%	12.76%	11.68%	0.00%	0.02%	0.02%	0.02%	10.21%	0.07%	1.20%
36 Mineral	2.86%	1.86%	1.60%	0.02%	0.03%	0.06%	0.03%	0.87%	0.05%	0.61%
37 Metal	3.33%	2.20%	1.87%	0.00%	0.02%	0.02%	0.02%	1.61%	0.02%	0.10%
38 Machinery	22.58%	32.25%	33.98%	0.00%	0.02%	0.02%	0.02%	25.48%	2.43%	2.55%
39 Other	0.50%	1.37%	1.57%	0.00%	0.02%	0.02%	0.02%	1.13%	2.43%	2.55%
Total	100.00%	100.00%	100.00%	1.08%	1.86%	2.05%	1.86%	69.48%	6.47%	10.11%

## 1.4 Framework Scenario

### 1.4.1 General

Figure 1.4.1 shows the conceptual flow chart for demand forecasting. A framework was discussed in the steering committee held in June 1996. It contains three key factors. The first is future GDP growth of Turkey. The second is future trends of trade between EU and Turkey. The third is future GDP growth of East European Countries and CIS (see Table 1.4.1).

FIGURE 1.4.1 Flow Chart for Demand Forecast



**TABLE 1.4.1 Framework of Scenario Making**

	<b>Trade with EU</b>	<b>Accelerated case</b>		<b>Low case</b>	
	<b>East Europe &amp; CIS</b>	<b>High growth case</b>	<b>Low growth case</b>	<b>High growth case</b>	<b>Low growth case</b>
<b>Turkish GDP</b>	<b>High growth</b>	<b>study</b>			
	<b>Medium growth</b>	<b>study</b>	<b>study</b>		
	<b>Low growth</b>				<b>study</b>

Each key factor will be treated in depth later.

## 1.4.2 Scenario Factor 1: Turkey's Economy

### (1) Gross Domestic Products

Three cases were set for the demand forecasting scenario as follows.

High case : 6.6% growth of GDP over 1996-2000  
7.6% growth of GDP over 2001- 2015

Medium case : 5.8% growth of GDP over 1996-2000  
6.3% growth of GDP over 2001- 2015

Low case : 5.0% growth of GDP over 1996-2015

Three cases are formulated in TABLE 1.4.2 . GDP level in 2015 reaches 4.1 in the high case, 3.3 in the medium case and 2.7 in the low case.

TABLE 1.4.2 Assumption of Future GDP Growth

		1995	2000	2015
			1995- 2000	2000- 2015
High	rate		6.60	7.60
	level	1.000	1.377	4.132
Medium	rate		5.80	6.30
	level	1.000	1.326	3.315
Low	rate		5.00	5.00
	level	1.000	1.276	2.653

## 1.4.3 Scenario Factor 2: Eastern Europe and CIS's Economy

Understanding the future economies of Eastern Europe and CIS is vital as the area surrounding the Black Sea, could account for significant cargo movement. Present economic situation of these countries is shown in TABLE 1.4.3.



**TABLE 1.4.3 Real GDP in Europe, the Baltics and the CIS**

	Real GDP Growth (%)							Note
	1990	1991	1992	1993	1994	1995	1996	
						Estm.	Proj.	1989=100
Eastern Europe, the Baltic's and the CIS	-5	-12	-10	-6	-7	-1	3	66
Eastern Europe and the Baltic's	-7	-11	-4	0	4	5	5	87
CIS	-4	-12	-15	-10	-14	-5	2	53

Source: EBRD, Transition report update, April 1996  
 WB, Economic Data Book, 1995  
 (Note) Estimated level of GDP in 1995

As seen in TABLE 1.4.1, two cases were set with the expression of GDP growth, which will be described in detail in the next chapter. Smooth transitions toward market economy are expected in the high growth case. On the other hand, in the second case, a lower growth rate is imagined because of the delay of the recovery of market reliability.

High growth case :	GDP Growth of Eastern Europe	5.0% over 1995-2015
	GDP Growth of CIS	3.0% over 1995-2005 4.0% over 2005-2015
Low growth case :	GDP Growth of Eastern Europe	3.8% over 1995-2015
	GDP Growth of CIS	1.5% over 1995-2005

#### 1.4.4 Scenario Factor 3: Relationship between Turkey and EU

What future scenario concerning the relationship between EU and Turkey or the economic situation of the EU, which influences on Turkish international trade, is most likely?

A lot of discussions were held. Some pointed to the future GDP growth of EU as being the key in whether integration of the European economies would smoothly progress or not.

In the end, a combination of trades, ( see TABLE 1.4.1 ) was identified as the most likely scenario. In future, if the relationship between Turkey and EU would be strengthened including full Turkish participation to EU, the coefficient of trade function might be shifted up. Then, two cases are set in TABLE 1.4.1, one is the accelerated trade coefficient case and the other is low case.

As mentioned in Chapter 1.2, an attempt was made to calculate the effect of this possibility on the coefficient. As a result, Turkey's coefficients of trade function to EU have been changed by 10% in export and 5.7% in import in the accelerated case.

## **2 Demand Forecast**

### **2.1 Methodology for Cargo Demand Forecast**

#### **2.1.1 Methodology of Forecast**

There are two different methods of forecasting demand for port traffic in general. One is the so-called macro forecast method on the basis of socio-economic conditions, and the other is the so-called micro forecast method on the basis of the characteristics of cargo flow by each commodity group of cargo.

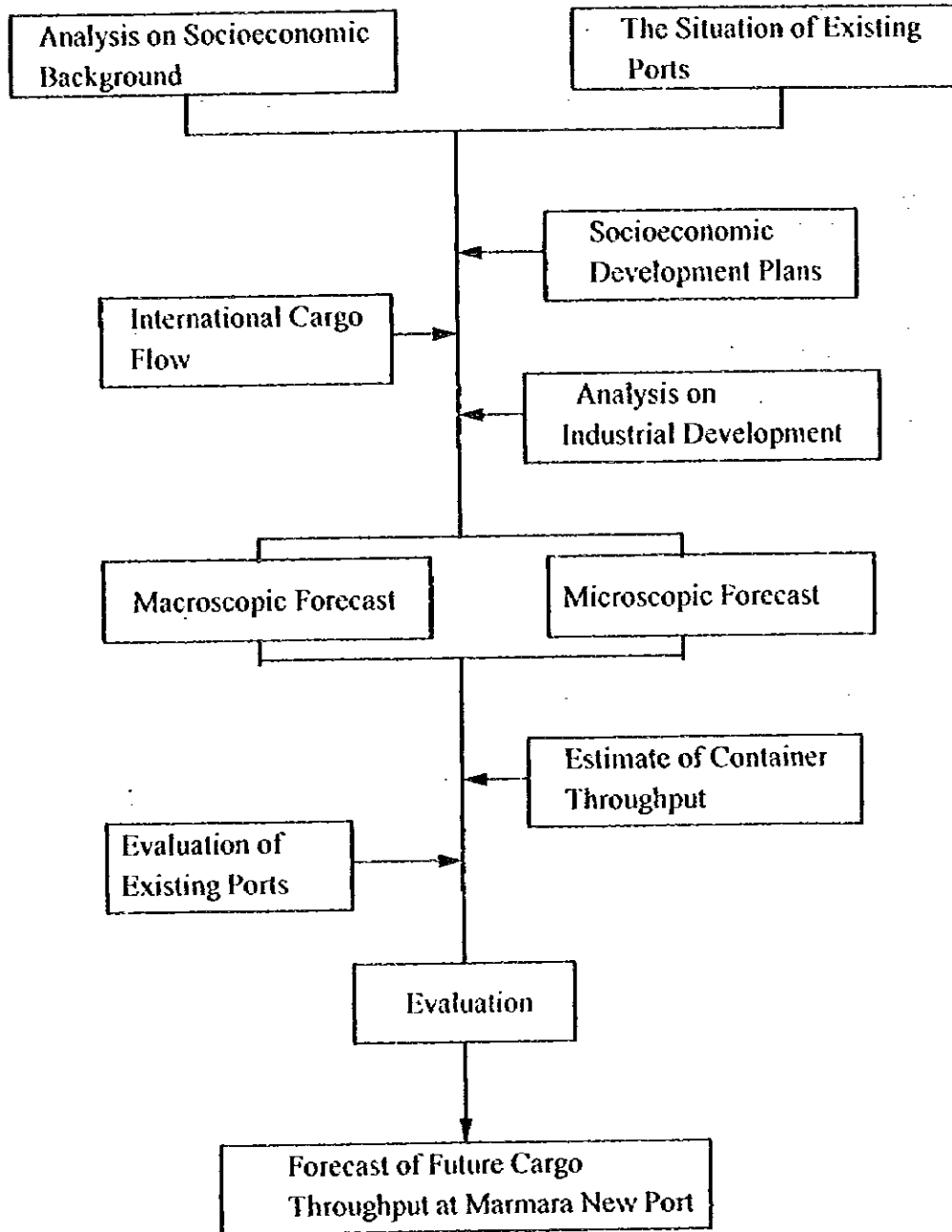
The former method forecasts the total cargo volume as a whole by statistical correlation between the cargo volume and socio-economic indices such as GDP(gross domestic products) of the hinterland of the port and/or population and the past time trend.

The latter one is a cumulative method forecasting the cargo volume based on the analysis of the patterns of major commodities individually ( related indices, the forecast demand and supply situation ).

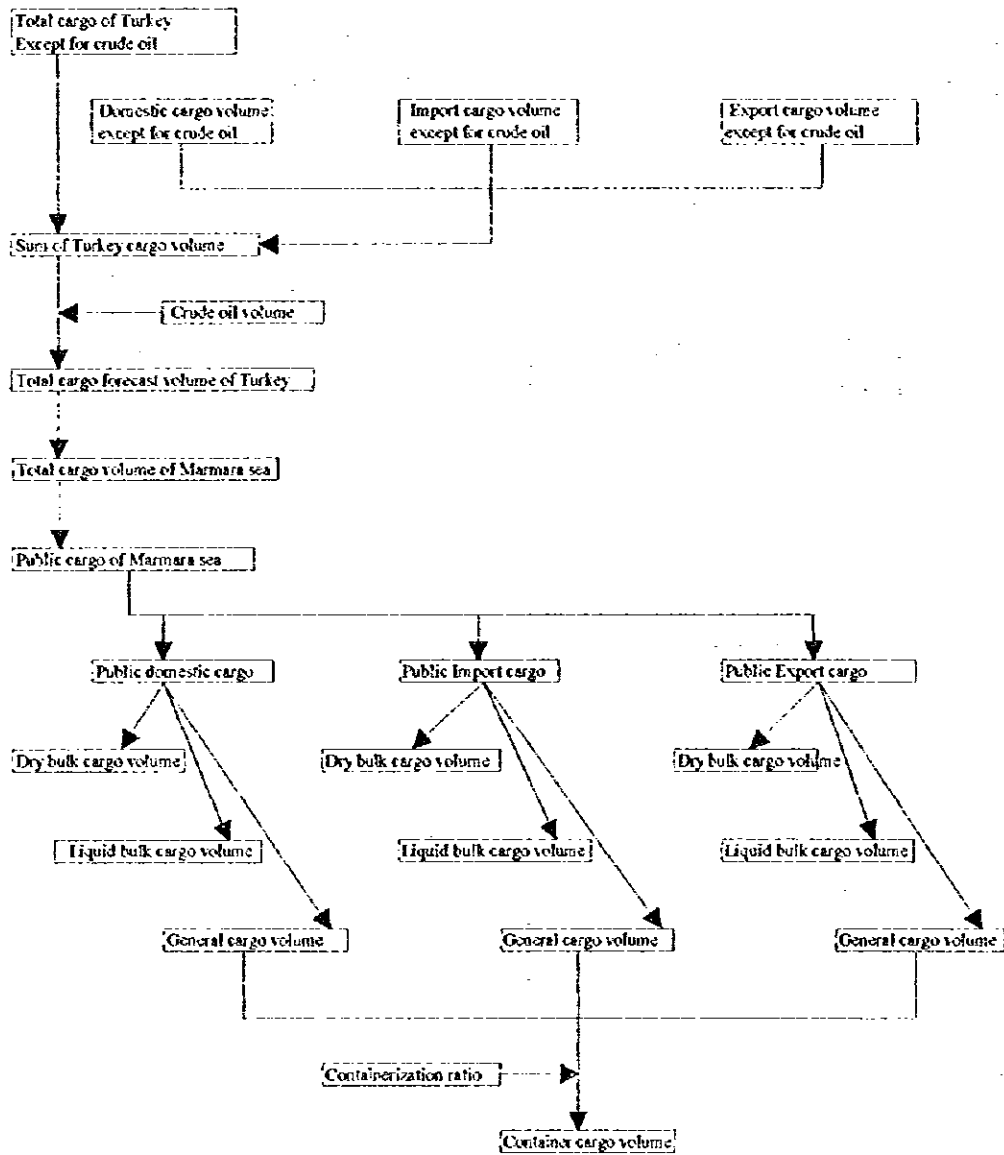
#### **2.1.2 Flowchart**

A flowchart of the demand forecast methodology and macroscopic demand forecast is presented in Figure 2.1.1 and Figure 2.1.2 respectively.

**FIGURE 2.1.1 Flowchart of Demand Forecast Methodology**



**FIGURE 2.1.2 Flowchart of Macroscopic Demand Forecast**



## 2.2 Hinterland

### 2.2.1 Cargo Movement to/from Marmara Sea Ports

At Haydarpaşa port, general cargo mainly consists of electronics equipment, machine, toys, consumer goods etc. General cargo used not to arrive in containers, however recently this type of cargo has been containerized. Textile and clothing materials

coming in containers are distributed to Bursa, Istanbul and Thrace Region as a whole. Dry bulk cargo is usually distributed to the industrial area covering Izmit and Adapazari by E-80 highway. Eighty to ninety percent of dry bulk is distributed to Gebze, Kocaeli and the rest is to the organized industrial area at Corlu, Cerkezkoy, Tekirdag. Distribution of general cargo and container cargo is almost the same as dry bulk. A portion of cargo is transported to Central Anatolia, accordingly. The hinterland of Haydarpasa port is extends as far as Ankara and Eskisehir.

As for Tekirdag port, most imported raw materials are distributed to the organized industrial area in Thrace Region. Corlu, Tekirdag, Cerkezkoy and Luleburgaz are the destinations of unloaded raw materials. Main export commodities loaded at the port are wheat, flour, glass, Iron and paper coming from Thrace Region.

The main import commodity at Canakkale port is frozen fish for a food processing company in Canakkale. Zinc mine from Can and agricultural products of Canakkale province are exported from the port.

Coal used by cement factories in Eskisehir, Bursa, Balikesir is mainly imported at Bandirma port. Main export commodities are tomato paste from Mustafakemalpassa and minerals excavated in Eskisehir and Kutahya. Ceramic factories in Can also use Bandirma port for exporting their products. Bakfas fertilizer factory has its own facility near the Bandirma port for the import of material.

As for Mudanya port, steel plate for automobile factories in Bursa and timber for Inegol are main import commodities. Minerals from Eskisehir and Kutahya is one of main export commodities.

Gemport handles coal used by cement factories in Bursa, Kutahya and Ankara. The hinterland of Gemport extends from Izmit to Eskisehir and includes the Aegean region.

As to Gemlik port, coal from the Black Sea Region is distributed to Bursa cement factory. Marble stone from Marmara island is transported to Bursa and Gemlik factories. Ceramic factories using imported clay are in Kutahya, Bozuyuk, Bilecik and Istanbul.

In Izmit bay, approximately 28 million tons of cargoes are unloaded at private facilities in front of factories as their raw materials and then loaded at same facilities and distributed to domestic or international market after processing.

According to the present cargo movement through ports around Marmara Sea and planned future transportation network, the hinterland of ports at Marmara Sea is defined as the entire of Marmara Region and some provinces in Central Anatolia such as Kutahya,

Eskisehir, Bolu and Ankara.

## 2.2.2 Hinterland Identification

### (1) Methodology of Hinterland Identification

In areas surrounding the Marmara Region, ports such as, Izmir port in the Aegean, Mersin port in the Mediterranean, Filyos port in the Black sea will compete with Marmara sea ports. Handling cargo collection amount of each port should be proportionate to the handling capacity of port and in inverse proportion to the cargo transportation distance. Therefore, to identify the hinterland of each port, gravity model type formula is adopted as follows.

$$\text{Share of Hinterland} = \frac{\text{Berth length/ Distance of Transportation}^2}{\Sigma (\text{ Berth length/ Distance of Transportation}^2)}$$

Table 2.2.1 shows the Hinterland share of Marmara sea ports by province. Two different cases are calculated, case1 includes the new Filyos port, while case2 does not.

### (2) Hinterland of Marmara Ports

Besides present Marmara Region, provinces of Central Anatolia Region, Bolu, Ankara, Eskisehir and Kutahya compose the hinterland of Marmara sea ports. Table 2.2.2 shows Marmara sea ports Hinterland GDP throughput at 1987 constant price and Table 2.2.3 shows projection of Marmara sea ports Hinterland GDP at 1987 constant price. Study team assume the GDP growth rate of Marmara sea ports hinterland same as the whole of Turkey.

Marmara sea port hinterland is divided into 4 areas as shown in Figure 2.2.1.

#### 1) Thrace Area

Tekirdag, Kirklareli, Edirne province and European side of Istanbul province  
Main ports are Tekirdag and Anbarli.

#### 2) Izmit Area

Kocaeli, Sakarya, Bilecik, Bursa province and Asian side of Istanbul province, part of Ankara, Eskisehir and Kutahya provinces.

TABLE 2.2.1 Hinterland Share of Marmara Sea Ports by Province

Case 1 With Filyos Port

Province	Port	Distance km	1/Distance/Distance 1/d/d	Berth Length ( BL ) m	BL/d/d	Ratio	Share %
Ankara	Izmit	342	8.54964E-06	4.500	0.0385	0.425	42.5
	Izmir	580	2.97265E-06	2.500	0.0074	0.082	
	Mersin	482	4.50433E-06	2.300	0.0099	0.109	
	Filyos	263	1.44573E-05	2.400	0.0347	0.383	
	Total				0.0905		
Bolu	Izmit	151	4.38577E-05	4.500	0.1974	0.603	60.3
	Filyos	136	5.40657E-05	2.400	0.1298	0.397	
	Total				0.3271		
Eskisehir	Izmit	219	2.08503E-05	4.500	0.0938	0.827	82.7
	Izmir	414	5.83444E-06	2.500	0.0146	0.129	
	Mersin	672	2.21443E-06	2.300	0.0051	0.045	
	Total				0.1135		
Kutahya	Izmit	249	1.61288E-05	4.500	0.0726	0.725	72.5
	Izmir	336	8.85771E-06	2.500	0.0221	0.221	
	Mersin	657	2.3167E-06	2.300	0.0053	0.053	
	Total				0.1001		

Distince : Distance between the capital of province each port

Berth Length : Total berth length for general cargo

Share : Share of the area belonging to the hinterland of Marmara sea port



Case 2 Without Filyos Port

Province	Port	Distance km	1/Distance/Distance 1/d/d	Berth Length ( BL ) m	BL/d/d	Ratio	Share %
Ankara	Izmit	342	8.54964E-06	4,500	0.0385	0.689	68.9
	Izmir	580	2.97265E-06	2,500	0.0074	0.133	
	Mersin	482	4.30433E-06	2,300	0.0099	0.177	
	Total				0.0558		
Bolu	Izmit	151	4.38577E-05	4,500	0.1974	1.000	100.0
	Total				0.1974		
Eskişehir	Izmit	219	2.08503E-05	4,500	0.0938	0.827	82.7
	Izmir	414	5.83444E-06	2,500	0.0146	0.129	
	Mersin	672	2.21443E-06	2,300	0.0051	0.045	
	Total				0.1135		
Kutahya	Izmit	249	1.61288E-05	4,500	0.0726	0.725	72.5
	Izmir	336	8.85771E-06	2,500	0.0221	0.221	
	Mersin	657	2.3167E-06	2,300	0.0053	0.053	
	Total				0.1001		

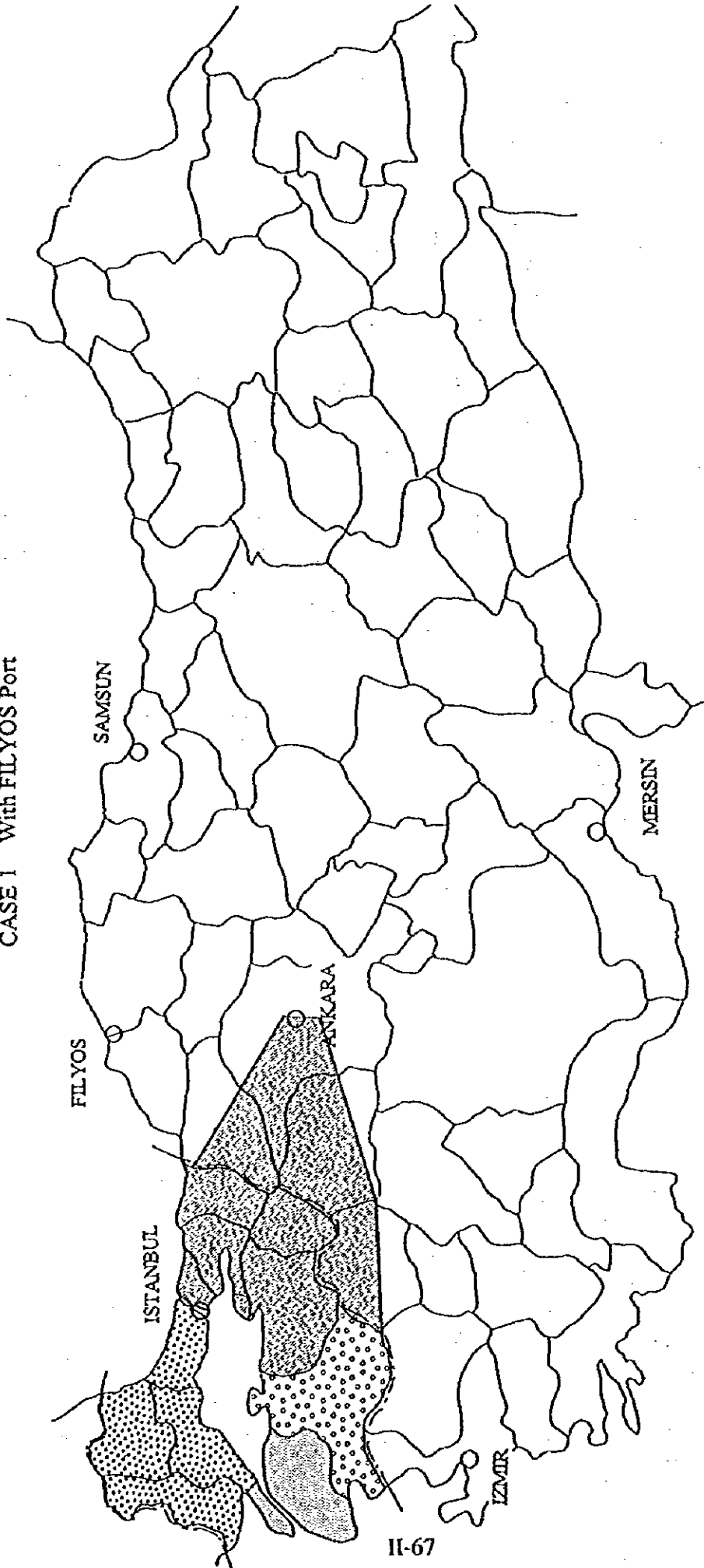
Distance : Distance between the capital of province each port

Berth Length : Total berth length for general cargo

Share : Share of the area belonging to the hinterland of Marmara sea port

FIGURE 2.2.1 (1) Four Hinterland Area of Marmara Sea Ports

CASE 1 With Filyos Port



II-67

Four Hinterland Areas

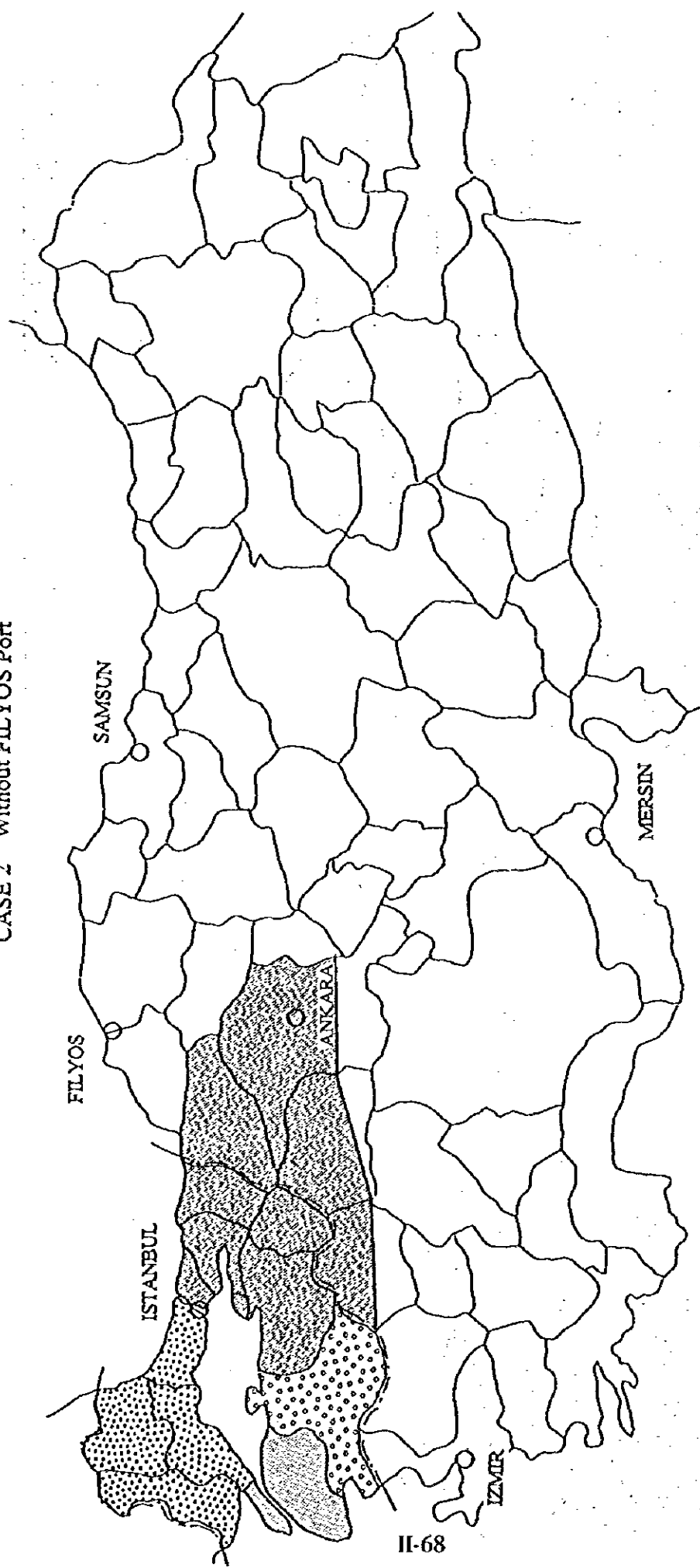
Area	
THRACE	
IZMIT	
BALIKESIR	
CANAKKALE	

Hinterland Area Share of Province

Province	Area Share (%)
ANKARA	42.5
BOLU	60.3
ESKISEHIR	82.7
KUTAHYA	72.5

FIGURE 2.2.1 (2) Four Hinterland Area of Marmara Sea Ports

CASE 2 Without FİLYOS Port



Hinterland Area Share of Province

Province	Area Share (%)
ANKARA	68.9
BOLU	100.0
ESKİSEHIR	82.7
KUTAHYA	72.5

Four Hinterland Areas

Area	Pattern
THRACE	[Dotted pattern]
IZMIT	[Cross-hatch pattern]
BALIKESIR	[Circles pattern]
CANAKKALE	[Horizontal lines pattern]



**TABLE 2.2.3 Projection of Marmara Sea port Hinterland GDP at 1987 Constant Price**

Case I With Filyos port

Year	Low Case		Medium Case		High Case	
	GDP million T.L.	growth rate %	GDP million T.L.	growth rate %	GDP million T.L.	growth rate %
1987			30,806,943			
1988			31,140,856			
1989			31,792,567			
1990			34,534,323			
1991			35,133,817			
1992			37,362,513			
1993			40,925,626			
1994			37,687,035			
1995	40,438,189	7.3	40,438,189	7.3	40,438,189	7.3
1996	42,460,098	5.0	42,783,603	5.8	43,107,109	6.6
1997	44,583,103	5.0	45,265,052	5.8	45,952,179	6.6
1998	46,812,259	5.0	47,890,426	5.8	48,985,022	6.6
1999	49,152,871	5.0	50,668,070	5.8	52,218,034	6.6
2000	51,610,515	5.0	53,606,818	5.8	55,664,424	6.6
2001	54,191,041	5.0	56,984,048	6.3	59,894,920	7.6
2002	56,900,593	5.0	60,574,043	6.3	64,446,934	7.6
2003	59,745,622	5.0	64,390,208	6.3	69,344,901	7.6
2004	62,732,904	5.0	68,446,791	6.3	74,615,114	7.6
2005	65,869,549	5.0	72,758,938	6.3	80,285,863	7.6
2006	69,163,026	5.0	77,342,752	6.3	86,387,588	7.6
2007	72,621,178	5.0	82,215,345	6.3	92,953,045	7.6
2008	76,252,236	5.0	87,394,912	6.3	100,017,476	7.6
2009	80,064,848	5.0	92,900,791	6.3	107,618,804	7.6
2010	84,068,091	5.0	98,753,541	6.3	115,797,834	7.6
2011	88,271,495	5.0	104,975,014	6.3	124,598,469	7.6
2012	92,685,070	5.0	111,588,440	6.3	134,067,953	7.6
2013	97,319,323	5.0	118,618,512	6.3	144,257,117	7.6
2014	102,185,290	5.0	126,091,478	6.3	155,220,658	7.6
2015	107,294,554	5.0	134,035,241	6.3	167,017,428	7.6

Case 2 Without Filyos port

Year	Low Case		Medium Case		High Case	
	GDP million T.L.	Growth rate %	GDP million T.L.	Growth rate %	GDP million T.L.	Growth rate %
1987			32,764,209			
1988			33,119,434			
1989			33,699,210			
1990			36,575,912			
1991			37,205,979			
1992			39,561,370			
1993			43,302,677			
1994			39,958,732			
1995	42,875,719	7.3	42,875,719	7.3	42,875,719	7.3
1996	45,019,505	5.0	45,362,511	5.8	45,705,516	6.6
1997	47,270,480	5.0	47,993,537	5.8	48,722,081	6.6
1998	49,634,004	5.0	50,777,162	5.8	51,937,738	6.6
1999	52,115,704	5.0	53,722,237	5.8	55,365,629	6.6
2000	54,721,490	5.0	56,838,127	5.8	59,019,760	6.6
2001	57,457,564	5.0	60,418,929	6.3	63,505,262	7.6
2002	60,330,442	5.0	64,225,322	6.3	68,331,662	7.6
2003	63,346,964	5.0	68,271,517	6.3	73,524,868	7.6
2004	66,514,313	5.0	72,572,622	6.3	79,112,758	7.6
2005	69,840,028	5.0	77,144,698	6.3	85,125,328	7.6
2006	73,332,030	5.0	82,004,814	6.3	91,594,852	7.6
2007	76,998,631	5.0	87,171,117	6.3	98,556,061	7.6
2008	80,848,563	5.0	92,662,897	6.3	106,046,322	7.6
2009	84,890,991	5.0	98,500,660	6.3	114,105,842	7.6
2010	89,135,540	5.0	104,706,201	6.3	122,777,886	7.6
2011	93,592,317	5.0	111,302,692	6.3	132,109,006	7.6
2012	98,271,933	5.0	118,314,762	6.3	142,149,290	7.6
2013	103,185,530	5.0	125,768,592	6.3	152,952,636	7.6
2014	108,344,807	5.0	133,692,013	6.3	164,577,037	7.6
2015	113,762,047	5.0	142,114,610	6.3	177,084,891	7.6

**Main ports are Hydarpasa, Derince, and Gempport.**

**3) Balikesir Area**

**Whole of Balikesir province**

**Main port is Bandirma port.**

**4) Canakkale Area**

**Whole of Canakkale province**

**Main port is Canakkale port.**

## 2.3 Cargo Demand Forecast

### 2.3.1 Macroscopic Forecast

#### (1) Turkey

Total cargo of Turkey is forecast by the macro- economic forecast using the gross domestic product of Turkey. Breakdown of total cargo, domestic trade cargo volume, import cargo volume and export cargo volume are forecast using the gross domestic product, import value and export value respectively. TABLE 2.3.1 shows trend of Turkey cargo volume throughput. The correlation equations are as follows

##### 1) Total cargo forecast except for crude oil

$$Y = 0.95311961 X_1 - 4,920,566 X_2 + 8,391,217 X_3 + 1,435,061$$

$r = 0.901$   
 $X_1$  : GDP of Turkey  
 $X_2$  : Dummy 1  
 $X_3$  : Dummy 2  
 $r$  : Correlation coefficient

##### 2) Domestic cargo forecast except for crude oil

$$Y = 0.33145376 X_1 + 5,498,725 X_2 + 3,009,838 X_3 - 350,262$$

$r = 0.915$   
 $X_1$  : GDP of Turkey  
 $X_2$  : Dummy 1  
 $X_3$  : Dummy 2

##### 3) Import cargo forecast except for crude oil

$$Y = 0.9939267 X + 9,120.321$$

$r = 0.964$   
 $X$  : Import value

##### 4) Export cargo forecast except for crude oil

$$Y = 0.939433195 X_1 + 4,996,637 X_2 + 2,683,105$$

$r = 0.955$   
 $X_1$  : Export value  
 $X_2$  : Dummy



TABLE 2.3.1 Trend of Turkey cargo volume

year	Domestic cargo			Import cargo			Export cargo			unit : ton
	No Crude oil	Crude oil	Total	No Crude oil	Crude oil	Total	No Crude oil	Crude oil	Total	
	1987	27,649,653	19,097,823	46,747,476	24,592,239	10,995,356	35,587,595	11,780,786	1,160,300	
1988	30,771,582	22,081,992	52,853,574	23,569,509	9,240,739	32,810,248	19,679,519	28,000	19,707,519	
1989	33,613,953	23,212,402	56,826,355	27,290,283	6,379,579	33,669,862	15,307,500	60,000	15,367,500	
1990	32,639,125	14,474,678	47,113,803	31,780,549	12,097,879	43,878,428	15,185,654	53,000	15,238,654	
1991	27,483,412	4,925,355	32,408,767	32,493,299	17,398,400	49,891,699	20,343,438	0	20,343,438	
1992	29,920,691	4,321,135	34,241,826	31,391,949	18,853,303	50,245,252	21,775,110	140,000	21,915,110	
1993	33,009,537	3,234,127	36,243,664	43,932,621	20,942,556	64,875,177	18,089,165	13,195	18,102,360	
1994	29,795,947	4,208,115	34,004,062	31,609,295	21,021,493	52,630,788	21,961,870	150,957	22,112,827	
1995	31,055,063	3,475,390	34,530,453	42,238,044	21,768,510	64,006,554	20,174,562	0	20,174,562	

year	Transit cargo			TOTAL		
	No Crude oil	Crude oil	Total	No Crude oil	Crude oil	Total
	1987	4,045,682	51,767,825	55,813,507	68,068,560	85,021,304
1988	5,098,717	68,431,235	73,529,952	79,119,327	99,781,966	178,901,293
1989	6,526,583	71,289,540	77,816,123	82,738,319	100,941,521	183,679,840
1990	3,257,211	39,693,000	42,950,211	82,862,539	66,318,557	149,181,096
1991	973,848	0	973,848	81,293,997	22,323,755	103,617,752
1992	1,030,121	0	1,030,121	84,117,871	23,314,438	107,432,309
1993	470,882	0	470,882	95,502,205	24,189,878	119,692,083
1994	186,954	0	186,954	83,554,066	25,380,565	108,934,631
1995	319,593	0	314,593	93,787,262	25,243,900	119,031,162

Source : Undersecretariat Maritime Affairs

## 5) Crude oil projection

Table 2.3.2 shows primary energy resource demand in Turkey.

**TABLE 2.3.2 Primary Energy Resource Demand in Turkey**

unit : 1000 ton

year	Oil volume		
	Demand volume	Production volume	Import volume
1995	26,990	2,410	24,580
1996	26,950	2,811	24,139
1997	27,792	2,447	25,345
1998	28,318	2,100	26,218
1999	29,092	1,809	27,283
2000	29,932	1,555	28,377
2001	30,623	1,339	29,284
2002	31,475	1,134	30,341
2003	32,315	951	31,364
2004	33,182	807	32,375
2005	34,158	684	33,474
2006	35,167	576	34,591
2007	36,276	494	35,782
2008	37,407	416	36,991
2009	38,613	354	38,259
2010	39,812	299	39,513
2015	43,292	135	43,157

*Reference : Turkish National Committee*

### a) Import crude oil volume

Crude oil future import volume should be the balance of demand volume and domestic production volume

### b) Domestic crude oil cargo volume

Crude oil future domestic volume is assumed to be the 2 times of the production volume. Table 2.3.3 shows crude oil projection volume in Turkey

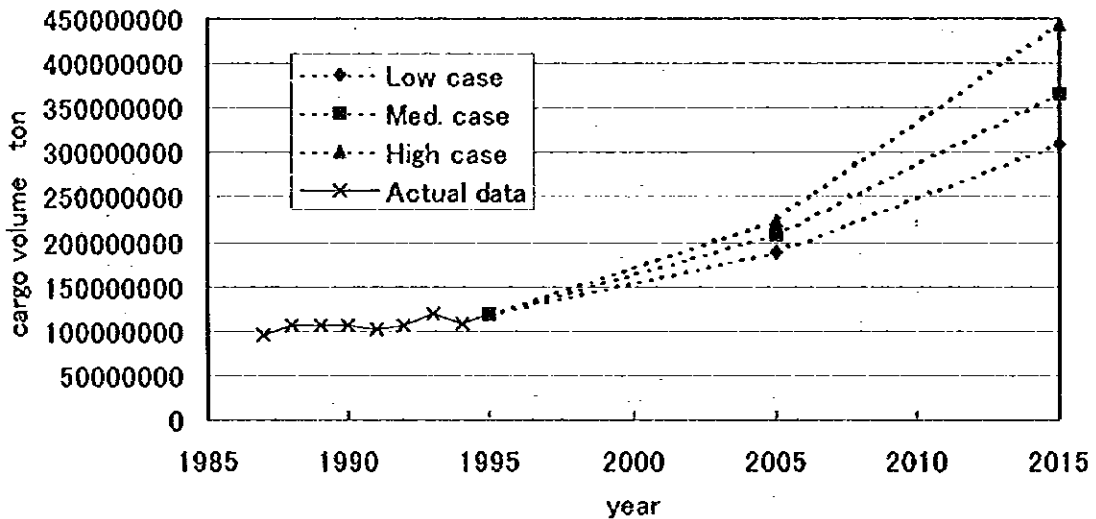
**TABLE 2.3.3 Crude Oil Cargo Volume Projection**

unit : ton		
year	Import Crude Oil	Domestic product Crude Oil
2005	33,474,000	1,368,000
2015	43,157,000	270,000

Table 2.3.4 and Figure 2.3.1 shows result of forecast Turkey cargo volume.

**FIGURE 2.3.1 Total cargo projection**

Turkey total cargo projection



(2) Total cargo volume of Marmara sea ports

1) Total cargo volume

Marmara sea ports total cargo is forecast using the gross domestic product of hinterland. Table 2.3.5 shows public and private cargo throughput of Marmara sea ports. Though some private port facilities in Izmit bay handle public cargo, the volume of this public cargo is not clearly recorded in statistics. Therefore, this report defines cargoes which

are handled in public ports and private ports e.g. Ambarli port and Gemport as public cargo and cargoes which are handled in private port facilities belonging to private enterprises as private cargo.

The correlation equation is as follows

a) Marmara sea ports total cargo forecast

$$Y = 1.268011416 X_1 + 3,829,619 X_2 - 3,644,038$$

$$r = 0.987$$

$X_1$  : Hinterland GDP taking into consideration of Filyos port

$X_2$  : Dummy

TABLE 2.3.4 Turkey Cargo Throughput Projection

unit : ton

year	Domestic cargo			Import cargo			Export cargo		
	Low case	Med. case	High case	Low case	Med. case	High case	Low case	Med. case	High case
1987		27,649,653			24,592,239			11,780,786	
1988		30,771,582			23,569,509			19,679,519	
1989		33,613,953			27,290,283			15,307,500	
1990		32,639,125			31,780,549			15,185,654	
1991		27,483,412			32,493,299			20,343,438	
1992		29,920,691			31,391,949			21,775,110	
1993		33,009,537			43,932,621			18,089,165	
1994		29,795,947			31,609,295			21,961,870	
1995		31,055,063			42,238,044			20,174,562	
2005	53,000,000	58,000,000	64,000,000	64,000,000	74,000,000	81,000,000	37,000,000	40,000,000	44,000,000
2015	86,000,000	107,000,000	134,000,000	101,000,000	133,000,000	163,000,000	78,000,000	82,000,000	102,000,000

year	Crude oil		Total cargo		
	Import	Domestic	Low case	Med. case	High case
1987	10,995,356	19,097,823		94,115,857	
1988	9,240,739	22,081,992		105,343,341	
1989	6,379,579	23,212,402		105,803,717	
1990	12,097,879	14,474,678		106,177,885	
1991	17,398,400	4,925,355		102,643,904	
1992	18,853,303	4,321,135		106,262,188	
1993	20,942,556	3,234,127		119,208,006	
1994	21,021,495	4,208,115		108,596,720	
1995	21,768,510	3,475,390		118,711,569	
2005	33,500,000	1,400,000	188,900,000	206,900,000	223,900,000
2015	43,200,000	300,000	308,500,000	365,500,000	442,500,000

TABLE 2.3.5 Public and Private Cargo Throughput of Marmara Sea Ports

unit: ton

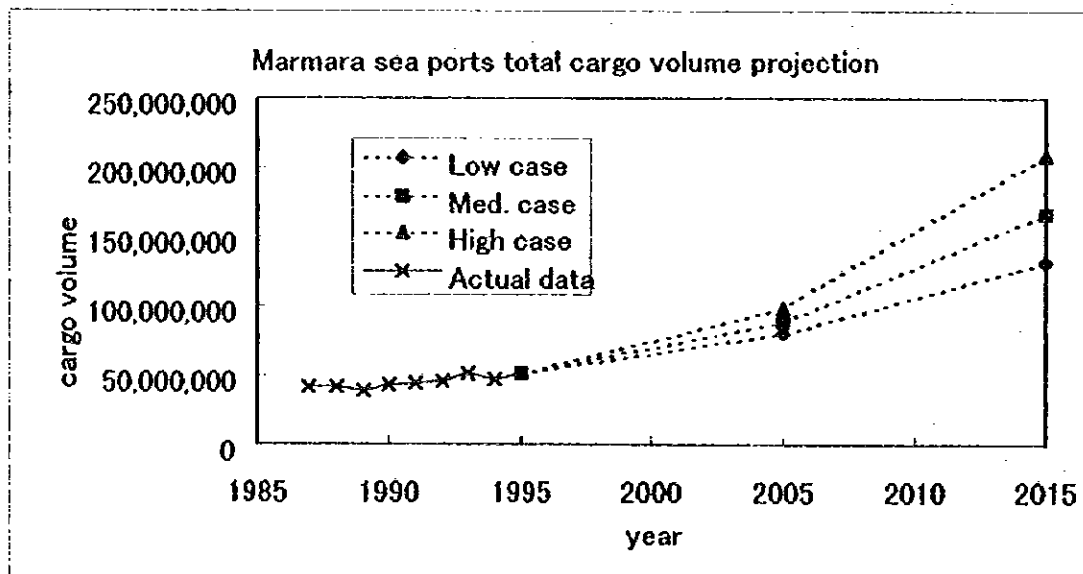
year		Domestic cargo						Export						Transit						Total		
		Public		Private		Total	Public		Private		Total	Public		Private		Total	Public		Private		Total	
1987	cargo volume	8,057,241	10,309,295	18,366,536	4,888,680	19,384,074	2,516,144	2,227,563	4,543,707	34,002	0	34,002	15,296,067	27,032,252	42,328,319							
	share	0.439	0.561		0.252		0.510	0.490		1,000	0.000	0.361	0.639									
1988	cargo volume	9,022,564	10,274,222	19,296,786	3,114,097	15,960,852	3,408,329	2,864,790	6,273,119	53,297	0	53,297	15,598,287	25,985,767	41,584,054							
	share	0.468	0.532		0.195		0.543	0.457		1,000	0.000	0.375	0.625									
1989	cargo volume	9,573,056	10,552,802	20,125,858	3,814,444	14,016,244	2,815,875	2,253,580	5,069,455	115,838	0	115,838	16,319,213	23,008,182	39,327,395							
	share	0.476	0.524		0.272		0.555	0.445		1,000	0.000	0.415	0.585									
1990	cargo volume	10,256,178	9,083,383	19,339,561	4,817,389	18,044,264	2,108,672	3,079,665	5,188,337	10,000	0	10,000	17,192,239	25,389,923	42,582,162							
	share	0.530	0.470		0.267		0.406	0.594		1,000	0.000	0.404	0.596									
1991	cargo volume	6,596,850	9,182,407	15,579,257	3,707,586	21,032,755	3,506,276	3,829,380	7,335,656	0	0	0	13,610,712	30,336,936	43,947,648							
	share	0.411	0.589		0.176		0.478	0.522					0.310	0.690								
1992	cargo volume	8,129,518	9,565,542	17,695,060	4,478,311	20,622,170	3,702,227	3,745,006	7,447,233	13,522	0	13,522	16,323,578	29,454,407	45,777,985							
	share	0.459	0.541		0.217		0.497	0.503		1,000	0.000	0.357	0.643									
1993	cargo volume	8,452,492	10,592,769	19,045,261	6,009,094	25,792,959	2,542,268	3,626,165	6,168,433	37,622	0	37,622	17,041,476	34,002,799	51,044,275							
	share	0.444	0.556		0.233		0.412	0.588		1,000	0.000	0.334	0.666									
1994	cargo volume	7,914,085	10,032,060	17,946,145	4,224,915	20,706,296	3,694,878	4,183,204	7,878,082	0	0	0	15,833,878	30,696,645	46,530,523							
	share	0.441	0.559		0.204		0.469	0.531					0.340	0.660								
1995	cargo volume	7,451,672	11,597,680	19,049,352	6,231,598	24,826,262	3,105,025	4,680,969	7,785,994	14,984	0	14,984	16,803,279	34,873,513	51,676,592							
	share	0.391	0.609		0.251		0.399	0.601		1,000	0.000	0.325	0.675									

Table 2.3.6 and Figure 2.3.2 show Marmara sea ports total cargo volume projection.

**TABLE 2.3.6 Marmara sea ports total cargo volume projection**

year	Total cargo volume		
	Low case	Med. case	High case
1987		42,328,319	
1988		41,584,054	
1989		39,327,395	
1990		42,582,162	
1991		43,947,648	
1992		45,777,985	
1993		51,044,275	
1994		46,530,523	
1995		51,676,592	
2005	80,000,000	89,000,000	98,000,000
2015	132,000,000	166,000,000	208,000,000

**FIGURE 2.3.2 Marmara sea ports total cargo volume projection**



**b) Marmara sea ports public total cargo forecast**

$$Y = 0.48543828 X_1 + 3,351,218 X_2 - 3,771,461$$

$$r = 0.886$$

$X_1$  : Hinterland GDP taking into consideration of Filyos port

$X_2$  : Dummy

## **2) Marmara sea ports public foreign trade and domestic cargo forecast**

The cargo volume for each mode are estimated based on the total public cargo utilizing correlation analysis with the import value for the whole country, the share projection and trend in the past.

## **3) Marmara sea ports public cargo packing type cargo forecast**

The cargo volume in each packing type for import, export and domestic are forecast based on total cargo volume for each trade modes respectively. Utilizing the correlation analysis with socioeconomic indices of a whole country like import value, export value and the trend in the past.

Table 2.3.7 and Figure 2.3.3 ~ Figure 2.3.6 show result of Marmara sea ports public total cargo forecast and forecast by packing type.



**TABLE 2.3.7 Marmara Sea Public Cargo Throughput and Forecast Volume by Packing Type**

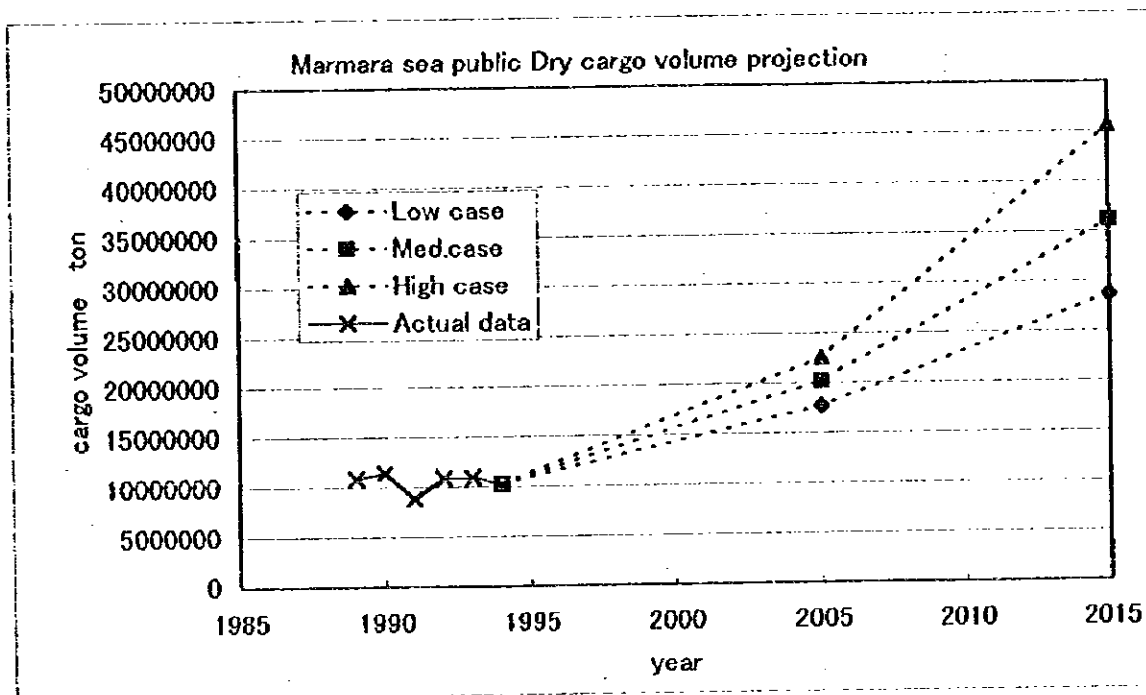
unit : ton

year	Domestic			Import			Export			Total
	Dry bulk	Liquid bulk	General cargo	Dry bulk	Liquid bulk	General cargo	Dry bulk	Liquid bulk	General cargo	
1989	7,959,962	237,310	1,375,784	1,655,484	244,678	1,934,282	1,215,346	0	1,600,529	2,815,875
1990	8,725,369	332,728	1,200,081	1,898,006	455,760	2,483,623	733,079	69,258	1,306,335	2,108,672
1991	5,275,040	252,939	868,871	1,342,143	511,035	1,854,408	2,202,228	80,371	1,223,677	3,506,276
1992	6,791,660	338,350	999,508	1,382,067	853,448	2,242,796	2,675,032	9,987	1,017,208	3,702,227
1993	6,950,231	445,485	1,056,776	2,667,358	397,842	2,945,894	1,277,506	8,760	1,256,002	2,542,268
1994	6,806,352	279,350	828,585	1,623,565	308,339	2,295,011	1,864,036	72,371	1,758,471	3,694,878
2005 Low case	9,300,000	400,000	1,300,000	4,900,000	500,000	6,200,000	3,500,000	100,000	4,200,000	7,800,000
Med. case	10,400,000	400,000	1,500,000	6,100,000	500,000	7,900,000	4,100,000	100,000	5,100,000	8,400,000
High case	11,600,000	400,000	1,700,000	6,800,000	500,000	8,800,000	4,700,000	100,000	6,000,000	9,300,000
2015 Low case	12,700,000	400,000	1,800,000	9,000,000	500,000	11,500,000	7,000,000	100,000	10,100,000	17,200,000
Med. case	16,100,000	400,000	2,400,000	12,700,000	500,000	14,800,000	7,300,000	100,000	10,700,000	18,100,000
High case	20,400,000	400,000	3,000,000	16,000,000	500,000	19,000,000	9,200,000	100,000	13,700,000	23,000,000

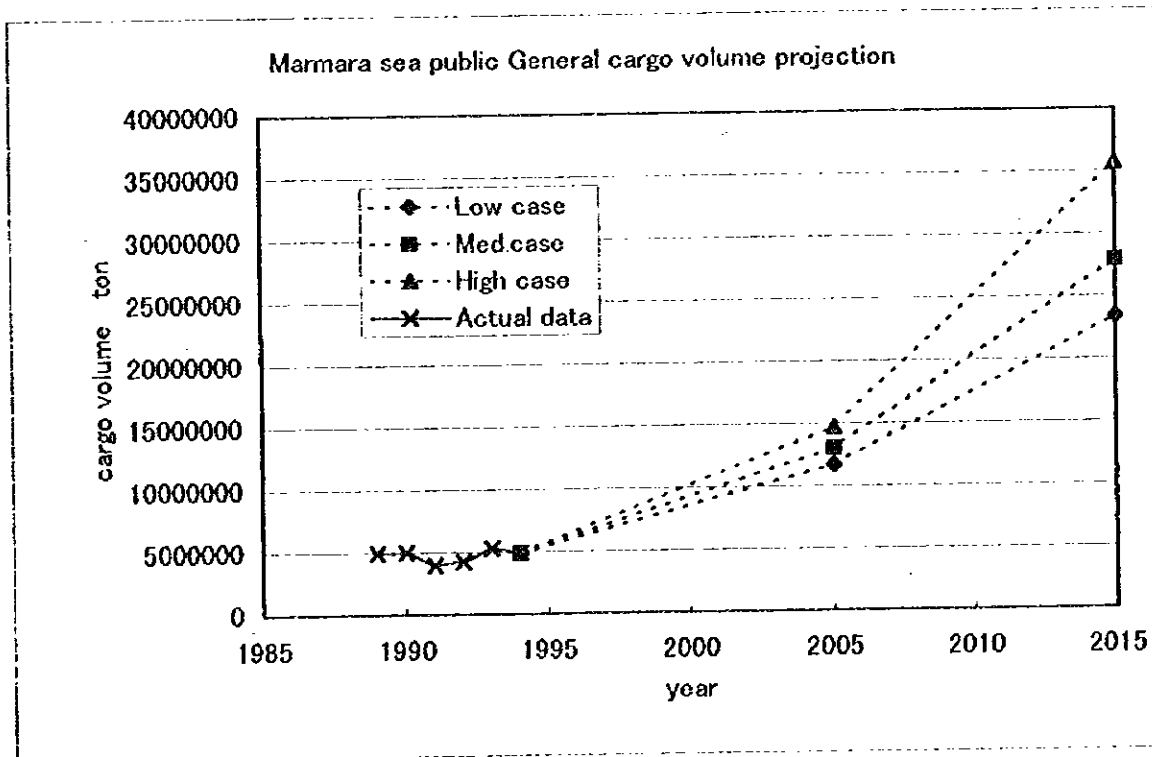
  

year	Transit			Total		
	Dry bulk	Liquid bulk	General cargo	Dry bulk	Liquid bulk	General cargo
1989	57,919	0	57,919	10,868,711	481,988	4,968,514
1990	5,000	0	5,000	11,359,454	837,746	4,995,039
1991	0	0	0	8,819,411	844,345	3,946,956
1992	3,522	0	10,000	10,852,281	1,201,785	4,269,512
1993	10,000	0	27,622	10,905,095	852,087	5,284,294
1994	0	0	0	10,293,953	660,060	4,879,865
2005 Low case				17,700,000	1,000,000	11,700,000
Med. case				20,200,000	1,000,000	13,000,000
High case				22,500,000	1,000,000	14,700,000
2015 Low case				28,700,000	1,000,000	23,400,000
Med. case				36,100,000	1,000,000	27,900,000
High case				45,600,000	1,000,000	35,700,000

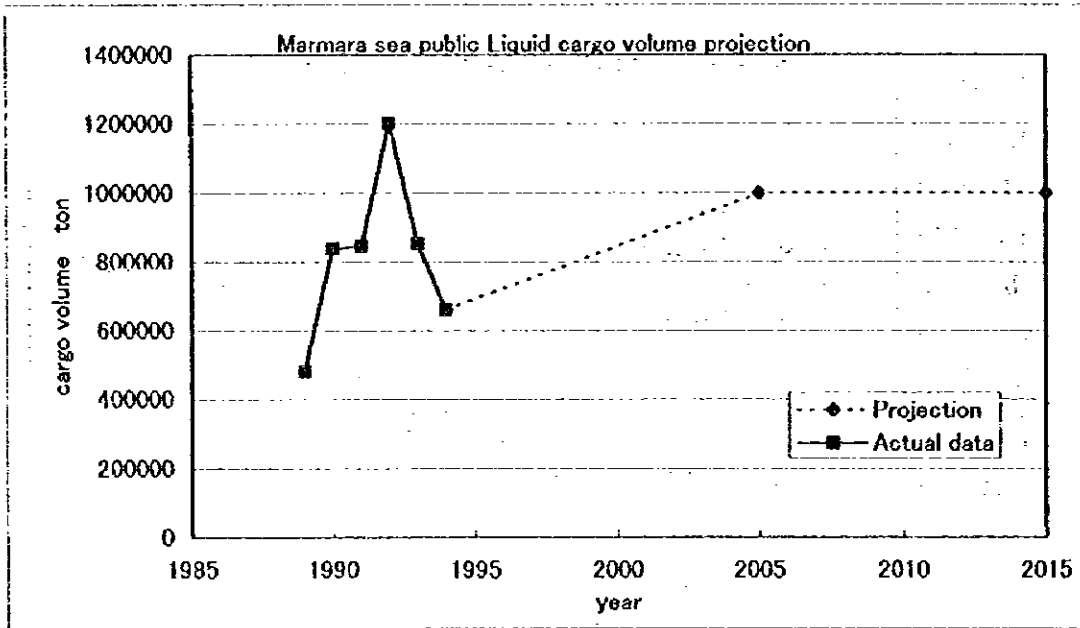
**FIGURE 2.3.3 Marmara Sea Public Dry Bulk Cargo Volume Projection**



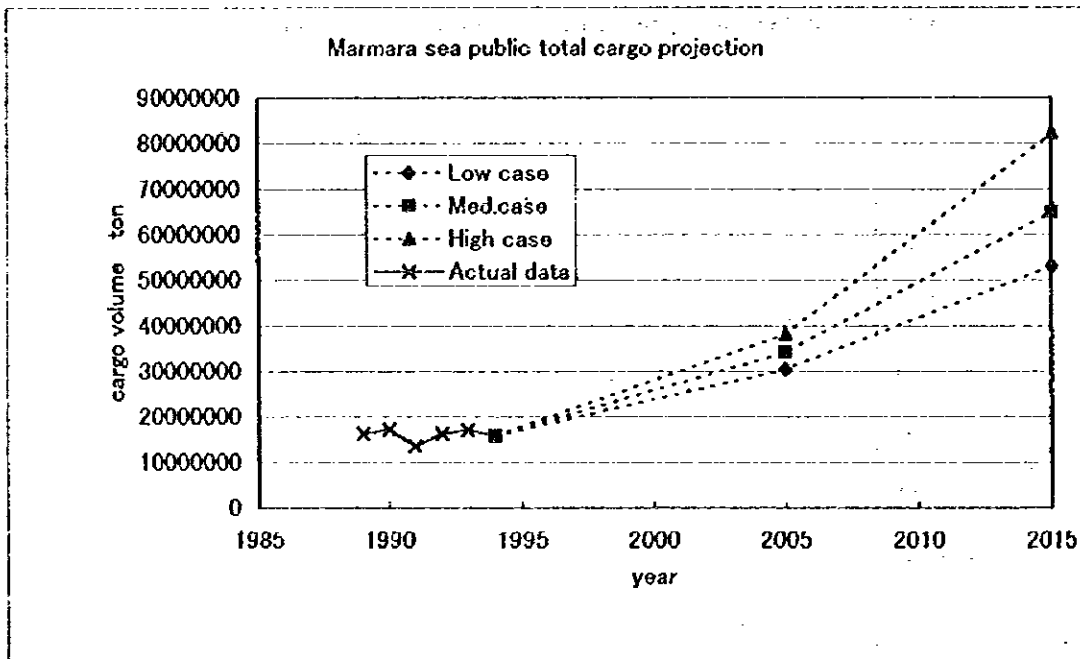
**FIGURE 2.3.4 Marmara Sea Public General Cargo Volume Projection**



**FIGURE 2.3.5 Marmara Sea Public Liquid Bulk Cargo Volume Projection**



**FIGURE 2.3.6 Marmara Sea Public Total Cargo Volume Projection**



#### 4) Container cargo volume forecast

The container cargo volume is estimated for domestic, import and export by multiplying the containerizable cargo volume by the expected ratio of containerization which is calculated based on the actual data of Marmara sea ports.

Table 2.3.8 shows Marmara sea ports container TEU throughput and Table 2.3.9 shows Marmara sea ports container cargo volume throughput.

**TABLE 2.3.8 Marmara Sea Ports Container TEU Throughput**

					unit : TEU
year	Hydarpasa	Derince	Bandırma	Gemport	TOTAL
1984	19,234				19,234
1985	23,270				23,270
1986	35,095				35,095
1987	40,578				40,578
1988	49,066				49,066
1989	59,869				59,869
1990	111,805				111,805
1991	146,046	3,432	1,886		151,364
1992	177,601	4,840	1,117		183,558
1993	232,364	2,617	1,950	7,791	244,722
1994	179,831	3,238	2,663	17,800	203,532
1995	256,569	5,071	1,116	35,000	297,756

#### a) Containerization ratio

The containerization ratio during the planning period is calculated by the following equations which were obtained by the regression analysis with the datum of Table 2.3.7 and Table 2.3.9.

$$\text{Import } Y = \frac{0.80}{1 + 0.664^{t-1.352}}$$

$$\text{Export } Y = \frac{0.80}{1 + 0.568^{t-3.478}}$$

Where Y : Ratio of containerization  
t : Number of years from 1989

Figure 2.3.7 shows import and export cargo ratio of containerization . The limit for the ratio of containerization is assumed as 80 % for import and export, 40 % for

TABLE 2.3.9 Marmara Sea Container Cargo Volume Throughput

unit : ton

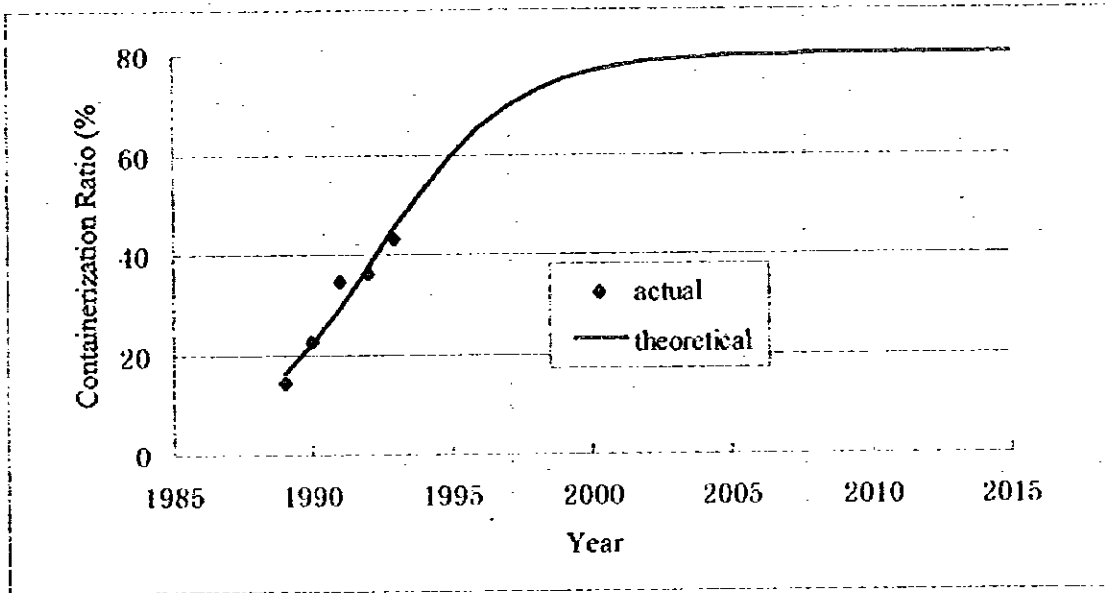
year	Haydarpasa		Total	Derince		Total	Bandirma		Total
	Load	Unload		Load	Unload		Load	Unload	
1988	160,575	178,350	338,925	2,755	2,755	5,510	6,229	6,229	12,458
1989	237,305	267,577	504,882	5,925	5,925	11,850	3,696	3,696	7,392
1990	321,079	547,607	868,686	6,547	6,547	13,094	4,240	4,240	8,480
1991	343,315	616,572	959,887	5,983	16,933	22,916	0	10,684	10,684
1992	551,575	797,962	1,349,537	13,404	12,245	25,649	3,245	2,957	6,202
1993	627,583	1,227,627	1,855,210	2,230	15,266	17,496	3,581	6,955	10,536

unit : ton

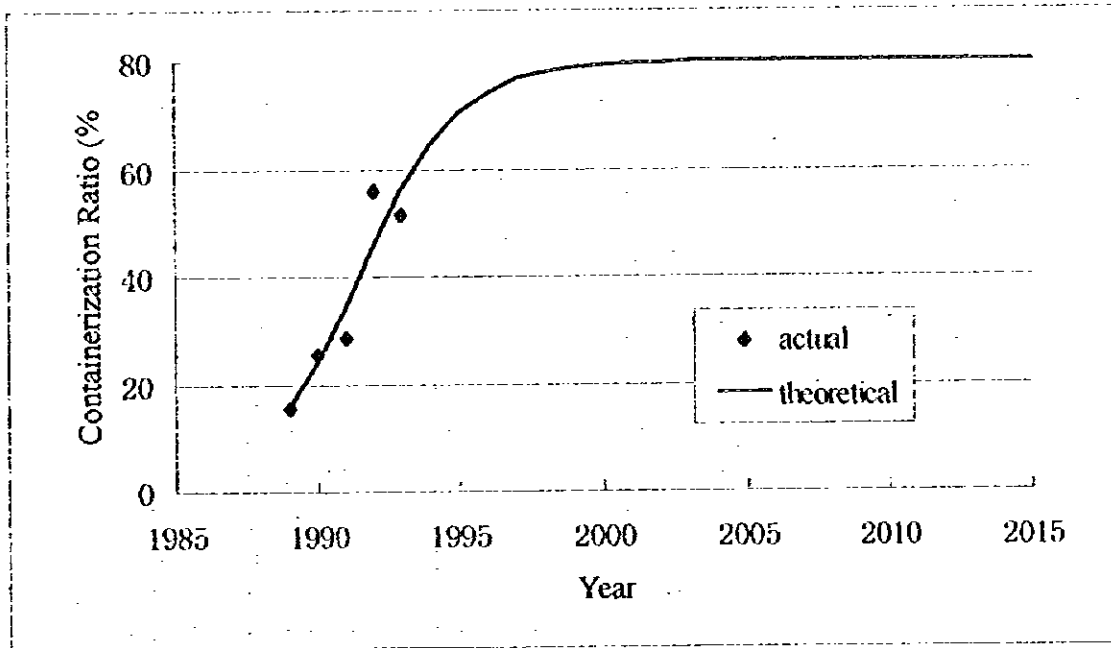
year	Gemport		Total	Total	
	Load	Unload		Load	Unload
1988	0	0	0	187,334	356,893
1989	0	0	0	277,198	524,124
1990	0	0	0	558,394	890,260
1991	0	0	0	644,189	993,487
1992	0	0	0	813,164	1,381,388
1993	14,610	14,610	29,220	1,264,458	1,912,462

domestic.

**FIGURE 2.3.7 Import Cargo Containerization Ratio**



**FIGURE 2.3.8 Export Cargo Containerization Ratio**



Container cargo projection volume is shown in Table 2.3.10.

**TABLE 2.3.10 Marmara Sea Ports Container Cargo Volume Projection**

year	Import			Export		
	General cargo	ratio	Container cargo	General cargo	ratio	Container cargo
2005 Low case	6,200,000	0.796	4,935,200	4,200,000	0.800	3,360,000
Med case	6,900,000	0.796	5,492,400	4,600,000	0.800	3,680,000
High case	7,900,000	0.796	6,288,400	5,100,000	0.800	4,080,000
2015 Low case	11,500,000	0.800	9,200,000	10,100,000	0.800	8,080,000
Med. case	14,800,000	0.800	11,840,000	10,700,000	0.800	8,560,000
High case	19,000,000	0.800	15,200,000	13,700,000	0.800	10,960,000

unit : ton

year	Domestic			Total container cargo
	General cargo	ratio	Container cargo	
2005 Low case	1,300,000	0.400	520,000	8,815,200
Med. case	1,500,000	0.400	600,000	9,772,400
High case	1,700,000	0.400	680,000	11,048,400
2015 Low case	1,800,000	0.400	720,000	18,000,000
Med. case	2,400,000	0.400	960,000	21,360,000
High case	3,000,000	0.400	1,200,000	27,360,000

ratio : ratio of containerization

**TABLE 2.3.11 Marmara Sea Ports Container Cargo Throughput and Projection**

year		unit : ton			
		Import	Export	Domestic	Total
1988		186,210	168,372	2,311	356,893
1989		270,822	240,259	13,043	524,124
1990		531,591	329,875	28,794	890,260
1991		639,036	345,106	9,346	993,488
1992		786,330	555,155	39,903	1,381,388
1993		1,249,285	637,636	25,541	1,912,462
2005	Low case	4,953,200	3,360,000	520,000	8,833,200
	Med. case	5,492,400	3,680,000	600,000	9,772,400
	High case	6,288,400	4,080,000	680,000	11,048,400
2015	Low case	9,200,000	8,080,000	720,000	18,000,000
	Med. case	11,840,000	8,560,000	960,000	21,360,000
	High case	15,200,000	10,960,000	1,200,000	27,360,000

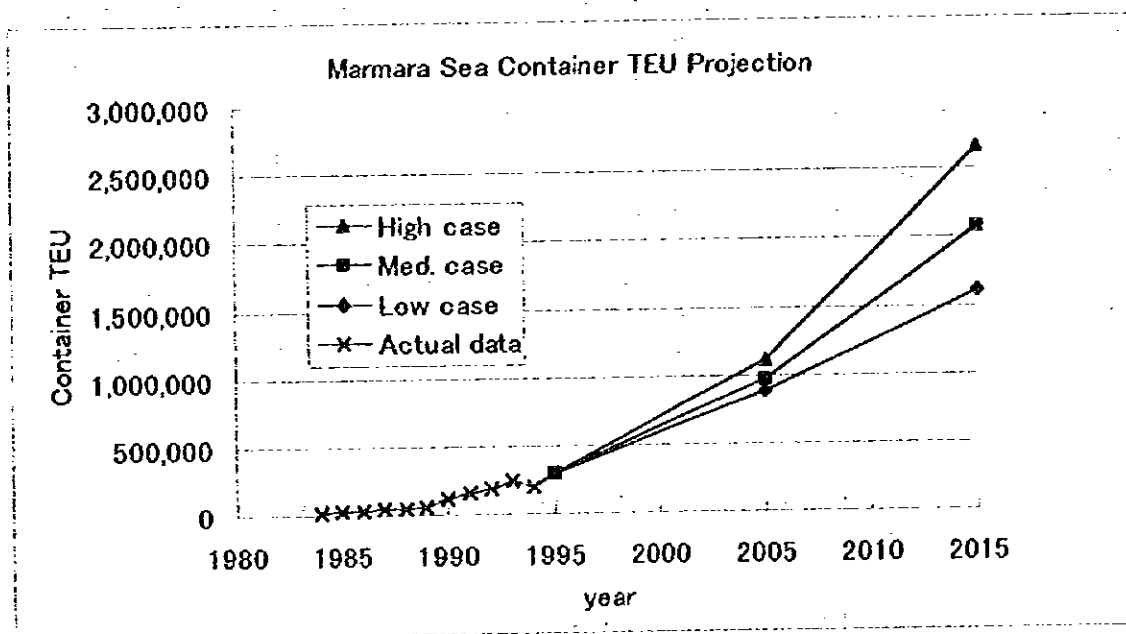
Table 2.3.12 and Figure 2.3.9 show result of Marmara sea ports Container cargo TEU projection .

**TABLE 2.3.12 Marmara Sea Ports Handling Container TEU Throughput**

unit : TEU

year	International Trade			Domestic Trade			Total		
	Low case	Med. case	High case	Low case	Med. case	High case	Low case	Med. case	High case
1984		19,234						19,234	
1985		23,270						23,270	
1986		35,095						35,095	
1987		40,158			420			40,578	
1988		48,747			319			49,066	
1989		58,379			1,490			59,869	
1990		108,652			3,153			111,805	
1991		149,848			1,516			151,364	
1992		178,431			5,127			183,558	
1993		241,302			3,410			244,712	
1994		201,329			2,251			203,580	
1995		293,552			4,204			297,756	
2005	832,000	923,000	1,056,000	43,680	50,400	57,120	875,680	973,400	1,113,120
2015	1,545,600	1,989,000	2,553,600	60,480	80,640	100,800	1,606,080	2,069,640	2,654,400

**FIGURE 2.3.9 Marmara Sea Ports Container TEU Projection**





### 2.3.2 Microscopic Forecast

#### (I) Dry bulk cargo forecast volume

The demand of commodity is used with the grouping of dry bulk cargo volume handled at Tekirdag Port and Ambarli Port as shown in Table 2.3.13 and Table 2.3.14.

#### 1) Cement

There are 3 cement factories in Thrace Region, Akicimento, Pinarhisar and Lalapasa . Total production capacity volume is 3.8 million tons / year. When the total demand volume of cement in Thrace Region exceeds the supply volume, additional cement to satisfy the demand will be transported to Ambarli port from Canakkale by cement vessel.

The future consumption of cement in Turkey is assumed to correlate with GDP . Table 2.3.15 shows historical trend of GDP and cement consumption volume in Turkey.

**TABLE 2.3.15 Historical Trend of GDP and Cement Consumption Volume in Turkey**

year	GDP in Turkey in million TL	Cement consumption volume ton	Population	Per capita consumption ton /capita
1987	74,721,925	21,695,000	52,561,000	0.413
1988	76,306,292	22,458,000	53,715,000	0.418
1989	76,498,311	22,929,000	54,893,000	0.418
1990	83,578,465	22,647,000	56,098,000	0.404
1991	84,352,830	23,841,000	57,326,000	0.416
1992	89,400,745	25,702,000	58,584,000	0.439
1993	96,590,370	27,604,000	59,869,000	0.461
1994	91,320,722	26,604,000	60,576,000	0.439
1995	98,023,152	30,085,000	61,644,000	0.488

Reference : Turkey Cement Association

The correlation between the GDP and Cement consumption volume is expressed in the following equation.

$$Y = 0.1604 X + 11,267,573$$

Y: Cement consumption volume ton

X: GDP

$$r = 0.984$$

#### Forecast cement consumption volume in Turkey

year 2005 X = 176,369,435 Y = 39,600,000

year 2015 X = 324,904,682 Y = 63,400,000

**TABLE 2.3.13 Tekirdag Port Dry Bulk Cargo Handling Volume Throughput**

**Import**

						unit : ton
year	1991	1992	1993	1994	1995	
Wheat	145,424	27,130	106,670	39,975	140,086	
Lumber	35,063	29,133	28,400	6,489	3,134	
Coal	60,526	41,544	38,813	0	0	
Cotton	345	7,311	34,142	0	0	
Sunflower seed	18,559	715	19,548	50,875	187,518	
Sand	0	0	0	18,332	57,904	

**Export**

						unit : ton
year	1991	1992	1993	1994	1995	
Wheat	627,986	980,470	398,921	631,069	200,195	
Cement	73,268	73,808	66,248	36,767	0	
Timber	0	0	244	1,759	1,638	

**Domestic loading**

						unit : ton
year	1991	1992	1993	1994	1995	
Wheat	86,494	59,036	19,131	6,700	23,403	

**Domestic unloading**

						unit : ton
year	1991	1992	1993	1994	1995	
Sand	0	1,630	0	900	0	
Coal	81,610	149,415	149,724	102,049	2,718	
Stone	5,415	11,812	25,064	27,738	1,440	
Soda	77,315	92,249	80,843	84,869	70,315	
Cement	4,179	12,031	13,115	0	0	
Clinker	69,077	179,169	33,816	0	0	
Marble	0	0	0	0	610	

**TABLE 2.3.14 Ambarli Port Dry Bulk Cargo Handling Volume Throughput**

**Import**

unit : ton

year	1994	1995	1996
Coal	0	152,396	81,126
Scrap	0	380,000	210,000

**Export**

unit : ton

year	1994	1995	1996
Cement	25,000	100,000	84,000
Clinker	150,000	130,000	0

**Domestic loading**

unit : ton

year	1994	1995	1996
Cement		117,775	32,560
Clinker	0	0	12,845

**Domestic unloading**

unit : ton

year	1994	1995	1996
Sand	4,800,000	4,360,000	1,360,000
Cement	500,000	785,000	260,000
Marble	0	70,000	20,000

Cement consumption volume in Thrace Region is calculated from the ratio of population. Table 2.3.16 shows cement volume from Canakkale by sea.

**TABLE 2.3.16 Cement Volume from Canakkale by Sea**

Year	Consumption volume	Supply from Thrace Region	from Canakkale by sea
2005	4,300,000	3,800,000	500,000
2015	6,810,000	3,800,000	3,010,000

2) Sand

Before 1989, sea sand was solely used for construction material in Thrace Region. Recently, land sand usage volume has increased. It is said that the usage ratio of land sand and sea sand is 1.5 : 1 in Thrace Region and this trend should continue.

Consumption volume of construction material sand is proportionate to the cement volume and usage magnification in volume is 3.

Sea sand consumption volume in Thrace Region is calculated as follows.

$$\text{Year 2005} \quad 4,300,000 \times 3 \div 2.5 = 5,160,000 \text{ tons}$$

$$\text{Year 2015} \quad 6,810,000 \times 3 \div 2.5 = 8,172,000 \text{ tons}$$

3) Clinker

Export volume of clinker is proportionate to the export value of forecasting year.

$$\text{Year 2005} \quad 150,000 \times 40,000 \div 19,241 = 311,834 \text{ tons}$$

$$\text{Year 2015} \quad 150,000 \times 84,000 \div 19,241 = 654,851 \text{ tons}$$

4) Scrap steel

Import volume of scrap steel is proportionate to the Metal industry manufacturing value of forecasting year.

$$\text{Year 2005} \quad 380,000 \times 8,761 \div 5,899 = 564,363 \text{ tons}$$

$$\text{Year 2015} \quad 380,000 \times 14,789 \div 5,899 = 952,673 \text{ tons}$$

5) Wheat

Export volume of wheat is proportionate to the Agriculture production GDP in Turkey of the forecasting year.

Year	Agriculture GDP in Turkey TL
1995	603,700,000,000,000
2005	820,900,000,000,000
2015	1,102,900,000,000,000

$$\text{Year 2005 } 980,470 \times 820,900 / 603,700 = 1,333,224 \text{ tons}$$

$$\text{Year 2015 } 980,470 \times 1,102,900 / 603,700 = 1,791,221 \text{ tons}$$

Import volume of wheat is proportionate to the Food Industry manufacturing value of the forecasting year.

$$\text{Year 2005 } 145,424 \times 31,851 / 26,380 = 175,584 \text{ tons}$$

$$\text{Year 2015 } 145,424 \times 55,367 / 26,380 = 305,220 \text{ tons}$$

Domestic loading volume of wheat is constantly 50,000 tons each year.

#### 6) Coal

The consumption volume of coal in Thrace Region will not increase in the volume since government has intention to convert the heating system to LNG utility.

Import coal volume 190,000 tons

#### 7) Soda Ash

Soda ash is a material for the Glass Industry which is popular in Thrace Rregion. Soda ash is transported to Thrace Region from Mersin port. Consumption volume of Soda ash is proportionate to the Mineral industry manufacturing value of the forecasting year.

$$\text{Year 2005 } 92,429 \times 7,329 / 5,061 = 133,849 \text{ tons}$$

$$\text{Year 2015 } 92,429 \times 13,166 / 5,061 = 240,450 \text{ tons}$$

#### 8) Sunflower seed

Import volume of sunflower seed is proportionate to the Food industry manufacturing value of the forecasting year.

$$\text{Year 2005 } 187,518 \times 31,851 / 27,943 = 213,743 \text{ tons}$$

$$\text{Year 2015 } 187,518 \times 55,367 / 27,943 = 371,553 \text{ tons}$$

9) Cotton seed

Import volume of cotton seed is proportionate to the Food industry manufacturing value of the forecasting year.

$$\text{Year 2005 } 34,142 \times 31,851 / 26,380 = 41,223 \text{ tons}$$

$$\text{Year 2015 } 34,142 \times 55,367 / 26,380 = 71,658 \text{ tons}$$

10) Lumber

Import volume of the lumber is proportionate to the Wood industry manufacturing value of the forecasting year.

$$\text{Year 2005 } 35,063 \times 1,917 / 709 = 94,804 \text{ tons}$$

$$\text{Year 2015 } 35,063 \times 3,787 / 709 = 187,283 \text{ tons}$$

(2) Liquid bulk cargo forecast volume

Table 2.3.17 Tekirdag port liquid bulk cargo handling volume throughput

TABLE 2.3.17 Tekirdag Port Liquid Bulk Cargo Handling Volume Throughput

unit : ton

Year	Domestic trading		International trading	
	Loading	Unloading	Export	Import
1991	1,072	36,691	0	195,577
1992	0	26,389	0	153,422
1993	30,418	25,117	0	165,474
1994	730	27,637	1,358	142,015
1995	3,720	33,304	900	150,853

Reference : Tekirdag port

This liquid bulk cargo is material for a margarine factory. The concerned company plans to market its product globally, therefore this liquid bulk cargo volume is expected to be maintained.

Domestic unloading volume    30,000 tons

Import volume                    162.000 tons

(3) General cargo Non container forecast volume

Table 2.3.18 shows non container general cargo handling volume at Tekirdag port

**TABLE 2.3.18 Tekirdag Port and Ambarli Port non Container General Cargo Handling Volume**

**Tekirdag Port**

**Import**

unit : ton					
year	1991	1992	1993	1994	1995
Rice	11,333	14,371	27,562	29,863	9,271
Pulp	0	34,997	40,637	0	1,004
Paper	6,030	8,669	28,901	8,800	0
Fertilizer	9,560	25,756	53,781	0	7,126
Iron	73,507	24,360	39,961	30,762	85,242

**Export**

unit : ton					
year	1991	1992	1993	1994	1995
Paper	5,330	4,568	1,200	24,637	18,261
Glass	68,600	61,976	49,361	57,078	59,465
Iron	22,549	50,662	60,439	56,638	62,558
Flour	267,358	65,823	100,273	96,511	100,710

**Domestic unloading**

unit : ton					
year	1991	1992	1993	1994	1995
Fertilizer	25,816	53,219	49,942	33,628	41,898
Iron	16,619	62,837	49,642	19,215	9,305

**Ambarli Port**

**Export**

unit : ton			
year	1994	1995	1996
Steel	25,000	380,000	215,373
Aluminium	0	45,000	25,000

**Import**

unit : ton			
year	1994	1995	1996
Paper	17000	157500	74500

and Ambarli port. Flour, Fertilizer and Pulp are to forecast by using the correlation with handling volume at port and socio-economic indices.

### 1) Flour

Export volume of flour is proportionate to the Food industry manufacturing value of the forecasting year.

$$\text{Year 2005 } 126,135 \times 31,851 / 26,380 = 152,294 \text{ tons}$$

$$\text{Year 2015 } 126,135 \times 55,367 / 26,380 = 264,735 \text{ tons}$$

### 2) Fertilizer

There is no fertilizer factory in Thrace Region and all consumption volume is transported to Thrace from Anatolia fertilizer factory and imported. Yearly consumption volume is 690,000 tons in 1994. Main transport mode is land which accounts for 600,000 tons while the balance of 90,000 tons is transported by sea.

Turkey's yearly average consumption volume of fertilizer per hectare of arable land and permanent crops field is about 220 kg/ha the same level of the USA. Average consumption of Thrace Region is already more than two times that of Turkey's. Therefore, consumption volume of fertilizer will not be increased at Thrace Region in the future.

Fertilizer handling volume 90,000 tons

### 3) Pulp

Import volume of pulp is proportionate to the Paper industry manufacturing value of the forecasting year.

$$\text{Year 2005 } 40,637 \times 25,919 / 10,253 = 102,728 \text{ tons}$$

$$\text{Year 2015 } 40,637 \times 49,777 / 10,253 = 197,287 \text{ tons}$$

Some volume of Steel, Metal products, Ceramics, Iron and Pulp will become container cargo. Therefore, these containerizable commodities are forecast together with containerized cargo volume.

### (4) Container Cargo forecast Volume

Container cargo volume forecast is separated into 3 groups. The first is industrial relations, industrial products and materials, which include containerizable commodities. Second is consumer goods. Third is agricultural products.



Custom office foreign trade data of Haydarpasa and Tekirdag in 1994 is shown in Table 2.3.19.

1) Agricultural products

Export and import volume of agriculture products in the forecasting year is proportionate to the estimated export and import value of Turkey respectively. Forecasted volume is shown in Table 2.3.20.

**TABLE 2.3.20 Thrace Region Agricultural Products Export and Import Forecast Volume**

Export

unit : ton

Chapter	Export volume in 1994 year			2005	2015
	Haydarpasya	Tekirdag	Total		
6	0	0	0	0	0
7	1,695	16,165	17,860	46,079	98,051
8	11,997	269	12,266	31,646	67,340
total	13,692	16,434	30,126	77,725	165,392

Import

unit : ton

Chapter	Import volume in 1994			2005	2015
	Haydarpasya	Tekirdag	Total		
6	0	44	44	90	172
7	471	12	483	985	1,893
8	739	3	742	1,514	2,909
total	1,210	59	1,269	2,589	4,974

2) Consumer goods

Import volume of consumer goods is proportionate to the estimated total import value of Turkey. Table 2.3.21 shows forecast volume of import consumer goods in Thrace Region.

TABLE 2.3.19 Custom Office Foreign Trade Data of Haydarpasya and Tekirdag in 1994

Export

Chapter	Haydarpasya custom office handling volume					Tekirdag office ton	Thrace Region total ton
	Total ton	Asia side ton	share	Europe side ton	share		
1	0	0	0	0	0	0	0
2	2	0	0	2	1	0	2
3	645	0	0	645	1	113	758
4	163	82	0.5	82	1	0	82
5	98	98	1	0	0	0	0
6	0	0	0	0	0	0	0
7	3,390	1,695	0.5	1,695	0.5	16,165	17,860
8	23,994	11,997	0.5	11,997	0.5	269	12,266
9	1,455	0	0	1,455	1	0	1,455
11	22,324	11,162	0.5	11,162	0.5	124,884	136,046
12	879	0	0.0	879	1.0	68	947
13	137	69	0.5	69	0.5	0	69
14	98	49	0.5	49	0.5	0	49
15	10,316	3,095	0.3	7,221	0.7	10,487	17,708
16	245	123	0.5	123	0.5	0	123
17	5,559	1,112	0.2	4,447	0.8	0	4,447
18	2,925	2,925	1.0	0	0.0	0	0
20	14,960	11,968	0.8	2,992	0.2	38	3,030
21	4,894	2,447	0.5	2,447	0.5	362	2,809
22	7,184	1,437	0.2	5,747	0.8	289	6,036
23	19	8	0.4	11	0.6	4,330	4,311
24	100	70	0.7	30	0.3	0	30
25	26,373	18,461	0.7	7,912	0.3	37,115	45,027
28	8,921	5,353	0.6	3,568	0.4	0	3,568
29	3,892	2,724	0.7	1,168	0.3	0	1,168
30	1,161	581	0.5	581	0.5	0	581
32	3,804	2,282	0.6	1,522	0.4	934	2,456
33	453	227	0.5	227	0.5	0	227
34	19,376	7,750	0.4	11,626	0.6	0	11,626
35	700	280	0.4	420	0.6	20	440
36	705	423	0.6	282	0.4	0	282
37	14	7	0.5	7	0.5	0	7
38	2,845	1,423	0.5	1,423	0.5	0	1,423
39	11,463	6,878	0.6	4,585	0.4	8	4,593
40	33,164	33,164	1.0	0	0.0	42	42
41	2,669	801	0.3	1,868	0.7	0	1,868
42	99	30	0.3	69	0.7	0	69
43	99	30	0.3	69	0.7	0	69
45	2	1	0.5	1	0.5	0	1
46	0	0	0.3	0	0.7	0	0
47	50	35	0.7	15	0.3	242	257
48	19,325	13,528	0.7	5,798	0.3	22,681	28,479
49	19	8	0.4	11	0.6	1	12

50	9	4	0.4	5	0.6	0	5
51	2,399	960	0.4	1,439	0.6	0	1,439
52	3,912	1,565	0.4	2,347	0.6	0	2,347
53	11	4	0.4	7	0.6	0	7
54	14,669	5,868	0.4	8,801	0.6	0	8,801
55	38,502	15,401	0.4	23,101	0.6	14	23,115
56	1,102	441	0.4	661	0.6	94	755
57	6,431	5,788	0.9	643	0.1	0	643
58	2,009	804	0.4	1,205	0.6	0	1,205
59	3,408	1,363	0.4	2,045	0.6	0	2,045
60	699	280	0.4	419	0.6	0	419
61	11,739	4,696	0.4	7,043	0.6	0	7,043
62	8,449	3,380	0.4	5,069	0.6	0	5,069
63	9,318	3,727	0.4	5,591	0.6	193	5,784
64	857	343	0.4	514	0.6	0	514
65	23	9	0.4	14	0.6	0	14
66	23	9	0.4	14	0.6	1	15
67	1	0	0.0	1	1.0	0	1
68	33,349	13,340	0.4	20,009	0.6	0	20,009
69	33,194	26,555	0.8	6,639	0.2	2	6,641
70	74,379	29,752	0.4	44,627	0.6	106,056	150,683
71	1	0	0.4	1	0.6	0	1
72	27,198	19,039	0.7	8,159	0.3	58,670	66,829
73	41,729	29,210	0.7	12,519	0.3	3,308	15,827
74	8,875	6,213	0.7	2,663	0.3	0	2,663
75	6	4	0.7	2	0.3	0	2
76	15,756	11,029	0.7	4,727	0.3	0	4,727
78	20	14	0.7	6	0.3	0	6
79	0	0	0.7	0	0.3	0	0
80	0	0	0.7	0	0.3	0	0
81	30	21	0.7	9	0.3	0	9
82	383	268	0.7	115	0.3	0	115
83	2,199	1,539	0.7	660	0.3	1	661
84	19,348	13,544	0.7	5,804	0.3	2,539	8,343
85	19,001	11,401	0.6	7,600	0.4	259	7,859
86	598	598	1.0	0	0.0	2	2
87	8,220	6,576	0.8	1,644	0.2	6	1,650
88	0	0	1.0	0	0.0	0	0
89	14,544	11,635	0.8	2,909	0.2	0	2,909
90	232	139	0.6	93	0.4	0	93
91	0	0	0.5	0	0.5	0	0
92	14	4	0.3	10	0.7	0	10
93	327	0	0.0	0	0.0	0	0
94	1,836	734	0.4	1,102	0.6	77	1,179
95	67	34	0.5	34	0.5	0	34
96	439	176	0.4	263	0.6	0	263
97	19	8	0.4	11	0.6	0	11
total	639,846	368,789		270,730		389,270	660,000

Import

Chapter	Hayderpasya custom office handling volume					Tekirda office ton	Thrace Region total ton
	Total ton	Asia side ton	share	Europe side ton	share		
1	200	0	0	0	0	0	0
2	0	0	0	0	1	98	98
3	4,949	2,475	0.5	2,475	0.5	0	2,475
4	2,418	1,209	0.5	1,209	1	208	1,417
5	576	576	1	0	0	0	0
6	11	0	0	0	0	44	44
7	942	471	0.5	471	0.5	12	483
8	1,478	739	0.5	739	0.5	3	742
9	5,144	0	0	5,144	1	10	5,154
11	1,847	924	0.5	924	0.5	7	931
12	2,525	0	0.0	2,525	1.0	56,031	58,559
13	375	188	0.5	188	0.5	5	193
14	1,021	511	0.5	511	0.5	0	511
15	10,933	3,280	0.3	7,653	0.7	144,460	152,113
16	4	2	0.5	2	0.5	17	19
17	1,282	256	0.2	1,026	0.8	31	1,057
18	2,132	1,066	0.5	1,066	0.5	302	1,368
20	403	202	0.5	202	0.5	9	211
21	1,211	606	0.5	606	0.5	178	784
22	609	305	0.5	305	0.5	150	455
23	3,721	1,488	0.4	2,233	0.6	12	2,245
24	3,865	1,933	0.5	1,933	0.5	0	1,933
25	51,316	27,173	0.5	27,173	0.5	18,715	45,888
28	74,414	37,207	0.5	37,207	0.5	42	37,249
29	50,913	35,639	0.7	15,274	0.3	1,364	16,638
30	299	150	0.5	150	0.5	0	150
32	18,459	9,230	0.5	9,230	0.5	0	9,230
33	1,342	671	0.5	671	0.5	17	688
34	10,585	5,293	0.5	5,293	0.5	695	5,988
35	2,329	932	0.4	1,397	0.6	81	1,478
36	103	62	0.6	41	0.4	0	41
37	1,715	858	0.5	858	0.5	0	858
38	20,135	10,068	0.5	10,068	0.5	1,520	11,588
39	140,530	70,265	0.5	70,265	0.5	2,240	72,505
40	48,379	33,865	0.7	14,514	0.3	1	14,515
41	29,593	8,878	0.3	20,715	0.7	78	20,793
42	237	71	0.3	166	0.7	0	166
43	6	2	0.3	4	0.7	0	4
45	129	65	0.5	65	0.5	0	65
46	276	83	0.3	193	0.7	0	193
47	23,465	16,426	0.7	7,040	0.3	5,933	12,973
48	114,105	68,463	0.6	45,642	0.4	1,012	46,654
49	5,837	2,335	0.4	3,502	0.6	0	3,502

50	28	11	0.4	17	0.6	0	17
51	5,704	2,282	0.4	3,422	0.6	5	3,427
52	15,043	6,017	0.4	9,026	0.6	632	9,658
53	6,111	2,444	0.4	3,667	0.6	0	3,667
54	16,587	6,635	0.4	9,952	0.6	22	9,974
55	35,947	14,379	0.4	21,568	0.6	16	21,584
56	1,103	441	0.4	662	0.6	0	662
57	52	47	0.9	5	0.1	0	5
58	277	111	0.4	166	0.6	0	166
59	2,647	1,059	0.4	1,588	0.6	0	1,588
60	2,463	985	0.4	1,478	0.6	0	1,478
61	429	172	0.4	257	0.6	0	257
62	98	39	0.4	59	0.6	0	59
63	2,322	929	0.4	1,393	0.6	0	1,393
64	2,442	977	0.4	1,465	0.6	0	1,465
65	397	159	0.4	238	0.6	0	238
66	124	50	0.4	74	0.6	0	74
67	50	0	0.0	50	1.0	0	50
68	7,691	3,076	0.4	4,615	0.6	2	4,617
69	7,883	5,518	0.7	2,365	0.3	0	2,365
70	17,499	7,000	0.4	10,499	0.6	2	10,501
71	190	76	0.4	114	0.6	0	114
72	254,489	127,245	0.5	127,245	0.5	60,142	187,387
73	36,261	18,131	0.5	18,131	0.5	3,383	21,514
74	20,989	10,495	0.5	10,495	0.5	0	10,495
75	617	309	0.5	309	0.5	0	309
76	18,657	9,329	0.5	9,329	0.5	78	9,407
78	14,046	7,023	0.5	7,023	0.5	20	7,043
79	4,201	2,101	0.5	2,101	0.5	0	2,101
80	348	174	0.5	174	0.5	0	174
81	265	133	0.5	133	0.5	0	133
82	1,170	585	0.5	585	0.5	1	586
83	3,535	1,768	0.5	1,768	0.5	10	1,778
84	42,602	25,561	0.6	17,041	0.4	1,581	18,622
85	18,653	9,327	0.5	9,327	0.5	33	9,360
86	5,110	4,088	0.8	1,022	0.2	0	1,022
87	14,881	8,929	0.6	5,952	0.4	0	5,952
88	53	53	1.0	0	0.0	0	0
89	441	309	0.7	132	0.3	0	132
90	1,680	840	0.5	840	0.5	7	847
91	165	83	0.5	83	0.5	0	83
92	38	19	0.5	19	0.5	0	19
93	2	0	0.0	0	0.0	0	0
94	3,234	1,294	0.4	1,940	0.6	33	1,973
95	4,088	2,044	0.5	2,044	0.5	0	2,044
96	4,450	1,780	0.4	2,670	0.6	0	2,670
97	0	0	0.4	0	0.6	0	0
	1,217,905	627,979		589,713		299,245	888,958

Source: SIS Foreign Trade Statistics 1994

CHAPTER CODE LIST

Code	Chapters	Code	Chapters
1	Live animals	38	Miscellaneous chemical products
2	Meal and edible meat offal	39	Plastics and articles thereof
3	Fish and crustaceans, molluscs and other aquatic invertebrates	40	Rubber and articles thereof
4	Dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified or included	41	Raw hides and skins (other than furskins) and leather
5	Products of animal origin, not elsewhere specified or included	42	Articles of leather, saddlery, and harness, travel goods, handbags and similar containers, articles of animal gut (other than silkworm gut)
6	Live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage	43	Furskins and artificial fur, manufactures thereof
7	Edible vegetables and certain roots and tubers	44	Wood and articles of wood, wood charcoal
8	Edible fruit and nuts; peel of citrus fruits or melons	45	Cork and articles of cork
9	Coffee, tea, mate and spices	46	Manufactures of straw, of esparto or of other plaiting materials, basketware and wickerwork
10	Cereals	47	Pulp of wood or of other fibrous cellulosic material, waste and scrap of paper or paperboard
11	Products of the milling industry; malt; starches; inulin; wheat gluten	48	Paper and paperboard, articles of paper pulp, of paper or of paperboard
12	Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medicinal plants; straw and fodder	49	Printed books, newspapers, pictures and other products of the printing industry, manuscripts, typescripts and plans
13	Lac; gums, resins and other vegetable saps and extracts	50	Silk
14	Vegetable plaiting materials; vegetable products not elsewhere specified or included	51	Wool, fine or coarse animal hair, horsehair yarn and woven fabric
15	Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes	52	Cotton, cotton yarn and cotton fabrics
16	Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates	53	Other vegetable textile fibres, paper yarn and woven fabrics of paper yarn
17	Sugars and sugars confectionery	54	Man-made filaments
18	Cocoa and cocoa preparations	55	Man-made staple fibres
19	Preparations of cereals, flour, starch or milk; pastrycooks' products	56	Wadding, felt and nonwovens; special yarns; twine, cordage, ropes and cables and articles thereof
20	Preparations of vegetables, fruits, nuts or other parts of plants	57	Carpets and other textile floor coverings
21	Miscellaneous edible preparations	58	Special woven fabrics; tufted textile fabrics; lace; tapestries; trimmings; embroidery
22	Beverages, spirits and vinegar	59	Impregnated, coated, covered or laminated textile fabrics, textile articles of kind suitable for industrial use
23	Residues and waste from the food industries; prepared animal fodder	60	Knitted or crocheted fabrics
24	Tobacco and manufactured tobacco substitutes	61	Articles of apparel and clothing accessories knitted or crocheted
25	Salt; sulphur; earths and stone; plastering materials, lime and cement	62	Articles of apparel and clothing accessories, not knitted or crocheted
26	Ores, slag and ash	63	Other made-up textile articles, sets, worn clothing and worn textile articles, rags
27	Mineral fuels; mineral oils and products of their distillation; bituminous substances; mineral waxes	64	Footwear, gaiters and the like, parts of such articles
28	Inorganic chemicals; organic or inorganic compounds of precious metals, of rare-earth metals, of radioactive elements or of isotopes	65	Headgear and parts thereof
29	Organic chemicals	66	Umbrellas, sun umbrellas, walking-sticks, seat-sticks, whips, riding-crops and parts thereof
30	Pharmaceutical products	67	Prepared feathers and down and articles made of feathers or of down; artificial flowers; articles of human hair
31	Fertilizers	68	Articles of stone, plaster, cement, asbestos, mica or similar materials
32	Tanning or dyeing extracts; tannins and their derivatives; dyes, pigments and other colouring matter, paints and varnishes; putty and other mastics; inks	69	Ceramic products
33	Essential oils and resinoids; perfumery, cosmetic or toilet preparations	70	Glass and glassware
34	Soap, organic surface-active agents, washing preparations, lubricating preparations, artificial waxes, prepared waxes, polishing or scouring preparations, candles and similar articles, modelling pastes, dental waxes and dental preparations with a basis of plaster	71	Natural or cultured pearls, precious or semi-precious stones, precious metals, metals clad with precious metal and articles thereof; imitation jewellery; coins
35	Albuminoidal substances, modified starches, glues, enzymes	72	Iron and steel
36	Explosives, pyrotechnic products, matches, pyrophoric alloys, certain combustible preparations	73	Articles of iron or steel
37	Photographic or cinematographic goods	74	Copper and articles thereof
		75	Nickel and articles thereof
		76	Aluminium and articles thereof
		77	(Reserved for possible future use in the harmonized system)
		78	Lead and articles thereof

## CHAPTER CODE LIST

Code	Chapters
79	Zinc and articles thereof
80	Tin and articles thereof
81	Other base metals; cermets; articles thereof
82	Tools, implements, cutlery, spoons and forks, of base metal; parts thereof of base metal
83	Miscellaneous articles of base metal
84	Nuclear reactors, boilers, machinery and mechanical appliances and parts thereof
85	Electrical machinery and equipment and parts thereof, sound recorders and reproducers, television image and sound recorders and reproducers and parts and accessories of such articles
86	Railway or tramway locomotives, rolling-stock and parts thereof, railway or tramway track fixtures and parts thereof, mechanical (including electromechanical) traffic signalling equipment of all kinds
87	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof
88	Aircraft, spacecraft and parts thereof
89	Ships, boats and floating structures
90	Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus, parts and accessories thereof
91	Clocks and watches and parts thereof
92	Musical instruments, parts and accessories of such articles
93	Arms and ammunition, parts and accessories thereof
94	Furniture, bedding, mattresses, mattress supports, cushions and similar stuffed furnishings, lamps and lighting fittings, not elsewhere specified or included; illuminated signs, illuminated name-plates and the like, prefabricated buildings
95	Toys, games and sports requisites, parts and accessories thereof
96	Miscellaneous manufactured articles
97	Works of art, collectors' pieces and antiques

**TABLE 2.3.21 Import Consumer Goods Forecast Volume in Thrace Region**

unit : ton

Chapter	Import volume in 1994			2005	2015
	Haydarpasya	Tekirdag	Total		
14	511	0	511	1,042	2,003
37	858	0	858	1,750	3,363
38	10,068	1,520	11,588	23,640	45,425
42	166	0	166	339	651
46	193	0	193	394	757
49	3,502	0	3,502	7,144	13,728
57	5	0	5	10	20
64	1,465	0	1,465	2,989	5,743
65	238	0	238	486	933
66	74	0	74	151	290
67	50	0	50	102	196
71	114	0	114	233	447
85	9,327	33	9,360	19,094	36,691
90	840	7	847	1,728	3,320
91	83	0	83	169	325
92	19	0	19	39	74
94	1,940	33	1,973	4,025	7,734
95	2,044	0	2,044	4,170	8,012
96	2,670	0	2,670	5,447	10,466
total	34,167	1,593	35,760	72,950	140,179

### 3) Industrial products and materials

There are 9 types of manufacturing industries, Food, Textile, Wood, Paper, Chemical, Mineral, Metal, Machinery and Other. Each type of industry has subdivisions. Composite ratio of manufacturing volume of these subdivisions is considered to be equal to the composite ratio of export volume from Thrace Region in 1994. Export value is composed of manufacturing value and transportation cost to the ports from factory. Compared with the manufacturing value, transportation cost is quite inexpensive, therefore, export value is to be considered as equal to manufacturing value. The forecast manufacturing volume of the 9 types of industries are proportionate to the estimated manufacturing value of each forecasting year. Distribution ratio of products to the domestic market and export and the ratio of transportation mode by maritime and the other are decided by referring to the datum from SIS Foreign trade by transport system 1994, interview with the manufacturer and transportation companies in Thrace Region and the tendencies of the world market. And the ratio of input cargo volume as materials and products are adopted from the data of Standard unit rate of input and output cargo volume classified by type of industry from "Overview of Port Planning by the Japan Ports & Harbour Association."

Appendix Table A 2.1~A 2.8 shows result of container cargo forecasting volume of industrial products and material.

Table 2.3.22 shows result of microscopic cargo volume forecast.



**TABLE 2.3.22 Result of Microscopic Forecast Cargo Volume in Thrace Region**  
Year 2005

Dry bulk

	Domestic		International		Total
	Loading	Unloading	Export	Import	
Sand	0	5,160,000	0	0	5,160,000
Cement	0	500,000	0	0	500,000
Clinker	0	0	312,000	0	312,000
Coal	0	0	0	190,000	190,000
Soda ash	0	134,000	0	0	134,000
Scrap steel	0	0	0	564,000	564,000
Lumber	0	0	0	95,000	95,000
Wheat	0	0	1,333,000	176,000	1,509,000
Sunflower seed	0	0	0	214,000	214,000
Cotton seed	0	0	0	41,000	41,000
total	0	5,794,000	1,645,000	1,280,000	8,719,000

Liquid bulk

	Domestic		International		Total
	Loading	Unloading	Export	Import	
Food oil	0	30,000	0	162,000	192,000
total	0	30,000	0	162,000	192,000

Non container general cargo

	Domestic		International		Total
	Loading	Unloading	Export	Import	
Steel	57,362	0	95,603	0	152,965
Metal products	0	28,083	5,679	87,593	121,355
Ceramic	0	0	26,462	0	26,462
Flour	0	0	152,000	0	152,000
Fertilizer	0	90,000	0	0	90,000
Wheat	50,000	0	0	0	50,000
iron	0	82,510	0	371,295	453,805
Machinery	39,719	0	59,578	36,316	135,613
Stones	3,366	16,306	6,731	0	26,403
Pulp	0	0	0	103,000	103,000
total	150,447	216,899	346,053	598,204	1,311,603

Container general cargo

	Domestic		International		Total
	Loading	Unloading	Export	Import	
Containerized cargo	185,105	2,495	816,387	1,419,222	2,423,209
Containerizable cargo	0	0	0	30,977	30,977
Agri. products	0	0	77,725	2,589	80,314
Consumer goods	0	0	0	72,950	72,950
total	185,105	2,495	894,112	1,525,738	2,607,450

Year 2015

Dry bulk

	Domestic		International		Total
	Loading	Unloading	Export	Import	
Sand	0	8,172,000	0	0	8,172,000
Cement	0	3,010,000	0	0	3,010,000
Clinker	0	0	655,000	0	655,000
Coal	0	0	0	190,000	190,000
Soda ash	0	240,000	0	0	240,000
Scrap steel	0	0	0	953,000	953,000
Lumber	0	0	0	187,000	187,000
Wheat	0	0	1,791,000	305,000	2,096,000
Sunflower seed	0	0	0	372,000	372,000
Cotton seed	0	0	0	72,000	72,000
total	0	11,422,000	2,446,000	2,079,000	15,947,000

Liquid bulk

	Domestic		International		Total
	Loading	Unloading	Export	Import	
Food oil	0	30,000	0	162,000	192,000
total	0	30,000	0	162,000	192,000

Non container general cargo

	Domestic		International		Total
	Loading	Unloading	Export	Import	
Steel	96,830	0	161,383	0	258,213
Metal products	0	54,650	26,462	169,163	250,275
Ceramic	0	0	47,131	0	47,131
Flour	0	0	265,000	0	265,000
Fertilizer	0	90,000	0	0	90,000
Wheat	50,000	0	0	0	50,000
Iron	0	69,159	0	564,802	633,961
Machinery	83,229	0	124,842	76,099	284,170
Stones	5,995	29,044	11,989	0	47,028
Pulp	0	0	0	197,000	197,000
total	236,054	242,853	636,807	1,007,064	2,122,778

Container general cargo

	Domestic		International		Total
	Loading	Unloading	Export	Import	
Containerized cargo	281,961	209,648	1,921,821	2,989,392	5,402,822
Containerizable cargo	0	0	0	61,315	61,315
Agri. products	0	0	165,392	4,974	170,366
Consumer goods	0	0	0	140,179	140,179
total	281,961	209,648	2,087,213	3,195,860	5,774,682

## Forecasted Container TEU volume

year 2005

$$(185,105+2,495)/12.5*1.05 + 1,525,738 /12.5 * 2 * 1.05 = 272,082$$

272,000 TEU

year 2015

$$(281,961+209,648)/12.5*1.05 + 3,195,860 /12.5 * 2 * 1.05 = 578,199$$

580,000 TEU

### 2.3.3 Marmara Four Port-hinterlands

Cargo volume in foreign and domestic trade by cargo type in whole Marmara hinterland has been estimated. To formulate the Long Term Marmara Ports Development Plan, that is, to examine whether capacity of existing port facilities will be sufficient for future port demand or not, determining cargo volume by type originating to/from each hinterland is indispensable.

Cargo volume in future is estimated by correlation analysis using economic indices. On the assumption that cargo volume originating to/from a hinterland has a close relationship with economic indices of the hinterland. In this cargo distribution work, GPI examined in each hinterland is used as economic indices and those of Ankara, Bolu, Eskisehir and Kutahiya are also considered besides the Marmara region.

The share of general cargo volume in each hinterland in the target year is estimated as follow;

$$X_n = (x_n + a \times G_n) / (1 + a) + b \times (G_n - g_n) \quad n=1 \sim 4: \text{No. of hinterland}$$

- a coefficient with cargo and economic size of hinterland ( a = 1 )
- b coefficient with cargo and economic growth ( b = 1 )
- X<sub>n</sub> share (%) of cargo volume distributed in each hinterland in the target year 2015
- x<sub>n</sub> share (%) of cargo handling volume in each hinterland in 1995  
share in 1995 is assumed same to the share in 1994
- G<sub>n</sub> share (%) of GPI in each hinterland in the target year 2015  
G<sub>n</sub> in Balkesir is the share of GPI added about 10 % of GPI(Chemical) in Izmit.
- g<sub>n</sub> share (%) of GPI in each hinterland in 1995

Bulky cargo such as dry bulk and liquid bulk cargo cannot be easily transported to other hinterlands without mass transport system such as railway or pipeline. That is, the share of bulky cargo in each hinterland will be stable, if there will be no mass transportation project. The share of bulky cargo such as dry bulk bulk and liquid bulk cargo volume in each hinterland in the target year is estimated as follows;

$$X_n = x_n + b \times (G_n - g_n)$$

$n=1 \sim 4$ :No. of hinterland

In this distribution work, the containerization ratio of hinterland in 2015 is assumed to be 80%. To calculate the number of containers (TEU) in each hinterland, the same equation given in above section is used. Transshipment container cargo is added to the cargo handled at the new container terminal in Thrace, because the container handling volume of the new terminal will be most among terminals in the Sea of Marmara. Liquid bulk cargo is distributed to hinterland which has some share of liquid bulk cargo in 1995.

The results in 2005 and 2015 of distribution work are shown in Table 2.3.23 and Table 2.3.24, respectively and the share of each hinterland by cargo type are shown in Figure 2.3.10. The share of container cargo volume (TEU) of each hinterland in 2005 and 2015 is shown in Figure 2.3.11.

It is outlined as follows;

- 1) The share of total cargo in Thrace, Balkesir and Canakkale will decrease by 10.85 points from 47.7% to 36.85%, 1.58 points from 12.82% to 11.24% and 1.11 points from 2.68 % to 1.57% respectively. On the other hand, the share of Izmit will increase from 36.79 % to 50.34%.
- 2) The share of general cargo in Thrace will greatly increase from 17% to 27% and that of Izmit will decrease from 68 % to 65%..
- 3) The share of dry bulk cargo in Izmit will greatly increase from 19% to 38% and that of Thrace will decrease from 65% to 46%.
- 4) The container cargo volume (TEU) in 2015 will be 0.69 mil. TEU in Thrace, 1.34 mil.

**TABLE 2.3.23 Distribution of cargo volume by type in 2005**

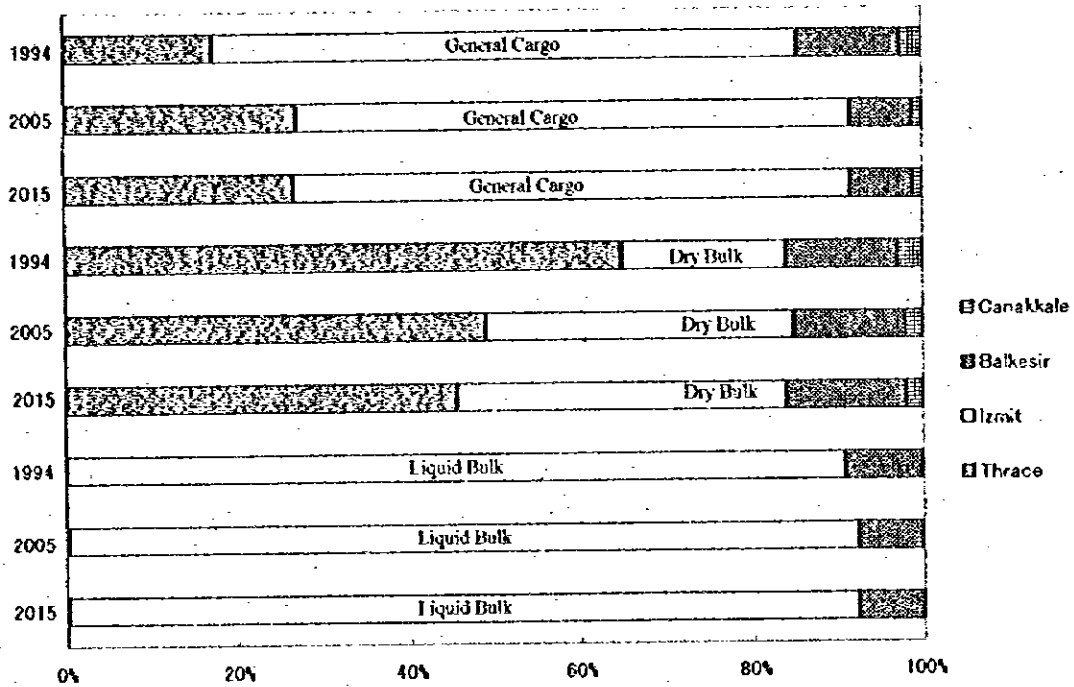
(Unit: ton)

Hinterland		1. Itraz	2. Izmit	3. Balıkesir	4. Canakkale	Area Total
<b>Export</b>	General	1,121,000	3,001,000	445,000	33,000	4,600,000
	Hinterland share%	24.38	65.23	9.67	0.71	
<b>Export</b>	Dry	1,161,000	1,004,000	1,535,000	0	3,700,000
	Hinterland share%	31.38	27.11	41.48	0.00	
<b>Export</b>	Liquid	0	100,000	0	0	100,000
	Hinterland share%	0.00	100.00	0.00	0.00	
<b>Export</b>	Sub total	2,282,000	4,105,000	1,980,000	33,000	8,400,000
	Hinterland share%	27.17	48.87	23.57	0.39	
<b>Import</b>	General	1,921,000	4,496,000	424,000	58,000	6,900,000
	Hinterland share%	27.84	63.17	6.15	0.84	
<b>Import</b>	Dry	1,127,738	4,224,506	632,594	115,000	6,100,000
	Hinterland share%	18.43	62.25	10.37	1.89	
<b>Import</b>	Liquid	0	495,000	5,000	0	500,000
	Hinterland share%	0.00	98.96	1.04	0.00	
<b>Import</b>	Sub total	3,049,000	9,216,000	1,062,000	173,000	13,500,000
	Hinterland share%	27.58	68.26	7.87	1.28	
<b>Domestic</b>	General	481,000	860,000	93,000	67,000	1,500,000
	Hinterland share%	32.05	57.30	6.19	4.45	
<b>Domestic</b>	Dry	7,632,000	1,955,000	508,000	305,000	10,400,000
	Hinterland share%	73.38	18.79	4.89	2.93	
<b>Domestic</b>	Liquid	3,000	324,000	73,000	0	400,000
	Hinterland share%	0.83	81.04	18.13	0.00	
<b>Domestic</b>	Sub total	8,116,000	3,138,000	674,000	372,000	12,300,000
	Hinterland share%	65.98	25.51	5.48	3.02	
<b>Total</b>		13,447,000	16,459,000	3,716,000	578,000	34,200,000
	Hinterland share%	39.32	48.13	10.87	1.69	
<b>Total</b>	General	3,523,000	8,357,000	962,000	158,000	13,000,000
	Hinterland share%	27.19	64.28	7.45	1.21	
	Container(TEU)	274,000	633,000	60,000	10,000	978,000
	Trasshipment(TEU)	46,000	0	0	0	46,000
	Non Container(ton)	897,000	2,015,000	230,000	58,000	3,200,000
<b>Total</b>	Dry	9,921,000	7,183,000	2,676,000	420,000	20,200,000
	Hinterland share%	49.11	35.56	13.25	2.08	
<b>Total</b>	Liquid	3,000	919,000	78,000	0	1,000,000
	Hinterland share%	0.33	91.90	7.77	0.00	

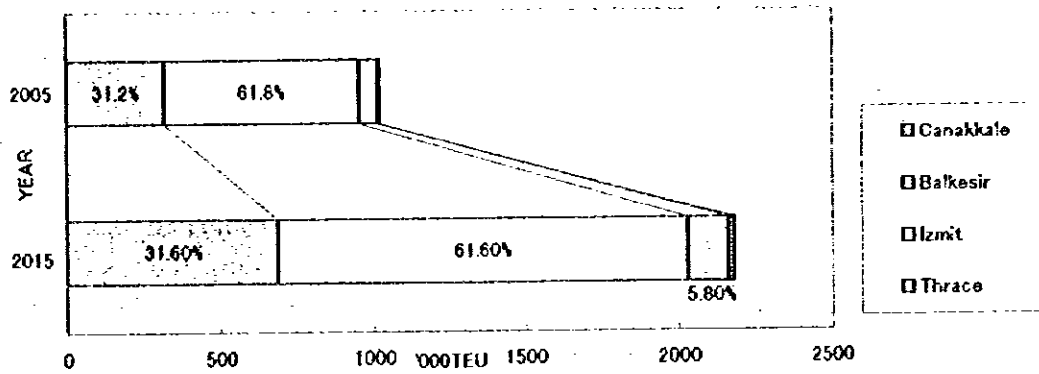
**TABLE 2.3.24 Distribution of cargo volume by type in 2015** (Unit: ton)

Hinterland		1.Thrace	2 Izmit	3 Balıkesir	4 Canakkale	Area Total
<b>Export</b>	General	2,608,000	6,980,000	1,035,000	76,000	10,700,000
	Hinterland share%	24.34	63.23	9.67	0.71	
<b>Export</b>	Dry	2,291,000	1,981,000	3,028,000	0	7,300,000
	Hinterland share%	31.32	27.14	41.43	0.00	
<b>Export</b>	Liquid	0	100,000	0	0	100,000
	Hinterland share%	0.00	100.00	0.00	0.00	
<b>Export</b>	Sub total	4,899,000	9,061,000	4,063,000	76,000	18,100,000
	Hinterland share%	27.07	50.06	22.45	0.42	
<b>Import</b>	General	4,120,000	9,644,000	910,000	125,000	14,800,000
	Hinterland share%	27.81	63.17	6.15	0.84	
<b>Import</b>	Dry	2,348,000	8,795,000	1,317,000	240,000	12,700,000
	Hinterland share%	18.47	69.25	10.37	1.89	
<b>Import</b>	Liquid	0	495,000	5,000	0	500,000
	Hinterland share%	0.00	58.96	1.04	0.00	
<b>Import</b>	Sub total	6,468,000	18,935,000	2,233,000	365,000	28,000,000
	Hinterland share%	23.10	67.62	7.97	1.30	
<b>Domestic</b>	General	769,000	1,375,000	149,000	107,000	2,400,000
	Hinterland share%	32.05	37.30	4.19	4.45	
<b>Domestic</b>	Dry	11,815,000	3,026,000	787,000	472,000	16,100,000
	Hinterland share%	73.33	18.79	4.89	2.93	
<b>Domestic</b>	Liquid	3,000	324,000	73,000	0	400,000
	Hinterland share%	0.83	81.04	18.13	0.00	
<b>Domestic</b>	Sub total	12,587,000	4,725,000	1,008,000	579,000	18,900,000
	Hinterland share%	66.60	25.00	5.34	3.06	
<b>Total</b>		23,955,000	32,721,000	7,304,000	1,020,000	65,000,000
	Hinterland share%	36.65	59.34	11.24	1.57	
<b>Total</b>	General	7,498,000	18,000,000	2,094,000	308,000	27,900,000
	Hinterland share%	26.87	64.32	7.51	1.10	
	Container(TEU)	580,000	1,342,000	127,000	20,000	2,070,000
	Trasshipment(TEU)	108,000	0	0	0	108,000
	Non Container(ton)	1,807,000	4,150,000	478,000	104,000	6,540,000
<b>Total</b>	Dry	16,454,000	13,802,000	5,132,000	712,000	36,100,000
	Hinterland share%	43.58	38.23	14.22	1.97	
<b>Total</b>	Liquid	3,000	919,000	78,000	0	1,000,000
	Hinterland share%	0.33	91.99	7.77	0.00	

**FIGURE 2.3.10 Share of Hinterland by Cargo Type**



**FIGURE 2.3.11 Share of Container Cargo Volume**





#### 2.3.4 Transshipment Cargo

The volume of transshipment container which ports can handle depends on whether the ports can become hub ports or not. Factors such as the diversion distance from the main route of mother vessels, the cargo volume and the level of port services are the keys for hub ports. Recently container vessels have been increasing in size, which has tended to limit the number of hub ports. Because of this situation, it is very difficult to forecast the future volume of transshipment container. So here, the transshipment ratio is calculated making reference to the situation of ports around the Mediterranean.

According to the July 1995 issue of "Containerisation International", there is a relationship between the diversion distance from the main route of mother vessels and the ratio of container traffic transhipped at each port. The transshipment ratio and diversion distance at Mediterranean ports are shown in Table 2.3.25 and Figure 2.3.12 shows the relationship between these two factors, which means that ports with shorter diversion distance achieve higher ratios of transshipment. From the diversion distance of 540 nautical miles and the upper deviated limit probability of 95% based on the correlation equation described in Figure 2.3.12, the maximum transshipment ratio at Marmara Sea Ports is calculated at 17%. From the estimated container traffic at the new container hubport at the Sea of Marmara as examined in the section 2.3.3, the future volume of transshipment container is calculated at 108 thousand TEUs in 2015.

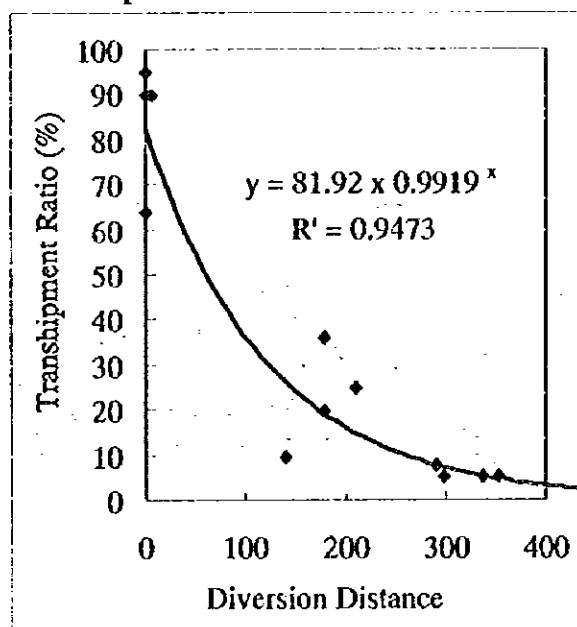
On the other hand, the future total volume of container traffic which goes in and out from the Black Sea by passing through the Sea of Marmara is shown in Table 1.2.21. Based on the share of the Black Sea region and the other area of Russia in 1994, it amounts to 493,000 TEUs in 2005 and 849,000 TEUs in 2015. Since the future volume of transshipment container at ports in the Marmara Sea has been estimated as 215 thousand TEUs, the ratio of transshipment container in the Marmara Sea turns out as around 25%. This seems reasonable, considering the disadvantage of longer diversion distance from the main route of mother vessel than other major ports around the Mediterranean and advantage of much shorter diversion distance than ports around the Black Sea.

**TABLE 2.3.25 Transshipment Ratio and Diversion Distance at Mediterranean**

	Container Traffic ('000TEU)	Transshipment Traffic	Transshipment Ratio (%)	Diversion Distance Required to Call at (Nautical Miles)	(Hours)
<b>West Mediterranean</b>					
Algeciras	1,004	901	90	0	9
Barcelona	605	151	25	209	22
Valencia	467	44	9	141	18
Marseilles	437	34	8	290	27
Genoa	512		5	352	31
Leghorn	371		5	298	28
La Spezia	823		5	337	30
Sub-total	4,219	1,130	27		
<b>East Mediterranean</b>					
Damietta	520	493	95	0	9
Larnaca	105	82	78	222	23
Port Said	171	109	64	0	9
Limassol	266	95	36	179	20
Piraeus	517	101	20	178	20
Alexandria	258	11	4	32	11
Sub-total	1,837	891	49		
Marsaxlokk	383	343	90	6	9.5
<b>Grand Total</b>	<b>6,439</b>	<b>2,364</b>	<b>37</b>		

Source: July 1995 Containerisation International

**FIGURE 2.3.12 Relationship between Transshipment Ratio and Diversion Distance**



## 2.4 Passenger Demand Forecast

### 2.4.1 International

The port of Istanbul handles the vast majority of international passengers in this region. The number of international passengers at the Port of Istanbul over the last 7 years is shown in Table 2.4.1. Because the data before and after 1993 is not consistent due to the different sources, number of passengers in the future is forecast based on the data after 1993. As shown in Table 2.4.2 international passengers can be divided into those for cruise and those for trade, using data of foreigners arriving in Turkey by ship from the OECD countries and other countries in 1994.

**TABLE 2.4.1 Trend of International Passengers at Istanbul**

	1989	1990	1991	1992	1993	1994	1995
Disembarked	21,285	11,516	10,411	2,736	15,556	13,592	18,626
Embarked	36,643	9,218	3,906	3,056	16,584	17,346	23,331
Total	57,928	20,733	14,317	5,792	32,140	30,938	41,957

By assuming that the growth rate is the same as the rate forecast by Cruise Lines International Association for North America, the future number of passengers for cruise is forecast by multiplying the annual growth rate as follows:

up to 2000:           7.9% / year  
after 2001 :           5.6% / year

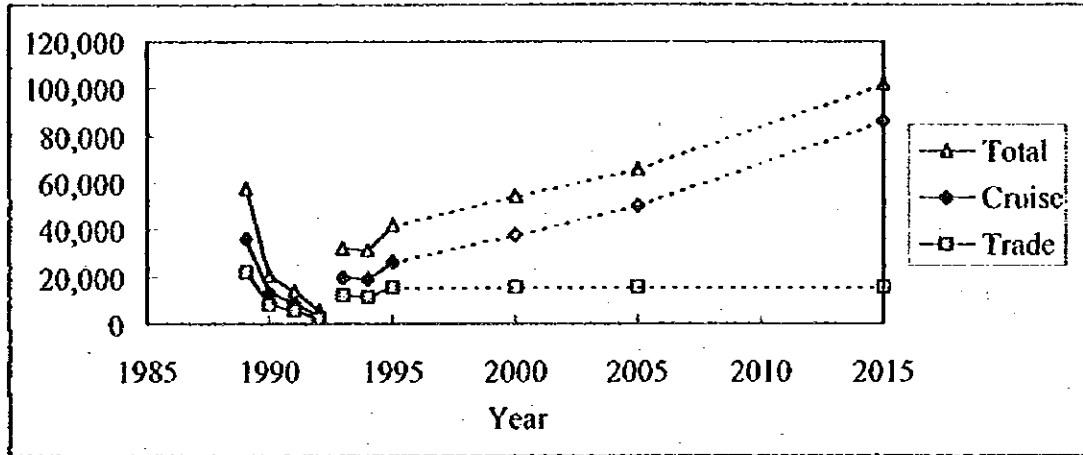
As the passengers for trade is not forecast to increase significantly, passengers in 2005 and 2015 are estimated to be same as the maximum among the actual data.

The results of the estimation are shown in Table 2.4.2 and Figure 2.4.1.

**TABLE 2.4.2 Future Forecast of International**

	1989	1990	1991	1992	1993	1994	1995	2000	2005	2015
Cruise	35,872	12,839	8,866	3,587	19,903	19,158	25,982	37,989	49,861	85,894
Trade	22,056	7,894	5,451	2,205	12,237	11,780	15,975	15,975	15,975	15,975
Total	57,928	20,733	14,317	5,792	32,140	30,938	41,957	53,964	65,836	101,868

**FIGURE 2.4.1 Future Forecast of International Passengers**



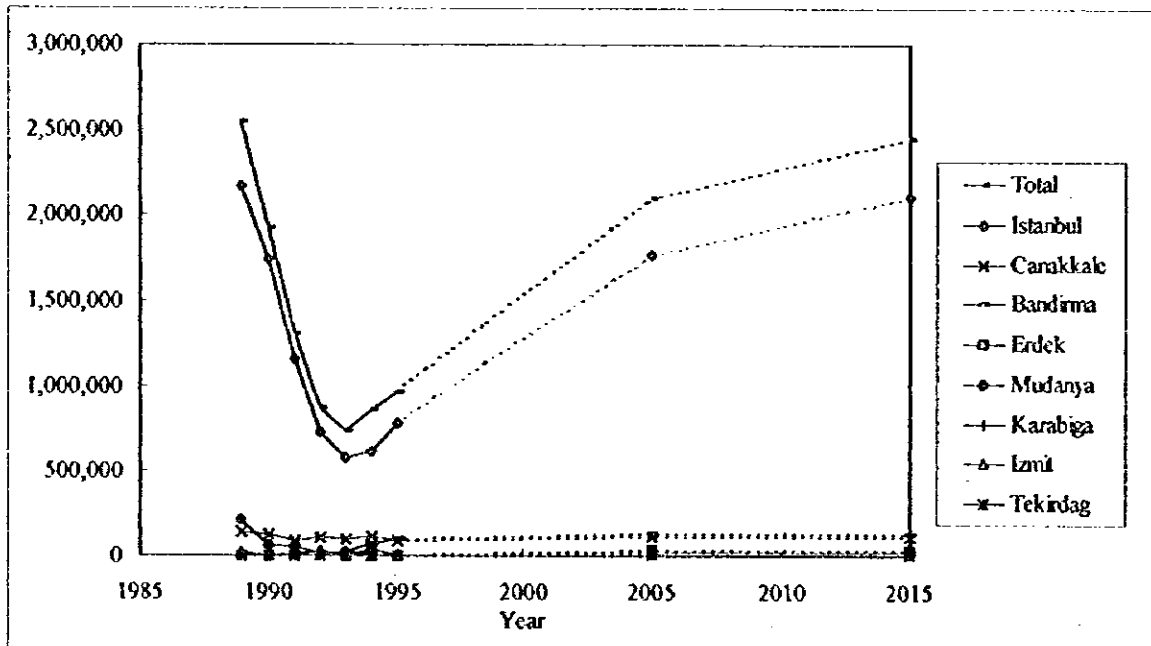
#### 2.4.2 Domestic

The numbers and trends of domestic passengers at major ports around the Marmara Sea over the last 7 years are shown in Table 2.4.3, Figure 2.4.2 and 2.4.3. As shown in Figure 2.4.2, Istanbul Port has had the largest share among the ports around the Marmara Sea, while share of other ports remain small. At the Ports of Istanbul and Mudanya, passengers decreased sharply after the completion of the 2nd Bosphorus Bridge in 1988 but rebounded once the capacity of the bridge was reached.

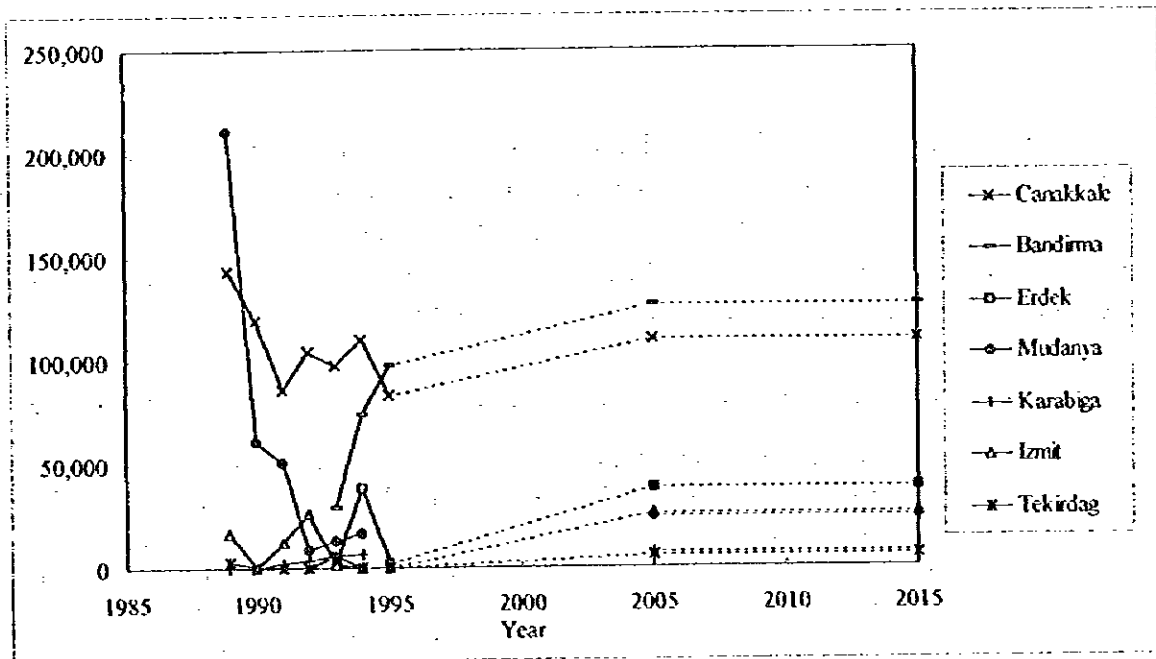
**TABLE 2.4.3 Trend of Domestic Passengers by Ports**

	1989	1990	1991	1992	1993	1994	1995	2005	2015
Disembarked					16,615	37,938	49,084		
Bandırma Embarked	n.a.	n.a.	n.a.	n.a.	12,660	35,913	49,032		
<b>Total</b>					<b>29,275</b>	<b>73,851</b>	<b>98,116</b>	<b>127,039</b>	<b>127,105</b>
Disembarked	74,563	62,387	44,885	53,832	49,759	55,504	42,287		
Canakkale Embarked	68,859	57,356	40,987	50,578	47,898	54,407	41,318		
<b>Total</b>	<b>143,421</b>	<b>119,743</b>	<b>85,872</b>	<b>104,410</b>	<b>97,657</b>	<b>109,911</b>	<b>83,604</b>	<b>109,911</b>	<b>109,911</b>
Disembarked					1,059	19,375	1,020		
Erdek Embarked	n.a.	n.a.	n.a.	n.a.	856	19,123	1,062		
<b>Total</b>					<b>1,915</b>	<b>38,498</b>	<b>2,082</b>	<b>38,498</b>	<b>38,498</b>
Disembarked	964,784	779,402	517,700	336,317	278,457	306,289	379,586		
Istanbul Embarked	1,205,443	962,032	633,507	389,912	297,257	304,172	398,867		
<b>Total</b>	<b>2,170,228</b>	<b>1,741,434</b>	<b>1,151,207</b>	<b>726,229</b>	<b>575,714</b>	<b>610,461</b>	<b>778,452</b>	<b>1,763,197</b>	<b>2,106,557</b>
Izmit (Kocaeli) Disembarked	7,110	9	2,904	2,770	1,126	163	0		
Embarked	9,507	1	9,400	22,966	553	81	0		
<b>Total</b>	<b>16,617</b>	<b>11</b>	<b>12,304</b>	<b>25,736</b>	<b>1,680</b>	<b>244</b>	<b>0</b>	<b>25,736</b>	<b>25,736</b>
Disembarked	0	0	1,185	2,038	2,794	3,988			
Karabiga Embarked	0	0	1,132	1,473	2,920	2,532	n.a.		
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,318</b>	<b>3,511</b>	<b>5,714</b>	<b>6,520</b>		<b>6,986</b>	<b>6,986</b>
Disembarked	108,173	28,956	29,573	4,833	9,549	8,787			
Mudanya Embarked	102,722	31,739	21,275	3,789	3,783	7,864	n.a.		
<b>Total</b>	<b>210,895</b>	<b>60,695</b>	<b>50,847</b>	<b>8,621</b>	<b>13,332</b>	<b>16,651</b>		<b>24,393</b>	<b>24,556</b>
Disembarked	1,747	397	0	0	4,154	0	0		
Tekirdag Embarked	1,395	412	0	0	1,993	0	0		
<b>Total</b>	<b>3,141</b>	<b>808</b>	<b>0</b>	<b>0</b>	<b>6,147</b>	<b>0</b>	<b>0</b>	<b>6,147</b>	<b>6,147</b>
Disembarked	1,156,377	871,151	596,247	399,790	363,514	432,044	471,976		
<b>Total Embarked</b>	<b>1,387,926</b>	<b>1,051,539</b>	<b>706,301</b>	<b>468,718</b>	<b>367,920</b>	<b>424,092</b>	<b>490,278</b>		
<b>Total</b>	<b>2,544,303</b>	<b>1,922,691</b>	<b>1,302,548</b>	<b>868,508</b>	<b>731,434</b>	<b>856,136</b>	<b>962,254</b>	<b>2,101,907</b>	<b>2,445,495</b>

**FIGURE 2.4.2 Trend of Domestic Passengers by Ports**



**FIGURE 2.4.3 Trend of Domestic Passengers by Ports**



Although passengers have increased recently at the Ports of Istanbul, Mudanya, Bandirma and Karabiga, it is unlikely that these growth rates will be maintained in future. Therefore, for the Ports of Mudanya, Bandirma and Karabiga, numbers of passengers are forecast by multiplying the annual growth rate using the increase rate calculated from the growth rates over the last 2 years. In case of Istanbul Port, the decrease rate is assumed as 10%. For other ports passengers in 2005 and 2015 are estimated to be same as maximum among the actual data after 1991. The results of estimation are shown in Table 2.4.3, Figure 2.4.2 and 2.4.3.

## 2.5 Ship Size Forecast

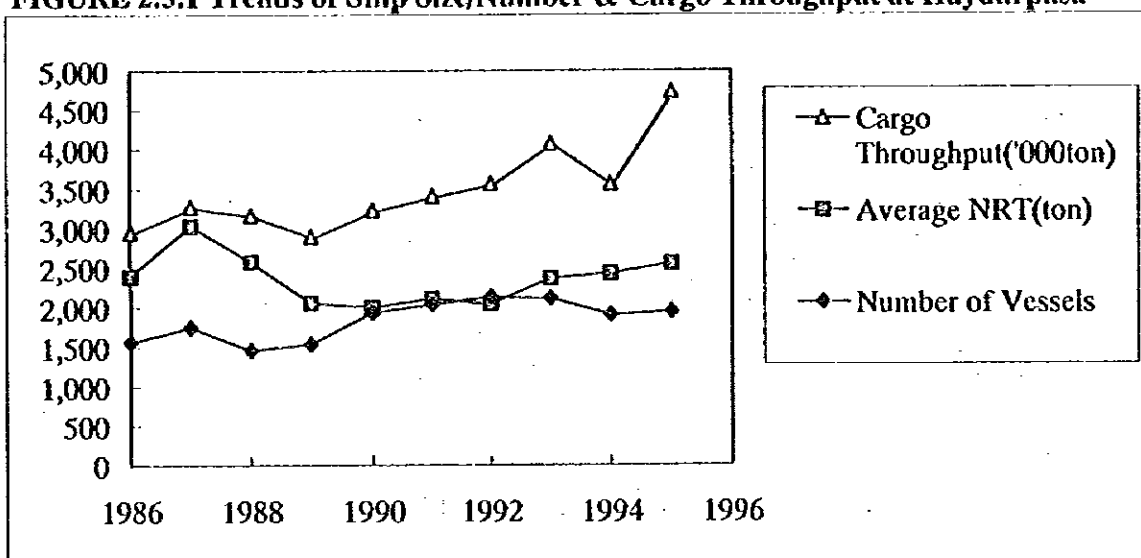
### 2.5.1 General

Number of Ship Arrivals by NRT group, average NRT and cargo throughput at the Ports of Haydarpaşa, Derince and Bandırma over the last 11 years are shown in Table 2.5.1 - 2.5.3, and Figure 2.5.1 - 2.5.3 show their trends. From these trends it can be said that the average NRT per vessel is correlated with the cargo throughput to some extent, although there are exceptions such as Derince Port's data after 1990.

**TABLE 2.5.1 Number of Ship Arrivals by NRT Group-Port of Haydarpaşa (1985-1995)**

NRT	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
0 - 500	276	227	236	241	311	400	399	514	402	393	344
501 - 1,000	139	320	223	280	330	400	380	377	365	232	324
1,001 - 2,000	321	395	350	331	395	457	564	562	510	425	413
2,001 - 3,000	165	238	215	232	221	298	240	230	270	299	241
3,001 - 4,000	117	111	214	94	86	169	167	128	170	114	138
4,001 - 5,000	27	24	142	11	17	32	81	90	99	172	127
5,001 - 6,000	64	98	170	105	73	80	77	103	151	170	161
6,001 - 7,000	29	66	56	53	35	37	53	49	49	43	129
7,001 - 8,000	17	28	27	22	14	13	20	20	19	24	26
8,001 - 9,000	4	9	55	25	17	17	19	20	18	7	6
9,001 - 10,000	7	17	27	16	12	13	17	13	9	9	16
over 10,001	48	30	35	51	28	24	26	31	54	25	21
<b>Total</b>	<b>1,214</b>	<b>1,563</b>	<b>1,750</b>	<b>1,461</b>	<b>1,539</b>	<b>1,940</b>	<b>2,043</b>	<b>2,137</b>	<b>2,116</b>	<b>1,913</b>	<b>1,946</b>
<b>Average NRT</b>	<b>2,412</b>	<b>2,398</b>	<b>3,035</b>	<b>2,582</b>	<b>2,058</b>	<b>2,007</b>	<b>2,117</b>	<b>2,047</b>	<b>2,371</b>	<b>2,437</b>	<b>2,556</b>
<b>Cargo Throughput</b>	<b>n.a.</b>	<b>2,953</b>	<b>3,275</b>	<b>3,170</b>	<b>2,897</b>	<b>3,231</b>	<b>3,411</b>	<b>3,566</b>	<b>4,074</b>	<b>3,563</b>	<b>4,727</b>

**FIGURE 2.5.1 Trends of Ship Size/Number & Cargo Throughput at Haydarpasa**

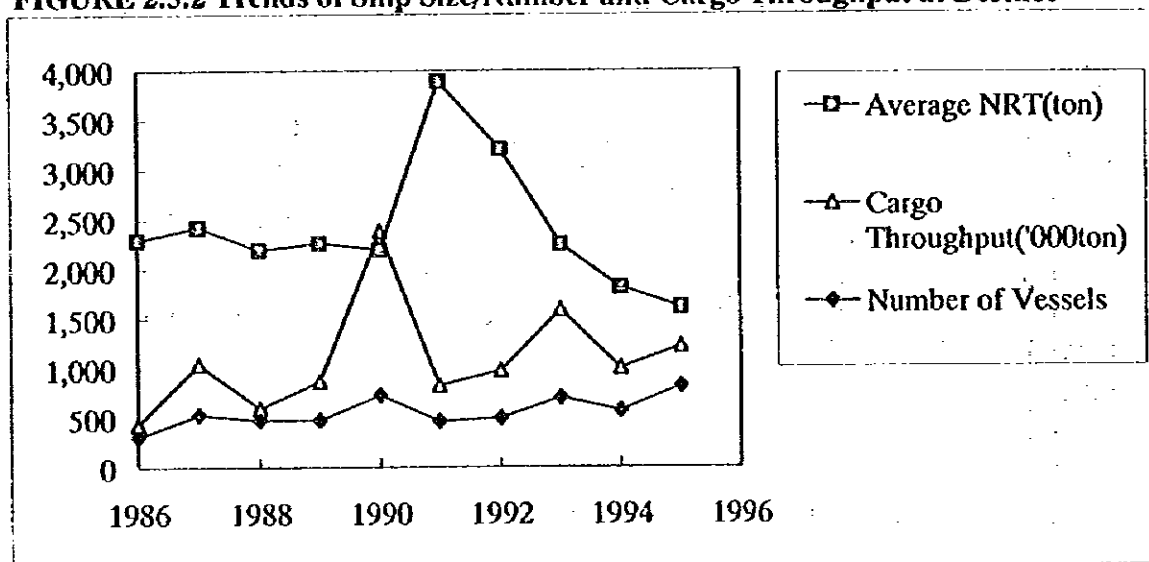


**TABLE 2.5.2 Number of Ship Arrivals by NRT Group - Port of Derince (1985-1995)**

NRT	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
0 - 500	59	48	83	68	59	142	50	116	116	91	223
501 - 1,000	33	42	68	77	71	119	26	81	172	118	168
1,001 - 2,000	69	68	190	174	199	240	120	95	185	195	214
2,001 - 3,000	45	74	58	57	65	102	49	55	66	103	137
3,001 - 4,000	30	30	48	23	10	20	39	9	10	15	15
4,001 - 5,000	6	6	1	6		9	56	5	27	3	9
5,001 - 6,000	43	36	29	39	29	26	20	33	86	28	18
6,001 - 7,000	3	3	14	9	16	19	10	9	10	4	11
7,001 - 8,000	3	1	7	9	5	9	4	7	6	3	4
8,001 - 9,000	4	3	13	10	6	8	14	5	3	3	5
9,001 - 10,000	1		10	1	5	6	16	3	6	2	5
over 10,001	5		10	2	11	28	58	78	15	6	9
<b>Total</b>	<b>301</b>	<b>311</b>	<b>531</b>	<b>475</b>	<b>476</b>	<b>728</b>	<b>462</b>	<b>496</b>	<b>702</b>	<b>571</b>	<b>818</b>
<b>Average NRT</b>	<b>2,529</b>	<b>2,293</b>	<b>2,422</b>	<b>2,193</b>	<b>2,263</b>	<b>2,196</b>	<b>3,892</b>	<b>3,211</b>	<b>2,247</b>	<b>1,815</b>	<b>1,616</b>
<b>Cargo Throughput</b>	<b>n.a.</b>	<b>434</b>	<b>1,037</b>	<b>598</b>	<b>866</b>	<b>2,381</b>	<b>824</b>	<b>975</b>	<b>1,590</b>	<b>1,000</b>	<b>1,223</b>



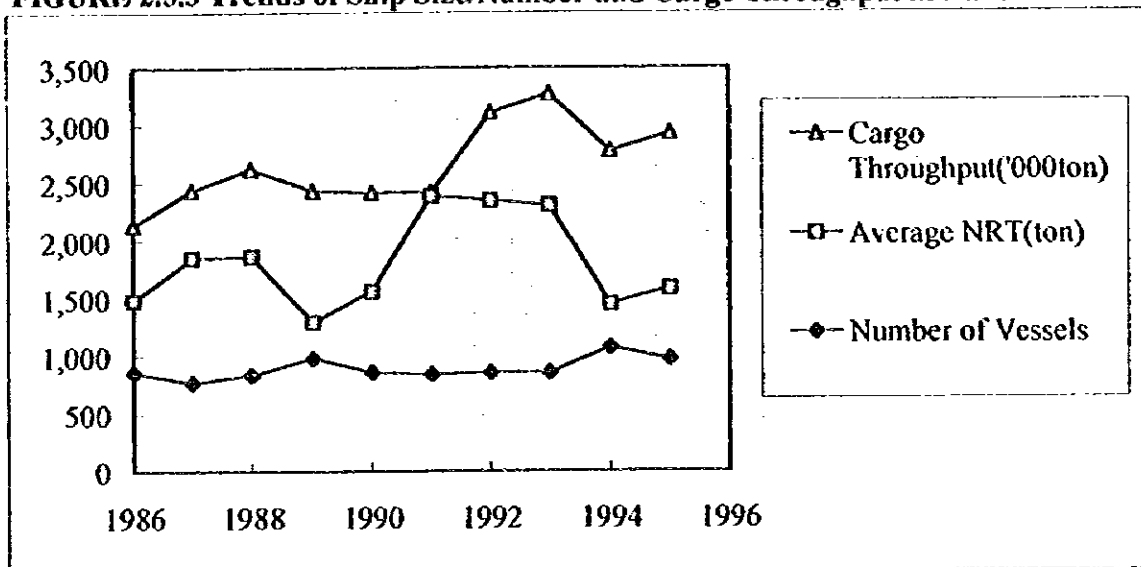
**FIGURE 2.5.2 Trends of Ship Size/Number and Cargo Throughput at Derince**



**TABLE 2.5.3 Number of Ship Arrivals by NRT Group - Port of Bandirma (1985-1995)**

NRT	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
0 - 500	866	514	371	397	621	516	432	279	319	667	486
501 - 1,000	43	53	64	77	88	60	42	98	72	55	117
1,001 - 2,000	94	89	116	139	107	95	67	187	175	134	155
2,001 - 3,000	66	69	83	82	68	63	65	87	91	69	81
3,001 - 4,000	25	39	22	25	16	26	51	64	58	47	40
4,001 - 5,000	14	13	16	16	6	2	37	20	21	14	10
5,001 - 6,000	23	24	26	22	11	11	27	12	10	8	6
6,001 - 7,000	17	15	15	13	11	26	22	17	18	10	8
7,001 - 8,000	11	14	20	10	5	16	6	6	7	12	12
8,001 - 9,000	8	4	6	6	4	6	4	10	15	11	19
9,001 - 10,000	7	9	13	15	14	11	13	23	18	11	13
over 10,001	23	15	19	36	30	26	77	53	53	35	25
<b>Total</b>	<b>1,197</b>	<b>858</b>	<b>771</b>	<b>838</b>	<b>981</b>	<b>858</b>	<b>843</b>	<b>856</b>	<b>857</b>	<b>1,073</b>	<b>972</b>
<b>Average NRT</b>	<b>1,161</b>	<b>1,484</b>	<b>1,850</b>	<b>1,867</b>	<b>1,296</b>	<b>1,561</b>	<b>2,386</b>	<b>2,349</b>	<b>2,304</b>	<b>1,450</b>	<b>1,584</b>
<b>Cargo Throughput</b>	<b>n.a.</b>	<b>2,133</b>	<b>2,440</b>	<b>2,619</b>	<b>2,433</b>	<b>2,417</b>	<b>2,423</b>	<b>3,108</b>	<b>3,270</b>	<b>2,778</b>	<b>2,928</b>

**FIGURE 2.5.3 Trends of Ship Size/Number and Cargo Throughput at Bandirma**



## 2.5.2 Vessel Size

### (1) Container Vessel

A total 86 container vessel called to Haydarpasa port in March 1996. Of these vessels, average G.R.T was 4,970 tons while maximum G.R.T was 21,636 tons. Conversion equation of container ship from G.R.T to D.W.T is as follows.

$$\text{Log G.R.T} = - 0.670 + 1.140 \text{ log D.W.T}$$

Average of D.W.T is 6,763 tons

Maximum of D.W.T is 24,576 tons

On the other hand, the number of over panamax type huge container vessel carrying capacity more than 4,000 TEU has been increasing significantly in the world maritime container transportation. But while the container ship size continues to increase, it is said that the size of ship will peak somewhere between 6,200 ~ 6,800 TEU or 75,000 ~ 80,000 D.W.T from the point of view of the economical operation. World container vessel average D.W.T throughput is shown in Table 2.5.4.

**TABLE 2.5.4 World Container Vessel Average D.W.T Throughput**

year	Average D.W.T
1988	22,765
1989	23,300
1990	23,385
1991	23,740
1992	23,980
1993	24,610
1994	24,840

*Source: The containerization 1996 8.9*

**1) Mother Vessel**

Mother vessel size servicing in main container routes has become larger and larger, typified by the appearance to the Post Panamax type. However, the Panamax type, with 3,000 TEU capacity, which currently the dominant ship size in main routes combined with container ports in the Mediterranean Sea is set up as the objective size of mother container vessel in this study.

**2) Feeder Vessel**

Feeder vessel size in the east Mediterranean Sea and Black Sea range from 100 to 200 TEU. Frequency of feeder vessel size in the east Mediterranean and the Black Sea is shown in Figure 8.4.10 of Interim Report (1). From the Figure 8.4.10, 4 sizes of feeder vessels are determined. They are 150TEU, 250TEU, 350TEU and 450TEU. The forecasting of the standard size of feeder vessel is made by the using annual increasing rate ( 3.3393 % ) of full container vessel size in the world from the 1980 to 1995 . In 2005 and 2015, 4 sizes of feeder vessels become 200TEU, 350TEU, 500TEU, 650TEU and 300TEU, 500TEU, 700TEU, 900TEU respectively. Calling port frequency of 4 sizes feeder vessels will be proportionate to the future cargo volume.

Maximum size of feeder vessel in 2005 is estimated as 75% of maximum size of feeder vessel in East Mediterranean Sea. Forecast feeder vessel size in East Mediterranean Sea is shown in Table 2.5.5.

**TABLE 2.5.5 Forecast Feeder Vessel Size in East Mediterranean Sea**

Servicing Area of Feeder Vessels	Present	2005	2015
East Mediterranean Sea (Average)	100 ~ 200TEU	139 ~ 278TEU	195 ~ 385TEU
East Mediterranean Sea (Maximum)	1,050TEU	1,460TEU	2,025TEU
All European Area (Average)	350 ~ 500TEU	485 ~ 695TEU	675 ~ 965TEU

The standard size of container vessel in this study is shown in Table 2.5.6.

**TABLE 2.5.6 Standard Size of Container Vessel in 2005 and 2015**

year	2005		2015	
	TEU	DWT	TEU	DWT
Mother Vessel			3,000	50,000
Feeder Vessel	1,100	20,500		
	200	7,000	300	8,500
	350	9,000	500	12,000
	500	12,000	700	15,000
	650	14,300	900	18,000

## (2) Conventional Vessel

### 1) General Cargo Vessel

#### a) Domestic trade general cargo vessel

The historical trend of Turkish conventional vessel size and number is shown in TABLE 2.5.7

**TABLE 2.5.7 Trend of Conventional Vessel Size in Turkey**

year	quantity	Total D.W.T.	Ave. D.W.T.
1986	446	1,309,145	2,935
1987	454	1,393,105	3,069
1988	457	1,388,738	3,039
1989	452	1,340,782	2,966
1990	454	1,335,411	2,941
1991	453	1,367,741	3,019
1992	460	1,344,362	2,923
1993	472	1,404,568	2,976
1994	479	1,468,784	3,066
1995	476	1,456,637	3,060

Conventional vessel average size has not changed last 10 years, therefore, set up standard size of domestic trade general cargo vessel by study team is 3,000 DWT .

**b) International trade general cargo vessel**

In 2015, vessel size navigating the Sea of Marmara and the two Straits is expected to increase by 2.5 times, which is mentioned in chapter 6 of Interim Report (1). From the data of distribution figures on the size of general cargo vessel at Derince port in August and September 1996 which is shown in Figure 7.2.3 in Interim Report (2), study team assumed the present average size of international general cargo vessel is 4,500 GRT. Therefore, set up standard size of international trade general cargo vessel by study team is 15,000 DWT.

**(2) Dry bulk cargo vessel**

**a) Domestic dry bulk cargo vessel**

Main domestic dry bulk in Thrace Region is sea sand and cement. The present distribution figures on the size of bulk cargo vessels calling at Bandirma port in August and September 1996 are shown in Figure 7.2.3 of Interim Report (2). There are three predominant sizes, 301~500 GRT, 2,001~3,000 GRT and 10,001~15,000 GRT. The group distributed around 500GRT are domestic vessels. The other groups around 3,000 GRT and 20,000 GRT are oceangoing vessels. Using the same forecast method as (1) - b), study team set up the standard size of domestic dry bulk cargo vessel 2,000 DWT.

**b) International grain vessel**

The standard vessel size for export and import of grain is predicted as 30,000 DWT, which is the maximum vessel size in the present Sea of Marmara.

**c) Sunflower and cotton seeds vessel**

Sunflower seeds are imported mainly from Russia using river type 4m draft 1,000 to 2,000 GRT vessel. This vessel size will not change .

**d) Other dry bulk cargo for international trade vessel**

Second predominant size of 2,001~3,000 GRT is the vessel for other dry bulk cargo except for grain and sunflower . Using the increase ratio of 2.5 times, study team set up the standard size of other dry bulk cargo for international trade vessel 9,500 DWT.

### 2.5.3 Number of Vessel Calls

The projected vessel calls in the 2005 and 2015 are determined by the relation between the productivity of cargo handling and the loaded/unloaded cargo volume per vessel.

TABLE 2.5.8 shows the number of vessel calls to Thrace Region in the year 2005 and 2015.

**TABLE 2.5.8 Number of Vessel Calls in the Year 2005 and 2015**

Year	Vessel type		Loading ratio	Calling times /year
	DWT	TEU		
2005	Container			
	Feeder Vessel			
	20,500	1,100	0.5	104
	7,000	200	0.5	374
	9,000	350	0.5	132
	12,000	500	0.5	133
	14,300	650	0.5	42
	General cargo			
	Domestic		0.5	123
	International		0.6	105
	Dry bulk cargo			
	Domestic		1.0	2,897
	International			
	Grain		0.6	84
	Sunflower		0.9	114
	Other dry bulk		0.7	175

Year 2015

	Vessel type		Loading ratio	Calling times / year
	DWT	TEU		
Container				
Mother vessel	50,000	3000	0.5	46
Feeder vessel	8,500	300	0.5	639
	12,000	500	0.5	238
	15,000	700	0.5	239
	18,000	900	0.5	80
General cargo				
Domestic	3,000		0.5	160
International	15,000		0.6	183
Dry bulk cargo				
Domestic	2,000		1.0	5,711
International				
Grain	30,000		0.6	116
Sunflower	2,500		0.9	198
Other dry bulk	9,500		0.7	299

### **3. Long Term Development Plan for Ports in the Sea of Marmara**

#### **3.1 Evaluation of Derince Container Terminal Feasibility Study**

The study team has evaluated "DERINCE CONTAINER TERMINAL FEASIBILITY STUDY REPORT, December, 1995" and "DERINCE CONTAINER TERMINAL FEASIBILITY STUDY SUPPLEMENTARY REPORT, April, 1996" (hereinafter the Report), which had been implemented by Istanbul Technical University, Faculty of Civil Engineering on behalf of D.I.H. The target year of the former Report is 2025 to 2030 and that of the latter Report is 2015.

Total Evaluation of the Report is as follows;

- 1) The projected container cargo demand for ports in the Sea of Marmara in the Report is nearly same as that projected by the study team. However, the differences between the Report and the study team in terms of containerizable cargo volume and containerization ratio are noticeable.
- 2) Layout of container berth and revetment of reclaimed land are acceptable. However, the layout of container terminal, such as handling system, traffic flow in the terminal, width of apron and dock railway sidings, should be examined in more detail.
- 3) Design and construction works are not comprehensively treated in the Report. For example, whether soil improvement of soft layer and seismic force to pier are considered or not, is not mentioned nor is quantity and unit rate of works. Therefore, the team could not completely evaluate the feasibility of the Derince Container Terminal.
- 4) More detailed data of prerequisites for financial analysis, concerning operating cost, income, depreciation and interest of short term loan are also not mentioned in the Report. After review of above items including construction cost, financial analysis should be implemented again.
- 5) For the total evaluation of the Report, detailed information was insufficient. In spite of the growing container cargo demand in the Marmara region, construction of a new container terminal is not so urgent because there is sufficient capacity up to 2005 if private ports are included. To realize this project, supplementary feasibility study



including site selection should be initiated by 2005.

### **3.2 Maritime Traffic Capacity of the Straits**

The Bosphorus and the Dardanelles Straits are important passage not only to Turkey but also to countries around the Black Sea from the Mediterranean and they separate the Continents of Europe and Asia. At present, around 100~150 vessels pass the Straits daily including some tankers. Recently, a fire broke out following collision involving a tanker in the Bosphorus and the Strait was closed. If traffic through the Straits increases in future, likelihood of accidents would also increase, because of the narrowness of the Straits. The study team thus examined the congestion in the Straits in future, according to the cargo estimation in 2015.

According to the result, about 200 vessels with an average size of 30,000DWT ~35,000DWT will navigate through the Strait in 2015. The capacity of Strait will not be exceeded in 2005 or 2015.

To guarantee this result, traffic control which is a prerequisite for this calculation, should be implemented and a suitable number of pilot boats and tug boats should be arranged to assist large vessels over 150 m in length.